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INSTALLATION RESTORATION PROGRAM

(1)

REMEDIAL INVESTIGATION REPORT

MINNESOTA AIR NATIONAL GUARD BASE DULUTH INTERNATIONAL AIRPORT DULUTH, MINNESOTA

VOLUME 4

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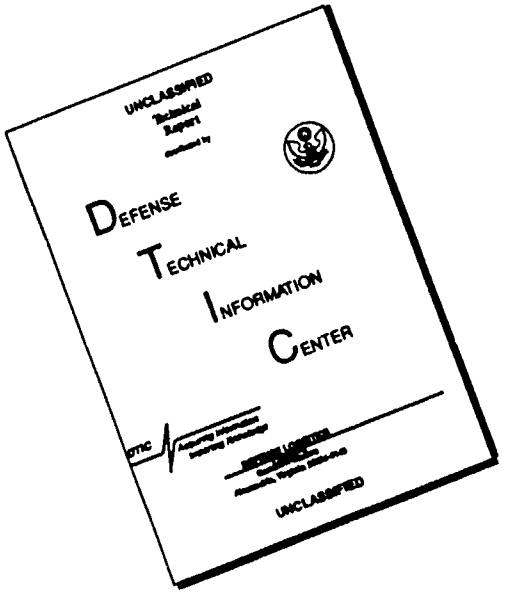


HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
Operated by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400

91 2 11 058

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REPORT DOCUMENTATION PAGE

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

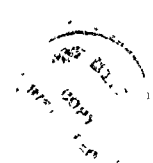
MINNESOTA AIR NATIONAL GUARD BASE
DULUTH INTERATIONAL AIRPORT
Duluth, Minnesota

VOLUME 4

JANUARY 1990

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Prepared For
HAZARDOUS WASTE
REMEDIAL ACTIONS PROGRAM
Oak Ridge, Tennessee

Submitted To
MINNESOTA AIR NATIONAL GUARD
Duluth International Airport
Duluth, Minnesota

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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.

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DATA PACKAGE #13

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ENGINEERING-SCIENCE, INC.

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

Job No.: OR001

Work Order No.: 1047

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 9-27-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092719	DANGB-4-SL13-GW1	BA-I	9-24-88		10-13-88	
88092719	DANGB-4-SL13-GW1	CD-F	9-24-88		10-27-88	
88092719	DANGB-4-SL13-GW1	CR-F	9-24-88		10-21-88	
88092719	DANGB-4-SL13-GW1	PB-F	9-24-88		10-22-88	
88092719	DANGB-4-SL13-GW1	418.1	9-24-88	10-10-88	10-12-88	
88092719	DANGB-4-SL13-GW1	8010	9-24-88		9-30-88	9-29-88
88092719	DANGB-4-SL13-GW1	8020	9-24-88		9-30-88	9-29-88
88092720	DANGB-4-SL26-GW1	BA-I	9-24-88		10-21-88	
88092720	DANGB-4-SL26-GW1	CD-F	9-24-88		10-27-88	
88092720	DANGB-4-SL26-GW1	CR-F	9-24-88		10-21-88	
88092720	DANGB-4-SL26-GW1	PB-F	9-24-88		10-22-88	
88092720	DANGB-4-SL26-GW1	418.1	9-24-88	10-10-88	10-12-88	
88092720	DANGB-4-SL26-GW1	8010	9-24-88		9-30-88	9-29-88
88092720	DANGB-4-SL26-GW1	8020	9-24-88		9-30-88	9-29-88
88092721	DANGB-8-SL17-GW1	BA-I	9-24-88		10-21-88	
88092721	DANGB-8-SL17-GW1	CD-F	9-24-88		10-27-88	
88092721	DANGB-8-SL17-GW1	CR-F	9-24-88		10-21-88	
88092721	DANGB-8-SL17-GW1	PB-F	9-24-88		10-22-88	
88092721	DANGB-8-SL17-GW1	418.1	9-24-88	10-10-88	10-12-88	
88092721	DANGB-8-SL17-GW1	8010	9-24-88		9-30-88	9-29-88
88092721	DANGB-8-SL17-GW1	8020	9-24-88		9-30-88	9-29-88
88092721	DANGB-8-SL17-GW1	8080	9-24-88	9-29-88	10-24-88	10-26-88
83092722	DANGB-4-SL15-GW1	BA-I	9-24-88		10-21-88	
88092722	DANGB-4-SL15-GW1	CD-F	9-24-88		10-27-88	
88092722	DANGB-4-SL15-GW1	CR-F	9-24-88		10-21-88	
88092722	DANGB-4-SL15-GW1	PB-F	9-24-88		10-22-88	
88092722	DANGB-4-SL15-GW1	418.1	9-24-88	10-10-88	10-12-88	
88092722	DANGB-4-SL15-GW1	8010	9-24-88		9-30-88	9-29-88
88092722	DANGB-4-SL15-GW1	8020	9-24-88		9-30-88	9-29-88

* If applicable

Job No.: OR001

Work Order No.: 1047

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092723	DANGB-4-SL14-GW1	418.1	9-24-88	10-10-88	10-12-88	
88092723	DANGB-4-SL14-GW1	8010	9-24-88		9-30-88	9-29-88
88092723	DANGB-4-SL14-GW1	8020	9-24-88		9-30-88	
88092724	DANGB-BG-SL3-SW1	AS-F	9-24-88		10-21-88	
88092724	DANGB-BG-SL3-SW1	BA-I	9-24-88		10-21-88	
88092724	DANGB-BG-SL3-SW1	CD-F	9-24-88		10-27-88	
88092724	DANGB-BG-SL3-SW1	CR-F	9-24-88		10-21-88	
88092724	DANGB-BG-SL3-SW1	HG-C	9-24-88		10-22-88	
88092724	DANGB-BG-SL3-SW1	PB-F	9-24-88		10-22-88	
88092724	DANGB-BG-SL3-SW1	418.1	9-24-88	10-10-88	10-12-88	
88092724	DANGB-BG-SL3-SW1	8270	9-24-88	9-30-88	11-09/23-88	
88092725	DANGB-BG-SL1-SW1	AS-F	9-24-88		10-21-88	
88092725	DANGB-BG-SL1-SW1	BA-I	9-24-88		10-21-88	
88092725	DANGB-BG-SL1-SW1	CD-F	9-24-88		10-27-88	
88092725	DANGB-BG-SL1-SW1	CR-F	9-24-88		10-21-88	
88092725	DANGB-BG-SL1-SW1	HG-C	9-24-88		10-22-88	
88092725	DANGB-BG-SL1-SW1	PB-F	9-24-88		10-22-88	
88092726	DANGB-8-SL19-SW1	418.1	9-24-88	10-10-88	10-12-88	
88092726	DANGB-8-SL19-SW1	8010	9-24-88		9-30-88	9-29-88
88092726	DANGB-8-SL19-SW1	8020	9-24-88		9-30-88	
88092726	DANGB-8-SL19-SW1	8080	9-24-88	9-30-88	10-24-88	10-26-88
88092727	DANGB-8-SL27-SW1	418.1	9-24-88	10-10-88	10-12-88	
88092727	DANGB-8-SL27-SW1	8010	9-24-88		9-30-88	9-29-88
88092727	DANGB-8-SL27-SW1	8020	9-24-88		9-30-88	9-29-88
88092727	DANGB-8-SL27-SW1	8080	9-24-88	9-30-88	10-24-88	
88092728	DANGB-FB17	8010	9-24-88		9-30-88	10-04-88
88092728	DANGB-FB17	8020	9-24-88		9-30-88	
88092729	DANGB-FB18	8010	9-24-88		10-01-88	10-04-88
88092729	DANGB-FB18	8020	9-24-88		10-01-88	
88092730	DANGB-TB13	8010	9-24-88		10-01-88	10-7-88
88092730	DANGB-TB13	8020	9-24-88		10-01-88	

* If applicable

ANALYSIS REPORT

ORK ORDER NUMBER: 1047
OB 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
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/L

EST COMPOUND	BCS-02 88092719	DANGB-4-SL26-GW1 88092720	DANGB-8-SL17-GW1 88092721	DANGB-4-SL15-GW1 88092722	DANGB-BG-SL3-SW1 88092724	DANGB-BG-SL1-SW1 88092725
CID DIG FLAME	NA	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA	NA
ARSENIC					<0.01	<0.01
BARIUM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
HROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY					<.0002	<.0002
EAD	<0.005	<0.005	<0.005	<0.005	0.0063	<0.005

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1047
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: 3, UNITS: mg/L

ST COMPOUND	DANGB-4-SL13-GW1 88092719	DANGB-4-SL26-GW1 88092720	DANGB-8-SL17-GW1 88092721	DANGB-4-SL15-GW1 88092722	DANGB-4-SL14-GW1 88092723	DANGB-BG-SL3-SW1 88092724
8.1 PETROLEUM HYDROCARBONS	<1.5	2.5	<1.5	<1.5	<1.5	<1.5

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1047

ASK: 3, UNITS: mg/L

EST COMPOUND	DANGB-8-SL19-SW1 88092726	DANGB-8-SL27-SW1 88092727
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1047
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/L, GROUP 8010

ST COMPOUND	DANGB-4-SL13-GW1 88092719	DANGB-4-SL26-GW1 88092720	DANGB-8-SL17-GW1 88092721	DANGB-4-SL15-GW1 88092722	DANGB-4-SL14-GW1 88092723	DANGB-8-SL19-SW1 88092726
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	ND	ND	ND	3.0	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	1.9	ND	ND
CHLOROMETHANE	45B	28B	1.7B	36B	1.6B	1.9B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1047

TEST COMPOUND	DANGB-4-SL13-GW1 88092719	DANGB-4-SL26-GW1 88092720	DANGB-8-SL17-GW1 88092721	DANGB-4-SL15-GW1 88092722	DANGB-4-SL14-GW1 88092723	DANGB-8-SL19-SW1 88092726
,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	0.98	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROPROPANE	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1047

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

ST COMPOUND	DANGB-8-SL27-SW1 88092727	DANGB-FB17 88092728	DANGB-FB18 88092729	DANGB-TB13 88092730
NZYL CHLORIDE	ND	ND	ND	ND
S (2-CHLOROETHOXY)METHANE	ND	ND	ND	ND
S (2-CHLOROISOPROPYL)ETHER	ND	ND	ND	ND
OMOBENZENE	ND	ND	ND	ND
OMODICHLOROMETHANE	ND	ND	ND	0.27
OMOFORM	ND	ND	ND	30
OMOETHANE	ND	ND	ND	ND
RBON TETRACHLORIDE	ND	ND	ND	ND
LORACETALDEHYDE	ND	ND	ND	ND
LORAL	ND	ND	ND	ND
LOROBENZENE	ND	ND	ND	ND
LOROETHANE	ND	ND	ND	ND
LOROFORM	ND	ND	ND	ND
CHLOROHEXANE	ND	ND	ND	ND
CHLOROETHYL VINYL ETHER	ND	ND	ND	ND
LOROMETHANE	ND	ND	ND	ND
LOROMETHYL METHYL ETHER	ND	ND	ND	ND
LOROTOLUENE	ND	ND	ND	ND
BROMOCHLOROMETHANE	ND	ND	ND	3.1
BROMOMETHANE	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND
CHLORODIFLUOROMETHANE	ND	ND	ND	ND
1-DICHLOROETHANE	ND	ND	ND	ND
2-DICHLOROETHANE	ND	ND	ND	ND
1-DICHLOROETHYLENE	ND	ND	ND	ND
ANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND
CHLOROMETHANE	0.61B	6.8B	1.5B	2.4B
2-DICHLOROPROPANE	ND	ND	ND	ND
3-DICHLOROPROPYLENE	ND	ND	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND
TRACHLOROETHYLENE	ND	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: 1047
JOB NUMBER : ZB0000000440
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

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

TEST COMPOUND	DANGB-4-SL13-GW1 88092719	DANGB-4-SL26-GW1 88092720	DANGB-8-SL17-GW1 88092721	DANGB-4-SL15-GW1 88092722	DANGB-4-SL14-GW1 88092723	DANGB-8-SL19-SW1 88092726
BENZENE	930	650	ND	80	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	74	150	ND	6.2	ND	ND
TOLUENE	ND	23	ND	ND	ND	ND
XYLENES	1020	940	ND	103	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1047

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

ST COMPOUND	DANGB-8-SL27-SW1 88092727	DANGB-FB17 88092728	DANGB-FB18 88092729	DANGB-TB13 88092730
NZENE	ND	ND	ND	ND
LOROBENZENE	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND
HYL BENZENE	ND	ND	ND	ND
LUENE	ND	ND	ND	ND
LENES	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1047
:OB 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
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 8080

EST COMPOUND	DANGB-8-SL17-GW1 88092721	DANGB-8-SL19-SW1 88092726	DANGB-8-SL27-SW1 88092727
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
IELDRIN	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	ND	ND	ND
METHOXYCHLOR	ND	ND	ND
OXAPHENE	ND	ND	ND
CB-1016	ND	ND	ND
PCB-1221	ND	ND	ND
CB-1232	ND	ND	ND
CB-1242	ND	ND	ND
PCB-1248	ND	ND	ND
PCB-1254	ND	ND	ND
CB-1260	ND	ND	ND

ND - Not Detected

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

ate Received: September 27, 1988 Work Order: 1047
ate Reported: December 9, 1988 Job Number: OR001

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

ab Number:	88092724
ample No.:	DANGB-EG-SL3-SW1
ate Sampled:	09-24-88
ime Sampled:	14:05
ate Extracted:	09-30-88
ate Analyzed:	11-09-88/11-23-88

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

= Compound was detected in the blank.

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

Date Received: September 27, 1988
Date Reported: December 9, 1988

Work Order: 1047
Job Number: OR001

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

ATT: Mr. Bill Hayden

Lab Number:	88092724
Sample No.:	DANGB-BG-SL3-SW1
Date Sampled:	09-24-88
Time Sampled:	14:05
Date Extracted:	09-30-88
Date Analyzed:	11-09-88/11-23-88

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

= Compound was detected in the blank.

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

ate Received: September 27, 1988 Work Order: 1047
ate Reported: December 9, 1988 Job Number: OR001

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

ab Number:	88092724
ample No.:	DANGB-BG-SL3-SW1
ate Sampled:	09-24-88
ime Sampled:	14:05
ate Extracted:	09-30-88
ate Analyzed:	11-09-88/11-23-88

ompound	Detection Limits ug/L	Analytical Results ug/L
etophenone	--*	ND
iline	--*	ND
-Aminobiphenyl	--*	ND
-Chloroaniline	20	ND
-Chloronaphthalene	--*	ND
benzofuran	10	ND
-Dimethylaminoazobenzene	--*	ND
,12-Dimethylbenz(a)anthracene	--*	ND
-,a-Dimethylphenethylamine	--*	ND
ipnenylamine	--*	ND
,2-Dipnenylhydrazine	--*	ND
thyl methanesulfonate	--*	ND
-Methylcholanthrene	--*	ND
ethyl methanesulfonate	--*	ND
-Methylnaphthalene	10	ND
-Naphthylamine	--*	ND
-Naphthylamine	--*	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroaniline	50	ND
-Nitroso-di-n-butylamine	--*	ND
-Nitrosopiperidine	--*	ND
entachlorobenzene	--*	ND
entachloronitrobenzene	--*	ND
nenacetin	--*	ND
-Picoline	--*	ND
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: Water

Date Received: September 27, 1988
Date Reported: December 9, 1988

Work Order: 1047
Job Number: OR001

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

ATTN:Mr. Bill Hayden

Lab Number:	88092724
Sample No.:	DANGB-BG-SL3-SW1
Date Sampled:	09-24-88
Time Sampled:	14:05
Date Extracted:	09-30-88
Date Analyzed:	11-09-88/11-23-88

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

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

B = Compound was detected in the blank.

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

ate Received: September 27, 1988
ate Reported: December 9, 1988

Work Order: 1047
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88092724
ample No.:	DANGB-BG-SL3-SW1
ate Sampled:	09-24-88
ime Sampled:	14:05
ate Extracted:	09-30-88
ate Analyzed:	11-09-88/11-23-88

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

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

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

1047

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION
EOR001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature) Jo-Ann Sherwin

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470, 7191	SW9010, 9315	SM429	REMARKS
9/24	9:15	DANGB-BG-SL1-SW1	2				X	X				882725
9/24/88	1600	DANGB-8-SL19-SW1	4		2		2					882726
9/24/88	1630	DANGB-8-SL27-SW1	4		2		2					882727
9/24/88	1450	DANGB-8-SL17-SW1	2		2							

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Donna Burk	9/24/88 2030	NORTHWEST AIR CARGO.			Floyd Abrew 9/25/88 0940

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
				SAMPLES RECEIVED Cat-Intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature)

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9-24-88	1115	DANGB-FB17	2	X								882728
9-24-88	1108	DANGB-4 SL14-GW-1	5	X								
9-24-88	0900	DANGB-4 SL13-GW-1	5	X								
9-24-88	0920	DANGB-4 SL26-GW-1	5	X								
9-24-88	1600	DANGB-8-SL19-GW-1	5	X								
9-24-88	1456	DANGB-8-SL17-GW-1	5	X								
9-24-88	1200	DANGB-4-SL15-GW-1	5	X								
9-24-88	1630	DANGB-8-SL27-GW-1	5	X								
9-24-88	1625	DANGB-~~FB16~~ FB15	2	X								882729
9-26-88	1230	DANGB-TB13	3	X								882730

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-24-88 2100 ~~1600~~	Duluth International A.P. Air Cargo			Floyd Abney 9/27/88 1000 hrs
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: SAMPLES RECEIVED COLD & INTACT	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

1049

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

SAMPLER(S): (Signature) Kimberly L. Ow

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1 TPC	SW8010, 7000, 7191	SW7131, 7421, 7421 Pb	REMARKS
9-24-88	1630	DANGB-8-SL27-GW-1	2	X	X		X	X	X	882731
9-24-88	0900	DANGB-4-SL13-GW-1	2	X			X	X	X	882733
9-24-88	1450	DANGB-8-SL17-GW-1	2	X	X		X	X	X	882735
9-24-88	1200	DANGB-4-SL15-GW-1	2	X			X	X	X	882732
9-24-88	1100	DANGB-4-SL14-GW-1	2	X			X	X	X	882740
9-24-88	1530	DANGB-8-SL18-GW-1	2	X	X		X	X	X	882736
9-24-88	1600	DANGB-8-SL19-GW-1	2	X	X		X	X	X	882737
9-24-88	0920	DANGB-4-SL26-GW-1	2	X			X	X	X	882741

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

(*) GW-1 should be SD-1 for all samples on this COC as per liz DN 9/27/88

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly L. Ow	9-24-88 2100	Pan Am International A.P. Air Cargo			Floyd Abney 9/27/88 0900 hrs.
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks: Samples received cold and intact	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

448

DRAFT

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Jo-Ann Sherwin Mike Roddy

SHIP TO:
NUS Corporation
3350 Campbells Run Rd
Pittsburgh, PA 15205
Attn: Donna Del Rock

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 601	EPA 625	EPA 420.1	SW 8010, 7060, 7131	SW7421, 7470	SW8310, 9315	SM429	REMARKS
9/24	10:45	DANGB-BG-SL2-SW1	1						X			
9/24	14.05	DANGB-BG-SL3 SW1	1						X			
9/24	9 15	DANGB-BG-SL1-SW1	1						X			

828

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo-Ann Sherwin	9/24 16:30				

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature)

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7000, 7131	SW7421, 7470	SW8310, 9315	SM429	REMARKS
1 6	1 30	DMNGS4-SL15-GW-1	2				X					
1 1 1	11 0	DMNGS4-SL16-GW-1	4				X	X	X			
1 1	14 0	DMNGS4-SL17-GW-1	2				X					
1 1	2	DMNGS4-SL18-GW-1	2				X					
1	20	DMNGS4-SL19-GW-1	2				X					

628

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

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

CHAIN OF CUSTODY RECORD

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7420	SW8310, 8315	SM420	REMARKS
6/15	1400	[illegible]	2					X	X			
"	1600	[illegible]	2					X	X			
6/15	450	[illegible]	2						X			

088

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

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Jo-Ann Sherwin Mike Roddy

SHIP TO:
NUS Corporation
5350 Campbells Run Rd
Pittsburgh, PA 15205
Attn: Donna Del Prete

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	SW9310, 9315	SM426	REMARKS
9/24	10:45	DANGB-BG-SL2-SW1	1							X		
9/24	14:05	DANGB-BG-SL3-SW1	1							X		
9/24	9:15	DANGB-BG-SL1-SW1	1							X		

1881

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo-Ann Sherwin	9/24 16:30				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		M. Stefanowicz	9/27 0930	

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

DRAFT

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) John Sherwin Mike Roddy

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

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

REMARKS

882731
882731 DN 882732
882732
882733
882732 882733 DN

288

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

White - Return to Originator Copy to Coordinator Field Files

883

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City | State | ZIP Required

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City | State | ZIP Required

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6 ☐ OVERNIGHT LETTER*
7 ☐
8 ☐
9 ☐
10 ☐
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3 DELIVER SATURDAY (Extra charges) ☐
4 ☐ DANGEROUS GOODS (Extra charges)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges) (Minimum Signature Not Applicable)
6 ☐ DRY ICE _____ Lbs.
7 ☐ OTHER SPECIAL SERVICE _____
8 ☐
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10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charges)

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2	1	42	1	
3				
4				
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5 ☒ Station

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Date/Time for FEDEX Use 1/24 [illegible]

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CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092719-88092730
WORK ORDER NO.: 1047

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

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

885

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

Project: Duluth ANGB

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

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

Laboratory Supervisor Approval:

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

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: 0R001.02

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

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

Project: Duluth ANCB

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

Laboratory Supervisor Approval:

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

887

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)

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: TPH-W-0065-88

Insufficient sample was available for quality control purposes. The laboratory control sample is designated as a quality control sample for this batch.

Reporting limit for the samples in this batch is provided by the sub-contract laboratory.

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: ORCC1

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092620-88092621, 88092719-88092724
88092726-88092727

QC Report No: TPH-W-0065-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-12-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	41.9	106	40.7	103	3	*

688

* See Case Narrative attached.

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

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

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

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

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092694-88092699
88092719-88092723
88092726-88092730

QC Report No: VGC-W-0052-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-27-88
Date Prepared: NA
Date Analyzed: 10-07-88
Date Reported: 10-27-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092744*	1,1-Dichloroethane	10	ND	10.2	102	10.2	102	0	26	70-130
	Trichloroethene	10	ND	10.0	100	10.2	102	2	19	65-131
	Chlorobenzene	10	ND	10.2	102	10.1	101	1	40	59-137
	Aromatics: 8020									
88092744*	Benzene	10	ND	10.0	100	10.6	106	6	20	56-146
	Toluene	10	ND	10.8	108	10.6	106	2	41	42-150
	Chlorobenzene	10	ND	10.6	106	10.4	104	2	36	76-133

* The quality control sample is from a different project.

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

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

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

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

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.
53	9-30-88	VGC	Carbopack	75-09-2	Dichloromethane	38	0.25	88092719-88092723 88092726-88092728
71	10-1-88	VGC	Carbopack	75-09-2 67-66-3	Dichloromethane Chloroform	19 0.22	0.25 0.05	88092729-88092730

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

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

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

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

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.236	118	85	33*	15	56-123
Heptachlor epoxide	0.263	132	92	35*	20	40-131
Aldrin	0.232	116	78	39*	22	40-120
Dieldrin	0.608	122	84	37*	18	52-126
Endrin	0.522	104	39*	92*	21	56-121
4,4'-DDT	0.567	113	77	38*	27	38-127

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

RPD: 6 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

No: OR001

ent: ES Oak Ridge
n: Bill Hayden
ress: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

oject: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

	MSD Conc. In Extract (ug/L)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	0.217	109	98	10	15	56-123
Heptachlor epoxide	0.256	128	120	7	20	40-131
Aldrin	0.251	126*	127*	1	22	40-120
Dieldrin	0.606	121	106	13	18	52-126
Endrin	0.543	109	95	13	21	56-121
4,4'-DDT	0.513	104	87	17	27	38-127

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

RPD: 0 out of 6 outside limits

out of 12 outside limits

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Water
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-03-88
Project:	Duluth ANGB		
Date Extracted:	9-30-88		
Date Analyzed (1):	10-24-88	Date Analyzed (2):	10-26-88
Time Analyzed (1):	20:26	Time Analyzed (2):	01:29
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
-	88092726	10-24-88	88092721	10-26-88
-	88092727	10-24-88		
-	88092765	10-24-88		
-	88092766	10-24-88		
-	88092721	10-25-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1047
EPA METHOD 8270 ANALYSIS

When this sample was first analyzed on November 11, 1988, recoveries of all base neutral surrogates were below EPA QC limits, and area counts for the sixth internal standard in the acid fraction was outside EPA QC limits. The acid extract was re-analyzed with the same result. No more sample remained for re-extraction of the base neutral fraction.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

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

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METHOD BLANK SUMMARY

Job No: OR001

Work Order No.: 1047

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

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

Project: Duluth ANGB

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E6135	11-08-88	AC	2	-	None Found	-	-	88092724
E6136	11-08-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	59	10	88092724

868

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
2724
Attn: Bill Hayden
Blank
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 1

Work Order No.: 1047
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092663-85,
2766-70 AC
Lab File ID: E6135
Date Received: NA
Date Extracted: 09-30-88
Date Analyzed: 11-08-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.20	10	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

Client: ES Oak Ridge
2724
Attn: Bill Hayden
Blank
Address: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

TICs Found: 3

Work Order No.: 1047
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092663-85,
2766-70 BN
Lab File ID: E6136
Date Received: NA
Date Extracted: 09-30-88
Date Analyzed: 11-08-88
Date Reported: 04-04-89
Dilution Factor: NA
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.16	10	
-	Unknown	25.07	17	
-	Unknown	28.77	7	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1047
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092724-BN
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0449
	Suite F-103	Date Received:	09-27-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-30-88
		Date Analyzed:	11-09-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
# TICs Found:	2	Extraction: (SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
79-01-6	Trichloroethene	3.35	6	
127-18-4	Tetrachloroethene	5.05	5	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1047
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092724-AC RE
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E6318
	Suite F-103	Date Received:	09-27-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-30-88
		Date Analyzed:	11-23-88
		Date Reported:	04-04-89
Project:	Duluth ANGB	Dilution Factor:	NA
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.92	37	
127-18-4	Tetrachloroethene	4.07	23	B
-	Unknown	4.42	28	
79-34-5	1,1,2,2-Tetrachloroethane	5.87	8	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.: OR001

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

Project: Duluth ANGB

TICs Found: 6

Work Order No.: 1047
Matrix: (soil/water) Water
Sample Wt/vol: 1000 ml
Lab Sample ID: 88092724-AC

Lab File ID: S0447
Date Received: 09-27-88
Date Extracted: 09-30-88
Date Analyzed: 11-09-88
Date Reported: 04-04-89
Dilution Factor: 1
% Moisture: dec:
not dec: N
GPC Clean up: (Y/N) N
Extraction:
(SepF/Cont/Conc) SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.32	120	
108-88-3	Toluene	4.47	4	
-	Unknown	4.98	51	
127-18-4	Tetrachloroethene	5.19	28	B
-	Unknown	5.57	38	
-	Unknown	7.33	6	

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):
88092620-88092621, 88092719-88092724
88092726-88092727

QC Report No: TPH-W-0065-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-10-88
Date Analyzed: 10-12-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	41.9	106	40.7	103	3	*

904

* 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

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: >T2109 DFTPP Injection Date: 11/09/88

Instrument ID: 70 1 DFTPP Injection Time: 12:10

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	43.2
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	51.
70	Less than 2.0% of mass 69	.3(.6)1
127	40.0 - 60.0% of mass 198	44.1
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.9
275	10.0 - 30.0% of mass 198	17.9
365	Greater than 1.00% of mass 198	1.76
441	Present, but less than mass 443	7.7
442	Greater than 40.0% of mass 198	58.7
443	17.0 - 23.0% of mass 442	10.5(18.0)2

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

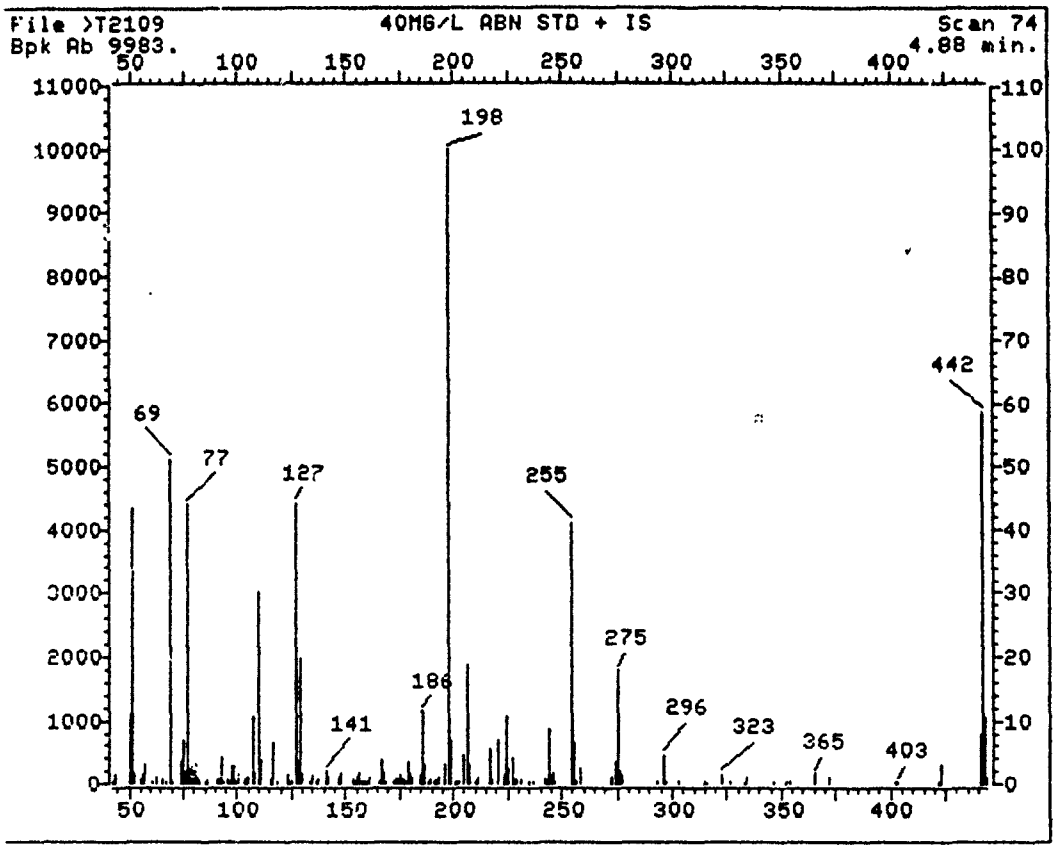
5 point 10/12/88

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

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	60 ug/ml BNA STD	>S0448	11/09/88	12:26
02	88092724 BN 1ml + IS	>S0449	11/09/88	13:33
03	88092766 AC 1ml + IS	>S0450	11/09/88	14:58
04	88092766 BN 1ml + IS	>S0451	11/09/88	15:57
05	88092768 AC 1ml + IS	>S0452	11/09/88	16:56
06	88092768 BN 1ml + IS	>S0453	11/09/88	17:55
07	88092769 AC 1ml + IS	>S0454	11/09/88	18:54
08	88092769 BN 1ml + IS	>S0455	11/09/88	19:54
09	88092603 BNA 1ml+ IS	>S0456	11/09/88	20:54
10	88092604 BNA 1ml+ IS	>S0457	11/09/88	21:53
11	88092605 BNA 1ml+ IS	>S0458	11/09/88	22:52
12	88092606 BNA 1ml+ IS	>S0459	11/09/88	23:52
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

another project

FORM V SV 1/87 Rev.



ile: >T2109 Scan #: 74 Retn. time: 4.88

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	.481	97.10	.411	154.05	.541	198.00	100.000	257.00	.411
44.10	1.282	98.00	2.925	154.95	1.082	199.00	6.892	258.00	2.354
50.10	10.959	99.00	2.634	156.05	1.693	201.20	.381	273.00	1.072
51.10	43.173	100.00	.381	157.05	.481	201.60	.561	274.05	3.296
52.10	1.883	101.00	1.793	157.75	.431	203.10	.441	275.05	17.910
55.10	.611	103.00	.831	159.05	.280	204.10	2.534	276.05	2.274
56.10	1.342	104.00	.962	160.05	.571	205.00	4.347	277.05	1.493
57.00	3.286	105.10	1.212	160.95	1.082	206.10	18.652	293.05	.361
61.10	.441	107.00	10.648	166.05	.581	207.00	3.135	295.95	4.548
63.10	1.202	108.00	1.863	166.95	3.877	210.20	.361	296.95	.471
65.10	.811	110.00	30.251	168.05	1.753	211.00	1.002	303.05	.461
67.10	.311	111.00	3.947	169.05	.351	217.00	5.519	315.05	.501
69.00	51.127	116.00	.651	172.05	.321	217.90	.902	315.95	.220
70.00	.301	117.00	6.491	173.05	.621	221.00	6.972	323.05	1.583
74.10	3.426	118.05	.491	174.05	.791	223.10	1.292	326.85	.371
75.00	6.761	123.05	1.322	175.05	1.473	224.10	10.428	333.05	.200
76.10	2.184	124.05	.541	176.05	.651	225.10	2.334	333.95	1.192
77.10	43.965	125.05	.561	176.95	.731	227.00	4.237	345.95	.331
78.10	2.574	127.05	44.145	177.95	.270	228.00	.611	351.95	.541
79.00	2.875	128.05	3.326	179.05	3.366	229.00	.751	353.90	.461
80.00	1.953	129.05	19.834	180.05	1.893	231.00	.621	364.90	1.763
81.00	3.145	130.05	1.703	181.05	1.042	235.00	.280	372.10	.992

82.10	1.142	134.05	.461	185.05	1.563	236.90	.361	401.90	.371
83.00	.831	135.05	1.553	186.05	11.409	242.10	.631	403.00	.421
85.00	.471	136.05	.591	187.05	3.145	243.10	.471	422.00	.311
86.10	.771	137.15	.801	188.15	.391	244.00	9 394	423.00	3.065
91.00	.741	141.05	1.993	189.05	.761	245.00	1.062	441.05	7.713
92.10	.721	142.15	.932	191.05	.551	246.00	1.663	442.05	58.680
93.00	4.157	147.05	1.192	192.05	.912	246.90	.361	443.05	10.538
94.00	.491	147.95	1.843	193.05	.942	255.00	41.020	444.05	1.052
96.10	.611	153.05	.671	196.00	3.215	256.00	6.411		

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/09/88

Contractor: ENVIRONMENTAL SCIENCE Time: 12:26

Contract No: ---------- Laboratory ID: >30446

Instrument ID: 2 Initial Calibration Date: 10/12/88 12/08

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.94852	5.17		
2-Fluorophenol	1.15802	1.24346	7.38		
bis(2-Chloroethyl)ether	1.11892	1.16292	3.93		
Phenol	1.41657	1.46255	3.25	*	
Phenol-d5	1.22488	1.32536	8.25		
Aniline	.54193	.69399	28.06		
2-Chlorophenol	1.23175	1.37995	12.03		
1,3-Dichlorobenzene	1.47535	1.45080	1.66		
1,4-Dichlorobenzene	1.40530	1.37232	2.35	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72306	.49084	32.66		
1,2-Dichlorobenzene	1.32240	1.42673	6.05		
2-Methylphenol	1.17367	1.39926	19.22		
3-&-4-Methylphenol	1.07139	1.33736	24.83		
bis(2-Chloroisopropyl)Ether	2.15627	2.63660	22.29		
N-Nitroso-Di-n-Propylamine	.84050	.82130	2.29		**
Hexachloroethane	.53840	.57364	6.55		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40512	.40580	.67		
Nitrobenzene-d5	.39137	.42122	7.63		
2-Nitrophenol	.24657	.27332	10.85	*	
Isophorone	.74170	.75268	1.51		
bis(2-Chloroethoxy)methane	.49386	.54207	9.76		
2,4-Dimethylphenol	.34849	.36749	5.45		
Benzoic Acid	.29725	.27924	6.06		
2,4-Dichlorophenol	.56733	.56460	.45	*	
1,2,4-Trichlorobenzene	.36313	.35411	4.07		
Naphthalene	.94589	.91264	3.52		
4-Chloroaniline	.36303	.38633	6.57		
Hexachlorobutadiene	.20283	.18456	9.01	*	
4-Chloro-3-Methylphenol	.31360	.30031	4.24	*	
2-Methylnaphthalene	.56337	.56601	.36		

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: 11/09/88

Contractor: ENGINEERING-SCIENCE Time: 12:26

Contract No: _____ Laboratory ID: >S0446

Instrument ID: 1 Initial Calibration Date: 10/[illegible]/88

Minimum $\overline{RF}$ for SPCC is _____ Maximum % Diff for CCC is 25

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.33963	14.86		**
2,4,6-Trichlorophenol	.42280	.37356	11.65	*	
2,4,5-Trichlorophenol	.52837	.44111	16.61		
2-Fluorobiphenyl	1.27220	1.12911	11.25		
2-Chloronaphthalene	1.23784	1.15775	6.47		
2-Nitroaniline	.47286	.50436	6.66		
Dimethylphthalate	1.40629	1.26060	10.35		
2,6-Dinitrotoluene	.37415	.38193	2.08		
Acenaphthylene	1.66918	1.52603	9.65		
3-Nitroaniline	.44557	.45474	2.06		
2,4-Dinitrophenol	.11856	.15439	29.76		**
Acenaphthene	1.13011	.93213	17.52	*	
Dibenzofuran	1.64131	1.51071	7.96		
2,4-Dinitrotoluene	.28418	.30051	5.75		
4-Nitrophenol	.28450	.28703	.51		**
Fluorene	1.12850	.98436	12.72		
Diethylphthalate	1.20935	1.10197	8.88		
4-Chlorophenyl-phenylether	.59183	.50688	14.35		
4-Nitroaniline	.35956	.38720	7.69		
2,4,6-Tribromophenol	.21023	.18603	11.51		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.44924	11.51	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21271	.14		
Hexachlorobenzene	.26273	.25753	1.98		
Pentachlorophenol	.14536	.13213	9.06	*	

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: 11/09/88

Contractor: ENGINEERING-SCIENCE Time: 12:26

Contract No: Laboratory ID: >S0448

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.01771	1.61		
Anthracene	1.05155	1.07688	2.41		
Di-n-butylphthalate	1.51956	1.67201	10.03		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.13163	4.92	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.11295	180.87		
Pyrene	1.56086	1.53533	1.64		
Terphenyl-d14	1.05635	1.03781	1.94		
Butylbenzylphthalate	1.03390	1.16741	12.91		
3,3'-Dichlorobenzidine	.13689	.22788	66.47		
Chrysene	.99655	1.03809	4.17		
Benzo(a)Anthracene	1.10407	1.17875	6.76		
bis(2-Ethylhexyl)Phthalate	1.21073	1.40011	15.64		
Di-n-octylphthalate	3.40275	3.14787	7.49	*	
Benzo(a)Pyrene	1.32096	1.31504	.45	*	
Benzo(b)fluoranthene	1.60850	1.60072	.48		
Indeno(1,2,3-cd)Pyrene	.96800	1.23269	27.34		
Dibenzo(a,h)Anthracene	.87481	1.04785	19.78		
Benzo(k)fluoranthene	1.44370	1.20562	16.48		
Benzo(g,h,i)Perylene	.85761	1.09283	21.76		

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 (**)

910

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0448 Date Analyzed:11/09/88

Instrument ID: 70 1 Time Analyzed: 12:26

		IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	79605.	9.04	290761.	12.64	168869.	18.09
	UPPER LIMIT	159210.		581522.		337738.	
	LOWER LIMIT	39803.		145380.		84435.	
	SAMPLE NO.						
01	88092724 BN	90172.	9.17	316965.	12.76	172002.	18.25
02	88092766 AC	113060.	9.17	413876.	12.76	226402.	18.25
03	88092766 BN	103681.	9.20	374325.	12.77	205315.	18.25
04	88092768 AC	97357.	9.17	350708.	12.77	187550.	18.25
05	88092768 BN	93885.	9.17	330790.	12.77	179328.	18.25
06	88092769 AC	85293.	9.17	309999.	12.76	170580.	18.24
07	88092769 BN	93027.	9.17	328112.	12.76	176275.	18.25
08	88092603 BNA	62685.	9.17	234819.	12.74	126022.	18.23
09	88092604 BNA	71273.	9.17	262761.	12.75	137729.	18.23
10	88092605 BNA	50904.	9.17	199685.	12.75	103678.	18.24
11	88092606 BNA	50842.	9.17	200613.	12.75	101550.	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 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

ab Name: Engineering Science Contract: _____.

ab Code: ES01 Case No.: _____ SAS No.: _____ SDG No.: ____.

ab File ID (Standard): >S0448 Date Analyzed: 11/09/88

strument ID: 70 1 Time Analyzed: 12:26

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
	12 HOUR STD	254150.	22.72	183947.	31.16	148668.	37.03
	UPPER LIMIT	508300.		367894.		297336.	
	LOWER LIMIT	127075.		91973.		74334.	
	EPA SAMPLE NO.						
01	88092724 BN	274163.	22.88	193260.	31.33	136880.	37.33
02	88092766 AC	366416.	22.89	269505.	31.35	164243.	37.36
03	88092766 BN	290158.	22.90	237570.	31.36	92898.	37.35
04	88092768 AC	297237.	22.89	223132.	31.34	157494.	37.36
05	88092768 BN	284517.	22.88	216019.	31.35	139632.	37.37
06	88092769 AC	276745.	22.88	204611.	31.34	130001.	37.35
07	88092769 BN	283111.	22.89	215600.	31.34	144080.	37.37
08	88092603 BNA	191938.	22.88	132019.	31.33	103290.	37.34
09	88092604 BNA	218399.	22.88	150808.	31.33	115495.	37.34
10	88092605 BNA	159398.	22.88	113944.	31.32	87591.	37.35
11	88092606 BNA	151420.	22.89	105382.	31.35	75851.	37.38
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

ge 1 of 1

24 OCT 88 2726,2727,2728

50.d continuing check 9/30/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/30/88 _____

LAB FILE ID: 51,52 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.30	0.44	47
bis (2-chloroethoxy methane	—	—	
bis (2-chloroisopropyl ether	—	—	
Bromobenzene	1.4	1.1	21
Bromodichloromethane	3.7	10.0	62
Bromoform	1.7	1.6	6
Bromomethane	0 40	0.18	55
Carbon tetrachloride	4.2	4.0	5
Chloroacetaldehyde	—	—	—
Chlorobenzene	1.4	1.4	0
Chloroethane	0 72	0.38	47
Chloroform	5 6	4.6	29
1-Chorohexane	1.2	0 92	23
2-Chloroethyl vinyl ether	—	—	—
Chloromethane	0.46	0.56	22
Chloromethyl methyl ether	—	—	—
o_,m_,& p_Chlorotoluenes	4.6	3.6	22
Dibromochloromethane	3 7	3.5	5
Dibromomethane	3 2	2.4	25
1,2_Dichlorobenzene	2.5	2.5	0
1,3_Dichlorobenzene	2.1	2.2	5
1,4_Dichlorobenzene	1.8	1.9	6
Dichlorodifluormethane	—	—	—
1,1_Dichloroethane	2.4	2.2	8
1,2_Dichloroethane	2.6	2.5	4
1,1_Dichloroethylene	2.6	2.2	15
trans_1,2_dichloroethylene	2.4	2.3	4
Dichloromethane	4.1	5 3	29
1,2_Dichloropropane	2.5	2.3	8
1,3_Dichloropropylene	5.9	4.5	24
1,1,2,2_Tetrachloroethane	7.5	7.2	4
1,1,1,2_Tetrachloroethane	5.0	3 9	25
Tetrachloroethylene	7.5	7.2	4
1,1,1_Trichloroethane	3.0	2.9	3
1,1,2_Trichloroethane	5.9	4.5	24
Trichloroethylene	4.0	3.6	10
Trichlorofluormethane	2.3	1.9	17
Trichloropropane	2.1	1.5	28
Vinyl chloride	0.94	0.76	19

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): 9/20/88 _____

LAB FILE ID: 51 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	RRF	RRF50	%D
Benzene	~~5.9~~ 4.9	4.4	10
Chlorobenzene	~~8.7~~ 5.3	5.0	6
1,2_Dichlorobenzene	~~4.9~~ 4.7	3.8	19
1,3_Dichlorobenzene	~~6.4~~ 4.7	4.3	8
1,4_Dichorobenzene	4.0	3.6	12
Ethyl Bezene	4.4	3.4	11
Toluene	3.9	3.6	8
Xylenes	13	11	15

10/1/88

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 10/1/88 _____

LAB FILE ID: 69, 70 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	RRF	RRF50	%D
Benzyl chloride	~~0.30~~ 0.30	0.30	0
bis (2-chloroethoxy methane			
bis (2-chloroisopropyl ether			
Bromobenzene	1.4	1.0	28
Bromodichloromethane	3.7	3.7	0
Bromoform	1.7	1.9	12
Bromomethane	0.40	0.18	56
Carbon tetrachloride	4.2	4.0	5
Chloroacetaldehyde			
Chlorobenzene	1.4	1.3	7
Chloroethane	0.72	0.40	1.8
Chloroform	5.6	4.1	27
1-Chorohexane	1.2	0.89	26
2-Chloroethyl vinyl ether		~~0.49~~	
Chloromethane	0.46	0.49	6
Chloromethyl methyl ether			
o_,m_,& p_Chlorotoluenes	4.6	3.5	24
Dioromochloromethane	3.7	3.8	3
Dibromomethane	3.2	2.4	25
1,2_Dichlorobenzene	2.5	2.3	8
1,3_Dichlorobenzene	2.1	2.0	5
1,4_Dichlorobenzene	1.8	2.1	17
Dichlorodifluormethane			
1,1_Dichloroethane	2.4	2.2	8
1,2_Dichloroethane	2.6	2.6	0
1,1_Dichloroethylene	2.6	2.2	15
trans_1,2_dichloroethylene	2.4	~~2.9~~ 2.7	4
Dichloromethane	4.1	5.6	36
1,2_Dichloropropane	2.5	2.3	8
1,3_Dichloropropylene	5.9	4.5	24
1,1,2,2_Tetrachloroethane	7.5	7.0	7
1,1,1,2_Tetrachloroethane	5.2	3.9	25
Tetrachloroethylene	7.5	7.0	7
1,1,1_Trichloroethane	3.0	2.9	3
1,1,2_Trichloroethane	5.9	4.5	24
Trichloroethylene	4.0	3.7	8
Trichlorofluormethane	2.3	1.9	17
Trichloropropane	2.1	1.4	33
chloride	0.94	0.72	23

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): 10/1/88 _____

LAB FILE ID: 69 Init. Calib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.6	6
Chlorobenzene	5.3	5.4	2
1,2_Dichlorobenzene	4.4	3.8	14
1,3_Dichlorobenzene	5.0	4.6	8
1,4_Dichorobenzene	4.1	3.7	10
Ethyl Bezene	4.4	3.6	18
Toluene	3.9	3.8	3
Xylenes	13	12	8

DATA PACKAGE #14

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ENGINEERING-SCIENCE, INC.

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

REVISED REPORT

Job No.: OR001

Work Order No.: 808

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 8-05-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081661	DANG-2-MW12-SS1	BA-I	8-05-88		9-07-88	
88081661	DANG-2-MW12-SS1	CD-I	8-05-88		9-07-88	
88081661	DANG-2-MW12-SS1	CR-I	8-05-88		9-07-88	
88081661	DANG-2-MW12-SS1	PB-F	8-05-88		9-12-88	
88081661	DANG-2-MW12-SS1	418.1	8-05-88	8-15-88	8-19-88	
88081661	DANG-2-MW12-SS1	MOIS	8-05-88		8-15-88	
88081661	DANG-2-MW12-SS1	8010	8-05-88		8-16-88	8-16-88
88081661	DANG-2-MW12-SS1	8020	8-05-88		8-16-88	8-16-88
88081661	DANG-2-MW12-SS1	8270	8-05-88	8-16-88	9-14-88	
88081662	DANG-2-MW12-SS3	BA-I	8-05-88		9-07-88	
88081662	DANG-2-MW12-SS3	CD-I	8-05-88		9-07-88	
88081662	DANG-2-MW12-SS3	CR-I	8-05-88		9-07-88	
88081662	DANG-2-MW12-SS3	PB-F	8-05-88		9-12-88	
88081662	DANG-2-MW12-SS3	418.1	8-05-88	8-15-88	8-19-88	
88081662	DANG-2-MW12-SS3	MOIS	8-05-88		8-15-88	
88081662	DANG-2-MW12-SS3	8010	8-05-88		8-16-88	8-16-88
88081662	DANG-2-MW12-SS3	8020	8-05-88		8-16-88	8-16-88
88081662	DANG-2-MW12-SS3	8270	8-05-88	8-16-88	9-20-88	

* If applicable

Job No.: OR001

Work Order No.: 808

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081663	DANG-2-MW12-SS5	BA-I	8-05-88		9-07-88	
88081663	DANG-2-MW12-SS5	CD-I	8-05-88		9-07-88	
88081663	DANG-2-MW12-SS5	CR-I	8-05-88		9-07-88	
88081663	DANG-2-MW12-SS5	PB-F	8-05-88		9-12-88	
88081663	DANG-2-MW12-SS5	418.1	8-05-88	8-15-88	8-19-88	
88081663	DANG-2-MW12-SS5	MOIS	8-05-88		8-15-88	
88081663	DANG-2-MW12-SS5	8010	8-05-88		8-16-88	8-16-88
88081663	DANG-2-MW12-SS5	8020	8-05-88		8-16-88	8-16-88
88081663	DANG-2-MW12-SS5	8270	8-05-88	8-16-88	9-15-88	
88081664	DANG-2-MW12-SS4	BA-I	8-05-88		9-07-88	
88081664	DANG-2-MW12-SS4	CD-I	8-05-88		9-07-88	
88081664	DANG-2-MW12-SS4	CR-I	8-05-88		9-07-88	
88081664	DANG-2-MW12-SS4	PB-F	8-05-88		9-12-88	
88081664	DANG-2-MW12-SS4	418.1	8-05-88	8-15-88	8-19-88	
88081664	DANG-2-MW12-SS4	MOIS	8-05-88		8-15-88	
88081664	DANG-2-MW12-SS4	8010	8-05-88		8-16-88	8-16-88
88081664	DANG-2-MW12-SS4	8020	8-05-88		8-16-88	8-16-88
88081664	DANG-2-MW12-SS4	8270	8-05-88	8-16-88	9-15-88	

* If applicable

ANALYSIS REPORT

WORK ORDER NUMBER: 808
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/05/88

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

	DANG-2-MW12-SS1	DANG-2-MW12-SS3	DANG-2-MW12-SS5	DANG-2-MW12-SS4
TEST COMPOUND	88081661	88081662	88081663	88081664
ACID DIG SOIL	NA	NA	NA	NA
BARIUM	64.9	48.1	28.2	69.2
CADMIUM	10.9N	11.0N	9.3N	9.8N
CHROMIUM	37.4N	30.7N	22.6N	32.1N
LEAD	6.7N	4.6SN	3.4N	10.5SN

* See Defaxman

ANALYSIS REPORT

K ORDER NUMBER: 808
NUMBER : ZB0000000440
K ORDER DATE : 08/05/88

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

: 3, UNITS: mg/KG

T COMPOUND	OANG-2-MW12-SS1 88081661	OANG-2-MW12-SS3 88081662	OANG-2-MW12-SS5 88081663	OANG-2-MW12-SS4 88081664
3.1 PETROLEUM HYDROCARBONS	<100	<100	<100	<100
IOISTURE	5.8	9.9	8.8	6 3

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 808
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/05/88

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

	DANG-2-MW12-SS1	ANG-2-MW12-SS3	DANG-2-MW12-SS5	DANG-2-MW12-SS4
TEST COMPOUND	88081661	88081662	88081663	88081664
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
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROETHYLENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	0.068	ND	0.128	ND
CHLOROMETHANE	ND	ND	ND	ND
2-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND
DIBROMOTOLUENE	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	1.08	1.68	1.78	[illegible]
1,2-DICHLOROPROPANE	ND	ND	ND	[illegible]

ND = Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 808

ST COMPOUND	DANG-2-MW12-SS1 88081661	DANG-2-MW12-SS3 88081662	DANG-2-MW12-SS5 88081663	DANG-2-MW12-SS4 88081664
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

ANALYSIS REPORT

WORK ORDER NUMBER: 808
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 08/05/88 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

	OANG-2-MW12-SS1	OANG-2-MW12-SS3	OANG-2-MW12-SS5	OANG-2-MW12-SS4
TEST COMPOUND	88081661	88081662	88081663	88081664
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	5.1	2.1	2.3	7.7
XYLENES	ND	ND	ND	ND

ND - Not Detected

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

Date Received: August 5, 1988
Date Reported: October 7, 1988
Work Order: 808
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:	88081661	88081662
Sample No.:	DANG-2-MW12-SS1	DANG-2-MW12-SS3
Date Sampled:	8-04-88	8-04-88
Time Sampled:	14:57	15:40
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-14-88	9-20-88
Percent Moisture:	6	10

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 5, 1988 Work Order: 808
Date Reported: October 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:	88081661	88081662
Sample No.:	DANG-2-MW12-SS1	DANG-2-MW12-SS3
Date Sampled:	8-04-88	8-04-88
Time Sampled:	14:57	15:40
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-14-88	9-20-88
Percent Moisture:	6	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	330	ND	ND
Anthracene	330	ND	ND
Dibutyl phthalate	330	1200	ND
Fluoranthene	330	ND	380
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 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081661	88081662
Sample No.:	DANG-2-MW12-SS1	DANG-2-MW12-SS3
Date Sampled:	8-04-88	8-04-88
Time Sampled:	14:57	15:40
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-14-88	9-20-88
Percent Moisture:	6	10

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 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081661	88081662
Sample No.:	DANG-2-MW12-SS1	DANG-2-MW12-SS3
Date Sampled:	8-04-88	8-04-88
Time Sampled:	14:57	15:40
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-14-88	9-20-88
Percent Moisture:	6	10

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 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081661	88081662
Sample No.:	DANG-2-MW12-SS1	DANG-2-MW12-SS3
Date Sampled:	8-04-88	8-04-88
Time Sampled:	14:57	15:40
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-14-88	9-20-88
Percent Moisture:	6	10

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 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081663	88081664
Sample No.:	DANG-2-MW12-SS5	DANG-2-MW12-SS4
Date Sampled:	8-04-88	8-04-88
Time Sampled:	15:51	14:57
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-15-88	9-15-88
Percent Moisture:	9	6

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 5, 1988 Work Order: 808
Date Reported: October 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:	88081663	88081664
Sample No.:	DANG-2-MW12-SS5	DANG-2-MW12-SS4
Date Sampled:	8-04-88	8-04-88
Time Sampled:	15:51	14:57
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-15-88	9-15-88
Percent Moisture:	9	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

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

Date Received: August 5, 1988
Date Reported: October 7, 1988

Work Order: 808
Job Number: OR00

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

ATTN: Mr. Bill Hayden

Lab Number:	88081663	88081664
Sample No.:	DANG-2-MW12-SS5	DANG-2-MW12-SS4
Date Sampled:	8-04-88	8-04-88
Time Sampled:	15:51	14:57
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-15-88	9-15-88
Percent Moisture:	9	6

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 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081663	88081664
Sample No.:	DANG-2-MW12-SS5	DANG-2-MW12-SS4
Date Sampled:	8-04-88	8-04-88
Time Sampled:	15:51	14:57
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-15-88	9-15-88
Percent Moisture:	9	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.

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

Date Received: August 5, 1988
Date Reported: October 7, 1988

Work Order: 808
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:	88081663	88081664
Sample No.:	DANG-2-MW12-SS5	DANG-2-MW12-SS4
Date Sampled:	8-04-88	8-04-88
Time Sampled:	15:51	14:57
Date Extracted:	8-16-88	8-16-88
Date Analyzed:	9-15-88	9-15-88
Percent Moisture:	3	6

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.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081661-88081664
WORK ORDER NO.: 808

These soil samples were received at the ES Berkeley Laboratory on 8-05-88. They were received cold and intact.

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

4

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

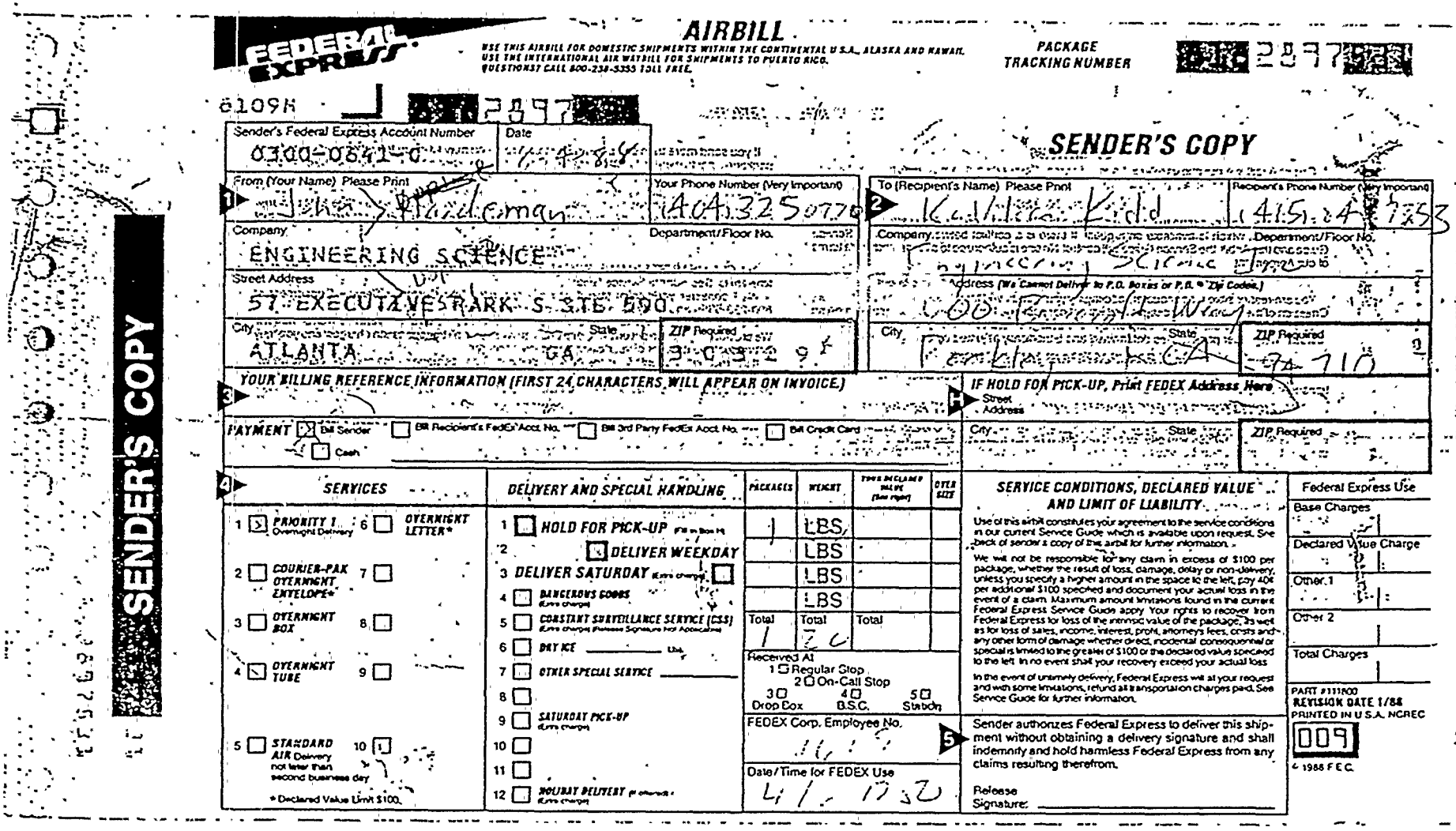
DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7060	SW7131, 7421, 7191	REMARKS
8-4-88	1457	DANG-2 - MW12 - SS1	1	X						SW8010 is for Barium
8-4-88	1457	DANG-2 - MW12 - SS1	1			X	X	X	X	" " "
8-4-88	1540	DANG-2 - MW12 - SS3	1	X						" "
8-4-88	1540	DANG-2 - MW12 - SS3	1			X	X	X	X	" "
8-4-88	1551	DANG-2-MW12-SS5 > Duplicate	1	X						" "
8-4-88	1551	DANG-2-MW12-SS5	1			X	X	X	X	" "
8-4-88	1457	DANG-2-MW12-SS4 > Duplicate of SS1	1	X						" "
8-4-88	1457	DANG-2-MW12-SS4	1			X	X	X	X	" "

937

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	8-4-88 1735				

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

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938

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
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	Notes
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

940

NOTES: 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

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	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Lead	88081661	88081661	9-08-88	8-19-88	7421	<0.5	6.7	6.5	3	5.3	6.7	10.5	72N	

941

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
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081593, 88081661-88081664

QC Report No: TPH-S-0037-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-05-88
Date Prepared: 8-19-88
Date Analyzed: 8-19-88
Date Reported: 9-12-88
Dilution Factor: 6.5
%Moisture: 18

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081665	418.1	<100	<100	1200	700	58	730	61	4	*

942

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project.
Percent recovery and RPD are within ES Laboratory QC limits.

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

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

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

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
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.

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

941

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

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-0034-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 8-22-88
Date Reported: 9-12-88
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	10.4	104	1	20	58-124
	Trichloroethene	10	ND	9.79	98	9.75	98	<1	16	75-110
	Chlorobenzene	10	ND	9.31	93	9.37	94	1	21	71-125
	Aromatics: 8020									
Blank	Benzene	10	ND	10.6	106	10.4	104	2	26	75-123
	Toluene	10	ND	10.0	100	9.69	97	3	16	79-115
	Chlorobenzene	10	ND	9.06	91	9.32	93	3	24	82-112

945

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

METHOD BLANK SUMMARY
EPA 8010/8020

Job No: OR001

Work Order No.: 808

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: 09-01-88

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.
C50	8-16-88	VOA	Carbo-pack	75-09-2 67-66-3	Dichloromethane Chloroform	0.89 1.1	0.25 0.05	88081661-88081664 88081692-88081699

946

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.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 8270

Job No.: 0R001

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-Chlorcphenol	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

948

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

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	%Recovery
	1,2,4-Trichlorobenzene	3330	ND	1490	45	1370	41	8	23	38-107
B/N	Acenaphthene	3330	ND	1270	38	1220	37	4	19	31-137
Laboratory	2,4-Dinitrotoluene	3330	ND	1370	41	1320	40	4	47	28-89
Sample #	Pyrene	3330	ND	1340	40	1300	39	3	36	35-142
Blank	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
	Pentachlorophenol	6670	ND	3140	47	2760	41	13	47	17-109
ACID	Phenol	6670	ND	2540	38	2300	34	10	35	26-90
Laboratory	2-Chlorophenol	6670	ND	2490	37	2320	35	7	50	25-102
Sample #	4-Chloro-3-Methylphenol	6670	ND	2910	44	2810	42	3	33	26-103
Blank	4-Nitrophenol	6670	ND	3250	49	3080	46	5	50	11-114

949

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: 10-17-88

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	88081661-88081664

930

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: BLANK

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 808 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081661-1694 BLANK

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50044

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 8/16/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/14/88

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

Number TICs found: 15 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.93	610	
2.			4.33	1400	
3.			4.90	210	
4.			5.36	140	
5.			5.48	520	
6.			5.94	9200	
7.			7.32	890	
8.			8.82	140	
9.			12.57	210	
10.	57-10-3	Hexadecanoic acid	25.19	220	
11.		unknown	26.91	170	
12.			30.07	1200	
13.			35.13	1100	
14.			38.10	190	
15.			43.01	220	
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

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EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANG2-MW13-SS1

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 808 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081661

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0045

Level: (low/med) low Date Received: 8/5/88

% Moisture: not dec. 5.8 dec. _____ Date Extracted: 8/16/88
DBD 3/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/14/88

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

Number TICs found: 12 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown	3.94	4200	
2.			4.10	240	
3.			5.07	3000	
4.			5.40	390	
5.			8.27	150	
6.			26.83	280	
7.			26.95	330	
8.			30.65	690	
9.			35.13	620	
10.			37.04	190	
11.			38.04	190	
12.			41.76	150	
13.					
14.					
15.					
16.					
17.					
18.					
19.					
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21.					
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EPA SAMPLE NO.

DAN62-MW12-SS3

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 808 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081662

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0081

Level: (low/med) low Date Received: 8/5/88

% Moisture: not dec. 9.9 10 dec. _____ Date Extracted: 8/16/88
2003/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/20/88

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	3.56	1200	
2.			3.98	660	
3.			4.31	490	
4.			4.45	1300	
5.			4.86	890	
6.			4.93	460	
7.			5.08	980	
8.			5.20	550	
9.			6.13	19,000	
10.			6.22	700	
11.			7.27	1100	
12.	79-37-5	1,1,2,2-tetrachloroethane	7.31	440	
13.		unKnown	7.42	1300	
14.			7.59	500	
15.			25.32	1100	
16.			30.10	470	
17.			30.43	430	
18.			32.49	230	
19.			34.84	380	
20.			37.46	470	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

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EPA SAMPLE NO.

DANG-2-MW12-555

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 808 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081663

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50059

Level: (low/med) low Date Received: 8/5/88

% Moisture: not dec. ~~8.8~~ 9 dec. _____ Date Extracted: 8/16/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/15/88

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

Number TICs found: 15 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.52	240	
2.		↓	3.91	2900	
3.		↓	4.93	166	
4.		unknown alkene C_7H_{14}	5.02	228	
5.		unknown	5.50	53e	
6.		↓	5.97	10,000	
7.		↓	7.32	1000	
8.		↓	20.17	150	
9.	57-10-3	hexadecanoic acid	25.26	1000	
10.		unknown	27.42	210	
11.		↓	27.68	170	
12.		↓	29.75	280	
13.		↓	30.05	650	
14.		↓	35.12	690	
15.		↓	38.31	12,000	
16.					
17.					
18.					
19.					
20.					
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22.					
23.					
24.					
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27.					
28.					
29.					
30.					

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EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DAN62-MW12
SS4

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 808 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808166 4

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0064

Level: (low/med) low Date Received: 8/5/88

% Moisture: not dec. 6.3 (6) dec. _____ Date Extracted: 8/16/88
DED 9/15/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/15/88

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	3.91	3000	
2.		unknown	4.30	550	
3.		unknown alkene C_7H_{14}	5.02	1100	
4.		unknown	5.49	450	
5.		↓	5.93	9800	
6.			7.18	380	
7.	79-34-5	1,1,2,2-tetrachloroethane	7.24	280	
8.		unknown	7.32	840	
9.		↓	7.50	210	
10.			8.28	320	
11.			8.88	200	
12.		↓	20.17	160	
13.	57-10-3	hexadecanoic acid	25.27	970	
14.		unknown	31.95	490	
15.		↓	30.35	220	
16.			32.11	160	
17.			35.15	560	
18.		↓	38.27	8500	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

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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).:
88081593, 88081661-88081664

Calibration Date: 8-19-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9984

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.104	
No. 2	1.2	0.193	RF = 6.28
No. 3	1.8	0.304	
No. 4	2.4	0.386	
Cont. Cal. No. 2 (88081593) (88081589-88081592)	1.17	0.194	98%
Cont. Cal. No. 2 (88081661-88081664)	1.15	0.192	96%

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-48
Lab File ID: Sa044
Matrix: Soil
Level (low/med):
Date Analyzed: 9/14/88
Time Analyzed: ~~9-14-88 xm~~ 20:55
Instrument ID:
Date Reported:

Project: Duluth

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

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANG-2 - MW12 - SS1	88081661	S0045	9-14-88
	88081661 MS	S0046	9-14-88
	88081661 MSD	S0063	9-15-88
DANG-2 - MW12 - SS3	88081662	S0081	9-20-88
SS5	88081663	S0059	9-15-88
SS4	88081664	S0064	9-15-88
DANGB2 - MW13 - SS1	88081692	S0062	9-15-88
- MW13 - SS3	88081693	S0061, E5634	9-15-88 9-19-88
- MW13 - SS4	88081694	S0060, E5635	9-15-88 9-19-88
	BLANK MS	S0079	9-20-88
	BLANK MSD	S0080	9-20-88

ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081593, 88081661-88081664

QC Report No: TPH-S-0037-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-05-88
Date Prepared: 8-19-88
Date Analyzed: 8-19-88
Date Reported: 9-12-88
Dilution Factor: 6.5
%Moisture: 18

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081665	418.1	<100	<100	1200	700	58	730	61	4	*

958

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is from a different Martin Marietta project.
Percent recovery and RPD are within ES Laboratory QC limits.

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

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

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

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

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081593, 88081661-88081664

QC Report No: TPH-S-0037-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 8-19-88
Date Analyzed: 8-19-88
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	540	54	550	55	2	

959

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 9/15/88 14:04

Lab ID >T0915::D3 Data Release Authorized By: _____

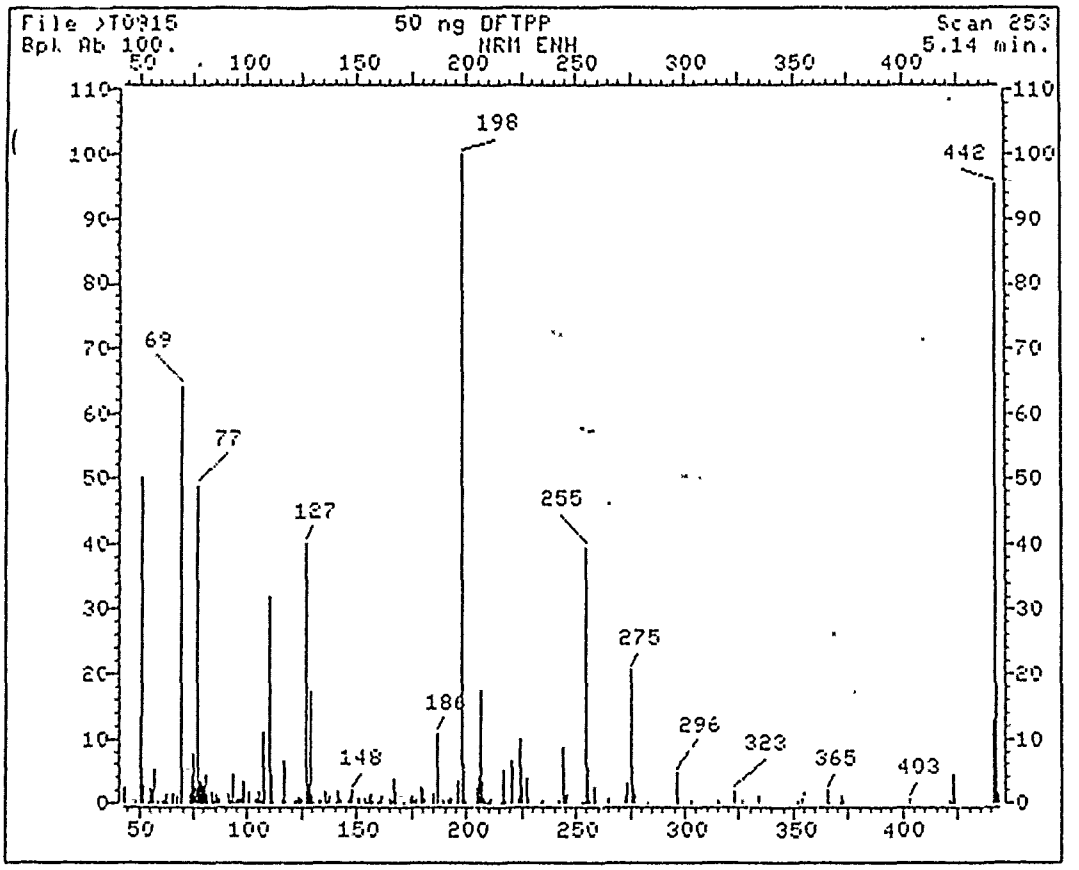
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	49.92 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	63.96	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	40.08 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.02 OK	
275	10.0 - 30.0% of mass 198	20.58 OK	
365	greater than 1.00% of mass 198	2.05 OK	
441	present, but less than mass 443	12.98 OK	
442	greater than 40.0% of mass 198	95.25 OK	
443	17.0 - 23.0% of mass 442	18.63 OK	(19.56) #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
25 mg/L std	50058	9/15/88	14:35
88081663	50059		16:37
88081694	50060		17:36
88081693	50061		18:36
88081692	50062		19:36
88081661MD	50063		20:35
88081664	50064		21:35



File >T0915 Scan #: 253 Retn. time: 5.14

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	2.431	95.05	.803	142.75	.446	196.00	3.424	256.80	.415
44.00	2.405	96.05	.640	143.05	.159	198.00	100.000	258.00	2.361
48.90	.481	97.15	.922	145.95	.344	199.00	6.023	258.90	.335
50.00	13.237	98.05	3.450	147.05	1.222	200.00	.300	264.80	.627
51.00	49.925	98.95	3.044	148.05	1.968	204.10	2.422	265.00	.357
52.00	2.643	100.85	1.844	151.05	.715	205.00	4.223	272.90	1.165
53.90	.119	103.05	.869	153.05	.618	206.10	17.706	274.00	3.239
55.10	2.568	104.05	.909	153.75	.640	207.00	3.389	275.00	20.579
56.10	2.166	105.05	1.884	154.15	.146	207.90	.657	276.00	2.859
57.00	5.286	105.75	.349	154.95	.931	208.90	.137	276.90	1.363
59.00	.331	106.95	11.066	156.05	1.469	209.10	.062	282.90	.172
61.05	.538	108.05	2.113	157.15	.446	210.00	.353	295.95	4.712
62.05	.534	110.05	31.720	158.95	.234	211.00	.918	296.85	.644
63.15	1.478	111.05	4.576	159.95	.309	215.90	.163	302.85	.379
63.95	.199	112.05	.477	160.85	1.059	217.00	5.206	314.85	.393
65.15	1.452	115.95	.671	165.05	.891	217.70	.419	315.95	.176
67.15	1.244	116.95	6.402	166.15	.521	218.00	.260	322.95	1.915
69.05	63.956	117.95	.260	166.95	3.750	221.00	6.645	326.65	.335
73.05	1.430	121.05	.318	167.85	1.619	223.00	1.077	333.85	1.028
74.05	4.567	122.15	.481	169.15	.115	224.00	9.782	341.25	.071
75.05	7.571	123.15	1.032	171.85	.216	225.00	2.471	351.95	.318
76.15	2.466	124.05	.785	174.05	.671	227.00	3.693	354.05	.697
77.15	48.676	124.95	.856	175.05	1.107	228.00	.693	364.85	2.052
78.05	3.322	126.95	40.081	175.85	.494	233.80	.093	365.85	.199
79.05	3.415	128.05	2.983	176.40	.106	235.00	.291	370.85	.093
79.95	2.855	128.95	17.442	177.00	.869	235.20	.101	372.05	1.218
81.05	4.558	129.95	1.315	179.10	2.590	242.00	.304	372.65	.260

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

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

Sample No. (Standard): 50 ng BNA STD Date Analyzed: 9/15/88

Lab File ID (Standard): 50058 Time Analyzed: 14:35

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	53590	9.33	205499	12.96	115091	18.46
UPPER LIMIT	107180	9.85	410998	13.46	230182	18.96
LOWER LIMIT	26795	8.85	102751	12.46	57546	17.96
EPA SAMPLE NO.						
50059 01 8808 1663	63175	9.34	257803	12.94	149602	18.45
50060 02 8808 1644	65484	9.34	265375	12.94	155262	18.46
50061 03 8808 1643	63818	9.34	254991	12.95	149552	18.46
50062 04 8808 1692	66029	9.35	264038	12.94	158216	18.46
50063 05 8808 1661 MSD	66800	9.35	262540	12.96	157213	18.46
50064 06 8808 1664	64801	9.34	259261	12.95	151563	18.46
07						
08						
09						
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22						

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

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

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR001

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

Sample No.(Standard): 50ng BNA STD Date Analyzed: 9/15/88

Lab File ID (Standard): S0058 Time Analyzed: 14:35

Instrument ID: 1

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD		206533	23.11	220692	31.59	220095	37.81
UPPER LIMIT		413066	23.61	441384	32.09	440190	38.31
LOWER LIMIT		103269	22.61	110346	31.09	110049	37.31
EPA SAMPLE NO.							
S0059	01 8808 1663	256161	23.11	289958	31.59	280713	37.82
S0060	02 8808 1644	267258	23.12	297833	31.60	301836	37.85
S0061	03 8808 1643	254625	23.11	294303	31.59	281044	37.82
S0062	04 8808 1647	266427	23.11	304650	31.59	306397	37.83
S0063	05 8808 1661 MSD	262990	23.13	298285	31.60	253837	37.83
S0064	06 8808 1664	264441	23.11	297531	31.60	258977	37.84
	07						
	08						
	09						
	10						
	11						
	12						
	13						
	14						
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	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

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 09/15/88

Contractor: ---------- Time: 14:35

Contract No: ENGINEERING-SCIENCE Laboratory ID: >S0058

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	1.11526	1.10734	.71			
2-Fluorophenol	1.04191	1.29776	24.56			
bis(2-Chloroethyl)ether	1.45395	1.42752	1.82			
Phenol	1.57814	1.81798	15.20	*		
Phenol-d5	1.44681	1.65147	14.15			
Aniline	1.29766	1.24632	3.96			
2-Chlorophenol	1.29000	1.35825	5.29			
1,3-Dichlorobenzene	1.33703	1.46577	9.63			
1,4-Dichlorobenzene	1.26808	1.45344	14.62	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.45243	.26889	40.57			
1,2-Dichlorobenzene	1.26918	1.44388	13.76			
2-Methylphenol	1.07746	1.25444	16.43			
3-&-4-Methylphenol	1.00178	1.19621	19.41			(Conc=50.00)
bis(2-chloroisopropyl)Ether	3.21777	3.03645	5.63			
N-Nitroso-Di-n-Propylamine	1.20333	1.11624	7.24		**	
Hexachloroethane	.53519	.68855	28.65			
Dibromochloropropane	-	-	-			
Nitrobenzene	.47991	.48958	2.01			
Nitrobenzene-d5	.41608	.41349	.62			
2-Nitrophenol	.21906	.22701	3.63	*		
Isophorone	.91400	.90050	1.48			
bis(2-Chloroethoxy)methane	.52989	.55310	4.38			
2,4-Dimethylphenol	.22693	.28056	23.63			
Benzoic Acid	.24110	.25895	7.41			
2,4-Dichlorophenol	.24667	.28608	15.98	*		
1,2,4-Trichlorobenzene	.32622	.34646	6.20			
Naphthalene	.85404	.94495	10.64			
4-Chloroaniline	.43129	.43249	.28			
Hexachlorobutadiene	.19284	.20641	7.04	*		
4-Chloro-3-Methylphenol	.28823	.34915	21.14	*		
2-Methylnaphthalene	.49727	.52729	6.04			

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: 09/15/88

Contractor: ENGINEERING-SCIENCE | Time: 14:35

Contract No: | Laboratory ID: >S0058

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.31998	.37898	18.44		**
2,4,6-Trichlorophenol	.34057	.42202	23.92	*	
2,4,5-Trichlorophenol	.37168	.49026	31.90		
2-Fluorobiphenyl	1.03228	1.10069	6.63		
2-Chloronaphthalene	1.10079	1.16897	6.19		
2-Nitroaniline	.62664	.59320	5.34		
Dimethylphthalate	1.30066	1.38222	6.27		
2,6-Dinitrotoluene	.37641	.37932	.77		
Acenaphthylene	1.60416	1.82574	13.81		
3-Nitroaniline	.66097	.64754	2.03		
2,4-Dinitrophenol	.20934	.19176	8.39		**
Acenaphthene	1.03503	1.12274	8.47	*	
Dibenzofuran	1.40372	1.55556	10.82		
2,4-Dinitrotoluene	.34782	.33338	4.15		
4-Nitrophenol	.17238	.16751	2.83		**
Fluorene	1.01979	1.15658	13.41		
Diethylphthalate	1.02412	1.21601	18.74		
4-Chlorophenyl-phenylether	.51416	.62463	21.49		
4-Nitroaniline	.51880	.49754	4.10		
2,4,6-Tribromophenol	.21315	.30632	43.71		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40222	.46181	14.82	*	
4,6-Dinitro-2-Methylphenol	.13708	.16317	19.03		
4-Bromophenyl-phenylether	.22189	.24340	9.70		
Hexachlorobenzene	.32402	.35028	8.11		
Pentachlorophenol	.17454	.21512	23.25	*	

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: 09/15/88

Contractor: ENGINEERING-SCIENCE Time: 14:35

Contract No: ---------- Laboratory ID: >50058

Instrument ID: 1 Initial Calibration Date: ~~09/15/88~~ 9/16/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.89963	1.01896	13.27		
Anthracene	.93373	1.06026	13.55		
Di-n-Butylphthalate	1.39617	1.50591	7.86		
4,4'-Dibromobiphenyl	1.84467	2.21338	19.99		
Fluoranthene	1.06035	1.14693	8.16	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.26516	.14229	46.34		
Pyrene	1.15829	1.13084	2.37		
Terphenyl-d14	.84627	.82933	2.00		
Butylbenzylphthalate	.75104	.71660	4.59		
3,3'-Dichlorobenzidine	.26111	.26550	1.68		
Chrysene	1.16493	1.17006	.44		
Benzo(a)Anthracene	1.12949	1.03528	8.34		
bis(2-Ethylhexyl)Phthalate	.90208	.87327	3.19		
Di-n-octylphthalate	1.47631	1.58376	7.28	*	
Benzo(a)Pyrene	1.05746	1.07301	1.47	*	
Benzo(b)Fluoranthene	1.20636	1.16204	3.67		
Indeno(1,2,3-cd)Pyrene	1.07984	1.00855	6.60		
Dibenzo(a,h)Anthracene	1.16399	1.15592	.69		
Benzo(k)Fluoranthene	.99205	1.07051	7.91		
Benzo(g,h,i)Perylene	.99401	1.07660	8.31		

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 (**)

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)P0920::01 Data Release Authorized By: Laura Kuck

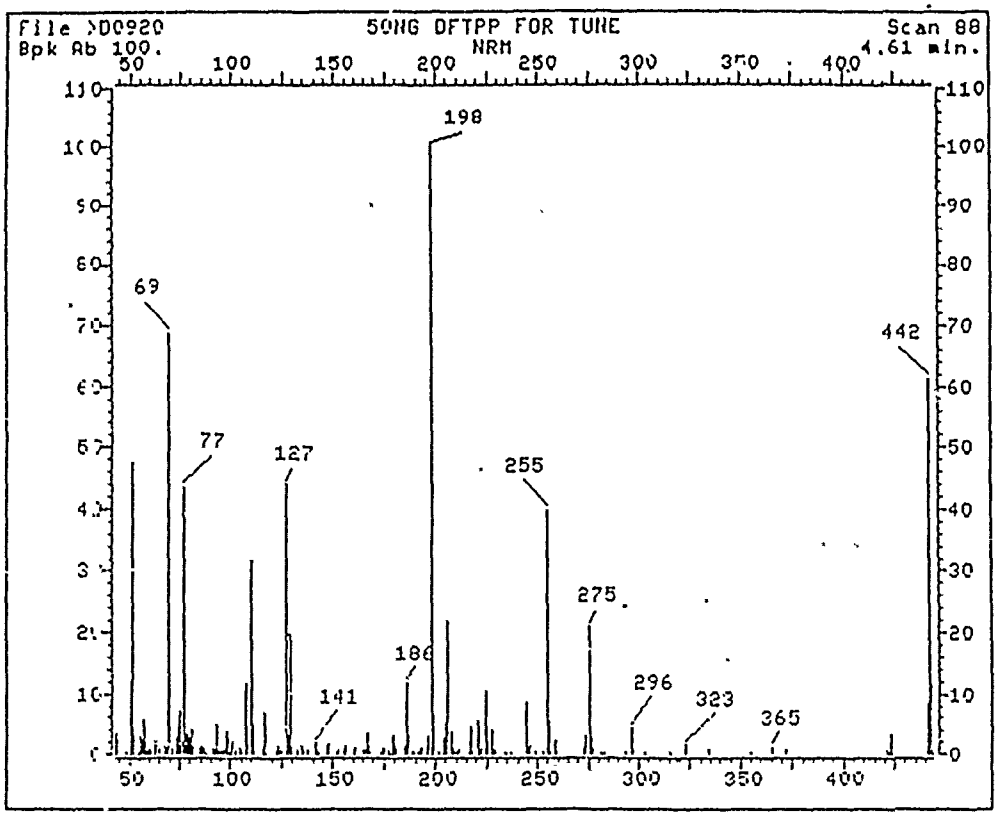
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	47.26 OK	
68	less than 2.0% of mass 69	1.12 OK	(1.626) #1
69	mass 69 relative abundance	68.77	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 50.0% of mass 198	43.92 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	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 443.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
	~~S0072 D00~~	9/20/88	
SSTD025	S0073		14:06
SSTD010	S0074		15:37
SSTD80	S0075		16:37
SSTD060	S0076		17:38
SSTD040	S0077		18:38
SSTD120	S0078		19:37
1661-64,90-94 BLK MS	S0079		20:37
1661-64,90-94 BLK MSD	S0080		21:37
88081662	S0081		22:30
1661-64,90-94 BLK	S0082		23:35

5 point 9/19/88 initial calibration all 5 files 9/20/88



File: >D0920 Scan #: 88 Retn. time: 4.61

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	3.416	87.05	.789	134.95	1.431	192.00	.937	253.00	.362
44.10	2.410	87.95	.247	135.95	.658	193.00	1.118	255.00	39.632
48.90	.543	91.05	1.151	137.35	.855	196.00	3.124	256.00	5.575
50.10	12.073	92.65	.904	140.35	2.006	198.00	100.000	256.90	.329
51.10	17.262	93.00	4.384	141.95	.888	199.00	6.545	258.00	2.396
52.10	3.256	94.00	.641	142.95	.576	201.50	.526	259.00	.395
54.10	.460	95.00	.789	146.95	1.595	203.95	2.845	273.00	1.151
55.10	3.124	96.10	.773	147.95	1.858	204.95	5.016	274.00	3.240
56.05	2.286	97.10	1.136	151.35	.345	205.95	21.871	275.00	20.951
57.05	5.723	98.00	3.857	152.35	.839	206.95	3.651	276.00	2.779
58.05	2.269	99.00	2.694	155.05	1.162	207.95	.937	276.95	1.069
59.05	.740	99.90	.543	156.35	1.513	208.85	.362	280.95	.477
60.05	.937	101.00	1.999	159.95	.921	210.15	.362	282.05	.230
60.95	.756	102.20	.773	161.15	1.168	210.95	.822	282.95	.345
62.35	2.023	104.20	1.151	165.85	.707	215.95	.411	292.95	.312
65.05	1.069	104.90	.394	166.00	.641	216.95	4.473	295.95	4.391
67.05	1.398	107.00	11.347	167.00	3.371	217.95	.543	296.95	.641
67.95	1.118	108.00	1.694	168.00	1.332	220.15	.230	303.05	.526
68.95	68.772	110.20	31.888	169.00	.395	220.95	5.460	314.90	.362
71.05	1.200	111.00	5.788	172.90	.395	221.95	.707	315.90	.164
73.05	2.894	112.00	.724	174.00	.937	222.95	1.118	323.00	1.677
74.05	4.539	116.00	.954	175.00	1.529	224.05	10.344	334.00	.806
75.05	7.269	117.00	6.307	176.90	.674	225.05	2.138	354.95	.263
76.05	2.056	118.00	.592	177.90	.230	226.95	4.210	361.85	1.135
77.05	43.496	122.00	.674	178.90	3.026	227.95	.707	371.95	.839
78.05	3.437	123.00	1.248	180.00	1.742	228.95	.921	421.00	.608
79.05	3.565	124.00	.641	181.00	1.052	233.95	.280	422.00	.428
79.95	2.660	125.10	.756	185.30	1.562	234.85	.197	423.10	3.496

81.05	4.095	127.00	13.924	186.00	11.676	236.95	.411	123.95	.111
82.05	1.117	128.10	3.092	187.00	3.223	241.00	8.568	111.05	8.502
84.05	1.020	129.00	19.536	188.00	.312	245.00	1.151	112.05	61.388
85.15	1.381	129.95	1.562	189.00	.395	246.00	1.496	113.05	11.692
86.05	1.102	132.95	.671	191.00	.576	248.90	.362	111.05	.901

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 4

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 9/20/88 2nd

Contract No: ----------

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

Laboratory ID:	)S0074	)S0073	)S0077	)S0076	)S0075	)S0078	-				
	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
N-Nitroso-Dimethylamine	1.11886	1.18867	1.11073	1.14522	1.11352	1.13810	-	.442	1.13585	2.582	
2-Fluorophenol	1.18726	1.46025	1.47934	1.47759	.96750	1.33179	-	.692	1.31729	15.627	
bis(2-Chloroethyl)ether	1.47806	1.55932	1.49398	1.51086	1.47454	1.45710	-	.944	1.49564	2.416	
Phenol	1.82363	2.17033	2.21115	2.15625	1.39698	1.73530	-	.934	1.91359	15.838	*
Phenol-d5	1.20672	1.84771	2.05586	1.92421	1.35502	1.46250	-	.930	1.64101	21.154	
Aniline	1.66855	1.43363	1.42670	1.03248	1.33938	1.41157	-	.923	1.38540	14.850	
2-Chlorophenol	1.43850	1.53418	1.50306	1.44858	1.36678	1.32072	-	.956	1.43530	5.607	
1,3-Dichlorobenzene	1.61539	1.55305	1.38360	1.31101	1.17795	1.07372	-	.989	1.35245	15.517	
1,4-Dichlorobenzene	1.57921	1.43980	1.27919	1.18040	1.05550	.92696	-	1.005	1.24351	19.435	*
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-	
Benzyl Alcohol	.35163	.78347	.55391	.96440	.70766	.65365	-	1.261	.66912	31.067	
1,2-Dichlorobenzene	1.57368	1.48786	1.34314	1.30016	1.16280	1.00541	-	1.056	1.31217	15.868	
2-Methylphenol	1.32681	1.46463	1.39725	1.39673	1.23726	1.19330	-	1.105	1.33600	7.792	
3-&-4-Methylphenol	1.43253	1.37807	1.49639	1.27442	1.26303	1.22676	-	1.150	1.34521	7.962	(Conc=20.
bis(2-chloroisopropyl)Ether	3.01043	3.15266	3.28288	3.04552	2.76001	2.64808	-	1.096	2.98325	8.007	
N-Nitroso-Di-n-Propylamine	1.21098	1.18021	1.07701	1.14158	1.04046	.96920	-	1.151	1.10324	8.268	**
Hexachloroethane	.72027	.61112	.50654	.48311	.48954	.40950	-	1.145	.53668	20.652	
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-	
Nitrobenzene	.60453	.51795	.52911	.52251	.49895	.48595	-	.849	.52650	7.872	
Nitrobenzene-d5	.41813	.45480	.43880	.42900	.43049	.38288	-	.844	.42568	5.709	
2-Nitrophenol	.24414	.24745	.24065	.22977	.23111	.20147	-	.919	.23243	7.193	*
Isophorone	.95694	.98339	.94650	.97342	.96725	.59603	-	.905	.90420	16.749	
bis(2-Chloroethoxy)methane	.58275	.59239	.55103	.51991	.51898	.43219	-	.959	.55287	10.897	
2,4-Dimethylphenol	.36325	.31840	.30354	.32713	.34817	.24234	-	.954	.31724	13.285	
Benzoic Acid	.19764	.18709	.20572	.19449	.17694	.15364	-	.989	.18592	9.996	
2,4-Dichlorophenol	.30321	.33655	.30816	.28304	.22503	.24387	-	.981	.28331	14.909	*
1,2,4-Trichlorobenzene	.37548	.37135	.34261	.31723	.30655	.27916	-	.991	.33207	11.436	
Naphthalene	1.09372	.96839	.89572	.82336	.76914	.66108	-	1.005	.86590	17.261	
4-Chloroaniline	.40001	.45371	.43537	.40811	.42762	.39760	-	1.025	.42040	5.289	
Hexachlorobutadiene	.22483	.20398	.19669	.18237	.16764	.15230	-	1.050	.18798	13.897	*

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 (**)

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/05/88~~ 9/20/88

Contract No: ----------

Minimum $\overline{RF}$ for SPCC is ---- Maximum % RSD for CCC is 30

Laboratory ID:	>S0074	>S0073	>S0077	>S0076	>S0075	>S0078	-				
	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-Chloro-3-Methylphenol	.37431	.41029	.42484	.45782	.44863	.38156	-	1.173	.42457	9.876	*
2-Methylnaphthalene	.61233	.57324	.52143	.48564	.46670	.41992	-	1.167	.51321	13.812	
Hexachlorocyclopentadiene	.25828	.31095	.34538	.34334	.34622	.28358	-	.860	.31462	11.825	**
2,4,6-Trichlorophenol	.29061	.39623	.46736	.48783	.48540	.38947	-	.886	.41948	18.267	*
2,4,5-Trichlorophenol	.61046	.65841	.65733	.58331	.48805	.35365	-	.905	.55954	21.183	
2-Fluorobiphenyl	1.25010	1.13488	1.11909	1.00349	.89980	.72471	-	.889	1.02201	18.454	
2-Chloronaphthalene	1.25935	1.26918	1.19639	1.07301	1.01434	.82979	-	.902	1.10701	15.335	
2-Nitroaniline	.58961	.66481	.69285	.66996	.65138	.58974	-	.929	.64273	6.781	
Dimethylphthalate	1.51307	1.51709	1.43272	1.28551	1.11245	.83275	-	.969	1.28226	20.983	
2,6-Dinitrotoluene	.39207	.43171	.41670	.39910	.37887	.32232	-	.980	.39013	9.756	
Acenaphthylene	2.06598	1.97943	1.79336	1.53600	1.33229	.95469	-	.973	1.61029	26.291	
3-Nitroaniline	.57052	.62991	.68268	.69474	.65659	.51772	-	1.002	.62536	11.087	
2,4-Dinitrophenol	.07807	.16817	.21422	.14795	.19211	.21957	-	1.020	.17001	30.947	**
Acenaphthene	1.32540	1.23722	1.12054	1.01295	.90087	.65213	-	1.007	1.04152	23.415	*
Dibenzofuran	1.74381	1.66979	1.58791	1.44596	1.35385	1.08883	-	1.033	1.48169	16.179	
2,4-Dinitrotoluene	.34024	.39892	.40110	.38091	.38245	.33117	-	1.046	.37380	8.135	
4-Nitrophenol	-	.41193	.23285	.32581	.44033	.26347	-	1.064	.33488	26.978	**
Fluorene	1.42739	1.17508	1.01166	.90445	.87647	.71500	-	1.092	1.01834	24.728	
Diethylphthalate	1.49732	1.29253	1.10944	.89978	.72868	.53194	-	1.093	1.00995	35.618	
4-Chlorophenyl-phenylether	.68403	.68077	.60974	.47042	.32965	.19998	-	1.096	.49577	40.179	
4-Nitroaniline	.41105	.56190	.56540	.56450	.54876	.38962	-	1.112	.50687	16.378	
2,4,6-Tribromophenol	.08883	.36986	.34163	.38010	.40286	.36821	-	1.186	.32525	36.125	
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-	
Alpha-BHC	-	-	-	-	-	-	-	-	-	-	
Beta-BHC	-	-	-	-	-	-	-	-	-	-	
Gamma-BHC	-	-	-	-	-	-	-	-	-	-	
Delta-BHC	-	-	-	-	-	-	-	-	-	-	
Heptachlor	-	-	-	-	-	-	-	-	-	-	
Aldrin	-	-	-	-	-	-	-	-	-	-	
N-Nitrosodiphenylamine	.55758	.50833	.43736	.34051	.30153	.30956	-	.895	.40915	26.522	*

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 (**)

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 9/20/88 2 of

Contract No: ----------

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

Laboratory ID:	>S0074	>S0073	>S0077	>S0076	>S0075	>S0078	-				
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	.10972	.14996	.16854	.14555	.11401	.10277	-	.893	.13176	20.124	
4-Bromophenyl-phenylether	.25643	.24473	.22713	.20665	.19733	.25371	-	.942	.23100	10.767	
Hexachlorobenzene	.36292	.35319	.32781	.30195	.29498	.37713	-	.960	.33633	9.968	
Pentachlorophenol	-	.20566	.14180	.17053	.22718	.16599	-	1.041	.18223	16.618	*
Phenanthrene	1.12677	1.01692	.92402	.86090	.84660	1.12657	-	1.004	.98396	12.855	
Anthracene	1.21729	1.09941	.97793	.87462	.82261	.98869	-	1.011	.99679	14.526	
Di-n-Butylphthalate	1.67100	1.60023	1.45907	1.36756	1.35620	1.70126	-	1.092	1.52639	10.010	
4,4'-Dibromobiphenyl	2.70238	1.97277	1.68644	1.44774	1.32161	1.58752	-	1.133	1.78641	28.034	
Fluoranthene	1.30239	1.20480	1.09659	.99312	.94113	1.20626	-	1.169	1.12405	12.355	*
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-	
Endosulfan I	-	-	-	-	-	-	-	-	-	-	
4,4'-DDE	-	-	-	-	-	-	-	-	-	-	
Dieldrin	-	-	-	-	-	-	-	-	-	-	
Endrin	-	-	-	-	-	-	-	-	-	-	
4,4'-DDD	-	-	-	-	-	-	-	-	-	-	
Endosulfan II	-	-	-	-	-	-	-	-	-	-	
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-	
4,4'-DDT	-	-	-	-	-	-	-	-	-	-	
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-	
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-	
Benzidine	.06895	.03008	.22261	.08721	.21397	.30372	-	.873	.15442	69.605	
Pyrene	1.26366	1.27277	1.17455	1.18655	1.29167	1.21792	-	.877	1.23502	3.984	
Terphenyl-d14	.89901	.90362	.86547	.83763	.91224	.84897	-	.896	.87783	3.566	
Butylbenzylphthalate	.82842	.82905	.78112	.75123	.83717	.76412	-	.951	.79852	4.700	
3,3'-Dichlorobenzidine	.22155	.23761	.32496	.15367	.23542	.21082	-	1.000	.23071	24.005	
Chrysene	1.29103	1.22273	1.10262	1.11300	1.17749	.97883	-	1.003	1.14763	9.449	
Benzo(a)Anthracene	1.14996	1.18246	1.12415	1.15549	1.28920	1.27657	-	.997	1.19631	5.825	
bis(2-Ethylhexyl)Phthalate	1.00511	.99581	.89415	.85897	.93075	.83516	-	1.013	.91999	7.639	
Di-n-octylphthalate	1.87459	1.78734	1.79897	1.66318	1.49194	1.29040	-	.917	1.65112	13.433	*
Benzo(a)Pyrene	1.09638	1.13296	1.08293	1.09994	1.07903	1.00321	-	.992	1.08341	3.997	*

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 (**)

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: ~~10/06/88~~ 9/20/89 2nd

Contract No: ----------

Minimum $\overline{RF}$ for SPCC is Maximum % RSD for CCC is 25

Laboratory ID: >S0074 >S0073 >S0077 >S0076 >S0075 >S0078 -

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
Benzo(b)fluoranthene	1.25907	1.34692	1.45544	1.28614	1.38015	1.39526	-	.954	1.35383	5.361		
Indeno(1,2,3-cd)Pyrene	.94159	1.07634	1.07065	1.14402	1.18777	1.10233	-	1.179	1.08712	7.714		
Dibenzo(a,h)Anthracene	1.07959	1.16870	1.13624	1.14118	1.17651	1.06814	-	1.185	1.12894	4.015		
Benzo(k)fluoranthene	1.13328	1.09665	.82046	1.02181	.80994	.60794	-	.957	.91501	22.200		
Benzo(g,h,i)Perylene	.96103	1.04776	1.02868	1.04243	1.10179	1.00326	-	1.231	1.03082	4.569		

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 (++)

6B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

Lab Code: _____ Case No.: _____ SAS No.: _____ Job No.: 9/20/88

Sample No. (Standard): 25mg/L BNA STD Date Analyzed: 9/20/88

Lab File ID (Standard): S0073 Time Analyzed: 14:06

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	78859	9.39	306105	13.01	169640	18.53
UPPER LIMIT	157718		612210		339280	
LOWER LIMIT	39429		153053		84820	
EPA SAMPLE NO.						
01 SB081661-94 BLK MS	81335	9.39	325187	13.00	193426	18.52
02 SB081661-94 BLK MSD	88463	9.40	350195	13.01	205216	18.52
03 SB081662	78689	9.39	312016	13.00	187474	18.51
04 SB081661-94 BLK	76522	9.39	316188	12.99	183181	18.51
05						
06						
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20						
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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): 25mg/L BNA STD Date Analyzed: 9/20/88

Lab File ID (Standard): S0073 Time Analyzed: 14:06

Instrument ID: 1

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS4 (PRY) AREA #	RT
12 HOUR STD	318792	2318	315126	31.66	325830	37.35
UPPER LIMIT	637584		630252		651660	
LOWER LIMIT	15996		157563		162915	
EPA SAMPLE NO.						
01 8808166-9484ms	331569	23.18	370953	31.65	311850	37.33
02 " msd	349701	23.18	400052	31.65	349547	37.31
03 8808166-2	334102	23.16	354851	31.65	180004	37.31
04 8808166-9484	323090	23.17	350995	31.65	248076	37.31
05						
06						
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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 EMS SCI(9/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 9/19/88 11:53

Lab ID >BD919::SC Data Release Authorized By: Laura Kuck

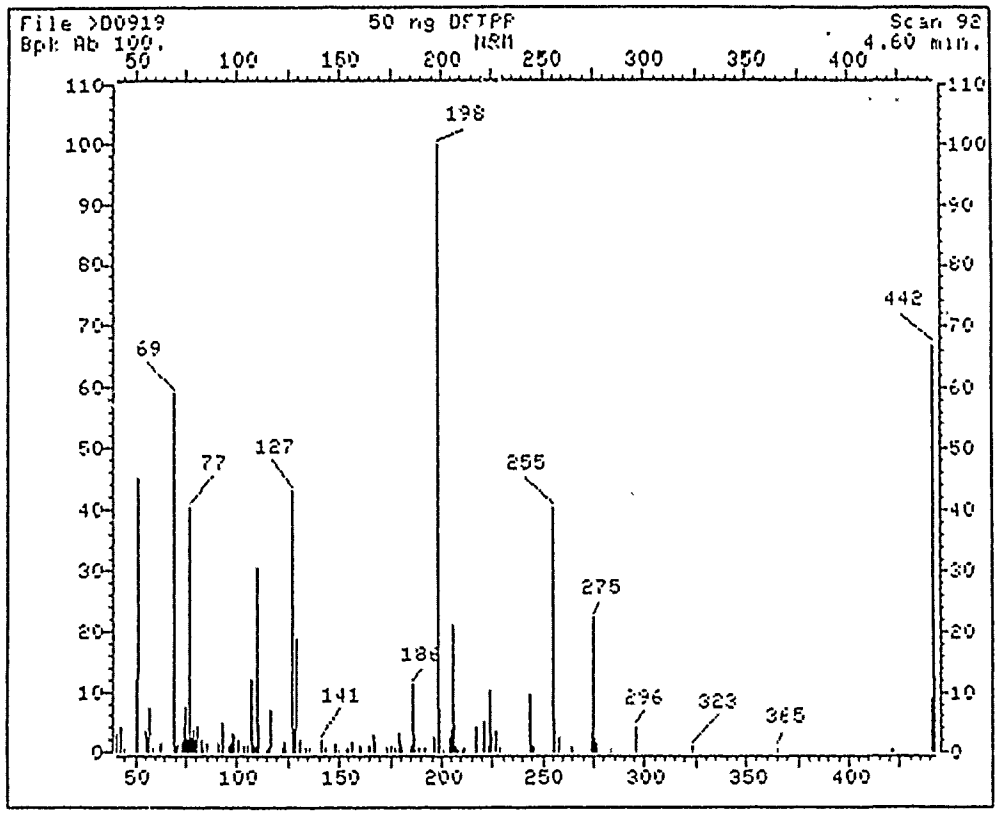
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	45.04 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	58.85	
70	less than 2.0% of mass 69	.70 OK	(1.197) #1
127	40.0 - 60.0% of mass 198	42.88 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base 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 SPoint

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

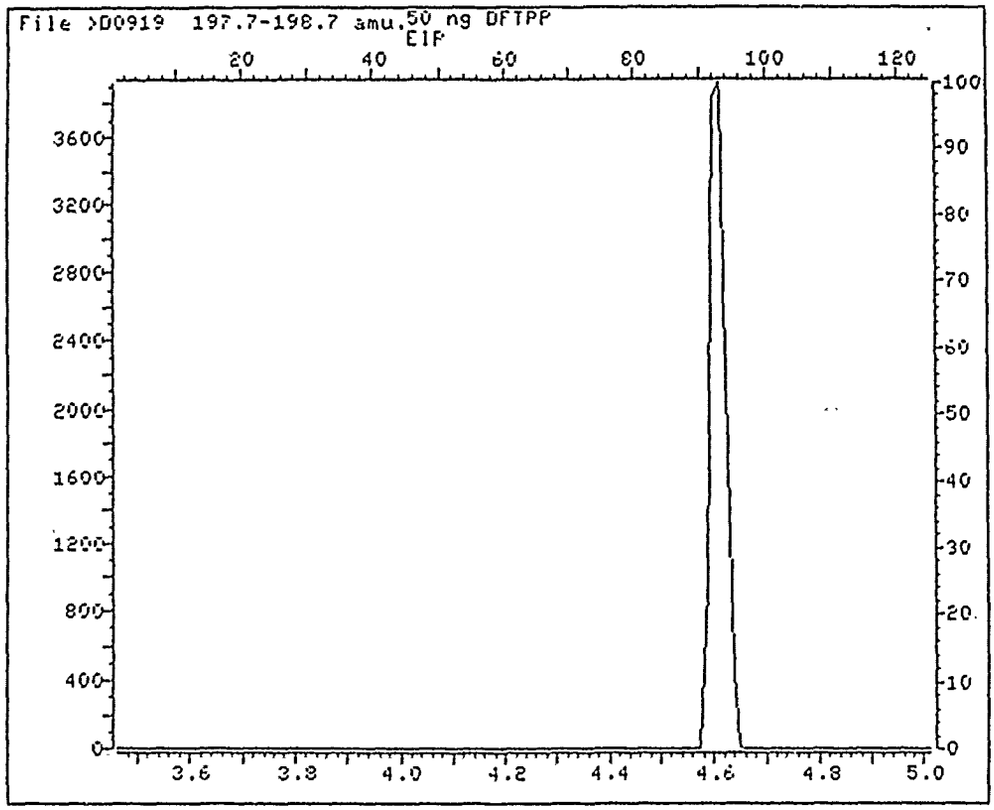
#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
25ng/µL AQM	>E5623	9/19/88	12:19	
88081693	>E5634	↓	22:56	SS ext, see ext 50264
88081694	>E5635	↓	23:50	SS ext, see ext 50265



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	1.171	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	261.90	.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	7.359	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	10.162	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: XE5623

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	1.19110	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 (**)

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 09/19/88

Contractor: _____ Time: 12:19

Contract No: _____ Laboratory ID:)ES623

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	.19068	.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 (**)

Continuing Calibration Check
HSL Compounds

Case No: ----------

Calibration Date: 09/?:.'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	1.10593	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	1.16574	1.39482	4.84		
Indeno(1,2,3-cd)Pyrene	.70560	.46815	33.65		
Dibenzo(a,h)Anthracene	.61885	.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: 9/19/88

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	17.41
UPPER LIMIT		155828		559298		301024	
LOWER LIMIT		38957		139824		75256	
EPA SAMPLE NO.							
ES634	01	88081693	97123	8.46	366041	11.97	207255	17.42
ES635	02	88081694	84433	8.47	324783	11.97	184340	17.41
	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 asteris

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: _____ Contract: _____

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

EPA Sample No.(Standard): _____ Date Analyzed: 9/19/88

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

Instrument ID: B

	IS4(PHN) AREA	#	RT	IS5(CRY) AREA	#	RT	IS4(PRY) AREA	#	RT
12 HOUR STD	~~271944~~ 256949		22.02	214569		30.41	169942		35.24
UPPER LIMIT	513898			429138			339884		
LOWER LIMIT	128474			107284			84971		
EPA SAMPLE NO.									
ES634 01	8308169 3		22.01	298279		30.40	165481		35.20
ES635 02	8808169 4		22.02	273392		30.42	174477		35.22
03									
04									
05									
06									
07									
08									
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15									
16									
17									
18									
19									
20									
21									
22									

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

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

Column used to flag internal standard area values with an asterisk

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:_____ Contract:_____

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

Instrument ID.:CARBOPAK_ Calibration Date(s):8/15/88____ _8/15/88___

LAB FILE ID: RRF10=31,40_____ RRF20=_32,41_____
RRF 50=_33,42____ RRF100=__34,43____ RRF200=_35,56_____

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzyl chloride	0.08	0.04	0.09	0.10	0.08	0.08	27.29
bis (2-choroethoxy) methane	0.03	0.03	0.05	0.04	0.06	0.04	31.04
bis (2-choroisopropyl 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	10.18
Bromodichloromethane	3.65	4.19	3.31	3.32	3.33	3.56	10.71
Bromoform	1.32	1.29	1.00	1.14	1.24	1.20	11.00
Bromomethane	0.23	0.10	0.11	0.21	0.25	0.18	39.04
Carbon tetrachloride	3.26	3.71	2.94	3.00	2.98	3.18	10.16
Chloroacetaldehyde	c.001	0.002	0.001	0.0005	0.0003	@.0005	ERR
Chlorobenzene	1.36	1.48	1.31	1.20	1.20	1.31	8.97
Chloroethane	0.45	0.49	0.34	0.32	0.34	0.39	19.52
Chloroform	5.12	5.34	4.11	4.14	3.95	4.53	14.29
1-Chorohexane	0.83	0.88	0.95	0.91	1.02	0.92	7.84
2-Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	0.04	31.04
Chloromethane	0.22	0.27	0.15	0.21	0.27	0.22	23.30
Chloromethyl methyl ether	0.12	0.21	0.22	0.16	0.15	0.17	24.46
o_,m_,& p_Chlorotoluenes	4.21	4.22	3.93	3.70	3.90	3.99	5.59
Dibromochloromethane	3.62	4.05	3.20	3.43	3.57	3.57	8.76
Dibromomethane	2.98	3.04	3.29	3.04	2.56	2.98	8.94
1,2_Dichlorobenzene	2.60	2.59	2.27	2.13	2.15	2.35	9.85
1,3_Dichlorobenzene	2.06	2.11	1.94	1.85	1.91	1.97	5.46
1,4_Dichlorobenzene	2.85	2.74	2.19	2.06	2.06	2.38	16.23
Dichlorodifluormethane	0.51	0.49	0.50	0.57	0.64	0.54	11.63
1,1_Dicuoroethane	2.31	2.50	1.99	1.97	1.98	2.15	11.26
1,2_Dichloroethane	2.03	2.33	2.31	2.28	2.30	2.25	5.45
1,1_Dichloroethylene	2.48	2.67	2.10	2.09	2.06	2.28	12.25
trans_1,2_dichloroethylene	1.65	1.88	1.56	1.56	1.56	1.64	8.41
Dichloromethane	15.07	8.65	2.90	2.72	2.52	6.37	86.34
1,2_Dichloropropane	2.80	2.17	1.82	1.77	1.74	2.06	21.62
1,3_Dichloropropylene	4.60	4.56	4.69	4.50	4.66	4.60	1.60
1,1,2,2_Tetrachloroethane	7.65	8.16	6.70	6.25	5.95	6.94	13.47
1,1,1,2_Tetrachloroethane	3.84	3.60	3.41	3.20	3.94	3.61	8.71
Tetrachloroethylene	7.65	8.16	6.70	6.25	5.95	6.94	13.49
1,1,1_Trichloroethane	2.25	2.44	2.14	2.11	2.12	2.21	6.29
1,1,2_Trichloroethane	4.60	4.56	4.69	4.50	4.66	4.60	1.64
Trichloroethylene	4.45	4.71	3.87	3.52	3.31	3.97	15.02
Trichlorofluormethane	2.06	2.18	1.73	1.77	1.75	1.90	10.80
Trichloropropane	4.47	3.74	3.60	3.29	2.83	3.59	16.85
Vinyl chloride	1.05	1.08	0.73	0.81	0.86	0.91	16.81

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:ENGINEERING SCIENCE_____ Contract:_____

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

Instrument ID.:CAR_____ Calibration Date(s):_8/15/88_____

LAB FILE ID: RRF 10 __31_____ RRF 20 __32_____
RRF 50=__33_____ RRF100=_____34_____ RRF200=____35_____

COMPOUND	RRF10	RRF20	RRF50	RRF100	RRF200	$\overline{RRF}$	%RSD
Benzene	4.42	3.72	4.83	4.35	3.93	4.25	10.21
Chlorobenzene	4.53	5.25	5.33	4.84	4.89	4.97	6.51
1,2_Dichlorobenzene	2.97	3.28	3.80	3.65	3.70	3.48	9.93
1,3_Dichlorobenzene	3.34	3.67	4.25	4.09	4.19	3.91	10.03
1,4_Dichlorobenzene	3.23	3.32	3.89	3.84	3.98	3.65	9.58
Ethyl Benzene	3.00	3.02	3.23	2.95	3.10	3.06	3.58
Toluene	3.98	3.76	3.79	3.32	3.23	3.61	8.95
Xylenes	15.17	11.30	11.64	10.17	9.95	11.65	17.99

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DATA PACKAGE #15

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ENGINEERING-SCIENCE, INC.

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

REVISED REPORT

Job No.: OR001

Work Order No.: 854

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 8-15-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081877	DANGB2-MW38-SS1	BA-I	8-13-88		9-18-88	
88081877	DANGB2-MW38-SS1	CD-I	8-13-88		9-16-88	
88081877	DANGB2-MW38-SS1	CR-I	8-13-88		9-16-88	
88081877	DANGB2-MW38-SS1	PB-I	8-13-88		9-23-88	
88081877	DANGB2-MW38-SS1	418.1	8-13-88	9-09-88	9-11-88	
88081877	DANGB2-MW38-SS1	MOIS	8-13-88		8-21-88	
88081877	DANGB2-MW38-SS1	8010	8-13-88		8-23-88	8-22-88
88081877	DANGB2-MW38-SS1	8020	8-13-88		8-23-88	8-23-88
88081877	DANGB2-MW38-SS1	8270	8-13-88	8-19-88	8-30-88	
88081878	DANGB2-MW38-SS2	BA-I	8-13-88		9-18-88	
88081878	DANGB2-MW38-SS2	CD-I	8-13-88		9-16-88	
88081878	DANGB2-MW38-SS2	CR-I	8-13-88		9-16-88	
88081878	DANGB2-MW38-SS2	PB-I	8-13-88		9-23-88	
88081878	DANGB2-MW38-SS2	418.1	8-13-88	9-09-88	9-11-88	
88081878	DANGB2-MW38-SS2	MOIS	8-13-88		8-21-88	
88081878	DANGB2-MW38-SS2	8010	8-13-88		8-23-88	8-22-88
88081878	DANGB2-MW38-SS2	8020	8-13-88		8-23-88	8-23-88
88081878	DANGB2-MW38-SS2	8270	8-13-88	8-19-88	8-30-88	
88081879	DANGB2-MW38-SS4	BA-I	8-13-88		9-18-88	
88081879	DANGB2-MW38-SS4	CD-I	8-13-88		9-16-88	
88081879	DANGB2-MW38-SS4	CR-I	8-13-88		9-16-88	
88081879	DANGB2-MW38-SS4	PB-I	8-13-88		9-23-88	
88081879	DANGB2-MW38-SS4	418.1	8-13-88	9-09-88	9-11-88	
88081879	DANGB2-MW38-SS4	MOIS	8-13-88		8-21-88	
88081879	DANGB2-MW38-SS4	8010	8-13-88		8-23-88	8-23-88
88081879	DANGB2-MW38-SS4	8020	8-13-88		8-23-88	8-23-88
88081879	DANGB2-MW38-SS4	8270	8-13-88	10-18-88	10-27-88	

* If applicable

ANALYSIS REPORT

JORK ORDER NUMBER: 854
IOB NUMBER : ZB0000000440
JORK ORDER DATE : 08/15/88

APPROVED BY _____
Lab Supervisor

'EPORT DATA:
:S OAK RIDGE/DULUTH ANGB
'10 S. ILLINOIS AVE. STE. S103
IAK RIDGE, TN 37830
SILL 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

TASK: 2, UNITS: mg/Kg

	DANGB2-MW38-SS1	DANGB2-MW38-SS2	DANGB2-MW38-SS4
'EST COMPOUND	88081877	88081878	88081879
ICID DIG SOIL	NA	NA	NA
BARIUM	69.2	50.1	40.2
:ADMIUM	3.22*N	12.0*N	6.31*N
:HROMIUM	33.1	26.5	20.9
LEAD	8.0S	3.6	4.5S

:A - Not Analyzed

'ID - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 854
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/15/88

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: 5, UNITS: mg/Kg

TEST COMPOUND	DANGB2-MW38-SS1 88081877	DANGB2-MW38-SS2 88081878	DANGB2-MW38-SS4 88081879
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100
% MOISTURE	13.1	10.8	9.6

ND - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 054
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/15/88

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 # : 3R001
CONTACT : BILL HAYDEN
(615)-481-3920

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

TEST COMPOUND	DANGB2-MW38-SS1 88081877	DANGB2-MW38-SS2 88081878	DANGB2-MW38-SS4 88081879
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	0.08B	ND	0.2B
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	6.1B	6.5B	6.3B
1,2-DICHLOROPROPANE	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 854

TEST COMPOUND	DANGB2-MW38-SS1 88081877	DANGB2-MW38-SS2 081878	DANGB2-MW38-SS4 88081879
1,3-DICHLOROPROPYLENE	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

WORK ORDER NUMBER: 854
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/15/88

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-MW38-SS1	DANGB2-MW38-SS2	DANGB2-MW38-SS
TEST COMPOUND	88081877	88081878	88081879
BENZENE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
ETHYL BENZENE	ND	ND	ND
TOLUENE	12	8.8	105
XYLENES	ND	ND	ND

ND - Not Detected

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

Date Received: August 15, 1988
Date Reported: October 7, 1988

Work Order: 854
Job Number: OR00[illegible]

FOR: ES:Oak Ridge/Duluth ANGB
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN [illegible]'830

ATTN: Mr. Bill Hayden

Lab Number:	88081877	88081878
Sample No.:	DANGB2-MW38-SS1	DANGB2-MW38-SS2
Date Sampled:	8-13-88	8-13-89
Time Sampled:	09:10	09:10
Date Extracted:	8-19-88	8-19-88
Date Analyzed:	8-30-88	8-30-88
Percent Moisture:	13	11

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 15, 1988 Work Order: 854
Date Reported: October 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:	88081877	88081878
Sample No.:	DANGB2-MW38-SS1	DANGB2-MW38-SS2
Date Sampled:	8-13-88	8-13-88
Time Sampled:	09:10	09:10
Date Extracted:	8-19-88	8-19-88
Date Analyzed:	8-30-88	8-30-88
Percent Moisture:	13	11

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

Date Received: August 15, 1988
Date Reported: October 7, 1988

Work Order: 854
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:	88081877	88081878
Sample No.:	DANGB2-MW38-SS1	DANGB2-MW38-SS2
Date Sampled:	8-13-88	8-13-88
Time Sampled:	09:10	09:10
Date Extracted:	8-19-88	8-19-88
Date Analyzed:	8-30-88	8-30-88
Percent Moisture:	13	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
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 15, 1988
Date Reported: October 7, 1988

Work Order: 854
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:	88081877	88081878
Sample No.:	DANGB2-MW38-SS1	DANGB2-MW38-SS2
Date Sampled:	8-13-88	8-13-88
Time Sampled:	09:10	09:10
Date Extracted:	8-19-88	8-19-88
Date Analyzed:	8-30-88	8-30-88
Percent Moisture:	13	11

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 15, 1988
Date Reported: October 7, 1988

Work Order: 854
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:	88081877	88081878
Sample No.:	DANGB2-MW38-SS1	DANGB2-MW38-SS2
Date Sampled:	8-13-88	8-13-88
Time Sampled:	09:10	09:10
Date Extracted:	8-19-88	8-19-88
Date Analyzed:	8-30-88	8-30-88
Percent Moisture:	13	11

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.

Priority Pollutant Analysis
Base Neutrals - SW 8270
Matrix: Soil

ıte Received: August 15, 1988 Work Order: 854
ıte Reported: November 17, 1988 Job Number: OR001

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

ıb Number:	88081879RE
ımple No.:	DANGB2-MW38-SS4
ıte Sampled:	8-13-88
.me Sampled:	09:40
ıte Extracted:	10-18-88
ıte Analyzed:	10-27-88
ercent Moisture:	10

)mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
,3-Dichlorobenzene	330	ND
,4-Dichlorobenzene	330	ND
exachloroethane	330	ND
:s(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
:trobenzene	330	ND
sophorone	330	ND
ıphthalene	330	ND
:s(2-chloroethoxy)methane	330	ND
-Chloronaphthalene	330	ND
exachlorocyclopentadiene	330	ND
:enaphthylene	330	ND
:enaphthene	330	ND
:methyl phthalate	330	ND
,6-Dinitrotoluene	330	ND
.uorene	330	ND
,4-Dinitrotoluene	330	ND
ıethyl phthalate	330	ND
-Nitrosodiphenylamine	330	ND
exachlorobenzene	330	ND

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

ate Received: August 15, 1988 Work Order: 854
ate Reported: November 17, 1988 Job Number: OR001

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

ab Number:	88081879RE
ample No.:	DANGB2-MW38-SS4
Date Sampled:	8-13-88
ime Sampled:	09:40
ate Extracted:	10-18-88
Date Analyzed:	10-27-88
Percent Moisture:	10

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
Phenanthrene	330	ND
nthracene	330	ND
ibutyl phthalate	330	ND
luoranthene	330	ND
4-Chlorophenyl phenyl ether	330	ND
yrene	330	ND
utyl Benzyl phthalate	330	ND
Bis(2-ethylhexyl) phthalate	330	ND
hrysene	330	ND
-Bromophenyl phenyl ether	330	ND
Benzo(a)anthracene	330	ND
i-n-octylphthalate	330	ND
enzo(b)fluoranthene	330	ND
enzo(k)fluoranthene	330	ND
Benzidine	2000	ND
,3'-Dichlorobenzidine	660	ND
enzo(a)pyrene	330	ND
Indeno(1,2,3-cd)pyrene	330	ND
ibenzo(a,h)anthracene	330	ND
enzo(ghi)perylene	330	ND
Benzyl Alcohol	660	ND

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

ıte Received: August 15, 1988
ıte Reported: November 17, 1988

Work Order: 854
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ıb Number:	88081879RE
ımple No.:	DANGB2-MW38-SS4
ıte Sampled:	8-13-88
ıme Sampled:	09:40
ıte Extracted:	10-18-88
ıte Analyzed:	10-27-88
ɛrcent Moisture:	10

ɔmpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
ɛetophenone	--*	ND
ıiline	--*	ND
-Aminobiphenyl	--*	ND
-Chloroaniline	660	ND
-Chloronaphthalene	--*	ND
ıbenzofuran	330	ND
-Dimethylaminoazobenzene	--*	ND
,12-Dimethylbenz(a)anthracene	--*	ND
-,a-Dimethylphenethylamine	--*	ND
ıphenylamine	--*	ND
,2-Diphenylhydrazine	--*	ND
ɛhyl methanesulfonate	--*	ND
-Methylcholanthrene	--*	ND
ɛthyl 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
ɛntachlorobenzene	--*	ND
ɛntachloronitrobenzene	--*	ND
ıenacetin	--*	ND
-Picoline	--*	ND
ɾonamide	--*	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

ate Received: August 15, 1988
ate Reported: November 17, 1988

Work Order: 854
Job Number: OR001

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

ATTN:Mr. Bill Hayden

ab Number:	88081879RE
ample No.:	DANGB2-MW38-SS4
Date Sampled:	8-13-88
ime Sampled:	09:40
ate Extracted:	10-18-88
Date Analyzed:	10-27-88
Percent Moisture:	10

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

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

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

ıte Received: August 15, 1988
ıte Reported: November 17, 1988

Work Order: 854
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ıb Number:	88081879RE
ımple No.:	DANGB2-MW38-SS4
ıte Sampled:	8-13-88
ıme Sampled:	09:40
ıte Extracted:	10-18-88
ıte Analyzed:	10-27-88
ercent Moisture:	10

ɔmpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	
-Nitrophenol	330	ND	
ıenol	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	
ɛntachlorophenol	1600	ND	
-Nitrophenol	1600	ND	
ɛnzoic Acid	1600	ND	
-Methylphenol	330	ND	
- & 4-Methylphenol	330	ND	
3,4,6-Tetrachlorophenol	--*	ND	
4,5-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 ırrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

854

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

SAMPLER(S): (Signature) Kimberly Z. Davis, Mike Rodolf, 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	SW8030	SW3270	EPA 418.1	SW8010, 7191	SW7131, 7421	REMARKS
8-13-88	0910	DANGB2-MW38-SS1	1	X						
8-13-88	0910	DANGB2-MW38-SS1	1			X	X	X	X	SW8010 is for Benzene only.
8-13-88	0910	DANGB2-MW38-SS2	1	X						
8-13-88	0910	DANGB2-MW38-SS2	1			X	X	X	X	" "
8-13-88	0940	DANGB2-MW38-SS4	1	X						
8-13-88	0940	DANGB2-MW38-SS4	1			X	X	X	X	" "

005

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly Z. Davis	8-13-88 1300				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathie C. Kida	8-15-88 0730	Rec'd cold & intact

Coordinator Field Files

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Total 1	Total 17	Total	

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1006

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081877-88081879
WORK ORDER NO.: 854

These soil samples were received at the ES Berkeley Laboratory on 8-15-88. They were received cold and intact.

1F

EPA SAMPLE NO.

BLANK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 854 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808706-709, 877-87 BLANK

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0069

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 8/19/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 9/16/88

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	3.96	140	
2.			4.08	290	
3.			4.15	400	
4.			4.35	2100	
5.			5.14	3300	
6.			5.28	150	
7.			5.36	480	
8.			5.58	1500	
9.			11.40	110	
10.			12.97	520	
11.	57-10-3	Hexadecanoic acid	25.27	410	
12.	57-11-4	Octadecanoic acid	27.71	140	
13		unknown	27.96	160	
14.			30.05	190	
15.			30.12	500	
16.			30.52	150	
17.			32.27	210	
18.			35.12	360	
19.			35.18	1080	
20.			38.26	9200	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN6B2-
mw38-351

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 854 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081877

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5546

Level: (low/med) low DOD 7/1/89 Date Received: 8/15/88

% Moisture: not dec. 13 dec. _____ Date Extracted: 8/19/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/30/88

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

Number TICs found: 15 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.64	1100	
2.			3.97	420	
3.			4.40	840	
4.			4.72	540	
5.			5.13	2100	
6.			5.60	50,000	
7.			6.81	1200	
8.			23.94	380	
9.			20.07	960	
10.	57-10-3	Hexadecanoic acid	20.69	1300	
11.	57-11-4	Octadecanoic acid	27.05	770	
12.		unknown	29.39	4600	
13.			29.45	5000	
14.			30.10	840	
15.			36.77	2900	
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN6B2-
MW38-552

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 854 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081878

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5547

Level: (low/med) low Date Received: 8/15/88

% Moisture: not dec. 10.8 dec. _____ Date Extracted: 8/19/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/30/88

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	3.13	1900	
2.			3.87	410	
3.			3.96	1200	
4.			4.44	1600	
5.			4.70	710	
6.			4.85	450	
7.			5.14	1700	
8.			5.62	52,000	
9.			6.82	1200	
10.	57-10-3	Hexadecanoic acid	24.56	600	
11.		unknown	25.97	670	
12.	57-11-4	Octadecanoic acid	27.05	860	
13.		unknown	27.28	410	
14.			29.40	5200	
15.			29.45	5100	
16.			30.94	560	
17.			34.05	740	
18.			36.73	3400	
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.: ~~884~~ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081693-93 1879 BLANK

Sample wt/vol: 30 (g/mL) gm Lab File ID: 50263

Level: (low/med) low Date Received: —

% Moisture: not dec. ✓ dec. _____ Date Extracted: 10/18/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/27/88

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

Number TICs found: 12 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.12	130	
2.		↓	4.30	830	
3.		↓	4.49	130	
4.		unknown alkene mol.wt. 98	5.03	1900	
5.		unknown	5.24	830	
6.		↓	5.38	200	
7.		↓	5.50	130	
8.		↓	5.98	14,000	
9.		↓	7.20	370	
10.	57-10-3	hexadecanoic acid	25.15	570	
11.		unknown	29.95	1100	
12.		unknown	34.95	470	
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN6B2-
mw38-SS4

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 854 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081879 REX

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0262

Level: (low/med) low Date Received: 8/15/88

% Moisture: not dec. 9.6 10 dec. _____ Date Extracted: 10/18/88
DAD 3/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/27/88

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

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.03	240	
2.			5.03	920	
3.			5.36	270	
4.			5.54	1500	
5.			6.00	19,000	
6.			7.26	600	
7.	57-10-3	Hexadecanoic acid	25.17	1300	
8.		unknown	29.94	670	
9.			34.94	520	
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
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27.					
28.					
29.					
30.					

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081877-88081879
Samples No.: 88081883-88081890
Samples No.: 88081938-88081942
Samples No.: 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

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):
88081877-88081879, 88081883-88081890
88081938-88081942, 88082000-88082002

QC Report No: ICP-S-0027-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-15-88
Date Reported: 10-13-88
Dilution Factor: NA
%Moisture: 9.6

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	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	150N	
Chromium	88081879	88081879	9-16-88	9-09-88	6010	<1.0	20.9	22.7	8	22.1	20.9	47.0	118	

10/14

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* See Legend attached.
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):
88081877-88081879, 88081883-88081890
88081898-88081900

QC Report No: AAF-S-0027-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-15-88
Date Reported: 10-10-88
DDilution Factor: NA
%Moisture: 9.6

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
Lead	88081879	88081879	9-21-88	9-17-88	7421	<0.5	2.81	2.52	11	5.53	2.81	7.43	84	

1015

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):
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	

1016

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:

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.

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.: OR091

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:

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

1018

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: 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.
59	8-23-88	VGC	Carbopack	75-09-2	Dichloromethane	5.8	0.5	88081877-88081889
				67-66-3	Chloroform	0.1	0.05	
93	8-25-88	VGC	Carbopack	75-09-2	Dichloromethane	9.3	0.5	88081890

1019

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):
88081706-88081709, 88081877-88081879

QC Report No: BNA-S-0029-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-09-88
Date Prepared: 8-19-88
Date Analyzed: 8-30-88
Date Reported: 10-03-88
Dilution Factor: NA
%Moisture: 12.2

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
	1,2,4-Trichlorobenzene	3790	ND	1800	47	1660	44	8	23	38-107
B/N	Acenaphthene	3790	ND	1830	48	1840	49	1	19	31-137
Laboratory	2,4-Dinitrotoluene	3790	ND	1660	44	1710	45	3	47	28-89
Sample #	Pyrene	3790	ND	2950	78	2860	75	3	36	35-142
88081706	N-Nitroso-di-n-Propylamine	3790	ND	2570	68	1990	52	25	38	41-126
	1,4-Dichlorobenzene	3790	ND	1150	30	970	26*	17	27	28-104
	Pentachlorophenol	7580	ND	4570	60	4140	55	10	47	17-109
ACID	Phenol	7580	ND	4150	55	4220	56	2	35	26-90
Laboratory	2-Chlorophenol	7580	ND	3380	46	3180	42	6	50	25-102
Sample #	4-Chloro-3-Methylphenol	7580	ND	4120	54	4310	57	4	33	26-103
88081706	4-Nitrophenol	7580	ND	4740	63	5360	71	12	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):
88081706-88081709, 88081877-88081879

QC Report No: BNA-S-0029-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-19-88
Date Analyzed: 9-20-88
Date Reported: 10-07-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

R W Burton

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%Recovery
	1,2,4-Trichlorobenzene	3330	ND	1730	52	1670	50	4	23	38-107
B/N	Acenaphthene	3330	ND	1830	55	1650	50	10	19	31-137
Laboratory	2,4-Dinitrotoluene	3330	ND	2180	65	1870	56	15	47	28-89
Sample #	Pyrene	3330	ND	2150	65	1830	55	16	36	35-142
Blank	N-Nitroso-di-n-Propylamine	3330	ND	2550	77	2290	69	11	38	41-126
	1,4-Dichlorobenzene	3330	ND	1230	37	1450	44	16	27	28-104
	Pentachlorophenol	6670	ND	4770	72	3870	58	21	47	17-109
ACID	Phenol	6670	ND	4050	61	3500	52	15	35	26-90
Laboratory	2-Chlorophenol	6670	ND	3330	50	3100	46	7	50	25-102
Sample #	4-Chloro-3-Methylphenol	6670	ND	440	66	3790	57	15	33	26-103
Blank	4-Nitrophenol	6670	ND	5540	83	4800	72	14	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.: BNA-S-0029-88

Analysis of duplicate matrix spike sample for this batch showed one recovery below the EPA limits. A pair of spiked blanks were analyzed and 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: 12-08-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5540	8-30-88	BNA	2	-	None Found	-	-	88081877-88081879 88081706-88081709
S0263	10-27-88	BNA	1	-	None Found	-	-	88081879Re

1023

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 04-12
Lab File ID: 50263
Matrix: Soil
Level (low/med):
Date Analyzed: 10-27-88
Time Analyzed: 21.15
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
ANGBQ-MW13-SS3	88081693 Rex	50264	10-27-88
↓ SS4	88081694 Rex	50265	10-27-88
ANGBQ-MW38-SS4	88081879 Rex	50262	10-27-88

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):
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: 6.3
%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	

1025

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

QC Report No: TPH-S-0045-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-09-88
Date Analyzed: 9-11-88
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	720	72	650	65	10	

1026

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 9/14/88 10:52

Lab ID >T0914::01 Data Release Authorized By: _____ 9/14/88

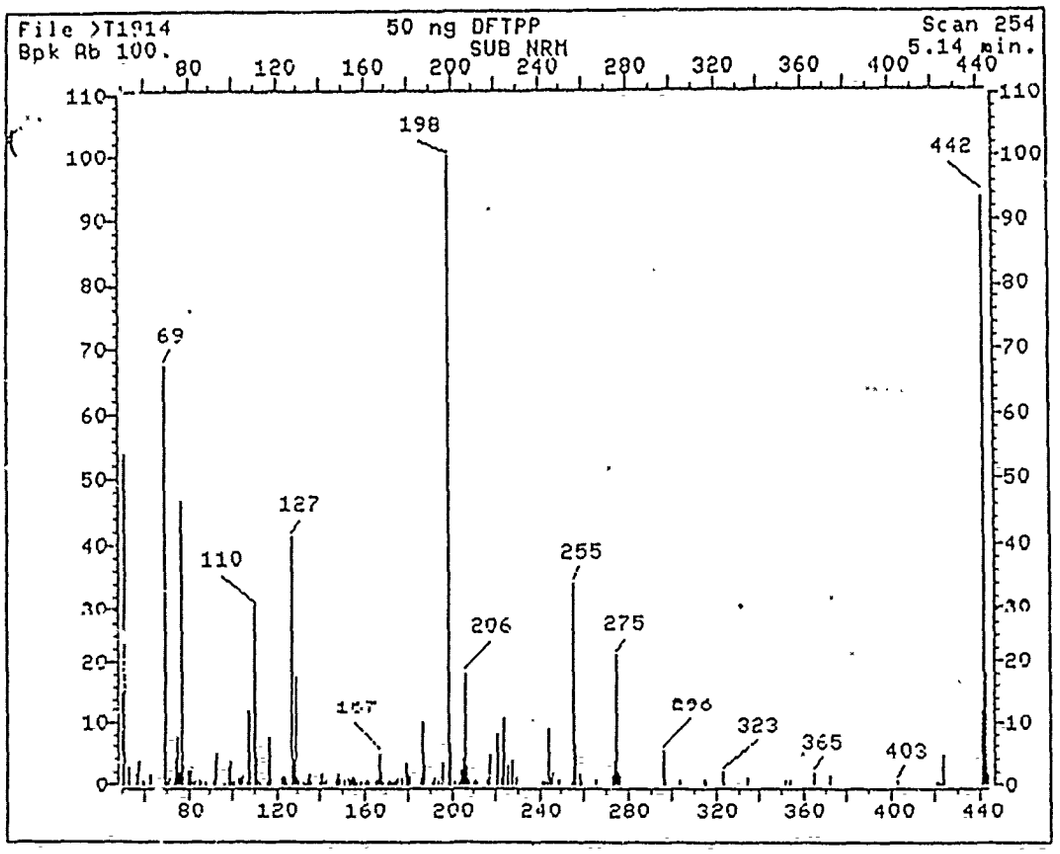
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	47.49 OK	
68	less than 2.0% of mass 69	.0.00 OK	(0.00) #1
69	mass 69 relative abundance	57.60	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	40.69 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peal, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.93 OK	
275	10.0 - 30.0% of mass 198	21.73 OK	
365	greater than 1.00% of mass 198	2.24 OK	
441	present, but less than mass 443	13.00 OK	
442	greater than 40.0% of mass 198	95.64 OK	
443	17.0 - 23.0% of mass 442	19.07 OK	(19.94) #2

initial calibration
all 5 files
9/14/88 - 9/16/88

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
~~DFTPP~~ SSTD025	S0036	9-14-88	14:25
SSTD040	S0037	"	15:58
SSTD060	S0038	"	16:57
SSTD080	S0039	"	17:56
SSTD120	S0040	"	18:56
SSTD010	S0041	"	19:56
8808 1879	S0042	"	20:56
8808 1661-94 BLK	S0044	"	22:55
8808 1661	S0045	"	23:54
8808 1661 MS	S0046	9-15-88	00:53



File: >T1914 Scan #: 254 Retn. time: 5.14

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
50.00	14.871	100.05	.520	146.95	1.248	190.80	.458	253.90	.520
51.00	53.806	100.95	.666	147.95	1.893	191.10	.395	255.00	33.923
52.10	2.849	102.95	1.082	149.05	.853	192.10	1.040	256.00	6.385
53.10	.062	104.05	1.102	151.15	.811	194.00	.603	257.90	1.809
56.10	1.851	105.05	1.373	153.05	1.123	196.00	3.390	258.90	.603
57.10	3.681	106.15	.437	153.95	.666	198.00	100.000	265.00	.728
59.10	.811	107.05	11.710	155.05	1.414	199.00	6.448	273.00	1.394
60.05	.291	108.05	2.165	155.95	1.186	201.50	.395	274.00	3.785
62.95	1.851	110.05	30.304	156.85	.187	202.80	.354	275.00	20.923
65.05	.790	111.05	4.139	157.05	.562	204.10	2.329	276.00	2.225
65.85	.312	112.05	.749	158.05	.374	205.00	4.264	276.90	1.373
69.05	67.388	113.05	.458	160.15	.541	206.10	18.136	296.05	5.449
70.15	.333	115.85	.853	161.05	.624	207.10	2.974	296.95	.853
71.15	.936	117.05	7.562	161.95	.458	208.00	.894	303.05	.686
73.05	.062	118.05	.292	164.95	.894	210.00	.520	315.05	.749
74.05	4.097	122.05	1.019	166.05	.832	210.70	.707	315.95	.354
75.05	7.467	122.95	1.310	166.25	.853	211.00	.790	323.05	1.997
76.15	2.080	124.05	1.082	166.95	4.929	211.70	.478	324.05	.166
77.05	46.631	125.05	.104	167.95	2.059	216.10	.728	334.05	1.123
78.05	3.286	127.05	41.202	168.95	.562	217.00	4.971	351.95	.832
79.05	2.392	128.05	3.691	170.65	.520	221.00	7.800	353.95	.707
80.05	2.579	129.05	17.804	171.15	.749	223.00	1.144	364.95	1.893
81.95	2.662	130.05	1.414	171.95	.832	224.00	10.691	371.95	1.331
82.15	.478	130.95	.666	172.65	.333	225.00	2.995	402.75	.603
83.05	.707	132.15	.541	173.05	.541	227.00	3.806	420.90	.374
85.05	.707	133.05	.250	173.95	.728	228.90	.978	421.70	.270
85.85	.333	134.05	.936	175.05	1.165	240.90	.520	422.00	.250

Initial Calibration Data
HSL Compounds:

Case No: ---------- Instrument ID: 1

Contractor: ENGINEERING-SCIENCE Calibration Date: 09/15/80

Contract No: ----------

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

Laboratory ID:	>S0041	>S0036	>S0037	>S0038	>S0039	>S0040	-					
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	1.09721	1.14017	1.15119	1.11240	1.10427	1.08633	-	.440	1.11526	2.269		
2-Fluorophenol	.96261	1.33635	1.11775	1.00958	.94622	.87893	-	.689	1.04191	15.800		
bis(2-Chloroethyl)ether	1.50310	1.48799	1.44982	1.46095	1.44478	1.37708	-	.944	1.45395	3.019		
Phenol	1.43064	2.02718	1.71411	1.51869	1.42260	1.35564	-	.928	1.57814	16.008	*	
Phenol-d5	1.34706	1.71894	1.52151	1.48256	1.37793	1.23283	-	.924	1.44681	11.623		
Aniline	1.78870	1.18980	1.29112	.97782	1.26694	1.27156	-	.921	1.29766	20.583		
2-Chlorophenol	1.21966	1.44979	1.34093	1.31601	1.26084	1.15274	-	.951	1.29000	8.014		
1,3-Dichlorobenzene	1.60163	1.51366	1.39594	1.27256	1.18112	1.05726	-	.989	1.33703	15.380		
1,4-Dichlorobenzene	1.55181	1.46601	1.33853	1.19043	1.09889	.96280	-	1.005	1.26809	17.721	*	
Benzyl Chloride	-	-	-	-	-	-	-	-	-	-		
Benzyl Alcohol	-	.26381	.48958	.48539	.45063	.57274	-	1.061	.45243	25.327		
1,2-Dichlorobenzene	1.57084	1.46547	1.34430	1.13650	1.05162	1.04638	-	1.056	1.26918	17.609		
2-Methylphenol	.73499	1.42258	1.29968	1.15623	1.03700	.81430	-	1.092	1.07746	25.003		
3-&-4-Methylphenol	.91642	1.26447	1.15394	.92319	.88652	.86615	-	1.143	1.00178	16.542		(Conc=2
bis(2-chloroisopropyl)Ether	3.41760	3.19343	3.21422	3.28284	3.20717	2.99133	-	1.098	3.21777	4.310		
N-Nitroso-Di-n-Propylamine	1.31403	1.19059	1.18288	1.24608	1.20172	1.08468	-	1.151	1.20333	6.301		**
Hexachloroethane	.69852	.67071	.58254	.46303	.43481	.36153	-	1.146	.53519	25.445		
Dibromochloropropane	-	-	-	-	-	-	-	-	-	-		
Nitrobenzene	.51131	.49266	.48057	.46463	.47521	.45509	-	.848	.47991	4.189		
Nitrobenzene-d5	.41027	.42595	.41646	.41142	.42568	.40672	-	.843	.41608	1.961		
2-Nitrophenol	.21462	.23947	.22776	.21945	.21686	.19619	-	.918	.21906	6.585	*	
Isophorone	.96480	.97932	.89556	.84665	.94751	.85015	-	.904	.91400	6.365		
bis(2-Chloroethoxy)methane	.58779	.57811	.55405	.53349	.49376	.43216	-	.960	.52989	11.046		
2,4-Dimethylphenol	.16877	.30193	.24541	.21338	.17752	.25460	-	.939	.22693	22.242		
Benzoic Acid	.22630	.27445	.28300	.29962	.17611	.18709	-	.984	.24110	21.674		
2,4-Dichlorophenol	.23367	.31254	.29333	.24871	.21789	.17388	-	.977	.24667	20.525	*	
1,2,4-Trichlorobenzene	.36693	.36487	.33698	.30391	.30546	.27919	-	.991	.32622	10.974		
Naphthalene	1.03622	.97506	.88510	.78213	.78000	.66573	-	1.005	.85404	16.133		
4-Chloroaniline	.45923	.43277	.43753	.41298	.42782	.41741	-	1.025	.43129	3.826		
Hexachlorobutadiene	.22575	.21297	.19800	.18278	.17787	.15969	-	1.051	.19284	12.573	*	

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: 09/15/88 (9/15/88)

Contract No: ----------

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

Laboratory ID:	>S0041	>S0036	>S0037	>S0038	>S0039	>S0040	-					
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	.17877	.38840	.32062	.29173	.28029	.26956	-	1.152	.28823	23.780	*	
2-Methylnaphthalene	.57617	.54761	.50639	.46982	.46008	.42357	-	1.168	.49727	11.521		
Hexachlorocyclopentadiene	.21015	.23450	.39665	.40273	.36621	.30966	-	.860	.31998	25.899		**
2,4,6-Trichlorophenol	.28824	.41996	.38130	.35667	.31839	.27886	-	.875	.34057	16.221	*	
2,4,5-Trichlorophenol	.25201	.54760	.35818	.37836	.35615	.33777	-	.881	.37168	26.053		
2-Fluorobiphenyl	1.15651	1.12297	1.08613	1.05631	.96304	.80874	-	.889	1.03228	12.398		
2-Chloronaphthalene	1.23233	1.18816	1.16133	1.12293	1.03895	.86102	-	.902	1.10079	12.215		
2-Nitroaniline	.57638	.61414	.63914	.67560	.65575	.59883	-	.928	.62664	5.910		
Dimethylphthalate	1.40654	1.43036	1.43776	1.37354	1.22974	.92600	-	.969	1.30066	15.282		
2,6-Dinitrotoluene	.34455	.39646	.40669	.40935	.37643	.32497	-	.980	.37641	9.252		
Acenaphthylene	1.90766	1.83492	1.80814	1.62874	1.42821	1.01731	-	.973	1.60416	20.917		
3-Nitroaniline	.69204	.66138	.64280	.68350	.69438	.59170	-	1.000	.66097	5.944		
2,4-Dinitrophenol	.07940	.20164	.22324	.25613	.25296	.24266	-	1.018	.20934	31.930		**
Acenaphthene	1.23187	1.13624	1.12539	1.04075	.95489	.72102	-	1.006	1.03503	17.402	*	
Dibenzofuran	1.64017	1.57918	1.55711	1.48443	1.36954	.79190	-	1.033	1.40372	22.352		
2,4-Dinitrotoluene	.30407	.35058	.36624	.38295	.36718	.31591	-	1.045	.34782	8.989		
4-Nitrophenol	-	.19463	.18087	.17532	.16046	.15061	-	1.038	.17238	10.014		**
Fluorene	1.33517	1.13672	1.02280	.98061	.90061	74281	-	1.092	1.01979	19.885		
Diethylphthalate	1.42587	1.21608	1.14294	.99780	.83486	.52719	-	1.094	1.02412	30.749		
4-Chlorophenyl-phenylether	.66711	.63491	.60929	.52523	.41565	.23279	-	1.096	.51416	32.079		
4-Nitroaniline	.45883	.50651	.55403	.58683	.54654	.46008	-	1.110	.51880	10.138		
2,4,6-Tribromophenol	.04558	.31239	.23229	.22985	.23320	.22561	-	1.138	.21315	41.504		
1,2-Diphenylhydrazine	-	-	-	-	-	-	-	-	-	-		
Alpha-BHC	-	-	-	-	-	-	-	-	-	-		
Beta-BHC	-	-	-	-	-	-	-	-	-	-		
Gamma-BHC	-	-	-	-	-	-	-	-	-	-		
Delta-BHC	-	-	-	-	-	-	-	-	-	-		
Heptachlor	-	-	-	-	-	-	-	-	-	-		
Aldrin	-	-	-	-	-	-	-	-	-	-		
N-Nitrosodiphenylamine	.53792	.49006	.44537	.36272	.32256	.25466	-	.895	.40222	26.702	*	

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 (**)

Initial Calibration Data
HSL Compounds

Case No: ---------- Instrument ID: 1-H

Contractor: ENGINEERING-SCIENCE Calibration Date: 09/15/88 (9-15-88)

Contract No: ----------

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

Laboratory ID:	>S0041	>S0036	>S0037	>S0038	>S0039	>S0040	-					
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	.09715	.17105	.16888	.16246	.14007	.08284	-	.892	.13708	27.978		
4-Bromophenyl-phenylether	.25086	.24781	.23139	.21265	.20498	.18364	-	.941	.22189	11.813		
Hexachlorobenzene	.36319	.35670	.33404	.31642	.30124	.27250	-	.959	.32402	10.632		
Pentachlorophenol	-	.24150	.17566	.15444	.14276	.15833	-	.986	.17454	22.488	*	
Phenanthrene	1.09844	1.02572	.90811	.83625	.80449	.72476	-	1.003	.89963	15.653		
Anthracene	1.15796	1.05290	.98142	.88185	.83225	.69600	-	1.010	.93373	17.680		
Di-n-Butylphthalate	1.65111	1.56349	1.43665	1.36509	1.27098	1.08968	-	1.097	1.39617	14.510		
4,4'-Dibromobiphenyl	2.88010	2.18542	1.84075	1.55051	1.42970	1.18152	-	1.133	1.84467	33.301		
Fluoranthene	1.28934	1.20163	1.08925	.98141	.95129	.84919	-	1.168	1.06035	15.551	*	
Heptachlor Epoxide	-	-	-	-	-	-	-	-	-	-		
Endosulfan I	-	-	-	-	-	-	-	-	-	-		
4,4'-DDE	-	-	-	-	-	-	-	-	-	-		
Dieldrin	-	-	-	-	-	-	-	-	-	-		
Endrin	-	-	-	-	-	-	-	-	-	-		
4,4'-DDD	-	-	-	-	-	-	-	-	-	-		
Endosulfan II	-	-	-	-	-	-	-	-	-	-		
Endrin Aldehyde	-	-	-	-	-	-	-	-	-	-		
4,4'-DDT	-	-	-	-	-	-	-	-	-	-		
Endosulfan Sulfate	-	-	-	-	-	-	-	-	-	-		
Dibutylchlorendate	-	-	-	-	-	-	-	-	-	-		
Benzidine	.09574	.01312	.23657	.37616	.42338	.44602	-	.870	.26516	68.114		
Pyrene	1.16995	1.12273	1.11248	1.13700	1.19038	1.21722	-	.876	1.15829	3.550		
Terphenyl-d14	.86612	.84217	.81872	.81960	.85250	.87854	-	.896	.84627	2.876		
Butylbenzylphthalate	.77570	.73651	.72059	.73279	.76199	.77867	-	.951	.75104	3.241		
3,3'-Dichlorobenzidine	.26109	.23864	.25979	.25600	.27690	.27426	-	.999	.26111	5.293		
Chrysene	1.23283	1.14161	1.14629	1.15931	1.19899	1.10857	-	1.003	1.16493	3.800		
Benzo(a)Anthracene	1.10337	1.04367	1.05782	1.11203	1.18873	1.27134	-	.997	1.12949	7.629		
bis(2-Ethylhexyl)Phthalate	.93894	.89977	.88399	.87318	.91035	.90624	-	1.015	.90208	2.534		
Di-n octylphthalate	1.71015	1.62986	1.47254	1.44293	1.38592	1.21646	-	.911	1.47631	11.929	*	
Benzo(a)Pyrene	1.07415	1.11322	1.06491	1.08160	1.04908	.96180	-	.991	1.05746	4.868	*	

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RRT}$ - Average Relative Retention Time (RT Std/Rf 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: 9-

Contractor: ENGINEERING-SCIENCE Calibration Date: 09/14/88 DRD 9-15-88

Contract No: _____

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

Laboratory ID:	>S0041	>S0036	>S0037	>S0038	>S0039	>S0040	-				
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
Benzo(b)Fluoranthene	1.17682	1.24405	1.15312	1.20517	1.27326	1.18575	-	.948	1.20636	3.713	
Indeno(1,2,3-cd)Pyrene	.93493	1.09593	1.07384	1.16440	1.15783	1.05210	-	1.200	1.07984	7.781	
Dibenzo(a,h)Anthracene	1.10407	1.22240	1.17289	1.21766	1.19455	1.07234	-	1.209	1.16399	5.337	
Benzo(k)Fluoranthene	1.17607	1.13927	1.07062	.95982	.86588	.74061	-	.952	.99205	16.981	
Benzo(g,h,i)Perylene	.97472	1.15511	1.08345	1.10918	1.08238	.55921	-	1.260	.99401	22.244	

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

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

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

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

Sample No. (Standard): 50 ng BNA 50 Date Analyzed: 9/14/88

Lab File ID (Standard): S0036 Time Analyzed: 14:25

Instrument ID: 1

	IS4 (PHN) AREA #	RT	IS5 (CRY) AREA #	RT	IS6 (PRY) AREA #	RT
12 HOUR STD	241289	23.12	271194	31.61	276076	37.86
UPPER LIMIT	482578	23.62	542388	32.11	552152	38.36
LOWER LIMIT	120646	22.62	135597	31.11	138038	37.36
EPA SAMPLE NO.						
S0042 01 8808187 9BK	225003	23.10	267305	31.57	256336	37.81
S0044 02 8808166 1-9A BLK	254437	23.11	313395	31.58	329443	37.82
S0045 03 8808166 1	268966	23.10	313591	31.58	193254	37.80
S0046 04 8808166 1MS	305614	23.13	363460	31.61	304678	37.79
05						
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20						
21						
22						

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

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

Column used to flag internal standard area values with an asterisk

page ___ of ___

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/30/88 12:17

Lab ID >01830::01 Data Release Authorized By: Laura Kuck

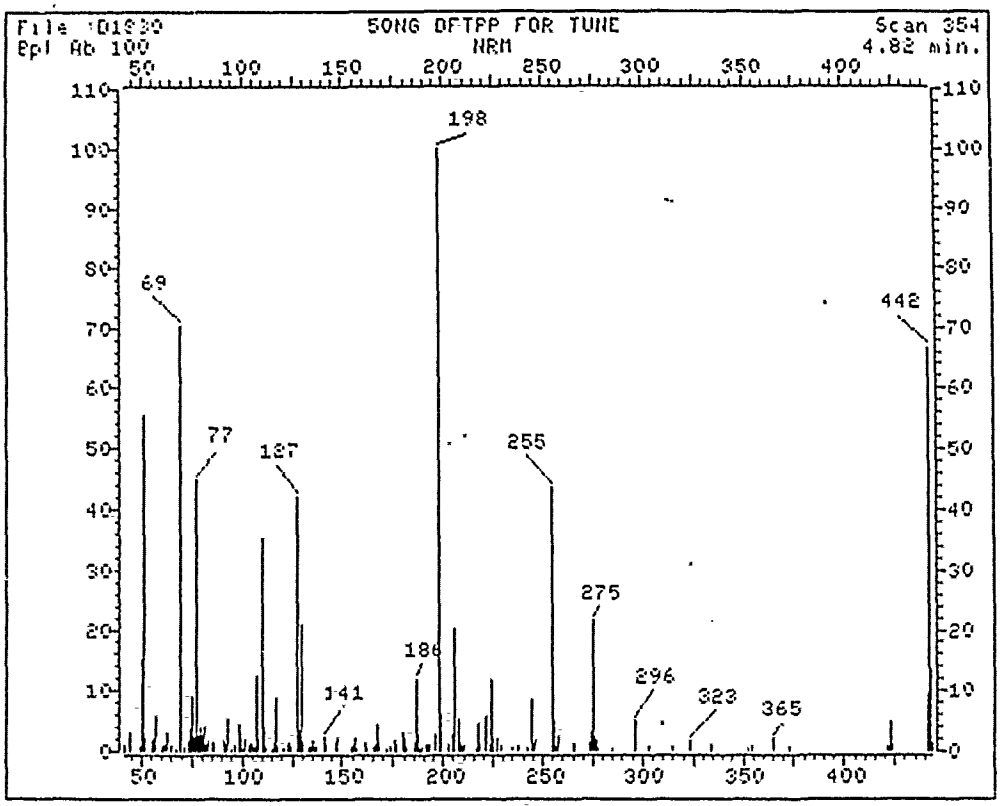
8/18 5p°

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	55.32 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	70.21	
70	less than 2.[illegible] of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.[illegible] of mass 198	42.05 OK	
197	less than 1.[illegible] of mass 198	0.00 OK	
198	base peak, 10[illegible] relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.00 OK	
275	10.0 - 30.0% of mass 198	21.36 OK	
365	greater than 1.00% of mass 198	2.02 OK	
441	present, but less than mass 443	9.38 OK	
442	greater than 40.0% of mass 198	66.57 OK	
443	17.0 - 23.0% of mass 442	13.52 OK	(20.31) #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.

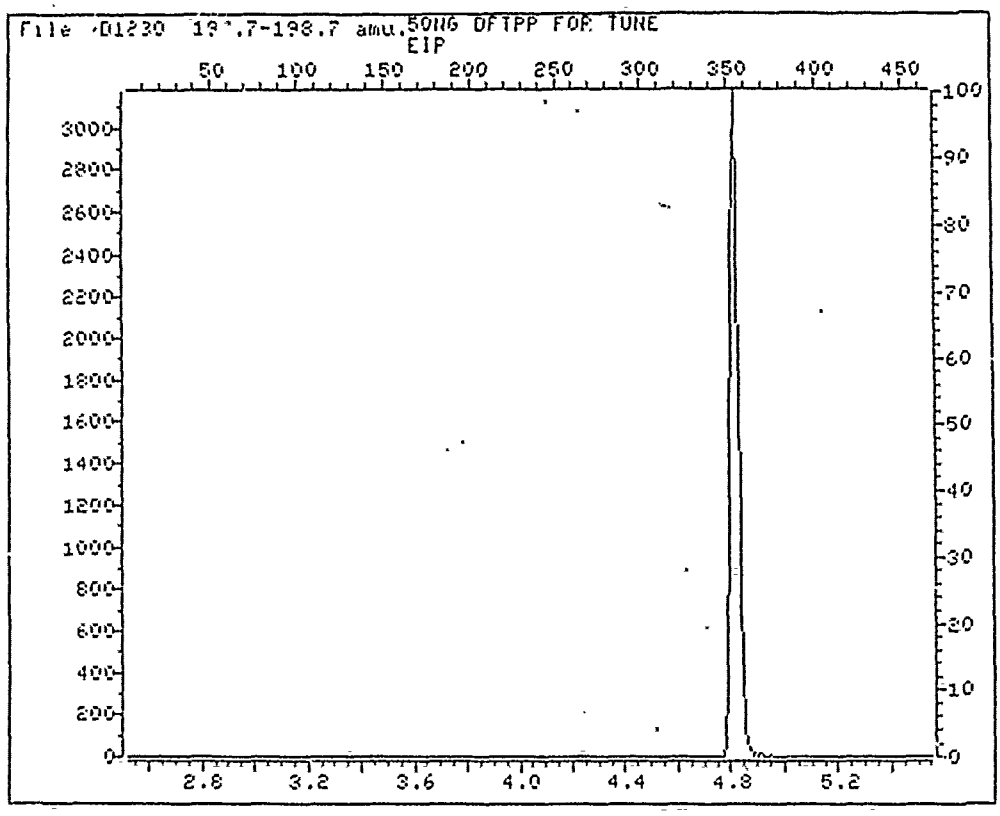
SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
SOM6 DFTPP FOR TUN	>01830	8/30/88	12:17	
25ng/LABN	E5539		12:47	✓
8808170[illegible]-09,1887-79 BLK	E5540		13:54	good, use
88081706	E5541		14.51	good, not needed
88081706 MS	E5542		15:48	good, use
88081706 MSD	E5543		16.45	good, use
88081705	E5544		17 42	good, not needed
88081709	E5545		18.39	good, not needed
88081877	E5546		19 36	good
88081878	E5547		20.32	good
88081879	E5548	↓	21:28	55 out *, see rest



File:)D1830 Scan #: 354 Retn. time: 4.82

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.106	90.95	1.580	134.05	.632	189.20	.853	246.15	1.675
44.10	3.002	92.05	.916	134.95	1.833	191.10	.916	255.10	43.602
48.90	.790	92.95	5.466	135.95	.632	191.95	.979	256.00	5.087
50.10	14.976	94.15	.537	137.10	.853	193.15	1.106	257.00	.695
51.10	55.324	96.05	1.169	141.10	2.306	196.05	2.686	258.00	2.464
52.10	2.338	98.05	4.265	142.00	1.074	198.05	100.000	265.20	.916
55.10	1.833	99.05	3.128	146.90	1.232	199.05	6.003	273.10	1.264
56.10	2.054	99.95	.379	148.00	1.959	203.05	1.074	274.10	3.128
57.00	5.814	101.05	1.959	154.10	.727	204.15	2.717	275.10	21.359
60.10	.790	102.95	.979	155.10	1.137	205.15	4.676	276.10	2.496
61.10	1.074	103.95	1.295	156.10	1.896	206.05	20.253	277.20	1.580
62.10	.979	105.15	1.169	157.30	.379	207.15	5.276	278.10	.442
63.10	2.970	105.95	.664	161.00	1.390	208.15	1.422	285.10	.379
64.90	.916	107.05	12.354	161.80	.411	209.25	.695	296.20	4.929
65.10	.916	108.15	2.148	164.90	.632	210.55	.948	303.05	.853
67.10	.442	110.05	35.166	166.30	.885	215.85	.442	315.05	.569
69.10	70.205	111.05	4.076	167.10	4.423	217.05	4.392	323.15	1.643
71.20	.758	111.95	.600	168.00	1.264	218.05	1.011	334.15	1.201
73.20	1.611	115.05	.537	171.90	.506	221.05	5.687	352.15	.316
74.00	3.760	116.15	1.485	174.10	.727	223.05	1.137	354.05	.790
75.10	8.973	117.05	8.815	175.20	1.611	224.05	11.943	365.10	2.022
76.10	2.275	118.05	1.106	175.80	.727	225.15	1.927	372.30	.600
77.10	44.897	120.15	.411	177.00	1.043	227.15	2.085	421.25	.664
78.20	2.875	122.15	1.011	179.10	2.970	228.95	1.043	422.25	.758
79.10	4.044	123.05	1.548	180.20	1.896	234.95	.506	423.15	4.645
80.10	2.591	124.15	.853	181.00	.727	237.15	.632	424.25	.916
81.20	3.918	127.05	42.054	185.10	1.264	242.25	.506	441.15	9.384
82.20	1.169	128.15	3.539	186.20	11.880	244.15	8.404	442.25	66.572

82.95	1.864	129.15	20.758	187.20	2.780	245.15	1.011	143.25	13.523
84.95	1.359	130.05	1.864	187.80	.537	245.55	.632	144.15	1.327
86.05	1.264	132.75	.600						


File :01230 197.7-198.7 amu.50NG DFTPP FOR TUNE
EIP
50 100 150 200 250 300 350 400 450
3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0
100 90 80 70 60 50 40 30 20 10 0
2.8 3.2 3.6 4.0 4.4 4.8 5.2

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 08/30/88

Contractor: Time: 12:47

Contract No: Laboratory ID:)E5539

Instrument ID: Initial Calibration Date: 08/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
N-Nitroso-Dimethylamine	.97147	.99705	2.32			
2-fluorophenol	1.13043	1.18513	4.84			
bis(2-Chloroethyl)ether	1.34309	1.16662	13.14			
Phenol	1.59648	1.39497	12.62	*		
Phenol-d5	1.38909	1.44434	3.98			
Aniline	1.37724	1.05455	23.43			
2-Chlorophenol	1.23872	1.30873	5.65			
1,3-Dichlorobenzene	1.33894	1.45240	8.47			
1,4-Dichlorobenzene	1.29251	1.40401	8.63	*		
Benzyl Chloride	-	-	-			
Benzyl Alcohol	.74390	.50248	32.45			
1,2-Dichlorobenzene	1.23619	1.37933	11.58			
2-Methylphenol	1.04062	1.06487	2.33			
3-&-4-Methylphenol	1.04613	1.07057	2.34			(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.44813	14.29			
N-Nitroso-Di-n-Propylamine	1.01091	.96818	4.23		**	
Hexachloroethane	.56084	.55743	.61			
Dibromochloropropane	-	-	-			
Nitrobenzene	.46004	.44407	3.47			
Nitrobenzene-d5	.39509	.38998	1.29			
2-Nitrophenol	.20748	.21499	3.62	*		
Isophorone	.81764	.76941	5.90			
bis(2-Chloroethoxy)methane	.47140	.48415	2.70			
2,4-Dimethylphenol	.27958	.27385	2.05			
Benzoic Acid	.24725	.25368	2.60			
2,4-Dichlorophenol	.27946	.28930	3.52	*		
1,2,4-Trichlorobenzene	.31217	.32756	4.93			
Naphthalene	.88333	.91064	3.09			
4-Chloroaniline	.39406	.38689	1.82			
Hexachlorobutadiene	.19193	.20378	6.17	*		
4-Chloro-3-Methylphenol	.32605	.32426	.55	*		
2-Methylnaphthalene	.51308	.50739	1.11			

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 (**)

1038

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 08/30/88 ----------

Contractor: ---------- Time: 12:47 ----------

Contract No: ---------- Laboratory ID:)E5539 ----------

Instrument ID: ---------- Initial Calibration Date: 08/19/88 ----------

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.41011	.26246	36.00		**
2,4,6-Trichlorophenol	.43671	.41235	5.58	*	
2,4,5-Trichlorophenol	.34677	.45975	32.58		
2-Fluorobiphenyl	1.07242	1.09927	2.50		
2-Chloronaphthalene	1.10710	1.13020	2.09		
2-Nitroaniline	.55901	.59052	5.65		
Dimethylphthalate	1.24432	1.31269	5.49		
2,6-Dinitrotoluene	.31339	.36666	17.00		
Acenaphthylene	1.57886	1.62002	2.61		
3-Nitroaniline	.57448	.60677	5.62		
2,4-Dinitrophenol	.15791	.13971	11.52		**
Acenaphthene	1.08564	1.09089	.48	*	
Dibenzofuran	1.36426	1.47629	8.21		
2,4-Dinitrotoluene	.34710	.35793	3.12		
4-Nitrophenol	.80161	.23189	71.07		**
Fluorene	1.12246	1.18781	5.82		
Diethylphthalate	1.28599	1.42673	10.94		
4-Chlorophenyl-phenylether	.47254	.55091	16.58		
4-Nitroaniline	.26489	.36458	37.63		
2,4,6-Tribromophenol	.21518	.25132	16.79		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.42249	.44494	5.31	*	
4,6-Dinitro-2-Methylphenol	.13086	-	-		
4-Bromophenyl-phenylether	.21830	.21649	.83		
Hexachlorobenzene	.30780	.28714	6.71		
Pentachlorophenol	.16736	.16920	1.10	*	

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 (**)

1039

Continuing Calibration Check
HSL Compounds

Case No: ----------
Calibration Date: 08/30/88 ----------
Contractor: ----------
Time: 12:47 ----------
Contract No: ----------
Laboratory ID:)E5539 ----------
Instrument ID: ----------
Initial Calibration Date: 08/19/88 ----------

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.94607	.95518	.96		
Anthracene	.95445	1.00712	5.52		
Di-n-Butylphthalate	1.51144	1.53160	1.33		
4,4'-Dibromobiphenyl	1.66208	1.89056	13.41		
Fluoranthene	.96211	1.06397	10.59	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.18071	.09187	49.16		
Pyrene	1.48460	1.27667	14.01		
Terphenyl-d14	1.03862	.92351	11.08		
Butylbenzylphthalate	1.05779	.91914	13.11		
3,3'-Dichlorobenzidine	.15037	.21778	44.35		
Chrysene	1.14312	1.14470	.14		
Benzo(a)Anthracene	1.09294	1.05067	3.87		
bis(2-Ethylhexyl)Phthalate	1.30762	1.12190	14.20		
Di-n-octylphthalate	2.71198	2.74304	1.15	*	
Benzo(a)Pyrene	1.03642	1.04930	1.24	*	
Benzo(b)Fluoranthene	1.33934	1.24913	6.74		
Indeno(1,2,3-cd)Pyrene	.98488	.63401	35.63		
Dibenzo(a,h)Anthracene	.88532	.60971	31.13		
Benzo(k)Fluoranthene	1.08633	1.22997	13.22		
Benzo(g,h,i)Perylene	.98474	.35570	63.88		

RF - Response Factor from daily standard for 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 (**)

1040

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR001

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

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

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

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	168372	22.38	111964	30.81	39631	36.30
UPPER LIMIT	336744		223928		79262	
LOWER LIMIT	84186		55982		19815	
EPA SAMPLE NO.						
01 [illegible]	289652	22.41	154570	30.80	21939	36.26
02 [illegible]	131732	22.46	67147	30.88	25830	36.37
03 [illegible]	158326	22.39	65162	30.78	21133	36.28
04 [illegible]	154216	22.40	71356	30.80	19303 *	36.28
05 [illegible]	125598	22.36	81995	30.79	24006	36.26
06 [illegible]	135449	22.38	83875	30.78	26887	36.28
07 [illegible]	143582	22.37	96181	30.79	28142	36.27
08 [illegible]	146315	22.37	99051	30.79	28827	36.26
09 [illegible]	144162	22.37	98134	30.78	30989	36.26
10						
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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

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	48999	8.72	181778	12.29	96783	17.75
UPPER LIMIT	97998		363556		193566	
LOWER LIMIT	24500		90889		48392	
EPA SAMPLE NO.						
01 8808170 01/877798M	95892	8.76	354065	12.29	161182	17.76
02 8808170 6	47703	8.82	167425	12.36	86005	17.83
03 8808170 6 MS	59948	8.76	210714	12.29	109794	17.76
04 8808170 6 MSD	52899	8.75	185418	12.30	99063	17.76
05 8808170 8	42606	8.74	149724	12.28	80603	17.75
06 8808170 9	45680	8.75	163718	12.28	88456	17.76
07 8808187 0	44894	8.74	161062	12.27	89842	17.74
08 8808187 8	45689	8.74	162812	12.28	91999	17.75
09 8808187 9	46356	8.74	166705	12.27	90451	17.74
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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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 8/30/88 12:17

Lab ID >D1830::01 Data Release Authorized By: Laura Kuck

8/18 5pm

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	55.32 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	70.21
70	less than 2.0% of mass 69	0.00 OK (0.00) #1
127	40.0 - 60.0% of mass 198	42.05 OK
197	less than 1.0% of mass 198	0.00 OK
198	base peak, 100% relative abundance	100.00 OK
199	5.0 - 9.0% of mass 198	6.60 OK
275	10.0 - 30.0% of mass 198	21.36 OK
365	greater than 1.00% of mass 198	2.02 OK
441	present, but less than mass 443	9.38 OK
442	greater than 40.0% of mass 198	66.57 OK
443	17.0 - 23.0% of mass 442	13.52 OK (20.31) #2

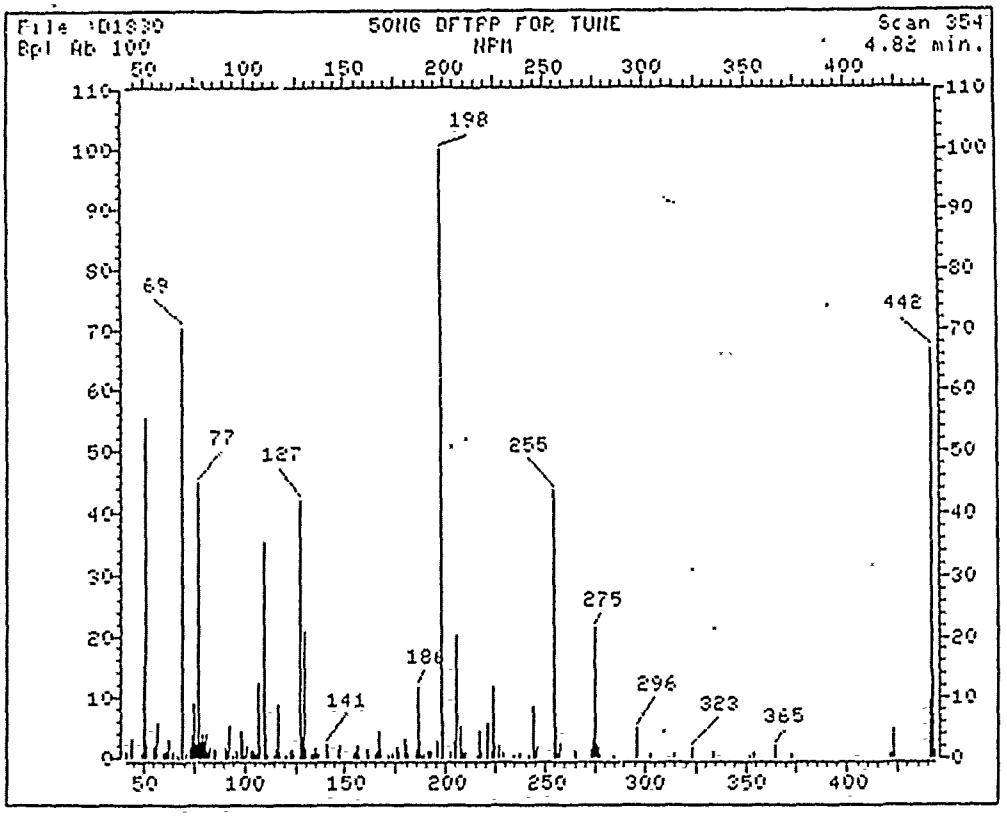
THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

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

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
SOW DFTPP FOR TUN:	>D1830	8/30/88	12:17	
25ng/LABV	E5539		12:47	✓
8808170x-09,1887-79 BLK	E5540		13:54	good, use
88081706	E5541		14.51	good, not needed
88081706 MS	E5542		15:48	good, use
88081706 MSD	E5543		16.45	good, use
88081708	E5544		17 42	good, not needed
88081709	E5545		18.39	good, not needed
88081877	E5546		19 36	good
88081878	E5547		20.32	good
88081879	E5548	↓	21:28	55 out *, see next

FORM V 7/85

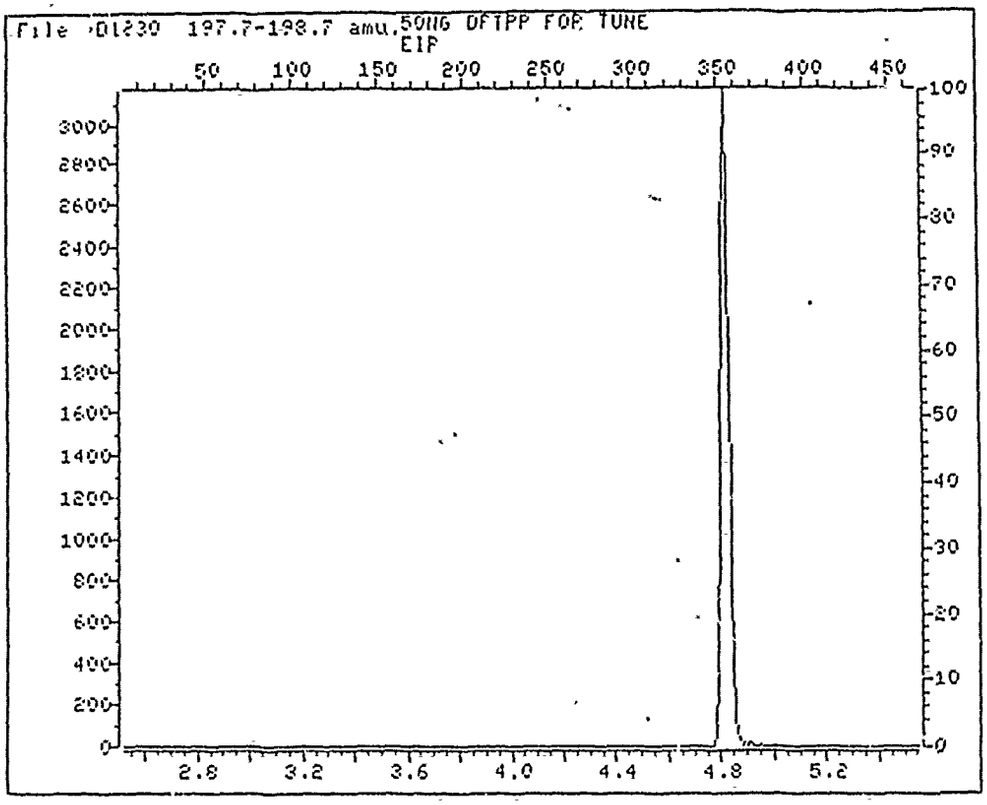
1043



File: >01839 Scan-1: 354 Retn. time: 4.82

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.106	90.95	1.580	134.05	.632	189.20	.853	246.15	1.675
44.10	3.002	92.05	.916	134.95	1.833	191.10	.916	255.10	43.602
48.90	.790	92.95	5.466	135.95	.632	191.95	.979	256.00	5.087
50.10	14.976	94.15	.537	137.10	.853	193.15	1.106	257.00	.695
51.10	55.324	96.05	1.169	141.10	2.306	196.05	2.686	258.00	2.464
52.10	2.338	98.05	4.265	142.00	1.074	198.05	100.000	265.20	.916
55.10	1.833	99.05	3.128	146.90	1.232	199.05	6.003	273.10	1.264
56.10	2.054	99.95	.379	148.00	1.959	203.05	1.074	274.10	3.128
57.00	5.814	101.05	1.959	151.10	.727	204.15	2.717	275.10	21.359
60.10	.790	102.95	.979	155.10	1.137	205.15	4.676	276.10	2.496
61.10	1.074	103.95	1.295	156.10	1.896	206.05	20.253	277.20	1.580
62.10	.979	105.15	1.169	157.30	.379	207.15	5.276	278.10	.442
63.10	2.970	105.95	.664	161.00	1.390	208.15	1.422	285.10	.379
64.90	.916	107.05	12.354	161.80	.411	209.25	.695	296.20	4.929
65.10	.916	108.15	2.148	164.90	.632	210.55	.948	303.05	.853
67.10	.442	110.05	35.166	166.30	.885	215.85	.442	315.05	.569
69.10	70.205	111.05	4.076	167.10	4.423	217.05	4.392	323.15	1.643
71.20	.758	111.95	.600	168.00	1.264	218.05	1.011	334.15	1.201
73.30	1.611	115.05	.537	171.90	.506	221.05	5.687	352.15	.316
74.00	3.760	116.15	1.485	174.10	.727	223.05	1.137	354.05	.790
75.10	8.973	117.05	8.815	175.20	1.611	224.05	11.943	365.10	2.022
76.10	2.275	118.05	1.106	175.80	.727	225.15	1.927	372.30	.600
77.10	44.897	120.15	.411	177.00	1.043	227.15	2.085	421.25	.664
78.20	2.875	122.15	1.011	179.10	2.970	228.95	1.043	422.25	.758
79.10	4.044	123.05	1.548	180.20	1.896	234.95	.506	423.15	1.645
80.10	2.591	124.15	.853	181.00	.727	237.15	.632	424.25	.916
81.20	3.918	127.05	42.054	185.10	1.264	242.25	.506	441.15	9.384
82.20	1.169	128.15	3.539	186.20	11.880	244.15	8.404	442.25	66.572

82.95	1.864	129.15	20.758	187.20	2.780	245.15	1.011	113.25	13.523
84.95	1.359	130.05	1.864	187.80	.537	245.55	.632	111.15	1.327
86.05	1.264	132.75	.600						


File :01230 197.7-198.7 amu,50NG DFTPP FOR TUNE
EIP
50 100 150 200 250 300 350 400 450
3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0
100 90 80 70 60 50 40 30 20 10 0
2.8 3.2 3.6 4.0 4.4 4.8 5.2

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 08/30/88

Contractor: Time: 12:47

Contract No: Laboratory ID: XE5539

Instrument ID: Initial Calibration Date: 08/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.97447	.99705	2.32		
2-Fluorophenol	1.13043	1.18513	4.84		
bis(2-Chloroethyl)ether	1.34309	1.16662	13.14		
Phenol	1.59648	1.39497	12.62	*	
Phenol-d5	1.38909	1.44434	3.98		
Aniline	1.37724	1.05455	23.43		
2-Chlorophenol	1.23872	1.30873	5.65		
1,3-Dichlorobenzene	1.33894	1.45240	8.47		
1,4-Dichlorobenzene	1.29251	1.40401	8.63	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.74390	.56248	32.45		
1,2-Dichlorobenzene	1.23619	1.37933	11.58		
2-Methylphenol	1.04062	1.06487	2.33		
3-&-4-Methylphenol	1.04613	1.07057	2.34		(Conc=50.00)
bis(2-chloroisopropyl)Ether	1.68957	1.44813	14.29		
N-Nitroso-Di-n-Propylamine	1.01091	.96818	4.23	**	
Hexachloroethane	.56084	.55743	.61		
Dibromochloropropane	-	-	-		
Nitrobenzene	.46004	.44407	3.47		
Nitrobenzene-d5	.39509	.38998	1.29		
2-Nitrophenol	.20748	.21499	3.62	*	
Isophorone	.81764	.76941	5.90		
bis(2-Chloroethoxy)methane	.47140	.48415	2.70		
2,4-Dimethylphenol	.27958	.27385	2.05		
Benzoic Acid	.24725	.25368	2.60		
2,4-Dichlorophenol	.27946	.28930	3.52	*	
1,2,4-Trichlorobenzene	.31217	.32756	4.93		
Naphthalene	.88333	.91064	3.09		
4-Chloroaniline	.39406	.38689	1.82		
Hexachlorobutadiene	.19193	.20378	6.17	*	
4-Chloro-3-Methylphenol	.32605	.32426	.55	*	
2-Methylnaphthalene	.51308	.50739	1.11		

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: 08/30/88 ----------

Contractor: ---------- Time: 12:47 ----------

Contract No: ---------- Laboratory ID: XES539 ----------

Instrument ID: ---------- Initial Calibration Date: 08/19/88 ----------

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.41011	.26246	36.00		**
2,4,6-Trichlorophenol	.43671	.41235	5.58	*	
2,4,5-Trichlorophenol	.34677	.45975	32.58		
2-Fluorobiphenyl	1.07242	1.09927	2.50		
2-Chloronaphthalene	1.10710	1.13020	2.09		
2-Nitroaniline	.55901	.59057	5.65		
Dimethylphthalate	1.24432	1.31269	5.49		
2,6-Dinitrotoluene	.31339	.36666	17.00		
Acenaphthylene	1.57886	1.62002	2.61		
3-Nitroaniline	.57448	.60677	5.62		
2,4-Dinitrophenol	.15791	.13971	11.52		**
Acenaphthene	1.08564	1.09089	.48	*	
Dibenzofuran	1.36426	1.47629	8.21		
2,4-Dinitrotoluene	.34710	.35793	3.12		
4-Nitrophenol	.80161	.23189	71.07		**
Fluorene	1.12246	1.18781	5.82		
Diethylphthalate	1.28599	1.42673	10.94		
4-Chlorophenyl-phenylether	.47254	.55091	16.58		
4-Nitroaniline	.26489	.36458	37.63		
2,4,6-Tribromophenol	.21518	.25132	16.79		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.42249	.44494	5.31	*	
4,6-Dinitro-2-Methylphenol	.13086	-	-		
4-Bromophenyl-phenylether	.21830	.21649	.83		
Hexachlorobenzene	.30780	.28714	6.71		
Pentachlorophenol	.16736	.16920	1.10	*	

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: 08/30/88

Contractor: Time: 12:47

Contract No: Laboratory ID:)E5539

Instrument ID: Initial Calibration Date: 08/19/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	.94607	.95518	.96		
Anthracene	.95445	1.00712	5.52		
Di-n-Butylphthalate	1.51144	1.53160	1.33		
4,4'-Dibromobiphenyl	1.66708	1.89056	13.41		
Fluoranthene	.96211	1.06397	10.59	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.18071	.09187	49.16		
Pyrene	1.48460	1.27667	14.01		
Terphenyl-d14	1.03862	.92351	11.08		
Butylbenzylphthalate	1.05779	.91914	13.11		
3,3'-Dichlorobenzidine	.15087	.21778	44.35		
Chrysene	1.14312	1.14470	.14		
Benzo(a)Anthracene	1.09294	1.05067	3.87		
bis(2-Ethylhexyl)Phthalate	1.30762	1.12190	14.20		
Di-n-octylphthalate	2.71198	2.74304	1.15	*	
Benzo(a)Pyrene	1.03642	1.04930	1.24	*	
Benzo(b)fluoranthene	1.33934	1.24913	6.74		
Indeno(1,2,3-cd)Pyrene	.98488	.63401	35.63		
Dibenzo(a,h)Anthracene	.88532	.60971	31.13		
Benzo(k)fluoranthene	1.08633	1.22997	13.22		
Benzo(g,h,i)Perylene	.98474	.35570	63.88		

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 (**)

8C

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

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	168372	22.38	111964	30.81	39631	36.30
UPPER LIMIT	336744		223928		79262	
LOWER LIMIT	84186		55982		19815	
EPA SAMPLE NO.						
01 SB170E-09/8/27-98	239652	22.41	154570	30.80	21939	36.26
02 SB081706	131732	22.46	67147	30.88	25830	36.37
03 SB081707	158326	22.39	65162	30.78	21133	36.28
04 SB081708	154216	22.40	71356	30.80	19303 *	36.28
05 SB081705	125598	22.36	81995	30.79	24006	36.26
06 SB081709	135449	22.38	83875	30.78	26887	36.27
07 SB081577	143582	22.37	96181	30.79	28142	36.27
08 SB081578	146315	22.37	99051	30.79	28827	36.26
09 SB081579	144162	22.37	98134	30.78	30989	36.26
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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

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	48999	8.72	181778	12.29	96783	17.75
UPPER LIMIT	97998		363556		193566	
LOWER LIMIT	24500		90889		48392	
EPA SAMPLE NO.						
01 8817MS 01,1877-7988	95892	8.76	354065	12.29	161182	17.76
02 88081706	47703	8.82	167425	12.36	86005	17.83
03 8808:706 MS	59948	8.76	210714	12.29	109794	17.76
04 88081706MSD	52899	8.75	185418	12.30	99063	17.76
05 88081708	42606	8.74	149724	12.28	80603	17.75
06 18081709	45680	8.75	163718	12.28	88456	17.76
07 88081877	44894	8.74	161062	12.27	89842	17.74
08 88081878	45689	8.74	162812	12.28	91999	17.75
09 88081879	46356	8.74	166705	12.27	90451	17.74
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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

LATILE CONTINUING CALIBRATION CHECK

bName:_____ Contract:_____

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

strument ID:CARBOPAK_____ Calibration Date(s):8/22/88

LAB FILE ID:_40,41_____ Init. Calib. Date(s):8/19/88, 8/15/88

OMPOUND	RRF	RRF50	%D
enzyl chloride	0.08	0.07	6.95
is (2-chloroethoxy) ethane	0.04		100.00
is (2-chloroisopropyl) ther	0.26		100.00
romobenzene	1.21	0.97	20.00
romodichloromethane	3.68	2.92	20.54
romoform	1.45	1.07	26.45
romomethane	0.26	0.27	-3.02
arbon tetrachloride	3.20	2.93	8.53
hloroacetaldehyde			ERR
hlorobenzene	1.36	1.25	7.88
hloroethane	0.55	0.49	11.59
hloroform	4.50	4.39	2.47
-Chloroethyl	0.92	0.79	13.83
-Chloroethyl vinyl ether	0.04		100.00
hloromethane	0.34	0.32	6.67
hloromethyl methyl ether	0.17		100.00
,m,& p-Dichlorotoluenes	3.99	3.38	15.39
ibromochloromethane	3.90	3.32	14.94
ibromomethane	2.98	2.45	17.81
,2-Dichlorobenzene	2.48	2.09	15.69
,3-Dichlorobenzene	1.94	1.60	17.74
,4-Dichlorobenzene	2.47	1.79	27.62
ichlorodifluormethane	0.54		100.00
,1-Dichloroethane	1.95	1.74	10.61
,2-Dichloroethane	2.33	1.91	17.84
,1-Dichloroethylene	2.44	2.38	2.55
rans-1,2-dichloroethylene	1.51	1.45	3.66
ichloromethane	4.21	3.87	7.99
,2-Dichloropropane	2.70	2.60	3.81
,3-Dichloropropylene	4.60	3.72	19.09
,1,2,2-Tetrachloroethane	6.65	5.95	10.52
,1,1,2-Tetrachloroethane	3.61	2.58	28.55
etrachloroethylene	6.65	5.95	10.53
,1,1-Trichloroethane	2.20	1.81	17.52
,1,2-Trichloroethane	4.60	3.72	19.13
richlorofluoromethane	4.40	3.77	14.21
richlorotrifluoroethane	2.19	1.93	11.75
inyl chloride	3.5	2.62	25.45
inyl acetate	1.0	0.9	11.10

_ATILE CONTINUING CALIBRATION CHECK

bName:ENGINEERING SCIENCE_____ Contract:_____

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

strument ID.:CARBOPAK Calibration Date(s):8/~~19~~20/88 _____

a FILE ID: RRF 50 __40_____

Initcalib = 8/19/88

OMPOUND	$\overline{RRF}$	RRF50	%D
enzene_____	3.10	2.73	-11.91
hlorobenzene_____	5.31	4.71	-11.22
,2_Dichlorobenzene_____	2.44	2.77	13.37
,3_Dichlorobenzene_____	2.71	2.77	2.08
,4_Dichlorobenzene_____	2.53	2.61	3.18
thyl Benzene_____	3.51	2.96	-15.64
oluene_____	3.47	3.55	2.17
ylenes_____	7.63	8.88	16.42

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DATA PACKAGE #16

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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.: 787

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 7-30-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88071552	DANGB2-BH1-SS4-6-8'	AS-F	7-29-88		8-17-88	
88071552	DANGB2-BH1-SS4-6-8'	BA-I	7-29-88		8-09-88	
88071552	DANGB2-BH1-SS4-6-8'	CD-F	7-29-88		8-15-88	
88071552	DANGB2-BH1-SS4-6-8'	HG-C	7-29-88		8-12-88	
88071552	DANGB2-BH1-SS4-6-8'	PB-F	7-29-88		8-15-88	
88071552	DANGB2-BH1-SS4-6-8'	418.1	7-29-88	8-03-88	8-04-88	
88071552	DANGB2-BH1-SS4-6-8'	MOIS	7-29-88		8-04-88	
88071552	DANGB2-BH1-SS4-6-8'	8080	7-29-88	8-04-88	8-09-88	
88071552	DANGB2-BH1-SS4-6-8'	8270	7-29-88	8-02-88	8-24-88	
88071553	DANGB2-BH1-SS2-2-4'	AS-F	7-29-88		8-17-88	
88071553	DANGB2-BH1-SS2-2-4'	BA-I	7-29-88		8-09-88	
88071553	DANGB2-BH1-SS2-2-4'	CD-F	7-29-88		8-15-88	
88071553	DANGB2-BH1-SS2-2-4'	HG-C	7-29-88		8-12-88	
88071553	DANGB2-BH1-SS2-2-4'	PB-F	7-29-88		8-15-88	
88071553	DANGB2-BH1-SS2-2-4'	418.1	7-29-88	8-03-88	8-04-88	
88071553	DANGB2-BH1-SS2-2-4'	MOIS	7-29-88		8-04-88	
88071553	DANGB2-BH1-SS2-2-4'	8080	7-29-88	8-04-88	8-09-88	
88071553	DANGB2-BH1-SS2-2-4'	8270	7-29-88	8-02-88	8-22-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

Job No.: OR001

Work Order No.: 787

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88071554	DANGB2-BH1-SS1-0-2'	AS-F	7-29-88		8-17-88	
88071554	DANGB2-BH1-SS1-0-2'	BA-I	7-29-88		8-09-88	
88071554	DANGB2-BH1-SS1-0-2'	CD-F	7-29-88		8-15-88	
88071554	DANGB2-BH1-SS1-0-2'	HG-C	7-29-88		8-12-88	
88071554	DANGB2-BH1-SS1-0-2'	PB-F	7-29-88		8-15-88	
88071554	DANGB2-BH1-SS1-0-2'	418.1	7-29-88	8-03-88	8-04-88	
88071554	DANGB2-BH1-SS1-0-2'	MOIS	7-29-88		8-04-88	
88071554	DANGB2-BH1-SS1-0-2'	8080	7-29-88	8-04-88	8-09-88	
88071554	DANGB2-BH1-SS1-0-2'	8270	7-29-88	8-02-88	8-25-88	
88071555	DANGB2-BH1-SS5-8-10'	AS-F	7-29-88		8-17-88	
88071555	DANGB2-BH1-SS5-8-10'	BA-I	7-29-88		8-09-88	
88071555	DANGB2-BH1-SS5-8-10'	CD-F	7-29-88		8-15-88	
88071555	DANGB2-BH1-SS5-8-10'	HG-C	7-29-88		8-12-88	
88071555	DANGB2-BH1-SS5-8-10'	PB-F	7-29-88		8-15-88	
88071555	DANGB2-BH1-SS5-8-10'	418.1	7-29-88	8-03-88	8-04-88	
88071555	DANGB2-BH1-SS5-8-10'	MOIS	7-29-88		8-04-88	
88071555	DANGB2-BH1-SS5-8-10'	8080	7-29-88	8-04-88	8-09-88	
88071555	DANGB2-BH1-SS5-8-10'	8270	7-29-88	8-02-88	8-19-88	

* If applicable

ANALYSIS REPORT

RK ORDER NUMBER: 787
B NUMBER : ZB0000000440
WORK ORDER DATE : 07/30/88

APPROVED BY _____
Lab Supervisor

PORT 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

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

SK: 2, UNITS: mg/KG

ST COMPOUND	DANG2-BH1 SS-4 6-8' 7-29-88 88071552	DANG2-BH1 SS-2 2-4' 7-29-88 88071553	DANG2-BH1 SS-1 0-2' 7-29-88 88071554	DANG2-BH1 SS-5 8-10' 7-29-88 88071555
ACID DIG SOIL	NA	NA	NA	NA
ARSENIC	1.4*	1.8*	3.7*	2.7*
BARIUM	60	262	295	61
CADMIUM	0.15B*	0.52*	1.8*	0.06B*
MERCURY	<0.2	<0.2	0.2	<0.2
LEAD	8.0	102	260	6.0

- Not Analyzed
ND - Not Detected

ANALYSIS REPORT

K ORDER NUMBER: 787
NUMBER : ZB0000000440
K ORDER DATE : 07/30/88

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: 3, UNITS: mg/KG

	DANG2-BH1 SS-4 6-8' 7-29-8	DANG2-BH1 SS-2 2-4' 7-29-88	DANG2-BH1 SS-1 0-2' 7-29-88	DANG2-BH1 SS-5 8-10' 7-29-88
T COMPOUND	88071552	88071553	88071554	88071555
.1 PETROLEUM HYDROCARBONS	2200	3200	9600	2300
OISTURE	12.8	8.4	6.4	15.9

ANALYSIS REPORT

RK ORDER NUMBER: 787
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 07/30/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
0 S. ILLINOIS AVE. STE. S103
K 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
NTACT : BILL HAYDEN
(615)-481-3920

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

ST COMPOUND	DANG2-BH1 SS-4 6-8' 7-29-8 88071552	DANG2-BH1 SS-2 2-4' 7-29-88 88071553	DANG2-BH1 SS-1 0-2' 7-29-88 88071554	DANG2-BH1 SS-5 8-10' 7-29-88 88071555
ALDRIN	ND	ND	ND	ND
PHA-BHC	ND	ND	ND	ND
TA-BHC	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND
MA-BHC	ND	ND	ND	ND
LORDANE	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND
4 4'-DDE	ND	ND	ND	ND
4'-DDT	ND	ND	ND	ND
DIELDRIN	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND
DOSULFAN II	ND	ND	ND	ND
DOSULFAN SULFATE	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND
RIN ALDEHYDE	NA	NA	NA	NA
PTACHLOR	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND
ETONE	NA	NA	NA	NA
THOXYCHLOR	ND	ND	ND	ND
TOXAPHENE	ND	ND	ND	ND
PCB-1016	ND	ND	ND	ND
B-1221	ND	ND	ND	ND
B-1232	ND	ND	ND	ND
PCB-1242	ND	ND	ND	ND
B-1248	ND	ND	ND	ND
B-1254	ND	ND	ND	ND
PCB-1260	ND	ND	ND	ND

ND - Not Detected
A - Not Analyzed

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071552	88071554
Sample No.:	DANG2-BH1 SS-4 6-8	DANG2-BH1 SS-1 0-2
Date Sampled:	7-29-88	7-29-88
Time Sampled:	16:08	13:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-24-88	8-25-88
Percent Moisture:	13	6

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
1,3-Dichlorobenzene	3300	ND	ND
1,4-Dichlorobenzene	3300	ND	ND
Hexachloroethane	3300	ND	ND
Bis(2-chloroethyl)ether	3300	ND	ND
1,2-Dichlorobenzene	3300	ND	ND
N-Nitrosodimethylamine	3300	ND	ND
Bis(2-chloroisopropyl)ether	3300	ND	ND
N-Nitrosodi-n-propyl amine	3300	ND	ND
Hexachlorobutadiene	3300	ND	ND
1,2,4-Trichlorobenzene	3300	ND	ND
Nitrobenzene	3300	ND	ND
Isophorone	3300	ND	ND
Naphthalene	3300	ND	ND
Bis(2-chloroethoxy)methane	3300	ND	ND
2-Chloronaphthalene	3300	ND	ND
Hexachlorocyclopentadiene	3300	ND	ND
Acenaphthylene	3300	ND	ND
Acenaphthene	3300	ND	ND
Dimethyl phthalate	3300	ND	ND
2,6-Dinitrotoluene	3300	ND	ND
Fluorene	3300	ND	ND
2,4-Dinitrotoluene	3300	ND	ND
Diethyl phthalate	3300	ND	ND
N-Nitrosodiphenylamine	3300	ND	ND
Hexachlorobenzene	3300	ND	ND

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

Date Received: July 30, 1988 Work Order: 787
Date Reported: August 29, 1988 Job No. : OR001

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

Lab Number:	88071552	88071554
Sample No.:	DANG2-BH1 SS-4 6-8	DANG2-BH1 SS-1 0-2
Date Sampled:	7-29-88	7-29-88
Time Sampled:	16:08	13:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-24-88	8-25-88
Percent Moisture:	13	6

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Phenanthrene	3300	ND	ND
Anthracene	3300	ND	ND
Dibutyl phthalate	3300	ND	ND
Fluoranthene	3300	ND	ND
4-Chlorophenyl phenyl ether	3300	ND	ND
Pyrene	3300	ND	ND
Butyl Benzyl phthalate	3300	ND	ND
Bis(2-ethylhexyl) phthalate	3300	6500	ND
Chrysene	3300	ND	ND
4-Bromophenyl phenyl ether	3300	ND	ND
Benzo(a)anthracene	3300	ND	ND
Di-n-octylphthalate	3300	ND	ND
Benzo(b)fluoranthene	3300	ND	ND
Benzo(k)fluoranthene	3300	ND	ND
Benzidine	6600	ND	ND
3,3'-Dichlorobenzidine	6600	ND	ND
Benzo(a)pyrene	3300	ND	ND
Indeno(1,2,3-cd)pyrene	3300	ND	ND
Dibenzo(a,h)anthracene	3300	ND	ND
Benzo(ghi)perylene	3300	ND	ND
Benzyl Alcohol	6600	ND	ND

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071552	88071554
Sample No.:	DANG2-BH1 SS-4 6-8	DANG2-BH1 SS-1 0-2
Date Sampled:	7-29-88	7-29-88
Time Sampled:	16:08	13:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-24-88	8-25-88
Percent Moisture:	13	6

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	6600	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	3300	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	3300	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	16000	ND	ND
3-Nitroaniline	16000	ND	ND
4-Nitroaniline	16000	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: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN:Mr. Bill Hayden

Lab Number:	88071552	88071554
Sample No.:	DANG2-BH1 SS-4 6-8	DANG2-BH1 SS-1 0-2
Date Sampled:	7-29-88	7-29-88
Time Sampled:	16:08	13:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-24-88	8-25-88
Percent Moisture:	13	6

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
Alpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
Beta-BHC	6600	ND	ND
Heptachlor	3300	ND	ND
Delta-BHC	5000	ND	ND
Aldrin	3300	ND	ND
Heptachlor epoxide	3300	ND	ND
Endosulfan I	--*	ND	ND
Dieldrin	5000	ND	ND
4,4'-DDE	10000	ND	ND
Endrin	--*	ND	ND
Endosulfan II	--*	ND	ND
4,4'-DDD	5000	ND	ND
4,4'-DDT	8300	ND	ND
Endosulfan Sulfate	10000	ND	ND
Endrin aldehyde	--*	ND	ND
Endrin Ketone	--*	ND	ND
Chlordane	20000	ND	ND
Methoxychlor	--*	ND	ND
Toxaphene	20000	ND	ND
Aroclor-1016	20000	ND	ND
Aroclor-1221	20000	ND	ND
Aroclor-1232	20000	ND	ND
Aroclor-1242	20000	ND	ND
Aroclor-1248	20000	ND	ND
Aroclor-1254	20000	ND	ND
Aroclor-1260	20000	ND	ND

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

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071552	88071554
Sample No.:	DANG2-BH1 SS-4 6-8	DANG2-BH1 SS-1 0-2
Date Sampled:	7-29-88	7-29-88
Time Sampled:	16:08	13:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-24-88	8-25-88
Percent Moisture:	13	6

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
2-Chlorophenol	3300	ND	ND
2-Nitrophenol	3300	ND	ND
Phenol	3300	ND	ND
2,4-Dimethylphenol	3300	ND	ND
2,4-Dichlorophenol	3300	ND	ND
2,4,6-Trichlorophenol	3300	ND	ND
4-Chloro-3-methylphenol	6600	ND	ND
2,4-Dinitrophenol	16000	ND	ND
2,6-Dichlorophenol	--*	ND	ND
2-Methyl-4,6-Dinitrophenol	16000	ND	ND
Pentachlorophenol	16000	ND	ND
4-Nitrophenol	16000	ND	ND
Benzoic Acid	16000	ND	ND
2-Methylphenol	3300	ND	ND
3- & 4-Methylphenol	3300	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	3300	ND	ND

Analyst

Laboratory Supervisor

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

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

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071553	88071555
Sample No.:	DANG2-BH1 SS-2 2-4	DANG2-BH1 SS-5 8-10
Date Sampled:	7-29-88	7-29-88
Time Sampled:	14:19	16:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-22-88	8-19-88
Percent Moisture:	8	16

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
1,3-Dichlorobenzene	330	ND	ND
1,4-Dichlorobenzene	330	ND	ND
Hexachloroethane	330	ND	ND
Bis(2-chloroethyl)ether	330	ND	ND
1,2-Dichlorobenzene	330	ND	ND
N-Nitrosodimethylamine	330	ND	ND
Bis(2-chloroisopropyl)ether	330	ND	ND
N-Nitrosodi-n-propyl amine	330	ND	ND
Hexachlorobutadiene	330	ND	ND
1,2,4-Trichlorobenzene	330	ND	ND
Nitrobenzene	330	ND	ND
Isophorone	330	ND	ND
Naphthalene	330	1500	480
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: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071553	88071555
Sample No.:	DANG2-BH1 SS-2 2-4	DANG2-BH1 SS-5 8-10
Date Sampled:	7-29-88	7-29-88
Time Sampled:	14:19	16:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-22-88	8-19-88
Percent Moisture:	8	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	940 B	2000 B
Fluoranthene	330	ND	ND
4-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	620	ND
Butyl Benzyl phthalate	330	ND	ND
Bis(2-ethylhexyl) phthalate	330	1600	520
Chrysene	330	ND	ND
4-Bromophenyl phenyl ether	330	ND	ND
Benzo(a)anthracene	330	ND	ND
Di-n-octylphthalate	330	ND	ND
Benzo(b)fluoranthene	330	ND	ND
Benzo(k)fluoranthene	330	ND	ND
Benzidine	660	ND	ND
3,3'-Dichlorobenzidine	660	ND	ND
Benzo(a)pyrene	330	ND	ND
Indeno(1,2,3-cd)pyrene	330	ND	ND
Dibenzo(a,h)anthracene	330	ND	ND
Benzo(ghi)perylene	330	ND	ND
Benzyl Alcohol	660	ND	ND

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071553	88071555
Sample No.:	DANG2-BH1 SS-2 2-4	DANG2-BH1 SS-5 8-10
Date Sampled:	7-29-88	7-29-88
Time Sampled:	14:19	16:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-22-88	8-19-88
Percent Moisture:	8	16

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	580	460
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: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : OR001

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

ATTN:Mr. Bill Hayden

Lab Number:	88071553	88071555
Sample No.:	DANG2-BH1 SS-2 2-4	DANG2-BH1 SS-5 8-10
Date Sampled:	7-29-88	7-29-88
Time Sampled:	14:19	16:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-22-88	8-19-88
Percent Moisture:	8	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

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

Date Received: July 30, 1988
Date Reported: August 29, 1988

Work Order: 787
Job No. : 0R001

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

ATTN: Mr. Bill Hayden

Lab Number:	88071553	88071555
Sample No.:	DANG2-BH1 SS-2 2-4	DANG2-BH1 SS-5 8-10
Date Sampled:	7-29-88	7-29-88
Time Sampled:	14:19	16:40
Date Extracted:	8-02-88	8-02-88
Date Analyzed:	8-22-88	8-19-88
Percent Moisture:	8	16

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

1071

Laboratory Supervisor

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

NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88071552-88071555
WORK ORDER NO.: 787

These soil samples were received at the [illegible] Berkeley Laboratory on 7-30-88. They were received cold and intact.

CHAIN OF CUSTODY RECORD 787

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

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

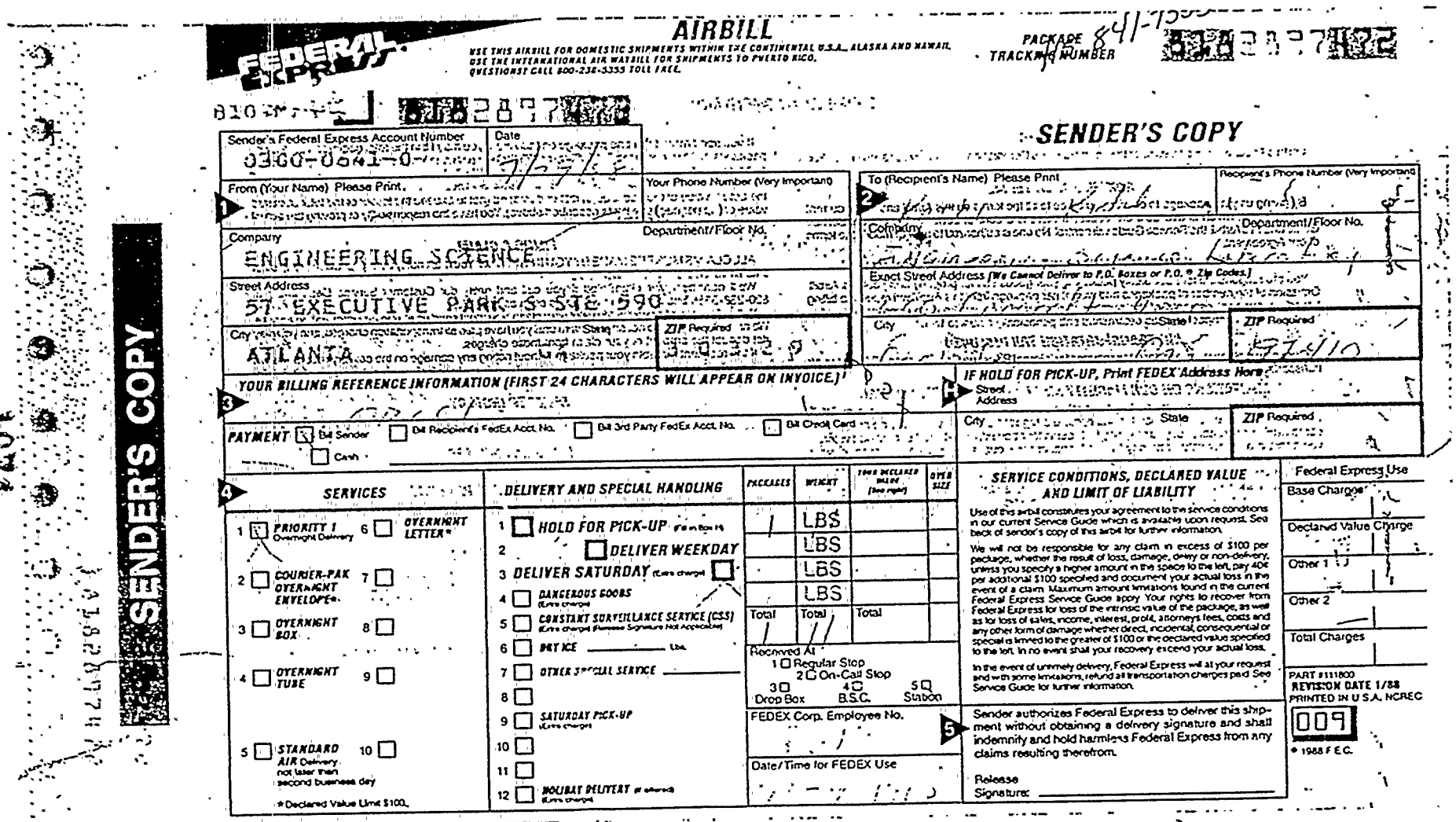
SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkley, CA. 97410

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, 7080	SW7131, 7421, 7471	REMARKS
7/29/88	1608	DANG2-BH1 SS-4 6-8	1		X	X	X	X	X	831552
7/29/88	1608	DANG2-BH1 SS-4 6-8	1	X						
7/29/88	1419	DANG2-BH1 SS-2 2-4	1		X	X	X	X	X	831553
7/29/88	1415	DANG2-BH1 SS-2 2-4	1	X						
7/29/88	1340	DANG2-BH1 SS-1 0-2	1		X	X	X	X	X	831554
7/29/88	1340	DANG2-BH1 SS-1 0-2	1	X						
7/29/88	1640	DANG2-BH1 SS-5 8-10	1		X	X	X	X	X	831555
7/29/88	1640	DANG2-BH1 SS-5 8-10	1	X						

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	7/29/88 1730				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Bill Trautman	7.30.88 1:30 pm	Rec'd cold & intact. LL ember for BH-1 SS-2 broken custody seal and no tape around lid. B.F. 7.30.88

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QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555
88081589-88081593

QC Report No: AAF-S-0014-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-26-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate Spike Recovery C1	C2	RPD	SA	SR	SSR	PR	Notes
Arsenic	88071552	88071552	8-15-88	8-08-88	7060	<0.3	1.4	1.8	25*	4.54	1.4	5.3	86	
Cadmium	88071552	88071552	8-15-88	8-08-88	7131	<0.04	0.158B	0.124B	24*	0.340	0.158B	0.417	76	A
Lead	88071552	88071552	8-15-88	8-08-88	7421	0.2	8.03	9.22	14	2.27	8.03	10.8	122	

1075

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

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

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

C1 = Concentration One
C2 = Concentration Two
NA = Not Applicable
NC = Not Calculated
ND = Not Detected
SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added (Concentration)

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555,
88081589-88081593

QC Report No: CVM-S-0007-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-25-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate Spike Recovery C1	C2	RPD	SA	SR	SSR	PR	Notes
Mercury	88071552	88071552	8-12-88	8-08-88	7471	<0.2	<0.2	<0.2	NC	0.568	<0.2	0.484	85	A

1076

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

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88071552-88071555
Samples No.: 88081589-88081593
QC REPORT NO.: AAF-S-0014-88
QC REPORT NO.: CVM-S-0007-88

The MDL for the following analyte(s) is as provided by the subcontracting laboratory: Cadmium, Mercury.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88071552-88071555,
88081539-88081593

QC Report No: ICP-S-0020-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 7-30-88
Date Reported: 8-25-88
Dilution Factor: NA
%Moisture: 12

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate Spike Recovery C1	C2	RPD	SA	SR	SSR	PR	Notes
Barium	88071552	88071552	8-09-88	8-08-88	6010	<0.5	60.3	65.0	7	227	60.3	283	98	

1078

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

C1 = Concentration One
C2 = Concentration Two

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

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

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

QUALITY CONTROL RESULTS SUMMARY
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):
88071552-88071555

QC Report No: TPH-S-0041-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-01-88
Date Prepared: 8-03-88
Date Analyzed: 8-05-88
Date Reported: 8-29-88
Dilution Factor: 6.5
%Moisture: 17.8

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88071577	418.1	<100	<100	1220	1000	82	1000	82	0	

1079

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) = $\frac{SSR - SR}{SA} \times 100$

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

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

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
SOIL

Job No: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88081552-88081558
88081589-88081593

QC Report No.: OCP-S-0029-88
QC Sample No.: 88081592
Level (Low/Med): Low
Date Reported: 11-02-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2270	ND	6	89	46-127
Heptachlor epoxide	2270	ND	63.9	85	35-130
Aldrin	2270	ND	57.4	76	34-132
Dieldrin	5670	ND	167	114	31-134
Endrin	5670	ND	180	95	42-139
4,4'-DDT	5670	ND	161	85	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	73.9	98	89	9	50	46-127
Heptachlor epoxide	67.9	90	85	6	31	35-130
Aldrin	70.5	93	76	21	43	34-132
Dieldrin	178	94	114	7	38	31-134
Endrin	193	102	95	7	45	42-139
4,4'-DDT	141	74	85	14	50	23-134

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

RPD: 0 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

1080

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
SOIL

Job No: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88081552-88081558
88081589-88081593

QC Report No.: OCP-S-0029-88B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-02-88

Laboratory Supervisor Approval:

Compound	Amount Added (ng)	Sample Conc. In Extract (ug/Kg)	MS Conc. In Extract (ug/Kg)	MS % Rec. #	QC Limits Rec.
Lindane	2000	ND	79.1	119	46-127
Heptachlor epoxide	2000	ND	79.2	119	35-130
Aldrin	2000	ND	86.1	129	34-132
Dieldrin	5000	ND	210	126	31-134
Endrin	5000	ND	234	140*	42-139
4,4'-DDT	5000	ND	254	152*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	78.1	117	119	1	50	46-127
Heptachlor epoxide	79.1	119	119	<1	31	35-130
Aldrin	88.0	132	129	2	43	34-132
Dieldrin	211	127	126	<1	38	31-134
Endrin	237	142*	140*	1	45	42-139
4,4'-DDT	256	154*	152*	1	50	23-134

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

RPD: 0 out of 6 outside limits. See Case Narrative attached.

Spike Recovery: 4 out of 12 outside limits

1081

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0029-88
QC REPORT NO.: OCP-S-0029-88B

Although the matrix spikes met EPA QC guidelines, analysis of blank spikes showed high recoveries for aldrin and DDT. The data associated with the analysis of this batch of samples was re-examined closely. No analytical problems were found. Since there were no detectable pesticides found in this batch of samples, the quality of the data should not be affected.

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

Heptachlor epoxide was accidently substituted for heptachlor in the matrix spiking solution.

PESTICIDE METHOD BLANK SUMMARY

Job No.:	OR001	Lab Name:	Engineering Science
		Lab Sample No.:	Blank
Client:	ES Oak Ridge		
Attn:	Bill Hayden	Matrix:	Soil
Address:	710 S. Illinois Avenue	Level (low/med):	Low
	Suite F-103	Extraction:	
	Oak Ridge, Tn. 37830	(SepF/Cont/Sonc):	Sonc
		Date Reported:	11-02-88
Project:	Duluth ANGB		
Date Extracted:	8-04-88		
Date Analyzed (1):	9-09-88	Date Analyzed (2):	
Time Analyzed (1):	06:26	Time Analyzed (2):	
Instrument ID (1):	5880	Instrument ID (2):	
GC Column ID (1):	Mixed	GC Column ID (2):	

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

EPA Sample No.	Lab Sample ID (1)	Date Analyzed 1	Lab Sample ID (2)	Date Analyzed 2
-	88071552	9-09-88		
-	88071553	9-09-88		
-	88071554	9-09-88		
-	88071555	9-09-88		
-	88071589	9-09-88		
-	88071590	9-09-88		
-	88071591	9-09-88		
-	88071592	9-09-88		
-	88071593	9-09-88		

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 8270

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081589-88081590, 8808071552-88081555,
88081591-88081593

QC Report No: BNA-S-0023-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 7-28-88
Date Prepared: 7-30-88
Date Analyzed: 8-03-88
Date Reported: 8-17-88
Dilution Factor: NA
%Moisture: 14

Laboratory Supervisor Approval:

1084

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%Recovery
	1,2,4-Trichlorobenzene	3970	ND	2630	66	2490	63	5	23	38-107
B/N	Acenaphthene	3970	ND	2390	60	2310	58	3	19	31-137
Laboratory	2,4-Dinitrotoluene	3970	ND	2560	64	2430	61	5	47	28-89
Sample #	Pyrene	3970	ND	2260	57	2160	54	4	36	35-142
88071506	N-Nitroso-Di-n-Propylamine	3970	ND	2670	67	2450	62	8	38	41-126
	1,4-Dichlorobenzene	3970	ND	22	56	2140	54	4	27	28-104
	Pentachlorophenol	7940	ND	7860	99	7420	93	6	47	17-109
ACID	Phenol	7940	ND	4520	57	4290	54	5	35	26-90
Laboratory	2-Chlorophenol	7940	ND	4320	54	4080	51	6	50	25-102
Sample #	4-Chloro-3-Methylphenol	7940	ND	5010	63	4810	60	4	33	26-103
88071506	4-Nitrophenol	7940	ND	6150	77	6000	76	2	50	11-114

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

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

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

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

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

METHOD BLANK SUMMARY

Job No: OR001

Work Order No.: 787

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: 4-21-89

Laboratory Supervisor Approval:



Project: Duluth ANGB

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5455	8-19-88	BNA	2	84-74-2	Di-n-butylphthalate	36	10	88081552-88081555

1085

1F

EPA SAMPLE NO.

BLANK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 787 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8807/552-55, 1559-93 BLANK

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5455

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 8/2/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/19/88

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.	67-66-3	Chloroform	2.58	~~540~~ 280	
2.		unknown	2.79	1700	
3.	71-43-2	benzene	3.08	1300	
4.		unknown	3.95	130	
5.		unknown	4.19	750	
6.			4.56	180	
7.			4.62	270	
8.			5.07	280	
9.			5.57	7300	
10.			6.84	270	
11.			29.39	370	
12.			30.84	400	
13.			34.11	230	
14.			36.47	16,000	
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN62-BH1-SS4 6-8'

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 787 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8807552 10 ml

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5503

Level: (low/med) low Date Received: 7/30/88

% Moisture: not dec. ~~12.8~~ 13 dec. _____ Date Extracted: 8/2/88
~~DAN 3/28/89~~

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/24/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 10:1

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	67-66-3	~~unknown~~ Chloroform	2.67	2000	
2.		unknown	5.36	15000	
3.			6.48	17000	
4.			7.15	12000	
5.			7.31	9000	
6.		unknown aromatic - C_9H_{12}	7.56	7500	
7.		- C_9H_{12}	7.72	19000	
8.		- C_9H_{12}	7.88	8000	
9.		unknown	8.19	8600	
10.		unknown	8.25	7100	
11.		unknown aromatic - C_9H_{12}	8.42	18000	
12.		unknown	8.59	59000	
13.			9.02	23000	
14.			9.22	9400	
15.			9.71	10,000	
16.			10.62	38,000	
17.		unknown aromatic - $C_{10}H_{14}$	11.67	7100	
18.		unknown	12.58	13000	
19.			29.70	21,000	
20.			36.65	80,000	
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: 10

Sample
~~Project~~ No: DANG2 - BH1 - SS2 2-4'
Sample Matrix: Soil
Conc Unit: ug/kg
Work Order No: 787
Lab Sample ID: 8807155 3
Lab File ID: E 5479
Date Received: 7-30-88
Date Extracted: 8-2-88
Date Analyzed: 8-22-88
Date Reported:
Dilution Factor: 1
% Moisture: 8 %

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	unknown	3.47	220	
	unknown	3.53	760	
	unknown	3.84	1700	
	unknown	4.52	2200	
	unknown	4.65	720	
	unknown	4.92	180	
	unknown	5.74	1600	
	unknown	12.86	9200	
	unknown	16.10	640	
	unknown hydrocarbon	18.16	3760	

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DAM62-BH1-SS1 0-2'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 787 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88071554 10 ml

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5504

Level: (low/med) low Date Received: 7/30/88

% Moisture: not dec. 6+6 DRO 2/28/89 dec. _____ Date Extracted: 8/2/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/25/88

GPC Cleanup: (Y/N) N pH: ____ Dilution Factor: 10.1

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	5.32	15000	
2.			6.46	20,000	
3.			7.14	20,000	
4.			7.31	23,000	
5.			7.62	15,000	
6.		unknown aromatic - C_9H_{12}	7.73	20000	
7.		unknown	8.22	17,000	
8.		unknown aromatic - C_9H_{12}	8.42	14,000	
9.		unknown	8.60	73,000	
10.			9.05	46,000	
11.			9.25	20,000	
12.			9.38	18,000	
13.			9.75	16,000	
14.			10.71	03,000	
15.		unknown aromatic - $C_{10}H_{14}$	11.72	14,000	
16.		unknown	12.65	27,000	
17.			12.89	12,000	
18.			16.26	17,000	
19.			17.32	15,000	
20.			17.92	14,000	
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DAW62-BH1-SS5 8-10'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 787 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88071555 1ml

Sample wt/vol: 30 (g/mL) gm Lab File ID: E.5460

Level: (low/med) low Date Received: 7/30/88

% Moisture: not dec. 15 16 dec. _____ Date Extracted: 8/2/88

<200 2/28/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 8/19/88

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.	67-66-3	chloroform	2.79	1900	
2.		unKnown	3.24	300	
3.		unKnown	5.38	380	
4.	100-41-4	ethyl benzene	5.90	910	
5.		unKnown	6.49	3000	
6.			6.56	1100	
7.			6.88	810	
8.			7.79	1600 ?	
9.			9.01	520	
10.			10.74	17000	
11.			14.09	1600 ?	
12.			15.97	1400	
13.			17.43	1500	
14.			18.02	1600 ?	
15.			21.08	970	
16.			21.18	1600 ?	
17.			30.44	970	
18.			30.56	1600 ?	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Project: Duluth

Work Order No.:
Lab Sample No.: 03-39
Lab File ID: ES455
Matrix: soil
Level (low/med):
Date Analyzed: 8-19-88
Time Analyzed: 15:00
Instrument ID:
Date Reported:

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

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANG2-BH1 SS-4 6-8'	8807 1552	ES477, ES503	8-22-88, 8-24-88
DANG2-BH1 SS-2 2-4'	8807 1553	ES479	8-22-88
DANG2-BH1 SS-1 0-2'	8807 1554	ES483, ES504	8-25-88
DANG2-BH1 SS-5 8-10'	8807 1555	ES460	8-19-88
DANG2-BH1 SS-6 10-12'	8808 1589	ES456, ES463	8-19-88, 8-20-88
BH2 SS-1 0-2'	8808 1590	ES481, ES505	8-22-88, 8-22-88
BH2 SS-4 6-8'	8808 1591	ES459, ES476	8-19-88, 8-22-88
BH2 SS-6 10-12'	8808 1592	ES458, ES464	8-19-88, 8-20-88
BH2 SS-9 16-18'	8808 1593	ES457, ES475	8-19-88, 8-22-88

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):
88071552-88071555

QC Report No: TPH-S-0041-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-01-88
Date Prepared: 8-03-88
Date Analyzed: 8-05-88
Date Reported: 8-29-88
Dilution Factor: 6.5
%Moisture: 17.8

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88071577	418.1	<100	<100	1220	1000	82	1000	82	0	

1092

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) = $\frac{SSR - SR}{SA} \times 100$

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

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

DATA PACKAGE #17

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ENGINEERING-SCIENCE, INC.

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

REVISED REPORT

Job No.: OR001

Work Order No.:

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 8-17-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081898	DANGB2-MW40-SS1	BA-I	8-16-88		9-07-88	
88081898	DANGB2-MW40-SS1	CD-F	8-16-88		9-07-88	
88081898	DANGB2-MW40-SS1	CR-F	8-16-88		9-07-88	
88081898	DANGB2-MW40-SS1	PB-F	8-16-88		9-21-88	
88081898	DANGB2-MW40-SS1	418.1	8-16-88	9-12-88	9-13-88	
88081898	DANGB2-MW40-SS1	MOIS	8-16-88		8-24-88	
88081898	DANGB2-MW40-SS1	8010	8-16-88		8-26-88	8-22-88
88081898	DANGB2-MW40-SS1	8020	8-16-88		8-26-88	8-22-88
88081898	DANGB2-MW40-SS1	8270	8-16-88	8-26-88	10-05-88	
88081899	DANGB2-MW40-SS2	BA-I	8-16-88		9-07-88	
88081899	DANGB2-MW40-SS2	CD-F	8-16-88		9-07-88	
88081899	DANGB2-MW40-SS2	CR-F	8-16-88		9-07-88	
88081899	DANGB2-MW40-SS2	PB-F	8-16-88		9-21-88	
88081899	DANGB2-MW40-SS2	418.1	8-16-88	9-12-88	9-13-88	
88081899	DANGB2-MW40-SS2	MOIS	8-16-88		8-24-88	
88081899	DANGB2-MW40-SS2	8010	8-16-88		8-26-88	8-22-88
88081899	DANGB2-MW40-SS2	8020	8-16-88		8-26-88	8-25-88
88081899	DANGB2-MW40-SS2	8270	8-16-88	8-26-88	10-05-88	
88081900	DANGB2-MW40-SS3	BA-I	8-16-88		9-07-88	
88081900	DANGB2-MW40-SS3	CD-F	8-16-88		9-07-88	
88081900	DANGB2-MW40-SS3	CR-F	8-16-88		9-07-88	
88081900	DANGB2-MW40-SS3	PB-F	8-16-88		9-21-83	
88081900	DANGB2-MW40-SS3	418.1	8-16-88	9-12-88	9-13-88	
88081900	DANGB2-MW40-SS3	MOIS	8-16-88		8-24-88	
88081900	DANGB2-MW40-SS3	8010	8-16-88		8-26-88	8-22-88
88081900	DANGB2-MW40-SS3	8020	8-16-88		8-26-88	8-22-88
88081900	DANGB2-MW40-SS3	8270	8-16-88	8-26-88	10-05-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081898-88081900
WORK ORDER NO.: 860

These soil samples were received at the ES Berkeley Laboratory on 8-17-88. They were received cold and intact.

ENGINEERING-SCIENCE INC.
11/02/88

ANALYSIS REPORT

ORK ORDER NUMBER: 860
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 2, UNITS: mg/Kg

EST COMPOUND	DANGB2-MW40-SS1 8-16-88 88081898	DANGB2-MW40-SS2 8-16-88 88081899	DANGB2-MW40-SS3 8-16-88 88081900
ACID DIG SOIL	NA	NA	NA
ARIUM	54.8	41.2	39.2
CADMIUM	11.9*N	9.6*N	9.4*N
CHROMIUM	29.6	19.2	21.2
EAD	3.8	4.1	4.2

IA_ Not Analyzed

ANALYSIS REPORT

ORK ORDER NUMBER: 860
OB NUMBER : ZB0000000440
ORK ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 3, UNITS: mg/Kg

EST COMPOUND	DANGB2-MW40-SS1 8-16-88 88081898	DANGB2-MW40-SS2 8-16-88 88081899	DANGB2-MW40-SS3 8-16-88 88081900
18.1 PETROLEUM HYDROCARBONS	<100	<100	<100
MOISTURE	10.9	8.9	8.3

ENGINEERING-SCIENCE INC.
11/02/88

ANALYSIS REPORT

WORK ORDER NUMBER: 860
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB2-MW40-SS1 8-16-88 88081898	DANGB2-MW40-SS2 8-16-88 88081899	DANGB2-MW40-SS3 8-16-88 88081900
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	0.13B	ND	0.1B
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	4.4B	0.9B	4.4B
1,2-DICHLOROPROPANE	ND	ND	ND

ND- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 860

EST COMPOUND	DANGB2-MW40-SS1 8-16-88 88081898	DANGB2-MW40-SS2 8-16-88 88081899	DANGB2-MW40-SS3 8-16-88 88081900
.3-DICHLOROPROPYLENE	ND	ND	ND
.1,2,2-TETRACHLOROETHANE	ND	ND	ND
.1,1,2-TETRACHLOROETHANE	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND
.1,1-TRICHLOROETHANE	ND	ND	ND
.1,2-TRICHLOROETHANE	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND
INYL CHLORIDE	ND	ND	ND

- Not Detected

ANALYSIS REPORT

'ORK ORDER NUMBER: 860
JOB NUMBER : ZB0000000440
'ORK ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
10 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

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

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

'EST COMPOUND	DANGB2-MW40-SS1 8-16-88 88081898	DANGB2-MW40-SS2 8-16-88 88081899	DANGB2-MW40-SS3 8-16-88 88081900
'ENZENE	ND	ND	ND
HLOROBENZENE	ND	ND	ND
ι,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND
_THYL BENZENE	ND	ND	ND
TOLUENE	37	8.8	8.9
YLENES	ND	ND	ND

1101

ND - Not Detected

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

Date Received: August 17, 1988
Date Reported: October 28, 1988

Work Order: 860
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:	88081898	88081899
Sample No.:	DANGB2-MW40-SS1	DANGB2-MW40-SS2
Date Sampled:	8-16-88	8-16-88
Time Sampled:	09:40	10:45
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-05-88	10-05-88
Percent Moisture:	11	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: August 17, 1988 Work Order: 860
Date Reported: October 28, 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:	88081898	88081899
Sample No.:	DANGB2-MW40-SS1	DANGB2-MW40-SS2
Date Sampled:	8-16-88	8-16-88
Time Sampled:	09:40	10:45
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-05-88	10-05-88
Percent Moisture:	11	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: August 17, 1988 Work Order: 860
Date Reported: October 28, 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:	88081898	88081899
Sample No.:	DANGB2-MW40-SS1	DANGB2-MW40-SS2
Date Sampled:	8-16-88	8-16-88
Time Sampled:	09:40	10:45
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-05-88	10-05-88
Percent Moisture:	11	9

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	660	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	330	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	1600	ND	ND
3-Nitroaniline	1600	ND	ND
4-Nitroaniline	1600	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

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

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

Date Received: August 17, 1988
Date Reported: October 23, 1988

Work Order: 860
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:	88081898	88081899
Sample No.:	DANGB2-MW40-SS1	DANGB2-MW40-SS2
Date Sampled:	8-16-88	8-16-88
Time Sampled:	09:40	10:45
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-05-88	10-05-88
Percent Moisture:	11	9

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

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

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

Date Received: August 17, 1988
Date Reported: October 28, 1988

Work Order: 860
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:	88081898	88081899
Sample No.:	DANGB2-MW40-SS1	DANGB2-MW40-SS2
Date Sampled:	8-16-88	8-16-88
Time Sampled:	09:40	10:45
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-05-88	10-05-88
Percent Moisture:	11	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

Laura Kuck
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 17, 1988
Date Reported: October 28, 1988

Work Order: 860
Job Number: OR001

FOR: ES:Oak Ridge/Duluth AN66
Address: 710 S. Illinois Ave, Suite F-103
Oak Ridge, TN 37830

ATTN: Mr. Bill Hayden

Lab Number:	88081900
Sample No.:	DAN6B2-MW40-SS3
Date Sampled:	8-16-88
Time Sampled:	10:53
Date Extracted:	8-26-88
Date Analyzed:	10-05-88
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)

Date Received: August 17, 1988 Work Order: 860
Date Reported: October 28, 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:	88081900
Sample No.:	DANGB2-MW40-SS3
Date Sampled:	8-16-88
Time Sampled:	10:53
Date Extracted:	8-26-88
Date Analyzed:	10-05-88
Percent Moisture:	8

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 17, 1988
Date Reported: October 28, 1988

Work Order: 860
Job Number: 0R001

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

ATTN: Mr. Bill Hayden

Lab Number:	88081900
Sample No.:	DANGB2-MW40-SS3
Date Sampled:	8-16-88
Time Sampled:	10:53
Date Extracted:	8-26-88
Date Analyzed:	10-05-88
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
α,α-Dimethylphenethylamine	--*	ND
2,6-Dinitrotoluene	--*	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 17, 1988
Date Reported: October 28, 1988

Work Order: 860
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:	88081900
Sample No.:	DANGB2-MW40-SS3
Date Sampled:	8-16-88
Time Sampled:	10:53
Date Extracted:	8-26-88
Date Analyzed:	10-05-88
Percent Moisture:	8

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 17, 1988
Date Reported: October 28, 1988

Work Order: 860
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:	88081900
Sample No.:	DANGB2-MW40-SS3
Date Sampled:	8-16-88
Time Sampled:	10:53
Date Extracted:	8-26-88
Date Analyzed:	10-05-88
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	
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	

Laura Kuk
Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

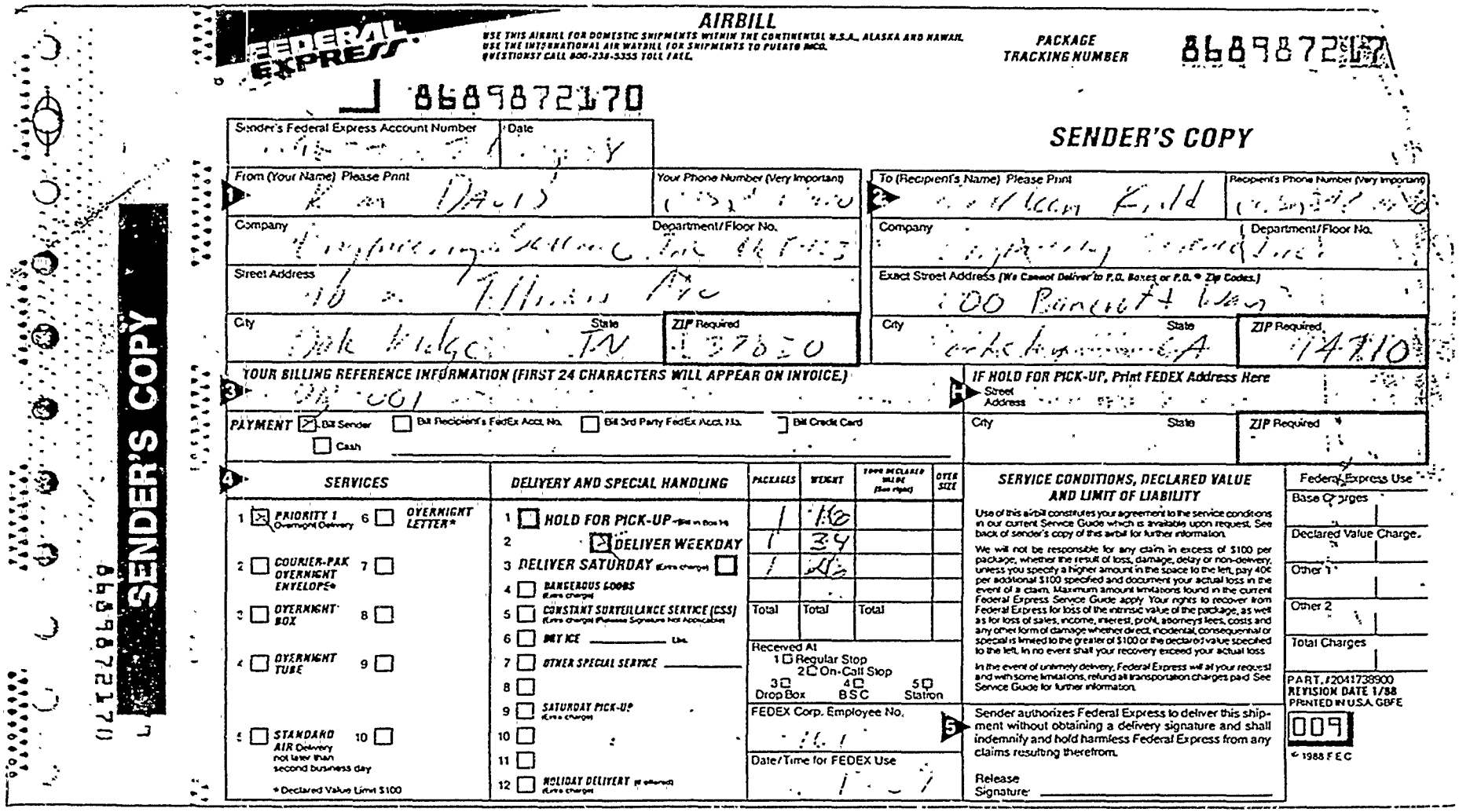
NOTE: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED								SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710
OR001	Duluth ANGB/Duluth, Mn.		SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7191	SW7131, 7421			
SAMPLER(S): (Signature) Richard Z. Dan											
DATE	TIME	SAMPLE DESCRIPTION									REMARKS
8-16-88	0940	DANGB2 - MW40 - SS1	1	X							
8-16-88	0940	DANGB2 - MW40 - SS1	1		X	X	X	X			SW6010 is for Ba only.
8-16-88	1045	DANGB2 - MW40 - SS2	1	X							
8-16-88	1045	DANGB2 - MW40 - SS2	1		X	X	X	X			" " "
8-16-88	1053	DANGB2 - MW40 - SS3	1	X							
8-16-88	1053	DANGB2 - MW40 - SS3	1		X	X	X	X			" " "

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Richard Z. Dan	8-16-88 1745				

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

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10 ☐	10 ☐
	11 ☐
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CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081706
Samples No.: 88081708-88081709
Samples No.: 88081749-88081754
Samples No.: 88081898-88081906

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 analytical spike as required by laboratory standard operating procedure. The results of the analytical spike recovery for Cadmium indicate matrix interference for this analyte.

1F

EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DAN6B2 - MW40-551

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 860 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808189B

Sample wt/vol: 30 (g/mL) gm Lab File ID: F5818

Level: (low/med) low Date Received: 8/17/88

% Moisture: not dec. 10.9 11 dec. _____ Date Extracted: 8/26/88
DUP 3/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/5/88

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	4.11	190	
2.			4.33	1200	
3.			4.74	600	
4.			5.24	20,000	
5.			625	150	
6.			6.41	1500	
7.			6.59	260	
8.			6.95	710	
9.			7.01	370	
10.			7.09	190	
11.			23.44	190	
12.			23.96	520	
13.	57-10-3	hexadecanoic acid	24.13	1600	
14.		unknown	26.57	190	
15.			28.81	1,200	
16.			35.02	590	
17.			35.37	22,000	
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1F

EPA SAMPLE NO.

DAN682 - MW40-552

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 860 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081899

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5820

Level: (low/med) low Date Received: 8/17/88

% Moisture: not dec. 8.9 9 dec. _____ DRO 3/1/89 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: 18 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.38	180	
2.			4.49	180	
3.			4.72	330	
4.			5.18	20000	
5.			6.41	950	
6.			6.44	290	
7.			6.58	260	
8.			6.67	180	
9.			6.96	620	
10.			7.01	360	
11.			7.09	220	
12.	57-10-3	hexadecanoic acid	24.10	1300	
13.		unknown	28.80	990	
14.			29.52	260	
15.			32.62	170	
16.			33.09	320	
17.			35.16	12000	
18.			35.51	380	
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081877-88081879, 88081883-88081890
88081898-88081900

QC Report No: AAF-S-0027-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-15-88
Date Reported: 10-10-88
Dilution Factor: NA
%Moisture: 9.6

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
Lead	88081879	88081879	9-21-88	9-17-88	7421	<0.5	2.81	2.52	11	5.53	2.81	7.43	84	

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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

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

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88081705, 88081708-88081709
88081749-88081754, 88081898-88081906

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	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

1112
20

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)

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):
88081898-88081906, 88082000-88082002
88082043-88082049

QC Report No: TPH-S-0050-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-17-88
Date Prepared: 9-12-88
Date Analyzed: 9-13-88
Date Reported: NA
Dilution Factor: 6
%Moisture: 22.2

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081903	418.1	<100	<100	1300	1000	77	820	63	20	*

1119

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
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OROC1

Client: ES Cak 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: 8-18-88
Date Prepared: NA
Date Analyzed: 8-30-88
Date Reported: 10-07-88
Dilution Factor: NA
% Moisture: 15.8

Laboratory Supervisor Approval:

1120

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

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

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: 10-27-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
15	8-26-88	VG	Carbo-pack	75-09-2 67-66-3	Dichloromethane Chloroform	3.3 0.2	0.25 0.05	88081898-88081900 88081904-88081906 88081960-88081962

11121

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: BNA-S-0044-88
QC REPORT NO.: BNA-S-0044-88B
QC REPORT NO.: BNA-S-0045-88
QC REPORT NO.: BNA-S-0045-88B
WORK ORDER NO.: 876

Initial analysis of samples 88081939, 88081941, 88081942 and the associated blank resulted in surrogate spike recoveries that were outside EPA QC limits. These samples were re-extracted after holding times had expired. Analysis of the second extracts resulted in good surrogate spike recoveries. Results of the second analysis are reported. No target compounds were found in either analysis of any of the samples.

Analysis of matrix spikes associated with the first extraction of these samples resulted in recoveries and RPD's for many of the spiked compounds that were outside EPA QC limits. Spiked blanks were analyzed with similar results. The data associated with these analyses were closely examined; no errors or problems were found.

Results of analysis of matrix spikes associated with the second extraction of samples 88081939, 88081941 and 88081942 showed high recoveries of dinitrotoluene, nitrosodipropylamine, pentachlorophenol and chloromethylphenol, although RPD's were good. Analysis of spiked blanks resulted in good recoveries and RPD's.

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-0044-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-18-88
Date Prepared: 8-26-88
Date Analyzed: 10-03-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: 16

Laboratory Supervisor Approval:

1123

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%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	2*	157	4*	63*	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

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.: 0R001

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

Project: Duluth ANGB

1124

QC Report for Laboratory Sample No(s):
88081898-88081906
88081938-88081942

QC Report No: BNA-S-0044-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-26-88
Date Analyzed: 10-25-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	%Recovery
	1,2,4-Trichlorobenzene	3330	ND	14	<1*	273	8*	NC*	23	38-107
B/N	Acenaphthene	3330	ND	757	23*	977	29*	25*	19	31-137
Laboratory	2,4-Dinitrotoluene	3330	ND	1740	52	2000	60	14	47	28-89
Sample #	Pyrene	3330	ND	1380	41	1470	44	6	36	35-142
Blank	N-Nitroso-di-n-Propylamine	3330	ND	957	29*	1140	34*	17	38	41-126
	1,4-Dichlorobenzene	3330	ND	ND	NC*	93	3*	NC*	27	28-104
	Pentachlorophenol	6670	ND	2720	41	3080	46	12	47	17-109
ACID	Phenol	6670	ND	1990	30	2710	41	31	35	26-90
Laboratory	2-Chlorophenol	6670	ND	1170	18*	1980	30	51*	50	25-102
Sample #	4-Chloro-3-Methylphenol	6670	ND	3170	48	3630	54	14	33	26-103
Blank	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.
* 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: 12-08-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5797	10-03-88	BNA	2	-	None Found	-	-	88081938-88081942 88081898-88081906

1125

1F

EPA SAMPLE NO.

DAN6B2 - mw40-553

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 860 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808190 0

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5821

Level: (low/med) low Date Received: 8/17/88

% Moisture: not dec. ~~83~~ 8 dec. _____ Date Extracted: 8/26/88
DAO 3/1/89

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/5/88

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

Number TICs found: 13 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.08	170	
2.			4.50	270	
3.			8.73	470	
4.			5.20	19,000	
5.			6.40	1000	
6.			6.45	170	
7.			6.95	470	
8.			7.01	270	
9.			7.10	170	
10.	57-10-3	hexadecanoic acid	24.10	1400	
11.		unknown	28.81	600	
12.			29.53	300	
13.			35.38	20,000	
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

1F

EPA SAMPLE NO.

BLANK

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 861 + 860 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88081888-1906, 1938-19 BLANK

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5797

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. _____ Date Extracted: 8/26/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/3/88

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	3.42	630	
2.			3.46	530	
3.			3.75	1200	
4.			4.38	130	
5.			4.42	530	
6.			4.55	1200	
7.			4.84	200	
8.			5.09	2400	
9.			5.31	17,000	
10.			6.39	330	
11.			6.93	430	
12.			6.99	230	
13.			21.73	330	
14.			28.83	400	
15.			35.09	400	
16.			35.46	8700	
17.					
18.					
19.					
20.					
21.					
22					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

FORM I SV-TIC 1/87 Rev.

CHAIN OF CUSTODY RECORD 8190

JOB NO.	PROJECT NAME/LOCATION
3001	Duluth ANGB/Duluth, Mn.

SAMPLER(S): (Signature)
Holly L. Dam

	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7181	SW7131, 7421
4	0940	DANGB2 - MW40 - 551	1	X					
4	0940	DANGB2 - MW40 - 551	1			X	X	X	X
44	1045	DANGB2 - MW40 - 552	1	X					
44	1045	DANGB2 - MW40 - 552	1			X	X	X	X
44	1053	DANGB2 - MW40 - 553	1	X					
44	1053	DANGB2 - MW40 - 553	1			X	X	X	X

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

REMARKS

881898

SW6010 is for Ba only.

881899

"

881900

"

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Holly L. Dam	8-16-88 1745	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)
		Bill Thompson

Date/Time: 8-17-88 11:00

Remarks: recd cold & intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

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).:
88081898-88081906

Calibration Date: 9-13-88
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	0.120	
No. 2	1.2	0.216	RF = 6.30
No. 3	1.8	0.312	
No. 4	2.4	0.407	
Cont. Cal. No. 2 (88081898-88081901) (88081903)	1.18	0.213	98%
Cont. Cal. No. 2 (88081902) (88081904-88081906)	1.15	0.209	96%

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DATA PACKAGE #18

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ENGINEERING-SCIENCE, INC.

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

Job No.: OR001

Work Order No.: 861

Client: ES Oak Ridge
Attention: Bill Hayden
Address: 710 S. Illinois Avenue
Suite F-105
Oak Ridge, Tn. 37830

Project: Duluth ANGB

Attached are the analytical reports for the soil sample(s) received by this laboratory on 8-17-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88081901	DANGB3-SS-C2	AS-F	8-16-88		10-04-88	
88081901	DANGB3-SS-C2	BA-I	8-16-88		9-07-88	
88081901	DANGB3-SS-C2	CD-F	8-16-88		9-07-88	
88081901	DANGB3-SS-C2	CR-F	8-16-88		9-07-88	
38081901	DANGB3-SS-C2	HG-C	8-16-88		9-12-88	
88081901	DANGB3-SS-C2	PB-F	8-16-88		9-23-88	
88081901	DANGB3-SS-C2	418.1	8-16-88	9-12-88	9-13-88	
88081901	DANGB3-SS-C2	MOIS	8-16-88		8-24-88	
88081901	DANGB3-SS-C2	8080	8-16-88	8-25-88	9-22-88	9-26-88
88081901	DANGB3-SS-C2	8270	8-16-88	8-26-88	10-11-88	
88081902	DANGB3-SS-A0	AS-F	8-16-88		10-04-88	
88081902	DANGB3-SS-A0	BA-I	8-16-88		9-07-88	
88081902	DANGB3-SS-A0	CD-F	8-16-88		9-07-88	
88081902	DANGB3-SS-A0	CR-F	8-16-88		9-07-88	
88081902	DANGB3-SS-A0	HG-C	8-16-88		9-12-88	
88081902	DANGB3-SS-A0	PB-F	8-16-88		9-23-88	
88081902	DANGB3-SS-A0	418.1	8-16-88	9-12-88	9-13-88	
88081902	DANGB3-SS-A0	MOIS	8-16-88		8-24-88	
88081902	DANGB3-SS-A0	8080	8-16-88	8-25-88	9-22-88	
38081902	DANGB3-SS-A0	8270	8-16-88	8-26-88	10-05-88	
38081903	DANGB3-SS-B1	AS-F	8-16-88		10-04-88	
88081903	DANGB3-SS-B1	BA-I	8-16-88		9-07-88	
38081903	DANGB3-SS-B1	CD-F	8-16-88		9-07-88	
38081903	DANGB3-SS-B1	CR-F	8-16-88		9-07-88	
88081903	DANGB3-SS-B1	HG-C	8-16-88		9-12-88	
88081903	DANGB3-SS-B1	PB-F	8-16-88		9-23-88	
38081903	DANGB3-SS-B1	418.1	8-16-88	9-12-88	9-13-88	
88081903	DANGB3-SS-B1	MOIS	8-16-88		8-24-88	
88081903	DANGB3-SS-B1	8080	8-16-88	8-25-88	9-22-88	
38081903	DANGB3-SS-B1	8270	8-16-88	8-26-88	10-11-88	

* If applicable

Job No.: OR001

Work Order No.: 861

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38081904	DANGB3-SS-A4	AS-F	8-16-88		10-04-88	
38081904	DANGB3-SS-A4	BA-I	8-16-88		9-07-88	
38081904	DANGB3-SS-A4	CD-F	8-16-88		9-07-88	
38081904	DANGB3-SS-A4	CR-F	8-16-88		9-07-88	
38081904	DANGB3-SS-A4	HG-C	8-16-88		9-12-88	
38081904	DANGB3-SS-A4	PB-F	8-16-88		9-23-88	
38081904	DANGB3-SS-A4	418.1	8-16-88	9-12-88	9-13-88	
38081904	DANGB3-SS-A4	MOIS	8-16-88		8-24-88	
38081904	DANGB3-SS-A4	8010	8-16-88		8-26-88	8-26-88
38081904	DANGB3-SS-A4	8020	8-16-88		8-26-88	8-25-88
38081904	DANGB3-SS-A4	8080	8-16-88	8-25-88	9-22-88	9-26-88
38081904	DANGB3-SS-A4	8270	8-16-88	8-26-88	10-05-88	
38081905	DANGB3-SS-B3	AS-F	8-16-88		10-04-88	
38081905	DANGB3-SS-B3	BA-I	8-16-88		9-07-88	
38081905	DANGB3-SS-B3	CD-F	8-16-88		9-07-88	
38081905	DANGB3-SS-B3	CR-F	8-16-88		9-07-88	
38081905	DANGB3-SS-B3	HG-C	8-16-88		9-12-88	
38081905	DANGB3-SS-B3	PB-F	8-16-88		9-23-88	
38081905	DANGB3-SS-B3	418.1	8-16-88	9-12-88	9-13-88	
38081905	DANGB3-SS-B3	MOIS	8-16-88		8-24-88	
38081905	DANGB3-SS-B3	8010	8-16-88		8-26-88	8-26-88
38081905	DANGB3-SS-B3	8020	8-16-88		8-26-88	8-25-88
38081905	DANGB3-SS-B3	8080	8-16-88	8-25-88	9-22-88	9-26-88
38081905	DANGB3-SS-B3	8270	8-16-88	8-26-88	10-11-88	
38081906	DANGB3-SS-A3.5	AS-F	8-16-88		10-04-88	
38081906	DANGB3-SS-A3.5	BA-I	8-16-88		9-07-88	
38081906	DANGB3-SS-A3.5	CD-F	8-16-88		9-07-88	
38081906	DANGB3-SS-A3.5	CR-F	8-16-88		9-07-88	
38081906	DANGB3-SS-A3.5	HG-C	8-16-88		9-12-88	
38081906	DANGB3-SS-A3.5	PB-F	8-16-88		9-23-88	
38081906	DANGB3-SS-A3.5	418.1	8-16-88	9-12-88	9-13-88	
38081906	DANGB3-SS-A3.5	MOIS	8-16-88		8-24-88	
38081906	DANGB3-SS-A3.5	8010	8-16-88		8-26-88	8-25-88
38081906	DANGB3-SS-A3.5	8020	8-16-88		8-26-88	8-25-88
38081906	DANGB3-SS-A3.5	8080	8-16-88	8-25-88	9-22-88	
38081906	DANGB3-SS-A3.5	8270	8-16-88	8-26-88	10-05-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081901-88081906
WORK ORDER NO.: 861

These soil samples were received at the ES Berkeley Laboratory on 8-17-88. They were received cold and intact.

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Michael Rodd, Jo-Ann Sherwin

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW6010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7191	SW7131, 7421,	SW7060, 7471	REMARKS
8-16-88	1350	DANGB 3 SS-A0	1	X							NOTE: Label on bottle is dated 8-15-88 by mistake; should be 8-16-88
8-16-88	1410	DANGB 3 SS-A3	1	X		✓					" "
8-16-88	1335	DANGB 3 SS-A1	1	X							" "
8-16-88	1055	DANGB 3 SS-C0	1	X							" "
8-16-88	1250	DANGB 3 SS-B1	1	X							" "
8-16-88	1125	DANGB 3 SS-C1	1	X							" "
8-16-88	0950	DANGB 3 SS-C2	1	X							" "
8-16-88	1025	DANGB 3 SS-C3	1	X							" "
8-16-88	1220	DANGB 3 SS-A2	1	X							" "
8-16-88	1035	DANGB 3 SS-C3	1		X	X	X	X	X	X	SW6010 is for Be only
8-16-88	1415	DANGB 3 SS-A3	1		X	X	X	X	X	X	" "
8-16-88	1100	DANGB 3 SS-C0	1		X	X	X	X	X	X	" "
8-16-88	1225	DANGB 3 SS-A2	1		X	X	X	X	X	X	" "
8-16-88	1340	DANGB 3 SS-A1	1		X	X	X	X	X	X	" "
8-16-88	1130	DANGB 3 SS-C1	1		X	X	X	X	X	X	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kimberly L. Dan	8-16-88 1545				

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

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ESE 1330

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Michael Reddy, J. Pam Sherwin

SOILS ANALYSES REQUIRED: SW8010, 8020 | SW8080 | SW8240 | E.P.A. 418.1 | SW8030, 7191 | SW7421, 742[illegible] | [illegible], 7471

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8240	E.P.A. 418.1	SW8030, 7191	SW7421, 7421	REMARKS
8-16-88	1000	DANGB3-SS-C2	1		X	X	X	X	X	881901 surr 10 is for Ba only.
8-16-88	1355	DANGB3 SS-A0	1		X	X	X	X	X	" 881902 "
8-16-88	1255	DANGB3 SS-B1	1		X	X	X	X	X	" 881903 "
8-16-88	1525	DANGB3 SS-A4	1		X	X	[illegible]	[illegible]	X	[illegible] 881904
8-16-88	1505	DANGB3 SS-B3	1		X	X	X	X	X	881905
8-16-88	1540	DANGB3 SS-A3.5	1		X	X	X	X	X	881906
8-16-88	1535	DANGB3-SS-A3.5	1	X						
8-16-88	1500	DANGB3 SS-B3	1	X						881905
8-16-88	1520	DANGB3 SS-A4	1	X						881904

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	8-16-88 1745				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	8 17 88 [illegible]	[illegible]

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1137

ANALYSIS REPORT

ORDER NUMBER: 861
UMBER : ZB0000003440
ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

T DATA:
K RIDGE/DULUTH ANGB
. ILLINOIS AVE. STE. S103
IDGE, TN 37830
HAYDEN

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

REPORT COPIES: 1

ACT / PO # : OR001
CT : BILL HAYDEN
(615)-481-3920

2, UNITS: mg/Kg

COMPOUND	DANGB3-SS-C2 8-16-88 88081901	DANGB3-SS-AO 8-16-88 88081902	DANGB3-SS-B1 8-16-88 88081903	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
DIG SOIL	NA	NA	NA	NA	NA	NA
IC	<5.0N	<5.0N	<5.0N	<5.0N	<5.0N	<5.0
M	62.9	78.4	96.3	76.6	69.9	59.6
UM	12.3*N	10.4*N	14.7*N	11.0*N	10.4*N	8.9*N
IUM	43.9	28.7	42.9	30.7	29.7	28.5
RY	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	10.2SN	12.0SN	9.0SN	8.7SN	12.2N	7.8SN

Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 861
C NUMBER : ZB0000000440 APPROVED BY _____
C ORDER DATE : 08/17/88 Lab Supervisor

EPORT DATA:
S AK RIDGE/DULUTH ANGB
1 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
I HAYDEN

Or REPORT COPIES: 1

C RACT / PO # : OR001
C ACT : BILL HAYDEN
(615)-481-3920

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

A : 3, UNITS: mg/Kg

E COMPOUND	DANGB3-SS-C2 8 16-88 88081901	DANGB3-SS-AO 8-16-88 88081902	DANGB3-SS-B1 8-16-88 88081903	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
18.1 PETROLEUM HYDROCARBONS	130	<100	<100	<100	<100	<100
- ISTURE	16.2	15.0	22.2	18.3	19.4	16.8

D - Not Detected

ANALYSIS REPORT

ORDER NUMBER: 861
NUMBER : ZB0000000440
ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

T DATA:
K RIDGE/DULUTH ANGB
S. ILLINOIS AVE. STE. S103
IDGE, TN 37830
HAYDEN

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

REPORT COPIES: 1

ACT / PO # : OR001
CT : BILL HAYDEN
(615)-481-3920

4, UNITS: ug/Kg, GROUP 8010

COMPOUND	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
L CHLORIDE	ND	ND	ND
2-CHLOROETHOXY)METHANE	ND	ND	ND
(2-CHLOROISOPROPYL)ETHER	ND	ND	ND
OBENZENE	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND
OFORM	ND	ND	ND
ETHANE	ND	ND	ND
N TETRACHLORIDE	ND	ND	ND
ACETALDEHYDE	ND	ND	ND
AL	ND	ND	ND
OBENZENE	ND	ND	ND
OETHANE	ND	ND	ND
OFORM	0.2B	1.1B	0.2B
OROHEXANE	ND	ND	ND
OROETHYL VINYL ETHER	ND	ND	ND
OMETHANE	ND	ND	ND
OMETHYL METHYL ETHER	ND	ND	ND
OTOLUENE	ND	ND	ND
HOCHLOROMETHANE	ND	ND	ND
HOMETHANE	ND	ND	ND
ICHLOROBENZENE	ND	ND	ND
ICHLOROBENZENE	ND	ND	ND
ICHLOROBENZENE	ND	ND	ND
OROD1FLUOROMETHANE	ND	ND	ND
ICHLOROETHANE	ND	ND	ND
ICHLOROETHANE	ND	ND	ND
ICHLOROETHYLENE	ND	0.7	ND
-1,2-DICHLOROETHYLENE	ND	ND	ND
OROMETHANE	12B	5.8B	4.3B
ICHLOROPROPANE	ND	ND	ND

Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 861

COMPOUND	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
, DICHLOROPROPYLENE	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND
E ACHLOROETHYLENE	ND	15	ND
, 1-TRICHLOROETHANE	ND	89	ND
,1,2-TRICHLOROETHANE	ND	ND	ND
RICHLOROETHYLENE	ND	ND	ND
R HLOROFLUOROMETHANE	ND	ND	ND
R HLOROPROPANE	ND	ND	ND
INYL CHLORIDE	ND	ND	ND

- Not Detected

ANALYSIS REPORT

ORDER NUMBER: 861
NUMBER : ZB0000000440
ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

T DATA:
K RIDGE/DULUTH ANGB
S. ILLINOIS AVE. STE. S103
RIDGE, TN 37830
HAYDEN

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

REPORT COPIES: 1

RACT / PO # : OR001
ACT : BILL HAYDEN
(615)-481-3920

: 4, UNITS: ug/Kg, GROUP 8020

COMPOUND	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
ENE	ND	ND	ND
ROBENZENE	ND	ND	ND
DICHLOROBENZENE	ND	ND	ND
DICHLOROBENZENE	ND	ND	ND
DICHLOROBENZENE	ND	ND	ND
- BENZENE	ND	ND	ND
ENE	1.6	36	1.6
NES	ND	ND	ND

Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 861
J NUMBER : Z80000000440
WORK ORDER DATE : 08/17/88

APPROVED BY _____
Lab Supervisor

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

T. K: 4, UNITS: ug/Kg, GROUP 3080

T. T COMPOUND	DANGB3-SS-C2 8-16-88 88081901	DANGB3-SS-A0 8-16-88 88081902	DANGB3-SS-B1 8-16-88 88081903	DANGB3-SS-A4 8-16-88 88081904	DANGB3-SS-B3 8-16-88 88081905	DANGB3-SS-A3.5 8-16-88 88081906
ALDRIN	ND	ND	ND	ND	ND	ND
ALPHA-BHC	ND	ND	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND	ND	ND
GAMMA-BHC	ND	ND	ND	ND	ND	ND
CHLORDANE	ND	ND	ND	ND	ND	ND
4,4'-DDD	110	ND	ND	ND	ND	ND
4,4'-DDE	61	ND	ND	33	ND	ND
4,4'-DDT	500	ND	ND	75	20	ND
DIELDRIN	ND	ND	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND	ND	ND
ENDOSULFAN II	ND	ND	ND	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	48	ND
ENDRIN ALDEHYDE	NA	NA	NA	NA	NA	NA
HEPTACHLOR	ND	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
KEPONE	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

D - Not Detected

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 861
EPA METHOD 8270 ANALYSIS

These samples were extracted, within holding time, on August 26, 1988. Samples 88081902, 88081904 and 88081906 were first analyzed within holding time, on October 5, 1988. The remainder were analyzed six days out of holding time, on October 11, 1988. One or more internal standards were outside of EPA QC limits for all samples, except 88081903. The non-compliant extracts were re-analyzed with the same result, suggesting a matrix effect. Results of the first analysis are reported.

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

Date Received: August 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081901	88081902
Sample No.:	DANGB3-SS-C2	DANGB3-SS-A0
Date Sampled:	8-16-88	8-16-88
Time Sampled:	10:00	13:55
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	16	15

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 17, 1988 Work Order: 861
Date Reported: October 28, 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:	88081901	88081902
Sample No.:	DANGB3-SS-C2	DANGB3-SS-A0
Date Sampled:	8-16-88	8-16-88
Time Sampled:	10:00	13:55
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	16	15

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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:		88081901	88081902
Sample No.:		DANGB3-SS-C2	DANGB3-SS-A0
Date Sampled:		8-16-88	8-16-88
Time Sampled:		10:00	13:55
Date Extracted:		8-26-88	8-26-88
Date Analyzed:		10-11-88	10-05-88
Percent Moisture:		16	15
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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081901	88081902
Sample No.:	DANGB3-SS-C2	DANGB3-SS-A0
Date Sampled:	8-16-88	8-16-88
Time Sampled:	10:00	13:55
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	16	15

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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081901	88081902
Sample No.:	DANGB3-SS-C2	DANGB3-SS-A0
Date Sampled:	8-16-88	8-16-88
Time Sampled:	10:00	13:55
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	16	15

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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081903	88081904
Sample No.:	DANGB3-SS-B1	DANGB3-SS-A4
Date Sampled:	8-16-88	8-16-88
Time Sampled:	12:55	15:25
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	22	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 17, 1988 Work Order: 861
Date Reported: October 28, 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:	88081903	88081904
Sample No.:	DANGB3-SS-B1	DANGB3-SS-A4
Date Sampled:	8-16-88	8-16-88
Time Sampled:	12:55	15:25
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	22	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(l)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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081903	88081904
Sample No.:	DANGB3-SS-B1	DANGB3-SS-A4
Date Sampled:	8-16-88	8-16-88
Time Sampled:	12:55	15:25
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	22	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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081903	88081904
Sample No.:	DANGB3-SS-B1	DANGB3-SS-A4
Date Sampled:	8-16-88	8-16-88
Time Sampled:	12:55	15:25
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	22	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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081903	88081904
Sample No.:	DANGB3-SS-B1	DANGB3-SS-A4
Date Sampled:	8-16-88	8-16-88
Time Sampled:	12:55	15:25
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	22	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.

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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081905	88081906
Sample No.:	DANGB3-SS-B3	DANGB3-SS-A3.5
Date Sampled:	8-16-88	8-16-88
Time Sampled:	15:05	15:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	19	17

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 17, 1988 Work Order: 861
Date Reported: October 28, 1988 Job Number: OR001

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

Lab Number:	88081905	88081906
Sample No.:	DANGB3-SS-B3	DANGB3-SS-A3.5
Date Sampled:	8-16-88	8-16-88
Time Sampled:	15:05	15:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	19	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

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

Date Received: August 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081905	88081906
Sample No.:	DANGB3-SS-B3	DANGB3-SS-A3.5
Date Sampled:	8-16-88	8-16-88
Time Sampled:	15:05	15:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	19	17

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 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081905	88081906
Sample No.:	DANGB3-SS-B3	DANGB3-SS-A3.5
Date Sampled:	8-16-88	8-16-88
Time Sampled:	15:05	15:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	19	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.

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

Date Received: August 17, 1988
Date Reported: October 28, 1988

Work Order: 861
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:	88081905	88081906
Sample No.:	DANGB3-SS-B3	DANGB3-SS-A3.5
Date Sampled:	8-16-88	8-16-88
Time Sampled:	15:05	15:40
Date Extracted:	8-26-88	8-26-88
Date Analyzed:	10-11-88	10-05-88
Percent Moisture:	19	17

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

Laura Kuck
Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank..

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88081901-88081906

As a result of extreme sample matrix interference, dilution was required for sample analysis. The reporting limit and MDL for the analyte(s) listed have increased as shown:

Analyte	Reporting Limit	MDL
Arsenic	10mg/Kg	5.0 mg/Kg

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, 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	Duplicate 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

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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)

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
88082000-88092002

QC Report No: AAF-S-0026-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-17-88
Date Reported: 10-10-88
Dilution Factor: NA
%Moisture: 15.0

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	88081902	88081902	10-03-88	9-17-88	7060	<1.0	<5.0E	<5.0E	NC	4.70	4.90E	8.59	79	
Lead	88081902	88081902	9-21-88	9-17-88	7421	<0.5	5.69	5.69	0	5.88	5.69	9.88	68N	

1163

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
N - See Legend attached.
E - 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):
88081901-88081906

QC Report No: CVM-S-0016-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-16-88
Date Reported: 10-10-88
Dilution Factor: NA
%Moisture: 20.3

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	88081891	88081891	9-12-88	9-12-88	7471	<0.1	<0.1	<0.1	NC	1.25	<0.1	1.32	105	*

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NOTE: If moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is not a part of this project.

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):
88081898-88081906, 88082000-88082002
88082043-88082049

QC Report No: TPH-S-0050-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-17-88
Date Prepared: 9-12-88
Date Analyzed: 9-13-88
Date Reported: NA
Dilution Factor: 6
%Moisture: 22.2

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081903	418.1	<100	<100	1300	1000	77	820	63	20	*

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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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: OCP-S-0041-88
QC REPORT NO.: OCP-S-0041-88B

Although results of matrix spike analysis were within EPA QC guidelines, analysis of spiked blanks gave one recovery for dieldrin and the RPD for endrin that are slightly high. The data associated with these analyses were closely examined. No analytical errors were found.

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

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
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).:
88081901-88081906

QC Report No.: OCP-S-0041-88B
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	66.2	99	46-127
Heptachlor	2000	ND	72.4	109	35-130
Aldrin	2000	ND	68.9	104	34-132
Dieldrin	5000	ND	196	118	31-134
Endrin	5000	ND	119	71	42-139
4,4'-DDT	5000	ND	169	101	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	75.5	113	99	13	50	46-127
Heptachlor	84.7	127	109	16	31	35-130
Aldrin	78.2	117	104	12	43	34-132
Dieldrin	225	135*	118	13	38	31-134
Endrin	144	116	71	48*	45	42-139
4,4'-DDT	197	118	101	16	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).:
88081901-88081906

QC Report No.: OCP-S-0041-88
QC Sample No.: 88081906
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	2400	ND	76.5	96	46-127
Heptachlor	2400	ND	81.3	102	35-130
Aldrin	2400	ND	92.8	116	34-132
Dieldrin	6010	ND	222	111	31-134
Endrin	6010	ND	195	97	42-139
4,4'-DDT	6010	ND	209	104	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	78.8	98	96	2	50	46-127
Heptachlor	87.3	109	102	7	31	35-130
Aldrin	82.9	104	116	11	43	34-132
Dieldrin	230	115	111	4	38	31-134
Endrin	204	102	97	5	45	42-139
4,4'-DDT	218	109	104	5	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 12 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
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	8-25-88		
Date Analyzed (1):	9-22-88	Date Analyzed (2):	9-26-88
Time Analyzed (1):	02:34	Time Analyzed (2):	00:07
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
-	88081901	9-22-88	88081901	9-26-88
-	88081902	9-22-88	88081904	9-26-88
-	88081903	9-22-88		
-	88081904	9-22-88		
-	88081905	9-22-88		
-	88081906	9-22-88		

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-0037-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-18-88
Date Prepared: NA
Date Analyzed: 8-30-88
Date Reported: 9-26-88
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

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

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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.
15	8-26-88	VGC	Carbopack	75-09-2	Dichloromethane	3.3	5	88081898-88081900
				67-66-3	Chloroform	0.2	0.05	88081904-88081906
								88081960-88081962
31	8-29-88	VGC	Carbopack	75-09-2	Dichloromethane	2.5	0.25	88081954-88081959
				67-66-3	Chloroform	0.5	0.05	88081938-88081940

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CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: BNA-S-0044-88
QC REPORT NO.: BNA-S-0044-88B
QC REPORT NO.: BNA-S-0045-88
QC REPORT NO.: BNA-S-0045-88B
WORK ORDER NO.: 876

Initial analysis of samples 88081939, 88081941, 88081942 and the associated blank resulted in surrogate spike recoveries that were outside EPA QC limits. These samples were re-extracted after holding times had expired. Analysis of the second extracts resulted in good surrogate spike recoveries. Results of the second analysis are reported. No target compounds were found in either analysis of any of the samples.

Analysis of matrix spikes associated with the first extraction of these samples resulted in recoveries and RPD's for many of the spiked compounds that were outside EPA QC limits. Spiked blanks were analyzed with similar results. The data associated with these analyses were closely examined; no errors or problems were found.

Results of analysis of matrix spikes associated with the second extraction of samples 88081939, 88081941 and 88081942 showed high recoveries of dinitrotoluene, nitrosodipropylamine, pentachlorophenol and chloromethylphenol, although RPD's were good. Analysis of spiked blanks resulted in good recoveries and RPD's.

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-0044-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-26-88
Date Analyzed: 10-25-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

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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	<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	6	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*	93	3*	NC*	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	2720	41	3080	46	12	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	14	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.
* 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):
88081898-88081906
88081938-88081942

QC Report No: BNA-S-0044-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: 8-26-88
Date Analyzed: 10-25-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: NA

Laboratory Supervisor Approval:

1174

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	<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	6	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*	93	3*	NC*	27	28-104
ACID Laboratory Sample # Blank	Pentachlorophenol	6670	ND	2720	41	3080	46	12	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	14	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.
* 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

Work Order No.: 861

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5797	10-03-88	BNA	2	-	None Detected	-	-	88081901-88081906

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081902
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5822
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-05-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	15.0
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	22	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.09	550	
-	Unknown	4.41	12000	
-	Unknown	4.44	470	
-	Unknown	4.87	3500	
-	Unknown	5.29	29000	
-	Unknown	6.28	550	
-	Unknown	6.45	1300	
-	Unknown	6.62	700	
-	Unknown	6.95	240	
-	Unknown	12.89	240	
57-10-3	Hexadecanoic Acid	24.11	1700	
-	Unknown	26.21	200	
-	Unknown	26.53	240	
-	Unknown	28.82	860	
-	Unknown	29.29	270	
-	Unknown	29.45	270	
-	Unknown	32.14	390	
-	Unknown	33.69	230	
-	Unknown	34.44	240	
-	Unknown	35.40	23000	
-	Unknown	36.62	340	
-	Unknown	37.61	310	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081903
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5842
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-11-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	22
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	22	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.21	7300	
-	Unknown	3.56	6800	
-	Unknown	4.32	27000	
-	Unknown	4.39	260	
-	Unknown	4.47	1800	
-	Unknown	4.82	19000	
-	Unknown	5.14	26000	
-	Unknown	6.21	2100	
-	Unknown	6.51	560	
-	Unknown	6.60	260	
-	Unknown	7.23	340	
-	Unknown	7.50	210	
-	Unknown	9.22	210	
-	Unknown	12.03	300	
-	Unknown	12.52	210	
-	Unknown	12.68	560	
-	Unknown	12.88	340	
-	Unknown	23.98	860	
-	Unknown	28.76	730	
-	Unknown Hydrocarbon	32.14	560	
-	Unknown Hydrocarbon	34.72	2400	
-	Unknown		180000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081888-1906
Attn:	Bill Hayden	Blank	88081938-1942
Address:	710 S. Illinois Avenue	Lab File ID:	E5797
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-03-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	16	(SepF/Cont/Conc)	Sonc

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.42	630	
-	Unknown	3.46	530	
-	Unknown	3.75	1200	
-	Unknown	4.34	130	
-	Unknown	4.42	530	
-	Unknown	4.55	1200	
-	Unknown	4.89	200	
-	Unknown	5.09	2400	
-	Unknown	5.30	17000	
-	Unknown	6.39	330	
-	Unknown	6.93	430	
-	Unknown	6.99	230	
-	Unknown	21.73	330	
-	Unknown	28.83	400	
-	Unknown	35.09	400	
-	Unknown	35.46	8700	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081906
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5824
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-05-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	17
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	12	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.28	4400	
-	Unknown	4.47	160	
-	Unknown	4.71	320	
-	Unknown	5.16	24000	
-	Unknown	6.25	200	
79-34-5	1,1,2,2-Tetrachloroethane	6.29	550	
-	Unknown	6.39	800	
57-10-3	Hexadecanoic Acid	24.12	2000	
-	Unknown	28.82	560	
-	Unknown	29.27	960	
-	Unknown	31.17	240	
-	Unknown	35.42	26000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081905
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5843
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-11-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	19
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found: 22		(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.22	2700	
-	Unknown	3.56	3400	
-	Unknown	4.33	34000	
-	Unknown	4.39	330	
-	Unknown	4.48	1100	
-	Unknown	4.86	24000	
-	Unknown	5.13	23000	
-	Unknown	6.22	2500	
79-34-5	1,1,2,2-Tetrachloroethane	6.25	1300	
-	Unknown	6.33	580	
-	Unknown	6.52	450	
-	Unknown	7.18	450	
57-10-3	Hexadecanoic Acid	23.99	1700	
-	Unknown	27.98	610	
-	Unknown	28.76	1500	
-	Unknown	31.10	540	
-	Unknown Hydrocarbon	32.15	1100	
-	Unknown	33.87	5800	
-	Unknown Hydrocarbon	34.73	6200	
-	Unknown	35.62	200000	
-	Unknown	37.21	7000	
-	Unknown Hydrocarbon	38.39	10000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	30 gm
Client:	ES Oak Ridge	Lab Sample ID:	88081904
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5823
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-05-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	18
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	22	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.47	28000	
-	Unknown	4.59	490	
-	Unknown	4.99	20000	
-	Unknown	5.04	3600	
-	Unknown	5.29	22000	
79-34-5	1,1,2,2-Tetrachloroethane	6.32	2800	
-	Unknown	6.44	820	
57-10-3	Hexadecanoic Acid	24.12	2700	
-	Unknown	25.74	780	
-	Unknown	26.53	330	
-	Unknown	28.04	570	
-	Unknown	28.83	610	
-	Unknown	29.20	1100	
-	Unknown	30.93	530	
-	Unknown	32.16	1100	
-	Unknown	32.33	330	
-	Unknown	33.71	760	
-	Unknown	34.46	710	
-	Unknown	35.37	23000	
-	Unknown	36.15	540	
-	Unknown	36.65	760	
-	Unknown	37.64	770	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	861
		Matrix: (soil/water)	Soil
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88081901
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5841
	Suite F-103	Date Received:	08-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	08-26-88
		Date Analyzed:	10-11-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	16
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	20	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.22	2100	
-	Unknown	3.50	280	
-	Unknown	3.56	200	
-	Unknown	3.60	760	
-	Unknown	3.67	280	
-	Unknown	3.99	360	
-	Unknown	4.29	14000	
-	Unknown	4.40	240	
-	Unknown	4.78	7200	
-	Unknown	5.13	29000	
-	Unknown	6.19	880	
-	Unknown	6.23	240	
-	Unknown	6.35	1800	
-	Unknown	6.53	880	
-	Unknown	6.59	280	
-	Unknown	7.18	360	
-	Unknown	7.43	280	
57-10-3	Hexadecanoic Acid	23.98	1200	
-	Unknown	29.40	720	
-	Unknown	35.75	760000	

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-56
Lab File ID: ES797
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
DANGB-2MW41-SS1	88081938	ES798	10-3-88
	88081938 MS	ES799	10-3-88
	88081938 MSD	ES800	10-3-88
DANGB-2MW41-SS2	88081939	ES801, ES970	10-3-88, 10-26-88
-2MP41-SS1	88081940	ES812	10-5-88
-2MW41-SS3	88081941	ES813	10-5-88
-2MP41-SS2	88081942	S0483, ES817	11-11-88, 10-5-88
DANGB2-MW40-SS1	88081898	ES818	10-5-88
-SS2	88081899	ES820	10-5-88
-SS3	88081900	ES821	10-5-88
DANGB3-SS-C2	88081901	ES841, S0688	10-11-88 12-9-88
-A0	88081902	ES822, S0689	10-5-88, 12-9-88
-B1	88081903	ES842	10-11-88
-A4	88081904	ES823, S0690	10-5-88, 12-9-88
-B3	88081905	ES843, S0691	10-11-88 12-9-88
-A3.5	88081906	ES824, S0692	10-5-88 12-9-88
	BLANK MS	ES951	10-25-88
	BLANK MSD	ES952	10-25-88

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):
88081898-88081906, 88082000-88082002
88082043-88082049

QC Report No: TPH-S-0050-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-17-88
Date Prepared: 9-12-88
Date Analyzed: 9-13-88
Date Reported: NA
Dilution Factor: 6
%Moisture: 22.2

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88081903	418.1	<100	<100	1300	1000	77	820	63	20	*

1184

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):
88081898-88081906, 88082000-88082002
88082043-88082049

QC Report No: TPH-S-0050-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-12-88
Date Analyzed: 9-13-88
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	700	70	850	85		

1185

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

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: >S0683 DFTPP Injection Date: 12/09/88

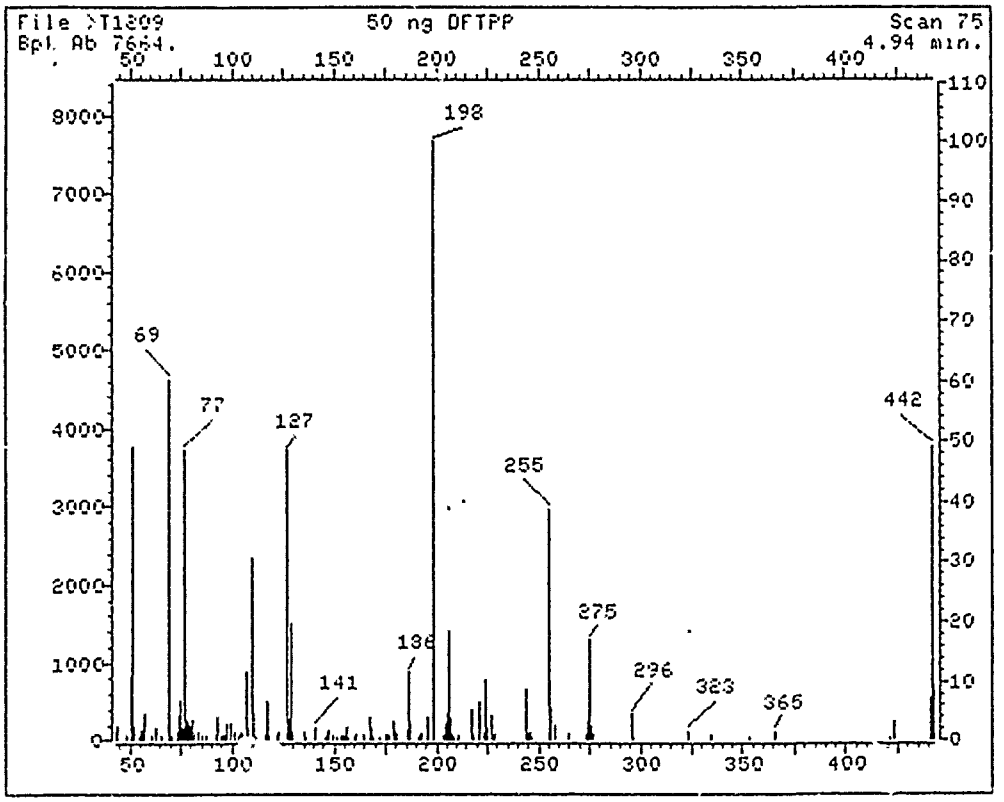
Instrument ID: 70 1 DFTPP Injection Time: 12:16

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	49.2
68	Less than 2.0% of mass 69	0.0(0.0
69	Mass 69 relative abundance	60.
70	Less than 2.0% of mass 69	.5(.
127	40.0 - 60.0% of mass 198	48.3
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	
275	10.0 - 30.0% of mass 198	16.8
365	Greater than 1.00% of mass 198	1.53
441	Present, but less than mass 443	7.0
442	Greater than 40.0% of mass 198	49.2
443	17.0 - 23.0% of mass 442	9.4(19.

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	>S0683	12/09/88	12:16
02	88092897 MSD REANAL.	>S0687	12/09/88	16:32
03	88081901 1ml REANAL.	>S0688	12/09/88	17:30
04	88081902 1ml REANAL.	>S0689	12/09/88	18:29
05	88081904 1ml REANAL.	>S0690	12/09/88	19:29
06	88081905 1ml REANAL.	>S0691	12/09/88	20:29
07	88081906 1ml REANAL.	>S0692	12/09/88	21:28
08	88092656-59,2629-39 BLK MS	>S0693	12/09/88	22:28
09	88092656-59,2629-39 BLK MSD	>S0694	12/09/88	23:27
10				
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16				
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19				
20				
21				
22				



>T1209 50 ng DFTPP
75 MRM

File: >T1209 Scan #: 75 Retn. time: 4.94

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	1.331	85.10	.613	130.05	1.370	181.05	1.174	228.00	.639
44.10	2.388	87.10	.731	135.15	1.435	185.05	1.631	229.10	1.070
49.00	.913	92.10	.835	135.95	.587	186.05	11.495	244.10	8.390
50.10	11.052	93.00	3.745	141.05	2.270	187.05	2.727	245.10	1.213
51.10	49.230	95.10	.731	146.15	.444	191.05	.378	246.10	1.487
52.00	2.309	96.10	.744	147.05	1.566	191.35	.404	247.00	.274
54.00	.457	97.10	.887	147.95	1.918	192.05	1.083	255.10	38.609
55.10	1.683	98.00	2.910	149.05	.744	192.95	1.109	256.10	5.532
56.00	1.827	99.10	2.805	151.05	.365	196.10	3.836	258.10	2.518
57.10	4.551	101.00	1.435	153.05	.861	198.10	100.000	265.00	.979
61.10	.652	103.00	.874	154.15	.757	199.00	7.020	273.10	1.187
63.10	1.996	104.00	1.461	155.05	.861	203.00	.613	274.15	3.158
65.20	.835	105.20	.992	156.15	1.957	204.10	2.910	275.15	16.819
69.00	60.282	107.00	11.404	157.15	.548	205.10	4.475	276.15	2.440
70.[illegible]	.496	108.10	2.166	160.15	.522	206.10	18.332	277.15	1.161
[illegible]	.678	110.10	30.467	161.15	1.057	207.20	3.810	296.05	4.436
73.10	1.292	111.00	4.541	164.95	.783	208.20	.939	296.95	.535
74.10	4.071	112.10	.587	167.05	3.719	209.00	.365	323.15	1.592
75.10	6.955	116.10	1.018	168.05	1.944	211.10	.744	334.05	.639
76.20	2.218	117.00	6.563	169.05	.378	217.00	5.063	353.20	.300
77.10	18.434	117.95	.731	171.95	.261	218.10	.665	365.20	1.527
78.10	3.562	122.15	.992	175.05	1.227	221.10	6.485	421.10	.300
79.10	3.171	123.05	1.448	176.15	.626	223.10	1.331	423.20	3.040
80.00	2.296	127.15	48.291	177.15	.626	224.20	10.230	441.25	7.020
81.00	3.340	128.15	3.458	179.05	3.001	225.10	2.205	442.25	49.178
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 12/09/88

Contractor: ENGINEERING SCIENCE Time: 12:16

Contract No: _____ Laboratory ID: >S0683

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	.98790	9.56		
2-Fluorophenol	1.15802	1.36842	18.17		
bis(2-Chloroethyl)ether	1.11892	1.12153	.23		
Phenol	1.41657	1.52749	7.83	*	
Phenol-d5	1.22488	1.21648	.69		
Aniline	.54193	.58924	8.73		
2-Chlorophenol	1.23175	1.22118	.86		
1,3-Dichlorobenzene	1.47535	1.37722	6.65		
1,4-Dichlorobenzene	1.40530	1.37825	1.93	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.60904	16.46		
1,2-Dichlorobenzene	1.32240	1.41676	7.14		
2-Methylphenol	1.17367	1.41223	20.33		
3-&-4-Methylphenol	1.07139	1.33613	24.71		
bis(2-chloroisopropyl)Ether	2.15627	2.99227	38.77		
N-Nitroso-Di-n-Propylamine	.84050	.74135	11.80		**
Hexachloroethane	.53840	.57532	6.86		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.48017	19.11		
Nitrobenzene-d5	.39137	.44253	13.07		
2-Nitrophenol	.24657	.26459	7.31	*	
Isophorone	.74170	.82017	10.58		
bis(2-Chloroethoxy)methane	.49386	.56634	14.68		
2,4-Dimethylphenol	.34849	.41066	17.84		
Benzoic Acid	.29725	.37907	27.53		
2,4-Dichlorophenol	.56733	.59432	4.76	*	
1,2,4-Trichlorobenzene	.36913	.33737	8.60		
Naphthalene	.94589	.94416	.18		
4-Chloroaniline	.36309	.37472	3.20		
Hexachlorobutadiene	.20283	.18670	7.95	*	
4-Chloro-3-Methylphenol	.31360	.34769	10.87	*	
2-Methylnaphthalene	.56397	.59559	5.61		

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: 12/09/88

Contractor: ENGINEERING-SCIENCE | Time: 12:16

Contract No: | Laboratory ID: >S0683

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	.29200	1.24		**
2,4,6-Trichlorophenol	.42280	.35900	15.09	*	
2,4,5-Trichlorophenol	.52897	.47501	10.20		
2-Fluorobiphenyl	1.27229	1.09365	14.03		
2-Chloronaphthalene	1.23784	1.08219	12.57		
2-Nitroaniline	.47288	.56099	18.63		
Dimethylphthalate	1.40629	1.23871	11.92		
2,6-Dinitrotoluene	.37415	.32505	13.12		
Acenaphthylene	1.68918	1.52200	9.90		
3-Nitroaniline	.44557	.57122	28.20		
2,4-Dinitrophenol	.11898	.13686	15.03		**
Acenaphthene	1.13011	.95965	15.08	*	
Dibenzofuran	1.64131	1.47854	9.92		
2,4-Dinitrotoluene	.28418	.30471	7.23		
4-Nitrophenol	.28450	.26422	7.13		**
Fluorene	1.12850	.92516	18.02		
Diethylphthalate	1.20939	1.04561	13.54		
4-Chlorophenyl-phenylether	.59183	.49768	15.91		
4-Nitroaniline	.35956	.31530	12.31		
2,4,6-Tribromophenol	.21023	.16595	21.06		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47381	17.61	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.21306	.02		
Hexachlorobenzene	.26273	.23211	11.65		
Pentachlorophenol	.14536	.14155	2.62	*	

RF - Response Factor from daily standard file at 80.00 ug/L

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

%Diff - % Difference from original average or curve

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

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/09/88

Contractor: ENGINEERING-SCIENCE Time: 12:16

Contract No: Laboratory ID: >S0683

Instrument ID: 1 Initial Calibration Date: 10/18/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.02772	.64		
Anthracene	1.05155	1.05185	.03		
Di-n-Butylphthalate	1.51956	1.36420	10.22		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.15627	2.87	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Encrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.11995	198.16		
Pyrene	1.56086	1.54266	1.17		
Terphenyl-d14	1.05835	1.03858	1.87		
Butylbenzylphtnalate	1.03390	1.03165	.22		
3,3'-Dichlorobenzidine	.13689	.23209	69.54		
Chrysene	.99655	.99944	.29		
Benzo(a)Anthracene	1.10407	1.10754	.31		
bis(2-Ethylhexyl)Phthalate	1.21073	1.20965	.09		
Di-n-octylphthalate	3.40275	2.96629	12.83	*	
Benzo(a)Pyrene	1.32098	1.26371	4.34	*	
Benzo(b)Fluoranthene	1.60850	1.65739	3.04		
Indeno(1,2,3-cd)Pyrene	.96800	1.09037	12.64		
Dibenzo(a,h)Anthracene	.87481	.81868	6.42		
Benzo(k)Fluoranthene	1.44370	1.23549	14.42		
Benzo(g,h,i)Perylene	.89761	1.00065	11.48		

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): >S0683 Date Analyzed:12/09/88

Instrument ID: 70 1 Time Analyzed: 12:16

		IS1(DCB)		IS2(NPT)		IS3(ANT)	
		AREA #	RT	AREA #	RT	AREA #	RT
	12 HOUR STD	157337.	9.11	531429.	12.73	333250.	18.21
	UPPER LIMIT	314674.		1062858.		666500.	
	LOWER LIMIT	78668.		265715.		166625.	
	SAMPLE NO.						
01	88092897 MSD	131230.	9.09	520071.	12.70	276970.	18.17
02	88081901 1ml	165757.	9.09	635219.	12.69	322537.	18.19
03	88081902 1ml	158209.	9.08	604241.	12.70	317084.	18.20
04	88081904 1ml	131393.	9.10	500743.	12.69	263852.	18.19
05	88081905 1ml	141761.	9.11	518473.	12.70	276918.	18.19
06	88081906 1ml	140566.	9.10	519864.	12.72	254829.	18.22
07	88092656-59,	127770.	9.10	532816.	12.70	288534.	18.19
08	88092656-59,	110373.	9.10	438680.	12.70	234358.	18.18
09							
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18							
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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): >S0683 Date Analyzed: 12/09/88

Instrument ID: 70 1 Time Analyzed: 12:16

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
12 HOUR STD	494579.	22.86	355739.	31.32	235802.	37.
UPPER LIMIT	989158.		711478.		471604.	
LOWER LIMIT	247290.		177869.		117901.	
EPA SAMPLE NO.						
01 88092897 MSD	432226.	22.84	275106.	31.34	119743.	37.4
02 88081901 1ml	452216.	22.86	321510.	31.31	5874.*	37.
03 88081902 1ml	464157.	22.86	317538.	31.33	29221.*	37.3
04 88081904 1ml	409789.	22.87	264880.	31.31	40456.*	37.4
05 88081905 1ml	428243.	22.87	265226.	31.32	32830.*	37.
06 88081906 1ml	418558.	22.90	265915.	31.34	7242.*	37.
07 88092656-59,	461738.	22.86	286261.	31.35	74290.*	37.5
08 88092656-59,	360594.	22.86	218718.	31.37	35226.*	37.
09						
10						
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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 asteris

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 80-76 Contractor ENG SCI(?/7/88) Contract No. 99-99-99

Instrument ID #1 Date / Time 10/05/88 12:08

Lab ID >01005::03 Data Release Authorized By: Laura Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	45.43 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	61.16	
70	less than 2.0% of mass 69	.81 OK	(1.323) #1
127	40.0 - 60.0% of mass 198	40.83 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	7.12 OK	
275	10.0 - 30.0% of mass 198	20.96 OK	
365	greater than 1.00% of mass 198	1.34 OK	
441	present, but less than mass 443	10.64 OK	
442	greater than 40.0% of mass 198	73.83 OK	
443	17.0 - 23.0% of mass 442	15.22 OK	(20.61) #2

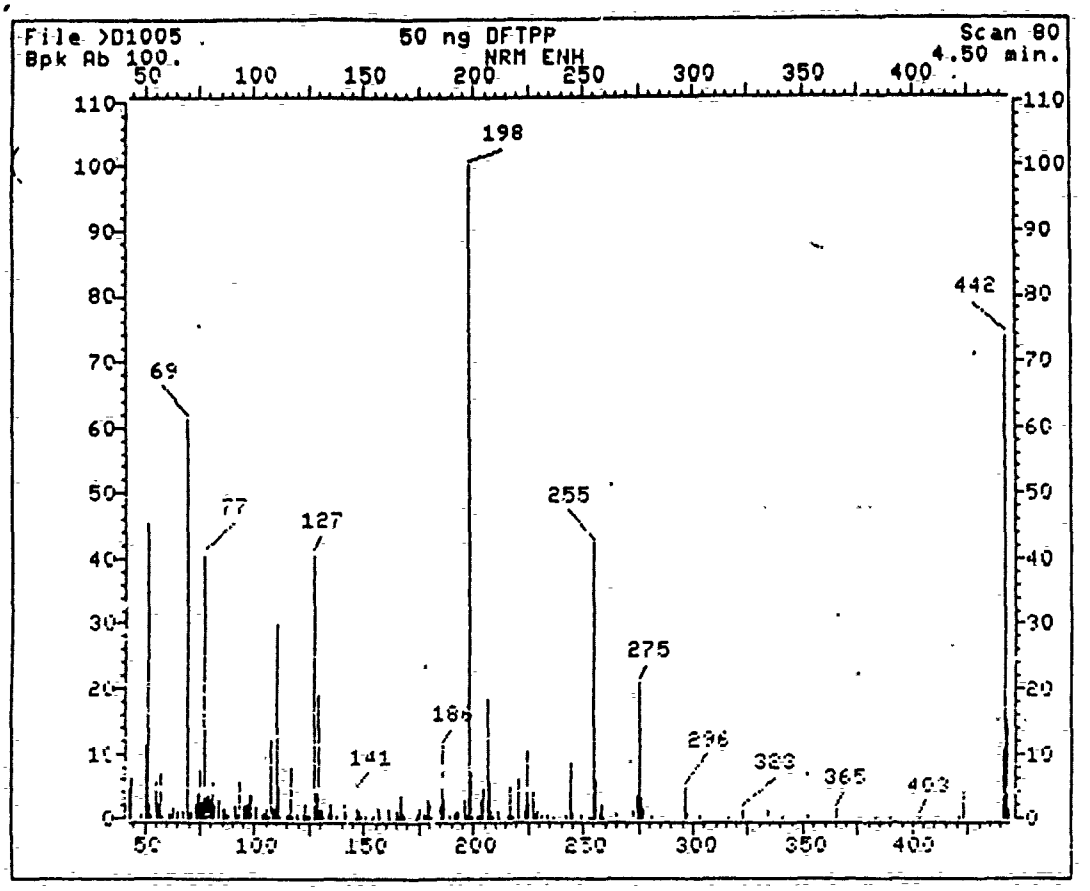
12/4/88 5 point

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.

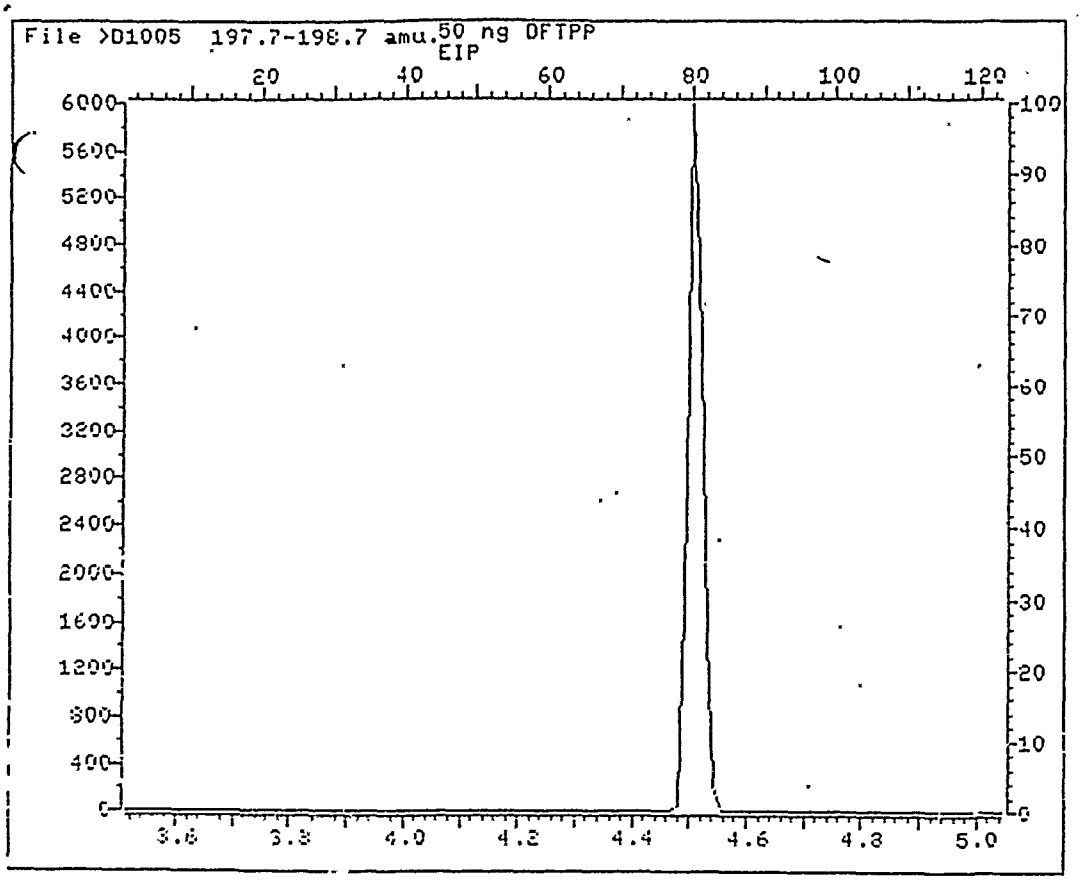
all SS

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50 ng DFTPP	>01005	10/05/88 12:08		
60mg/L std	>ES819	10/5/88	12:34	
8681899	ES820		13:39	good
1900	ES821		14:34	good
1902	ES822		15:29	-IS out, u
1904	ES823		16:24	-IS out, u
1906	ES824		17:19	- IS out, u
1945	ES825		18:14	use
1946	ES826		19:08	-IS out, us
1950	ES827		20:03	use



File: >D1005 Scan #: 80 Retn. time: 4.50

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	4.792	92.05	.550	134.95	2.226	191.00	.720	244.90	8.532
44.00	6.2c5	95.00	5.-15	135.35	.815	192.00	.947	245.00	823
49.00	.801	95.00	1.392	136.75	.150	193.00	1.214	248.90	.476
50.10	11.589	96.90	1.765	140.55	1.46	196.00	2.914	253.00	.170
51.10	45.427	97.10	2.31c	142.00	.312	195.50	.478	254.00	.162
52.10	2.096	98.00	5.573	145.35	.202	197.90	100.000	255.00	42.254
53.10	.259	99.00	3.497	147.05	1.441	199.00	7.115	256.00	5.933
55.10	5.423	100.90	1.746	147.95	1.026	200.00	.437	257.00	.76-
56.05	2.080	103.00	639	149.95	.550	201.30	.469	258.00	3.094
57.05	6.686	104.00	.696	151.05	.445	202.70	.478	258.90	.219
58.05	.275	105.00	1.31c	153.05	.745	202.95	.194	265.00	.809
61.05	.696	106.00	.510	154.05	.599	205.95	2.744	273.00	1.156
61.95	.559	107.00	11.350	156.05	1.473	204.95	4.322	274.00	3.473
62.95	1.329	108.00	1.522	157.05	.364	205.95	18.407	275.00	20.957
65.05	1.012	109.00	1.392	157.55	.105	206.95	5.610	276.00	2.935
67.05	1.238	110.00	29.582	160.95	1.319	207.95	.971	276.95	1.360
68.95	61.162	111.00	4.679	161.95	.194	208.95	.648	280.85	.534
70.05	.809	112.00	.563	165.05	1.141	210.95	.988	295.95	4.792
71.05	1.230	115.10	.453	165.95	.559	211.55	.138	296.95	.388
73.05	2.016	116.90	.664	167.00	3.497	211.75	.130	302.95	.596
74.05	3.861	117.00	7.965	168.00	.648	216.05	.405	316.00	.154
75.05	7.641	118.00	.526	169.00	.405	216.95	4.824	323.00	1.263
76.05	2.426	119.00	.842	173.00	.251	217.85	.397	334.00	1.060
77.05	40.400	120.00	.162	174.00	.753	218.95	.178	340.90	.121
78.05	2.987	122.00	.729	175.00	1.368	220.95	5.723	351.95	.283
79.05	3.788	123.00	2.096	176.95	.874	222.95	1.174	364.85	1.344
80.05	2.639	124.00	.3o4	177.90	.316	223.95	10.345	382.95	.154


File >D1005 197.7-198.7 amu.50 ng DFTPP
EIP
20
40
60
80
100
120
6000
5600
5200
4800
4400
4000
3600
3200
2800
2400
2000
1600
1200
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100
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10
0
3.8
3.9
4.0
4.2
4.4
4.6
4.8
5.0

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBF82-NO2-4-ME-H
Calibrated: 881005 13:47

Check Standard Data File: >E5619
Injection Time: 881005 12:34

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.65393	1.77954	7.21	Average
3-Nitroaniline	.65718	.65565	.23	Average
2,4-Dinitrophenol	.13830	.12440	9.99	Average
Acenaphthene	1.09782	1.14551	4.34	Average
Dibenzofuran	1.63801	1.64690	.54	Average
2,4-Dinitrotoluene	.34323	.38436	11.98	Average
4-Nitrophenol	.26395	.21806	17.38	Average
Fluorene	1.21752	1.26835	4.18	Average
Diethylphthalate	1.49859	1.62253	8.27	Average
4-Chlorophenyl-phenylether	.54172	.63287	16.83	Average
4-Nitroaniline	.29251	.35228	20.43	Average
2,4,6-Tribromophenol	.11971	.15285	27.69	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N rosodiphenylamine	.53965	.58198	7.84	Average
4,6-Dinitro-2-Methylphenol	.11757	.13676	16.32	Average
4-Bromophenyl-phenylether	.24162	.28550	19.16	Average
Hexachlorobenzene	.30979	.34639	11.81	Average
Pentachlorophenol	.12119	.12321	1.67	Average
Phenanthrene	1.13087	1.15682	2.29	Average
Anthracene	1.06434	1.14069	7.17	Average
Di-n-Butylphthalate	1.93436	2.04318	5.63	Average
4,4'-Dibromobiphenyl	1.36857	1.98319	44.91	Average
Fluoranthene	1.06699	1.19737	12.22	Average
Heptachlor Epoxide	-	-	-	Average
Endosulfan I	-	-	-	Average
4,4'-DDE	-	-	-	Average
Dieldrin	-	-	-	Average
Endrin	-	-	-	Average
4,4' DDD	-	-	-	Average
Endosulfan II	-	-	-	Average
Endrin Aldehyde	-	-	-	Average
4,4'-DDT	-	-	-	Average
Endosulfan Sulfate	-	-	-	Average
Dibutylchlorendate	-	-	-	Average

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

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

%Diff - % Difference from original average or curve

Calibration Check Report

Title: 10 625 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 881005 13:47

Check Standard Data File: >E5819
Injection Time: 881005 12:34

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.13113	.07531	42.57	Average
Pyrene	1.84158	1.80391	2.05	Average
Terphenyl-d14	-	-	-	Average
Butylbenzylphthalate	1.52222	1.37531	9.65	Average
3,3'-Dichlorobenzidine	.22025	.17462	20.72	Average
Chrysene	1.00549	1.01316	.76	Average
Benzo(a)Anthracene	1.34377	1.25971	6.26	Average
bis(2-Ethylhexyl)Phthalate	1.85353	1.72366	7.01	Average
Di-n-octylphthalate	4.45640	4.31497	3.17	Average
Benzo(a)Pyrene	1.24652	1.29124	3.59	Average
Benzo(b)fluoranthene	1.76158	1.70586	3.16	Average
Indeno(1,2,3-cd)Pyrene	1.18178	1.07353	9.16	Average
Dibenzo(a,h)Anthracene	.99610	.93589	6.05	Average
Benzo(k)fluoranthene	1.16721	1.35429	16.03	Average
Benzo(g,h,i)Perylene	1.01655	.92901	8.61	Average

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

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

%Diff - % Difference from original average or curve

1197

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR00-1

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	77080	8.27	261501	11.80	137934	17.22
UPPER LIMIT	154160		523002		275868	
LOWER LIMIT	38540		130750		68967	
EPA SAMPLE NO.						
01 88081899	56947	8.26	192401	11.76	100631	17.19
02 1900	52707	8.26	202337	11.75	103922	17.18
03 1902	57602	8.26	211137	11.76	104258	17.19
04 1904	51739	8.28	189617	11.77	89062	17.20
05 1906	49711	8.26	189330	11.78	90368	17.21
06 1945	53312	8.28	201488	11.77	99283	17.20
07 1946	40418	8.13	736308	11.77	77966	17.20
08 1950	61628	8.29	232307	11.78	117353	17.22
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21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10

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

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	77080		8.27	261501		11.80	137934		17.22
UPPER LIMIT	154160			523002			275868		
LOWER LIMIT	38540			130750			68967		
EPA SAMPLE NO.									
01 SB081899	56947		8.26	192401		11.76	100631		17.19
02 1901	52707		8.26	202337		11.75	103977		17.18
03 1902	57602		8.26	211137		11.76	104258		17.19
04 1904	51739		8.28	189617		11.77	89067		17.20
05 1906	49711		8.26	189330		11.78	90368		17.21
06 1945	53312		8.28	201488		11.77	99283		17.20
07 1946	46418		8.13	736308	*	11.77	77966		17.20
08 1950	61628		8.29	232307		11.78	117353		17.22
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20									
21									
22									

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10

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 Contracto· Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/10/88 15:47

Lab ID >02010::01 Data Release Authorized By: Laura Kirk

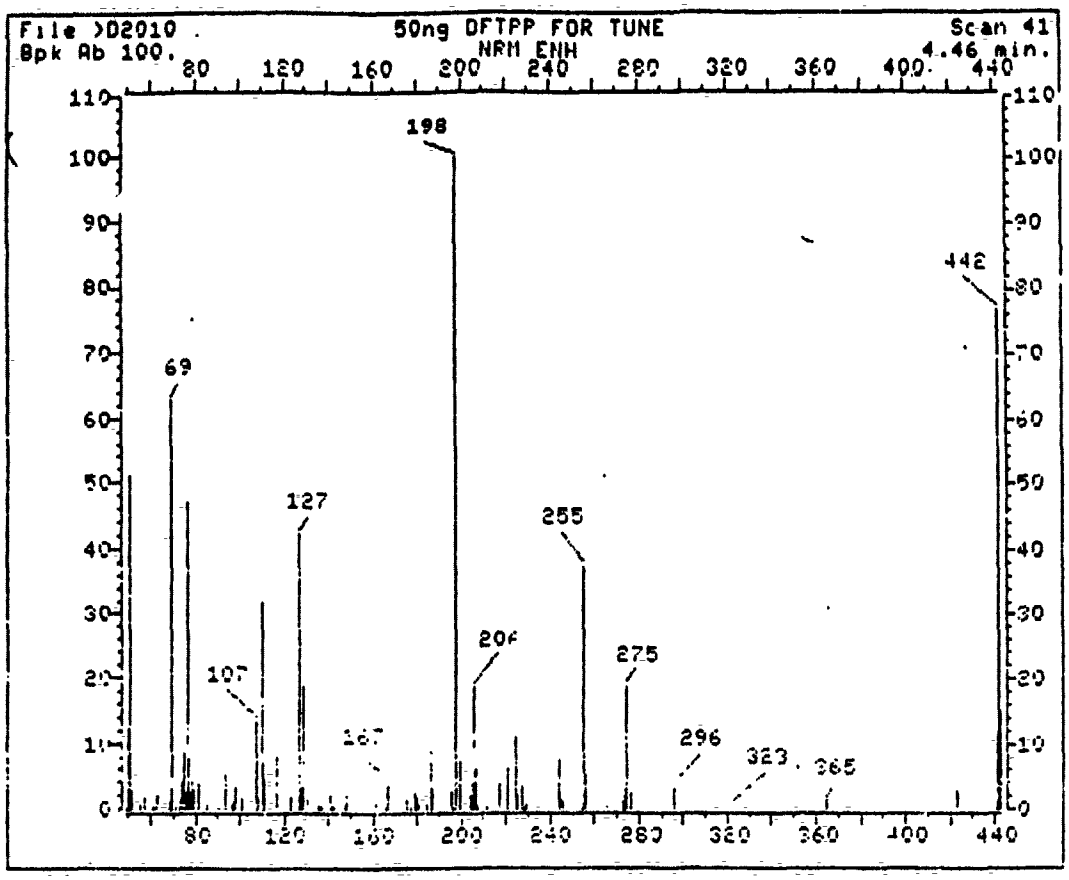
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	50.99 OK	
68	less than 2.0% of mass 69	1.10 OK	(1.747) #1
69	mass 69 relative abundance	62.87	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	42.26 OK	
197	less than 1.0 of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.12 OK	
275	10.0 - 30.0% of mass 198	18.80 OK	
365	greater than 1.00% of mass 198	1.43 OK	
441	present, but less than mass 443	11.42 OK	
442	greater than 40.0% of mass 198	76.65 OK	
443	17.0 - 23.0% of mass 442	14.97 OK	(19.53) #2

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

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

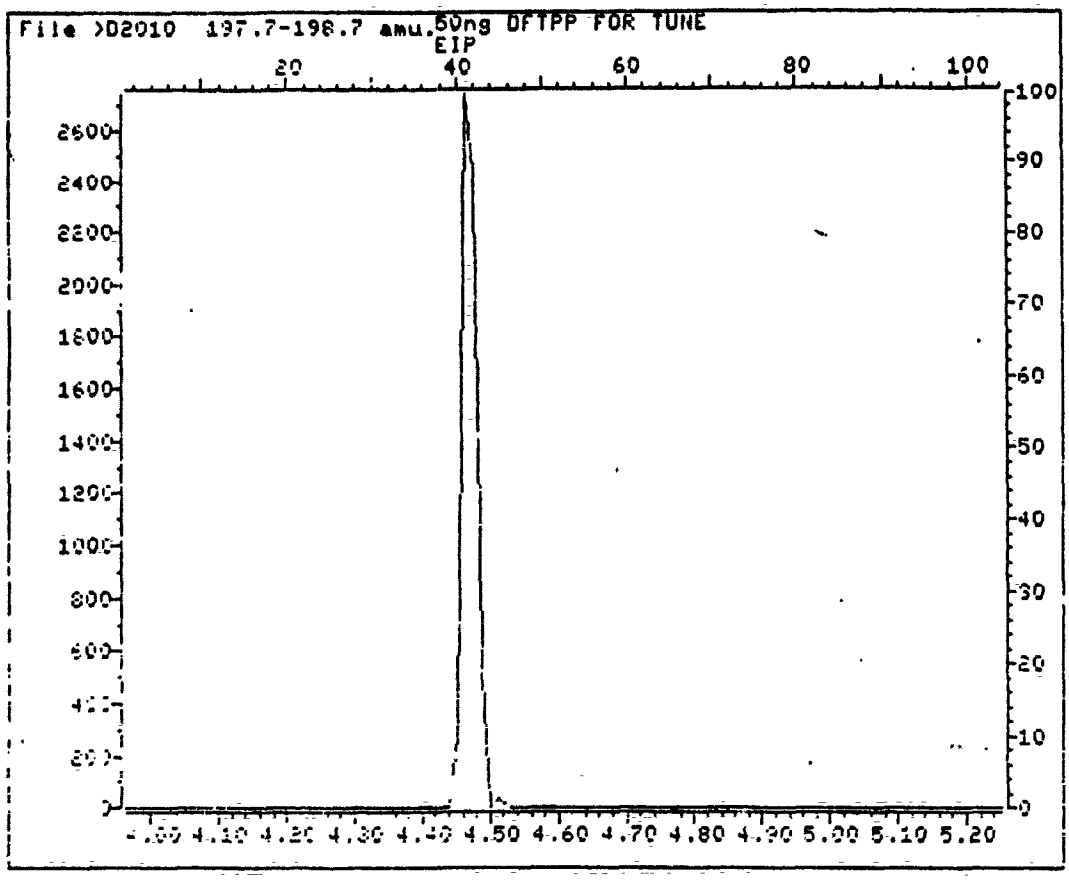
SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
50ng DFTPP FOR TUNE	2010	10/10/88	15:47	
8ong/L ABN std	E5833		17:07	good
8808[illegible]19 BLK	E5838		21:47	
88081917	E5839		22:43	SS out -IS out or
88081919	E5840		23:38	
88081901	E5841	10/11/88	00:34	- IS out, use
88081903	E5842		01:30	
88081905	E5843		02:25	-IS out, use
88081907	E5844		03:21	- IS out, use

FORM I 7/87



File: >D2010 Scan #: 41 Retn. time: 4.46

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
49.10	.185	81.05	3.262	136.95	.714	182.00	3.164	223.95	.622
50.00	12.299	84.75	[illegible]	[illegible]	[illegible]	195.50	.291	24[illegible]	[illegible]
51.10	50.988	85.15	.[illegible]	.5[illegible]	[illegible]	[illegible]	1.360	[illegible]	[illegible]
52.10	2.947	90.95	[illegible]	[illegible]	[illegible]	[illegible]	.220	245.[illegible]	[illegible]
55.10	.897	93.00	[illegible]	[illegible]	[illegible]	[illegible]	100.000	253.[illegible]	[illegible]
57.05	1.903	96.00	.[illegible]	[illegible]	.[illegible]	199.[illegible]	7.119	[illegible]	[illegible]
61.05	.548	97.00	1.[illegible]	146.95	.677	19[illegible]	.238	256.00	5.070
62.15	.311	98.30	[illegible]	[illegible]	[illegible]	[illegible]	2.013	264.[illegible]	.584
63.05	.105	101.00	[illegible]	.56.05	[illegible]	204.95	3.697	[illegible]	1.245
67.95	1.098	104.50	.258	150.95	.622	205.95	18.660	274.00	3.058
68.95	62.866	107.00	[illegible]	[illegible]	.366	206.95	6.277	[illegible]	[illegible]
71.05	.256	108.00	[illegible]	167.00	[illegible]	[illegible]	.439	276.00	2.452
73.05	1.263	110.00	[illegible]	[illegible]	[illegible]	[illegible]	.403	[illegible]	[illegible]
74.05	4.447	111.00	[illegible]	[illegible]	.586	215.95	3.935	[illegible]	.[illegible]
75.05	8.675	112.00	[illegible]	[illegible]	[illegible]	220.95	6.021	[illegible]	[illegible]
76.05	2.544	125.00	[illegible]	180.00	[illegible]	223.95	10.743	425.00	[illegible]
77.05	47.182	127.00	42.256	181.00	.659	224.95	2.105	440.95	11.420
78.05	2.489	128.00	[illegible]	184.90	.677	226.95	[illegible]	441.95	[illegible]
79.05	4.063	129.00	18.543	186.00	10.688	228.45	.201	442.95	14.971
79.95	2.947	130.95	1.482						


File >D2010 197.7-198.7 amu.50ng DFTPP FOR TUNE
EIP
20
40
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100
2600
2400
2200
2000
1800
1600
1400
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100
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30
20
10
0
4.00 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: ID 625 ACID AND BASE/NEUTRALS + EXPHENOL,DMSBPB2-NO2-4-METH
Calibrated: 881005 13:47

Check Standard Data File:)CS833
Injection Time: 881010 17:07

Compound	RF	$\overline{RF}$	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	1.27080	1.25866	.96	Average	
2-Fluorophenol	1.31109	1.34076	2.03	Average	
bis(2-Chloroethyl)ether	1.51173	1.56104	3.26	Average	
Phenol	1.74714	1.79873	2.95	Average	
Phenol-d5	1.51617	1.34168	11.51	Average	
Aniline	1.82358	1.47436	19.15	Average	
2-Chlorophenol	1.36329	1.37341	.74	Average	
1,3-Dichlorobenzene	1.56915	1.52154	3.03	Average	
1,4-Dichlorobenzene	1.49247	1.49427	.12	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.78240	.66418	15.11	Average	
1,2-Dichlorobenzene	1.48187	1.47390	.54	Average	
2-Methylphenol	1.41182	1.41047	.10	Average	
3-&-4-Methylphenol	2.67126	1.31104	50.92	Average	(Conc=160.00)
bis(2-chloroisopropyl)Ether	2.61315	2.73476	4.65	Average	
N-Nitroso-Di-n-Propylamine	1.31081	1.24172	5.27	Average	
Hexachloroethane	.68709	.71652	4.28	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.73556	.62659	14.81	Average	
Nitrobenzene-d5	-	-	-	Average	
2-Nitrophenol	.23415	.22383	4.38	Average	
Isophorone	.94936	.91338	3.79	Average	
bis(2-Chloroethoxy)methane	.60210	.61031	1.36	Average	
2,4-Dimethylphenol	.32307	.40648	25.82	Average	
Benzoic Acid	.23677	.25406	7.30	Average	
2,4-Dichlorophenol	.28719	.26874	6.42	Average	
1,2,4-Trichlorobenzene	.34485	.30401	11.84	Average	
Naphthalene	.96720	.94391	2.41	Average	
4-Chloroaniline	.45308	.40211	11.25	Average	
Hexachlorobutadiene	.19599	.18044	7.93	Average	
4-Chloro-3-Methylphenol	.35283	.33465	5.15	Average	
2-Methylnaphthalene	.57109	.54697	4.22	Average	
Hexachlorocyclopentadiene	.39989	.45240	13.16	Average	
2,4,6-Trichlorophenol	.34737	.33215	4.38	Average	
2,4,5-Trichlorophenol	.52543	.46930	10.68	Average	
2-Fluorobiphenyl	-	-	-	Average	
2-Chloronaphthalene	1.26674	1.20304	5.03	Average	
2-Nitroaniline	.62957	.67110	6.77	Average	
Dimethylphthalate	1.32836	1.27747	3.83	Average	
2,6-Dinitrotoluene	.32899	.35895	9.11	Average	

RF - Response Factor from daily standard file at 80.00 ng/L

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

%Diff - % Difference from original average or curve

1203

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + CLPHENOL,DNSGF&2-NO2-4-METH
Calibrated: 881005 13:47

Check Standard Data File:)CS833
Injection Time: 891010 17:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.65993	1.57440	5.15	Average
3-Nitroaniline	.65718	.66832	1.70	Average
2,4-Dinitrophenol	.13830	.11513	16.75	Average
Acenaphthene	1.09782	.98595	10.19	Average
Dibenzofuran	1.63801	1.46605	10.50	Average
2,4-Dinitrotoluene	.34323	.35212	2.59	Average
4-Nitrophenol	.26395	.22537	14.62	Average
Fluorene	1.21752	1.09330	10.20	Average
Diethylphthalate	1.49859	1.36510	8.90	Average
4-Chlorophenyl-phenylether	.54172	.19250	9.08	Average
4-Nitroaniline	.29251	.33566	14....	Average
2,4,6-Tribromophenol	.11971	.11222	18.81	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.53965	.58589	8.57	Average
4,6-Dinitro-2-Methylphenol	.11757	.14108	39.99	Average
4-Bromophenyl-phenylether	.24162	.25240	4.46	Average
Hexachlorobenzene	.30979	.29041	6.26	Average
Pentachlorophenol	.12119	.12788	5.52	Average
Phenanthrene	1.13087	1.06777	5.58	Average
Anthracene	1.06434	1.12780	5.96	Average
Di-n-Butylphthalate	1.93436	1.72156	11.00	Average
4,4'-Dibromobiphenyl	1.36857	-	-	Average
Fluoranthene	1.06693	.87684	17.82	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 80.00 ng/L

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

%Diff - % Difference from original average or curve

1204

Calibration Check Report

Title: ID 625 ACID AND BASE/NEUTRALS + CLPHENOL,DNSBP62-NO2-4-MCPH
Calibrated: 881005 13:47

Check Standard Data File:)E5833
Injection line: 881010 17:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.13113	.00435	96.68	Average
Pyrene	1.84158	1.54130	16.31	Average
Terphenyl-d14	-	-	-	Average
Butylbenzylphthalate	1.52222	1.20414	20.90	Average
3,3'-Dichlorobenzidine	.22025	.14436	34.46	Average
Chrysene	1.00549	1.03775	3.21	Average
Benzo(a)Anthracene	1.34377	1.07149	20.26	Average
bis(2-Ethylhexyl)Phthalate	1.85353	1.38015	25.54	Average
Di-n-octylphthalate	4.45640	3.81665	14.36	Average
Benzo(a)Pyrene	1.24652	1.33493	7.09	Average
Benzo(b)Fluoranthene	1.76158	1.77033	.50	Average
Indeno(1,2,3-cd)Pyrene	1.18178	1.10358	6.62	Average
Dibenzo(a,h)Anthracene	.99610	1.06553	6.97	Average
Benzo(k)Fluoranthene	1.16721	1.51333	29.65	Average
Benzo(g,h,i)Perylene	1.01653	.99402	2.21	Average

RF - Response Factor from daily standard file at 80.00 ng/L

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

%Diff - % Difference from original average or curve

1205

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	35860	8.21	121800	11.75	58238	17.15
UPPER LIMIT	71720		243600		116476	
LOWER LIMIT	17930		60900		29119	
EPA SAMPLE NO.						
01 ~~SBLK01~~	38873	8.17	92594	11.69	39336	17.13
02 SBLK1918	35580	8.19	133337	11.70	55355	17.12
03 SBLK1919	34807	8.18	107979	11.69	38759	17.12
04 SBLS1901	41054	8.19	119489	11.69	42725	17.12
05 SBLS1902	34297	8.20	104479	11.70	37176	17.12
06 SBLS1905	33567	8.21	95984	11.70	33437	17.12
07 SBLS1947	21616	8.18	75172	11.70	32265	17.12
08						
09						
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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): _____ Date Analyzed: _____

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

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT	
12 HOUR STD	71880	21.74	37605	30.11	21418	35.19	
UPPER LIMIT	143760		75210		42836		
LOWER LIMIT	35940		18803		10709		
EPA SAMPLE NO.							
01 [illegible]	58793	21.71	42327	30.08	21925	35.15	
02 [illegible]	61626	21.72	34870	30.11	13248	35.15	
03 [illegible]	45012	21.72	27618	30.08	7422 *	35.15	I
04 88081901	50071	21.72	31368	30.08	2050 *	35.13	I
05 [illegible]	46945	21.72	32107	30.08	13033	35.16	
06 88081905	43795	21.72	26317	30.09	9569	35.16	IS
07 [illegible]	42518	21.74	25063	30.10	6268	35.18	IS
08							
09							
10							
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12							
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17							
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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 10/03/88 10:27

Lab ID >D103A::03 Data Release Authorized By: Laura Kuck

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	54.58 OK
68	less than 2.0% of mass 69	0.00 OK (0.00) #1
69	mass 69 relative abundance	79.36
70	less than 2.0% of mass 69	0.00 OK (0.00) #1
127	40.0 - 60.0% of mass 198	46.32 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	6.50 OK
275	10.0 - 30.0% of mass 198	19.12 OK
365	greater than 1.00% of mass 198	1.24 OK
441	present, but less than mass 443	5.77 OK
442	greater than 40.0% of mass 198	52.26 OK
443	17.0 - 23.0% of mass 442	8.99 OK (17.21) #2

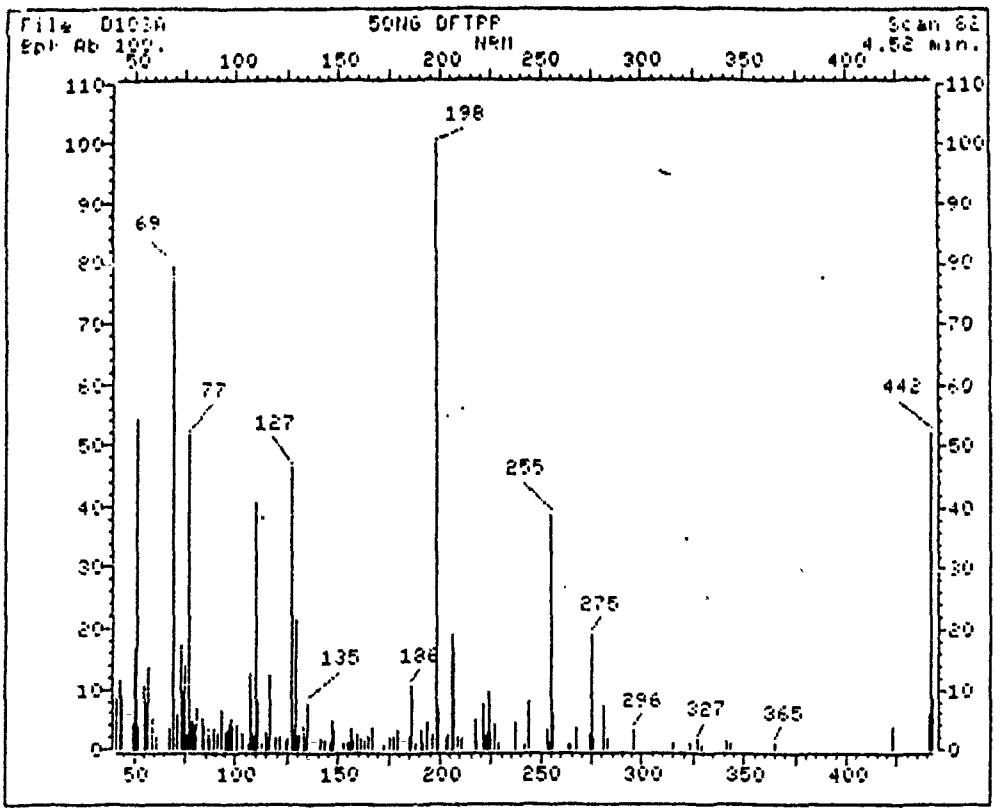
9/27/88 5 point

all IS good

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

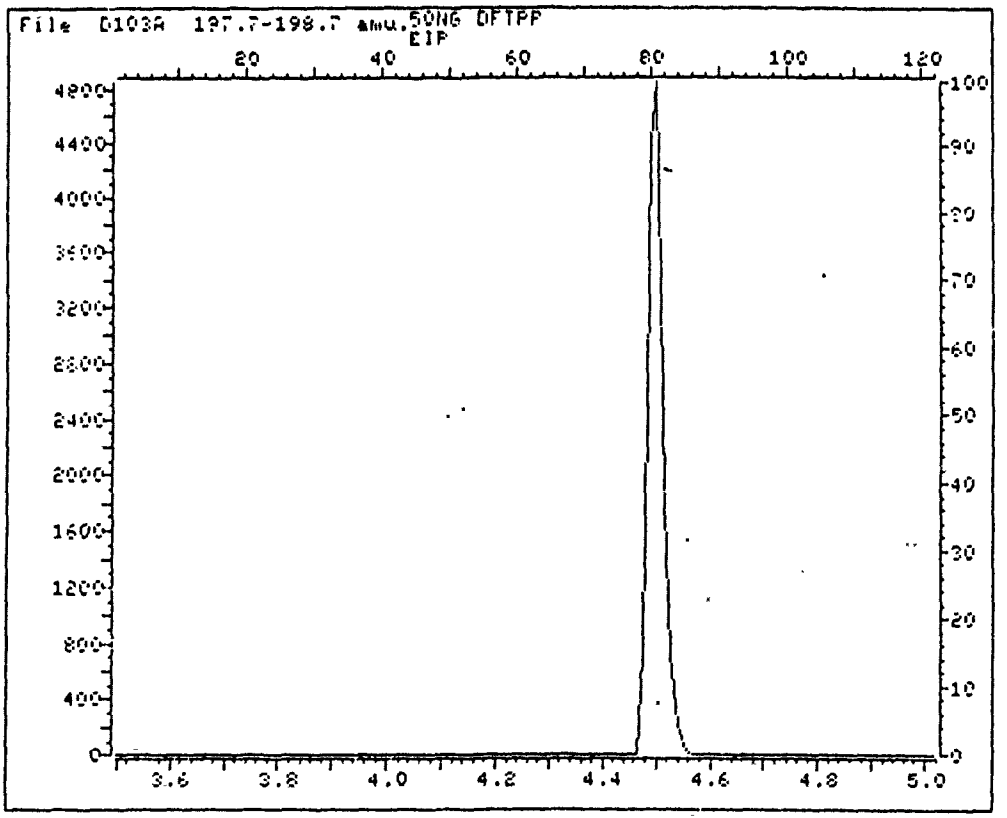
#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
ES784	25ng/l ABN std	10/3/88	10:47	
ES790	88081886		11:55	use
ES791	88081887		12:50	- SS out rm 2x, use
ES792	88081888		13:45	use
ES793	88081889		14:40	- SS out rm 2x, use
ES794	88081890		15:36	use
ES795	88081869-90BLKMS		16:30	use
ES796	88081869-90BLKMSD		17:24	use
ES797	88081886-190.A38-V2BLK		18:18	use
ES798	88081938		19:13	use
ES799	88081938MS		20:07	use
ES800	88081938MSD		21:01	use
ES801	88081939		21:56	- SS out, rm 2x, use



File: D103A Scan #: 82 Retn. time: 4.52

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	8.428	89.05	3.450	129.95	2.036	179.00	3.111	237.05	4.638
43.10	11.652	91.05	2.715	130.95	2.489	185.00	2.206	242.00	.905
44.10	8.710	93.00	6.561	133.05	3.733	186.00	10.690	244.00	7.805
49.00	4.072	95.00	2.715	133.85	1.923	187.70	.735	252.90	3.054
50.00	16.686	96.00	2.998	134.95	7.579	188.00	.962	254.10	1.188
51.10	54.581	97.00	4.186	140.95	1.753	191.00	3.167	255.00	30.688
52.10	3.959	98.00	5.034	142.95	1.584	191.90	1.244	256.00	5.995
55.10	10.577	99.00	3.790	145.95	1.131	193.00	4.638	263.90	.735
56.05	7.523	101.00	4.129	147.05	4.695	196.00	2.432	264.60	.622
57.05	13.575	103.00	2.658	147.95	3.111	196.60	1.244	267.00	3.337
59.05	5.204	106.10	.679	152.95	1.188	198.00	100.000	274.00	2.376
60.95	1.980	107.00	13.066	154.65	.735	199.00	6.505	275.00	19.118
67.05	3.503	108.00	2.885	155.05	1.188	202.95	1.640	276.00	1.923
68.95	79.355	109.10	2.036	155.25	1.131	203.95	2.602	280.95	7.127
71.05	5.826	110.00	40.781	156.05	3.507	205.95	19.174	282.05	1.697
73.05	17.251	111.00	7.749	157.05	1.584	206.95	16.686	295.95	3.291
74.05	9.389	112.90	.962	157.35	.848	208.95	1.980	314.80	1.018
75.05	13.857	115.00	2.885	157.65	.735	210.95	1.923	322.80	1.131
76.05	2.432	116.00	1.810	157.85	.848	216.95	4.864	327.00	1.697
77.05	51.640	117.00	12.104	159.05	2.376	217.75	1.244	328.90	.679
78.05	4.355	119.10	2.149	160.95	1.697	221.05	7.353	341.00	1.471
79.05	4.864	121.00	2.262	163.05	1.471	222.05	2.093	343.00	1.244
80.05	3.846	124.00	1.301	165.05	2.036	222.95	2.885	364.85	1.244
81.05	6.731	125.10	1.697	167.00	3.507	224.05	9.672	423.00	3.676
83.05	5.260	127.00	46.324	173.00	.848	224.95	2.941	440.95	5.769
84.05	3.959	128.10	3.111	175.00	2.149	226.95	4.242	441.95	52.262
85.95	3.620	129.00	21.437	176.90	2.206	228.95	1.075	442.95	8.993
87.05	1.753								


File D103A 197.7-198.7 amu.50NG DFTPP
EIP
20
40
60
80
100
120
4800
4400
4000
3600
3200
2800
2400
2000
1600
1200
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3.6
3.8
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4.2
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4.6
4.8
5.0

Calibration Check Report

Title: 0 625 ACID AND BASE/NEUTRALS + ETPHENOL,DNSBP&2-NO2-4-METPH
Calibrated: 880928 09:57

Check Standard Data File: >ES784
Injection Time: 881003 10:47

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	1.20337	1.09051	9.38	Average	
2-Fluorophenol	1.19956	1.32043	10.08	Average	
bis(2-Chloroethyl)ether	1.45200	1.19404	17.77	Average	
Phenol	1.46685	1.67623	14.27	Average	
Phenol-d5	1.27603	1.41792	11.12	Average	
Aniline	1.30453	.98925	24.17	Average	
2-Chlorophenol	1.34100	1.41016	4.92	Average	
1,3-Dichlorobenzene	1.42194	1.50967	5.95	Average	
1,4-Dichlorobenzene	1.28358	1.42476	11.00	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.17434	.32604	87.01	Average	
1,2-Dichlorobenzene	1.33987	1.43557	7.14	Average	
2-Methylphenol	1.33318	1.20584	9.55	Average	
3-&-4-Methylphenol	1.09850	1.20846	10.01	Average	(Conc=50.00)
bis(2-chloroisopropyl)Ether	2.45055	2.00360	18.24	Average	
N-Nitroso-Di-n-Propylamine	1.18870	1.08429	8.78	Average	
Hexachloroethane	.62514	.64370	2.97	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.56945	.50182	11.88	Average	
Nitrobenzene-d5	.40949	.38965	4.85	Average	
2-Nitrophenol	.22805	.21174	7.15	Average	
Isophorone	.88701	.80564	9.17	Average	
bis(2-Chloroethoxy)methane	.54476	.48364	11.22	Average	
2,4-Dimethylphenol	.29644	.25267	14.76	Average	
Benzoic Acid	.23912	.21101	11.75	Average	
2,4-Dichlorophenol	.26321	.29532	12.20	Average	
1,2,4-Trichlorobenzene	.30633	.32076	4.71	Average	
Naphthalene	.87644	.86894	.86	Average	
4-Chloroaniline	.34235	.36722	7.27	Average	
Hexachlorobutadiene	.17620	.20068	14.01	Average	
4-Chloro-3-Methylphenol	.32730	.26844	17.98	Average	
2-Methylnaphthalene	.51061	.52031	1.90	Average	
Hexachlorocyclopentadiene	.32738	.15161	53.69	Average	
2,4,6-Trichlorophenol	.33927	.39600	16.72	Average	
2,4,5-Trichlorophenol	.35674	.37356	4.71	Average	
2-Fluorobiphenyl	1.02602	1.03990	1.35	Average	
2-Chloronaphthalene	1.09146	1.13120	3.64	Average	
2-Nitroaniline	.60933	.50987	16.32	Average	
Dimethylphthalate	1.09915	1.19133	8.39	Average	
2,6-Dinitrotoluene	.31777	.33890	6.65	Average	

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

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

%Diff - % Difference from original average or curve

1211

Calibration Check Report

Title: D 625 ACID AND BASE/NEUTRALS + EtPHENOL,DMSBP82-NO2-4-MEPH
Calibrated: 880928 09:57

Check Standard Data File: >E5784
Injection Time: 881003 10:47

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.54101	1.53592	.33	Average
3-Nitroaniline	.59590	.53070	10.94	Average
2,4-Dinitrophenol	.11560	.08899	23.02	Average
Acenaphthene	.98668	1.02202	3.58	Average
Dibenzofuran	1.37061	1.39184	1.77	Average
2,4-Dinitrotoluene	.33047	.30937	6.39	Average
4-Nitrophenol	.23540	.12497	46.91	Average
Fluorene	1.07776	1.13850	5.64	Average
Diethylphthalate	1.22324	1.30945	7.05	Average
4-Chlorophenyl-phenylether	.43391	.49785	14.74	Average
4-Nitroaniline	.31539	.28310	10.24	Average
2,4,6-Tribromophenol	.15076	.17271	14.56	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.42741	.47356	10.80	Average
4,6-Dinitro-2-Methylphenol	.10717	.09352	12.73	Average
4-Bromophenyl-phenylether	.20902	.23287	11.41	Average
Hexachlorobenzene	.26747	.29965	12.03	Average
Pentachlorophenol	.07959	.06848	13.96	Average
Phenanthrene	.99099	1.01081	2.00	Average
Anthracene	.94190	.95871	1.78	Average
Di-n-Butylphthalate	1.58680	1.55533	1.98	Average
4,4'-Dibromobiphenyl	1.15457	1.48229	28.38	Average
Fluoranthene	.81688	.87584	7.22	Average
Heptachlor Epoxide	-	-	-	Average
Endosulfan I	-	-	-	Average
4,4'-DDE	-	-	-	Average
Dieldrin	-	-	-	Average
Endrin	-	-	-	Average
4,4'-DDD	-	-	-	Average
Endosulfan II	-	-	-	Average
Endrin Aldehyde	-	-	-	Average
4,4'-DDT	-	-	-	Average
Endosulfan Sulfate	-	-	-	Average
Dibutylchlorendate	-	-	-	Average

RF - Response factor from daily standard file at 25.00 ng/L

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

%Diff - % Difference from original average or curve

1212

Calibration Check Report

Title: 0 625 ACID AND BASE/NEUTRALS + C(PHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 880928 09:57

Check Standard Data File:)CS784
Injection Time: 881003 10:47

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.14297	.00225	98.43	Average
Pyrene	1.68778	1.60248	5.05	Average
Terphenyl-d14	1.09198	1.07853	1.23	Average
Butylbenzylphthalate	1.26295	1.16918	7.42	Average
3,3'-Dichlorobenzidine	.16928	.07712	54.44	Average
Chrysene	1.11613	1.06074	4.96	Average
Benzo(a)Anthracene	1.15601	1.07025	7.42	Average
bis(2-Ethylhexyl)Phthalate	1.54343	1.49567	3.09	Average
Di-n-octylphthalate	3.23005	3.70298	14.64	Average
Benzo(a)Pyrene	1.06563	1.10533	3.73	Average
Benzo(b)fluoranthene	1.53177	1.52811	.24	Average
Indeno(1,2,3-cd)Pyrene	1.07257	.85981	19.84	Average
Dibenzo(a,h)Anthracene	1.06543	.98742	7.32	Average
Benzo(k)fluoranthene	1.02429	1.19638	16.80	Average
Benzo(g,h,i)Perylene	.96158	.81090	15.67	Average

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

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

%Diff - % Difference from original average or curve

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR00I

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	84044	8.30	290551	11.83	151039	17.26
UPPER LIMIT	168088		581102		302078	
LOWER LIMIT	42022		145276		75520	
EPA SAMPLE NO.						
01 8801886	79877	8.30	299249	11.79	155806	17.23
02 8801887	79534	8.30	306042	11.80	155364	17.23
03 8801888	71761	8.28	283089	11.78	142686	17.22
04 8801889	64696	8.30	259125	11.80	129731	17.23
05 8801890	66833	8.30	260488	11.80	129287	17.23
06 BLK MS	68284	8.32	261814	11.81	135603	17.25
07 BLK MSD	69170	8.31	269218	11.80	130169	17.23
08						
09 8808888-1906 BLK	48210	8.25	388794	11.74	175899	17.23
10 88081938	77331	8.30	307886	11.79	158283	17.23
11 88081938 MS	83135	8.32	317877	11.80	161668	17.24
12 88081938 MSD	95152	8.30	369503	11.79	199541	17.24
13 88081939	92782	8.30	382177	11.80	200451	17.23
14						
15						
16						
17						
18						
19						
20						
21						
22						

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

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

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

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

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

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

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	222184	21.86	119524	30.24	68309	34.99
UPPER LIMIT	444368		239048		136618	
LOWER LIMIT	111092		59762		34155	
EPA SAMPLE NO.						
01 SB01886	200022	21.83	102835	30.21	60281	34.97
02 SB01887	234015	21.84	109871	30.22	67157	34.97
03 SB01888	202065	21.83	84936	30.22	48306	34.97
04 SB01889	191293	21.83	84574	30.22	55649	34.97
05 SB01890	194779	21.84	98770	30.22	71541	34.99
06 BLK MS	201575	21.85	89015	30.21	68228	34.99
07 BLK MSD	203979	21.85	97215	30.22	62408	34.98
08						
09						
10 SB081888-MOD BLK	166767	21.84	113157	30.22	64007	34.97
11 SB081938	235250	21.84	123914	30.23	67756	34.98
12 SB081938 MS	238986	21.86	125843	30.23	66915	34.99
13 SB081938MSD	214950	21.86	147774	30.24	81898	35.01
14 SB081939	312273	21.86	188560	30.23	109746	35.01
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

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DATA PACKAGE #19

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ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

Job No.: OR001

Work Order No.: 909

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 8-25-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88082102	DANGB-3-MW27-SS1	AS-F	8-24-88		10-07-88	
88082102	DANGB-3-MW27-SS1	BA-I	8-24-88		9-19-88	
88082102	DANGB-3-MW27-SS1	CD-F	8-24-88		9-19-88	
88082102	DANGB-3-MW27-SS1	CR-F	8-24-88		9-19-88	
88082102	DANGB-3-MW27-SS1	HG-C	8-24-88		9-20-88	
88082102	DANGB-3-MW27-SS1	PB-F	8-24-88		10-04-88	
88082102	DANGB-3-MW27-SS1	418.1	8-24-88	9-17-88	9-19-88	
88082102	DANGB-3-MW27-SS1	MOIS	8-24-88		9-02-88	
88082102	DANGB-3-MW27-SS1	8010	8-24-88		9-01-88	9-02-88
88082102	DANGB-3-MW27-SS1	8020	8-24-88		9-01-88	9-01-88
88082102	DANGB-3-MW27-SS1	8080	8-24-88	9-01-88	9-27-88	
88082102	DANGB-3-MW27-SS1	8270	8-24-88	9-02-88	10-13-88	

* If applicable

Job No.: OR001

Work Order No.: 909

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38082103	DANGB-3-MW27-SS2	AS-F	8-24-88		10-07-88	
38082103	DANGB-3-MW27-SS2	BA-I	8-24-88		9-19-88	
38082103	DANGB-3-MW27-SS2	CD-F	8-24-88		9-19-88	
38082103	DANGB-3-MW27-SS2	CR-F	8-24-88		9-19-88	
38082103	DANGB-3-MW27-SS2	HG-C	8-24-88		9-20-88	
38082103	DANGB-3-MW27-SS2	PB-F	8-24-88		10-04-88	
38082103	DANGB-3-MW27-SS2	418.1	8-24-88	9-17-88	9-19-88	
38082103	DANGB-3-MW27-SS2	MOIS	8-24-88		9-02-88	
38082103	DANGB-3-MW27-SS2	8010	8-24-88		9-01-88	9-02-88
38082103	DANGB-3-MW27-SS2	8020	8-24-88		9-01-88	9-01-88
38082103	DANGB-3-MW27-SS2	8080	8-24-88	9-01-88	9-27-88	
38082103	DANGB-3-MW27-SS2	8270	8-24-88	9-02-88	10-13-88	
38082104	DANGB-3-MW27-SS3	AS-F	8-24-88		10-07-88	
38082104	DANGB-3-MW27-SS3	BA-I	8-24-88		9-19-88	
38082104	DANGB-3-MW27-SS3	CD-F	8-24-88		9-19-88	
38082104	DANGB-3-MW27-SS3	CR-F	8-24-88		9-19-88	
38082104	DANGB-3-MW27-SS3	HG-C	8-24-88		9-20-88	
38082104	DANGB-3-MW27-SS3	PB-F	8-24-88		10-04-88	
38082104	DANGB-3-MW27-SS3	418.1	8-24-88	9-17-88	9-19-88	
38082104	DANGB-3-MW27-SS3	MOIS	8-24-88		9-02-88	
38082104	DANGB-3-MW27-SS3	8010	8-24-88		9-01-88	9-02-88
38082104	DANGB-3-MW27-SS3	8020	8-24-88		9-01-88	9-01-88
38082104	DANGB-3-MW27-SS3	8080	8-24-88	9-01-88	9-27-88	
38082104	DANGB-3-MW27-SS3	8270	8-24-88	12-19-88	10-18-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88082102-88082104
WORK ORDER NO.: 909

These soil samples were received at the ES Berkelev Laboratory on 8-25-88. They were received cold and intact.

ANALYSIS REPORT

)RK ORDER NUMBER: 909
)B NUMBER : ZB0000000440
)RK ORDER DATE : 08/25/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

.SK: 2, UNITS: mg/Kg

:ST COMPOUND	DANGB-3-MW27-SS1 88082102	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
:ID DIG SOIL	NA	NA	NA
'SENIC	<5.0E	<5.0E	<5.0E
.RIUM	77.8	47.5	46.9
.DMIUM	10.2NE	10.8NE	10.6NE
.ROMIUM	31.0	31.5	30.7
:RCURY	<0.1	<0.1	<0.1
.AD	16.2S*	3.3*	3.2*

ANALYSIS REPORT

WORK ORDER NUMBER: 909
JOB NUMBER : ZR0000000440
WORK ORDER DATE : 08/25/88

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	DANGB-3-MW27-SS1 88082102	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100
% MOISTURE	17.3	9.4	8.5

ANALYSIS REPORT

ORK ORDER NUMBER: 909
OB NUMBER : ZB0000000440
ORK ORDER DATE : 08/25/88

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 8010

EST COMPOUND	DANGB-3-MW27-SS1 88082102	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
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	ND	ND	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	ND	ND
,2-DICHLOROETHANE	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND
ICHLOROMETHANE	3.0B	1.9B	12B
,2-DICHLOROPROPANE	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 909

TEST COMPOUND	DANGB-3-MW27-SS1 88082102	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
1,3-DICHLOROPROPYLENE	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHYLENE	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND
,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHYLENE	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND

ANALYSIS REPORT

)RK ORDER NUMBER: 909
)B NUMBER : ZB0000000440
)RK ORDER DATE : 08/25/88

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	DANG[illegible]-MW27-SS1 88082[illegible]	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
: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	610	740	100
'LENES	ND	ND	ND

ANALYSIS REPORT

WORK ORDER NUMBER: 909
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 08/25/88

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-3-MW27-SS1 88082102	DANGB-3-MW27-SS2 88082103	DANGB-3-MW27-SS3 88082104
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	NA	NA	NA
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

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

Date Received: August 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082102	88082103
Sample No.:	DANGB3-MW27-SS1	DANGB3-MW27-SS2
Date Sampled:	8-24-88	8-24-88
Time Sampled:	15:38	16:10
Date Extracted:	9-02-88	9-02-88
Date Analyzed:	10-13-88	10-13-88
Percent Moisture:	17	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: August 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082102	88082103
Sample No.:	DANGB3-MW27-SS1	DANGB3-MW27-SS2
Date Sampled:	8-24-88	8-24-88
Time Sampled:	15:38	16:10
Date Extracted:	9-02-88	9-02-88
Date Analyzed:	10-13-88	10-13-88
Percent Moisture:	17	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	430
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 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082102	88082103
Sample No.:	DANGB3-MW27-SS1	DANGB3-MW27-SS2
Date Sampled:	8-24-88	8-24-88
Time Sampled:	15:38	16:10
Date Extracted:	9-02-88	9-02-88
Date Analyzed:	10-13-88	10-13-88
Percent Moisture:	17	9

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	660	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	330	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a-,a-Dimethylphenethylamine	--*	ND	ND
Diphenylamine	--*	ND	ND
1,2-Diphenylhydrazine	--*	ND	ND
Ethyl methanesulfonate	--*	ND	ND
3-Methylcholanthrene	--*	ND	ND
Methyl methanesulfonate	--*	ND	ND
2-Methylnaphthalene	330	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	1600	ND	ND
3-Nitroaniline	1600	ND	ND
4-Nitroaniline	1600	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

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

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

Date Received: August 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082102	88082103
Sample No.:	DANGB3-MW27-SS1	DANGB3-MW27-SS2
Date Sampled:	8-24-88	8-24-88
Time Sampled:	15:38	16:10
Date Extracted:	9-02-88	9-02-88
Date Analyzed:	10-13-88	10-13-88
Percent Moisture:	17	9

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

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

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

Date Received: August 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082102	88082103
Sample No.:	DANGB3-MW27-SS1	DANGB3-MW27-SS2
Date Sampled:	8-24-88	8-24-88
Time Sampled:	15:38	16:10
Date Extracted:	9-02-88	9-02-88
Date Analyzed:	10-13-88	10-13-88
Percent Moisture:	17	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

Date Received: August 25, 1988
Date Reported: December 8, 1988
Work Order: 909
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:	88082104
Sample No.:	DANGB3-MW27-SS3
Date Sampled:	8-24-88
Time Sampled:	16:32
Date Extracted:	12-19-88
Date Analyzed:	1-18-89
Percent Moisture:	8

Compound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
,3-Dichlorobenzene	330	ND
,4-Dichlorobenzene	330	ND
Hexachloroethane	330	ND
is(2-chloroethyl)ether	330	ND
,2-Dichlorobenzene	330	ND
N-Nitrosodimethylamine	330	ND
is(2-chloroisopropyl)ether	330	ND
-Nitrosodi-n-propylamine	330	ND
Hexachlorobutadiene	330	ND
1,2,4-Trichlorobenzene	330	ND
itrobenzene	330	ND
sophorone	330	ND
Naphthalene	330	ND
is(2-chloroethoxy)methane	330	ND
-Chloronaphthalene	330	ND
Hexachlorocyclopentadiene	330	ND
cenaphthylene	330	ND
cenaphthene	330	ND
imethyl phthalate	330	ND
2,6-Dinitrotoluene	330	ND
luorene	330	ND
,4-Dinitrotoluene	330	ND
Diethyl phthalate	330	ND
-Nitrosodiphenylamine	330	ND
exachlorobenzene	330	ND

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

ıte Received: August 25, 1988 Work Order: 909
ıte Reported: December 8, 1988 Job Number: OR001

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

ıb Number: 88082104
ımple No.: DANGB3-MW27-SS3
ıte Sampled: 8-24-88
.me Sampled: 16:32
ıte Extracted: 12-19-88
ıte Analyzed: 1-18-89
ercent Moisture: 8

)mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
ıenanthrene	330	ND
ıthracene	330	ND
ibutyl phthalate	330	ND
luoranthene	330	ND
-Chlorophenyl phenyl ether	330	ND
/rene	330	ND
ıtyl Benzyl phthalate	330	ND
.s(2-ethylhexyl) phthalate	330	630
ırysene	330	ND
-Bromophenyl phenyl ether	330	ND
enzo(a)anthracene	330	ND
.-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
ıdeno(1,2,3-cd)pyrene	330	ND
.benzo(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 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082104
Sample No.:	DANGB3-MW27-SS3
Date Sampled:	8-24-88
Time Sampled:	16:32
Date Extracted:	12-19-88
Date Analyzed:	1-18-89
Percent Moisture:	8

Compound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg
Acetophenone	--*	ND
Aniline	--*	ND
4-Aminobiphenyl	--*	ND
-Chloroaniline	660	ND
-Chloronaphthalene	--*	ND
Dibenzofuran	330	ND
-Dimethylaminoazobenzene	--*	ND
,12-Dimethylbenz(a)anthracene	--*	ND
a-,a-Dimethylphenethylamine	--*	ND
Diphenylamine	--*	ND
,2-Diphenylhydrazine	--*	ND
Ethyl methanesulfonate	--*	ND
3-Methylcholanthrene	--*	ND
ethyl methanesulfonate	--*	ND
-Methylnaphthalene	330	ND
1-Naphthylamine	--*	ND
2-Naphthylamine	--*	ND
-Nitroaniline	1600	ND
3-Nitroaniline	1600	ND
4-Nitroaniline	1600	ND
-Nitroso-di-n-butylamine	--*	ND
-Nitrosopiperidine	--*	ND
Pentachlorobenzene	--*	ND
Pentachloronitrobenzene	--*	ND
Phenacetin	--*	ND
2-Picoline	--*	ND
Pronamide	--*	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

ıte Received: August 25, 1988
ıte Reported: December 8, 1988

Work Order: 909
Job Number: OR001

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

ATTN:Mr. Bill Hayden

ıb Number:	88082104
ımple No.:	DANGB3-MW27-SS3
ıte Sampled:	8-24-88
ıme Sampled:	16:32
ıte Extracted:	12-19-88
ıte Analyzed:	1-18-89
ercent Moisture:	8

›mpound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg
.pha-BHC	--*	ND
ımma-BHC	--*	ND
eta-BHC	660	ND
eptachlor	330	ND
elta-BHC	500	ND
.drin	330	ND
eptachlor epoxide	330	ND
ıdosulfan I	--*	ND
.eldrin	500	ND
.4'-DDE	1000	ND
ıdrin	--*	ND
ıdosulfan II	--*	ND
,4'-DDD	500	ND
,4'-DDT	830	ND
ıdosulfan Sulfate	1000	ND
ıdrin aldehyde	--*	ND
ıdrin Ketone	--*	ND
ılordane	2000	ND
ethoxychlor	--*	ND
oxaphene	2000	ND
oclor-1016	2000	ND
oclor-1221	2000	ND
oclor-1232	2000	ND
oclor-1242	2000	ND
oclor-1248	2000	ND
oclor-1254	2000	ND
oclor-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 25, 1988
Date Reported: December 8, 1988

Work Order: 909
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:	88082104
Sample No.:	DANGB3-MW27-SS3
Date Sampled:	8-24-88
Time Sampled:	16:32
Date Extracted:	12-19-88
Date Analyzed:	1-18-89
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.

CHAIN OF CUSTODY RECORD 908, 909

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

SAMPLER(S): (Signature) J. Ann Sherwin, Linda Fiddy

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	SW	SW	REMARKS
8/24/88	8:10a	DANGB-4-MW24 SS1	1	X								882099 908
8/24/88	8:10a	DANGB-4-MW24 SS1	1				X	X	X			882100
8/24/88	8:20a	DANGB-4-MW24 SS2	1	X								
8/24/88	8:20a	DANGB 4-MW24 SS2	1				X	X	X			
8/24/88	9:30a	DANGB-4-MW24 SS3	1	X								882101
8/24/88	9:30a	DANGB-4-MW24 SS3	1				X	X	X			
8/24/88	3:38	DANGB-3-MW27 SS1	1	X								882102 909
8/24/88	3:38	DANGB-3-MW27 SS1	1		X	X	X	X	X	X	X	
8/24/88	4:10	DANGB-3-MW27 SS2	1	X								882103
8/24/88	4:10	DANGB-3-MW27 SS2	1		X	X	X	X	X	X	X	
8/24/88	4:32	DANGB-3-MW27 SS3	1	X								882104
8/24/88	4:32	DANGB-3-MW27 SS3	1		X	X	X	X	X	X	X	

8821

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. Ann Sherwin	8/24/88 5:30p				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Bill Friedman	8.25.88 10:45	Iced cold & intact

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1233 A 23

MAB

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88082099-88082104
SAMPLE NO(S).: 88082146-88082148
SAMPLE NO(S).: 88082130-88082133

As a result of extreme sample matrix interference, dilution was required for sample analysis. The reporting limit and MDL for the analyte(s) listed have increased as shown:

Analyte	Reporting Limit	MDL
Arsenic	10 mg/Kg	5.0 mg/Kg

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO.: ICP-S-0029-88
SAMPLE NOS.: 88081969-88081976, 88082043-88082049
SAMPLE NOS.: 88082099-88082101, 88082102-88082104
SAMPLE NOS.: 88082130-88082133, 88082146-88082148

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):
88082133, 88082099-88082104
88082146-88082148, 88082130-88082132

QC Report No: ICP-S-0029-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-26-88
Date Reported: 10-13-88
Dilution Factor: NA
%Moisture: 7.8

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	88082133	88082133	9-10-88	9-15-88	6010	<20	43.7	43.9	<1	217	43.7	275	107	
Cadmium	88082133	88082133	9-10-88	9-15-88	6010	<0.5	10.7	10.7	0	5.42	10.7	13.9	59N	A
Chromium	88082133	88082133	9-10-88	9-15-88	6010	<1.0	27.3	30.4	11	21.7	27.3	50.3	106	

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

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):
88082131-88082133, 88082043-88082049
88082100-88082104, 88082146-88082148

1243

QC Report No: AAF-S-0028-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-26-88
Date Reported: 10-13-88
Dilution Factor: See Notes
%Moisture: 7.8

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88082133	88082133	10-06-88	9-23-88	7060	<0.5	<0.5E	<0.5E	NC	4.34	2.71E	4.99E	53	DF=10
Lead	88082133	88082133	10-04-88	9-23-88	7421	<0.5	2.82	3.53	22*	5.42	2.82	8.59	106	DF=NA

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88082102-88082104

QC Report No: CVM-S-0012-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-25-88
Date Reported: 9-21-88
Dilution Factor: NA
%Moisture: 8.3

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	88082097	88082097	9-20-88	9-20-88	245.1	<0.1	<0.1	<0.1	NC	1.09	<0.1	1.21	111	*

1244

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The quality control sample is not a part of this batch.

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.: OCP-S-0030-88
QC REPORT NO.: OCP-S-0030-88B

Percent recovery for some of the matrix spike and duplicate exceed EPA QC guidelines. Analysis of spiked blanks shows the laboratory to be in control.

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

Heptachor epoxide was accidently substituted for Heptachlor in the matrix spiking solution.

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-0047-88
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
88081947	418.1	<100	<100	1150	805	70	805	70	0	*

1246

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

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).:
88082102-88082104
88082130-88082133
88082146-88082148

QC Report No.: OCP-S-0030-88
QC Sample No.: 88082104
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	2190	ND	103	141*	46-127
Heptachlor	2190	ND	109	150*	35-130
Aldrin	2190	ND	118	162*	34-132
Dieldrin	5460	ND	320	176*	31-134
Endrin	5460	ND	286	157*	42-139
4,4'-DDT	5460	ND	299	164*	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	77.3	106	141*	29	50	46-127
Heptachlor	84.4	116	150*	25	31	35-130
Aldrin	99.1	136*	162*	17	43	34-132
Dieldrin	256	141*	176*	22	38	31-134
Endrin	225	124	157*	24	45	42-139
4,4'-DDT	219	120	164*	31	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: 8 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).:
88082102-88082104
88082130-88082133
88082146-88082148

QC Report No.: OCP-S-0030-88B
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	63.0	95	46-127
Heptachlor	2000	ND	67.8	102	35-130
Aldrin	2000	ND	78.6	118	34-132
Dieldrin	5000	ND	190	114	31-134
Endrin	5000	ND	149	89	42-139
4,4'-DDT	5000	ND	187	112	23-134

	MSD Conc. In Extract (ug/Kg)	MSD % Rec. #	MS % Rec. #	% RPD #	QC Limits RPD	QC Limits REC
Lindane	43.5	65	95	37	50	46-127
Heptachlor	58.3	87	102	15	31	35-130
Aldrin	64.9	97	118	19	43	34-132
Dieldrin	171	103	114	11	38	31-134
Endrin	149	89	89	0	45	42-139
4,4'-DDT	154	92	112	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
		Date Reported:	11-11-88
Project:	Duluth ANGB		
Date Extracted:	9-01-88		
Date Analyzed (1):	9-27-88	Date Analyzed (2):	
Time Analyzed (1):	10:21	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
-	88082102	9-27-88		
-	88082103	9-27-88		
-	88082104	9-27-88		
-	88082130	9-27-88		
-	88082131	9-27-88		
-	88082132	9-27-88		
-	88082133	9-27-88		
-	88082146	9-27-88		
-	88082147	9-27-88		
-	88082148	9-27-88		

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).:
88082043-88082049
88082099-88082104
88082130-88082133

1250

QC Report No: VGC-S-0042-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-26-88
Date Prepared: NA
Date Analyzed: 9-07-88
Date Reported: 10-10-88
Dilution Factor: NA
% Moisture: 8.4

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88082130	1,1-dichloroethane	10.9	ND	11.2	103	11.7	107	4	20	58-124
	Trichloroethene	10.9	ND	9.0	83	8.7	80	3	16	75-110
	Chlorobenzene	10.9	ND	9.0	83	9.3	85	3	21	71-125
	Aromatics: 8020									
88082130	Benzene	10.9	ND	9.7	89	9.3	85	4	26	75-123
	Toluene	10.9	0.7	9.8	83	9.7	83	1	16	79-115
	Chlorobenzene	10.9	ND	9.6	88	9.2	84	4	24	82-112

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The QC analysis was performed on the confirmatory column. Therefore, the sample result (SR) value for toluene is not the same as the one appearing on the final result form for the sample.

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: 10-10-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
15	9-01-88	VGC	Carbopack	75-09-2	Dichloromethane	3.6	0.25	88082099-88082104
50	9-03-88	VGC	Carbopack	75-09-2	Dichloromethane	0.6	0.25	88082130-88082133
				67-66-3	Chloroform	0.8	0.05	
				71-55-6	1,1,1-Trichloromethane	1.9	0.03	

1251

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 909
EPA METHOD 8270 ANALYSIS

These samples were first extracted on September 2, 1988, within holing time. They were first analyzed on October 13, 1988, one day out of holding time. Two or more surrogate spike recoveries were outside of EPA QC limits for sample 88082104. This sample was re-extracted and re-analyzed. surrogate spike recoveries in the second analysis met EPA criteria. Results of the second analysis are reported.

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):
88082130-88082133, 88082102-88082104
88082146-88082148

QC Report No: BNA-S-0027-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-20-88
Date Prepared: 08-31-88
Date Analyzed: 09-22-88
Date Reported: 12-13-88
Dilution Factor: NA
%Moisture: 5.5

Laboratory Supervisor Approval:



1253

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88082005	1,2,4-Trichlorobenzene	3550	ND	2090	59	2280	64	9	23	38-107
	Acenaphthene	3550	ND	2470	70	2820	79	13	19	31-137
	2,4-Dinitrotoluene	3550	ND	2430	68	2560	72	5	47	28-89
	Pyrene	3550	ND	2970	84	2720	77	9	36	35-142
	N-Nitroso-di-n-Propylamine	3550	ND	2420	68	2350	66	3	38	41-126
	1,4-Dichlorobenzene	3550	ND	1550	44	1440	41	7	27	28-104
ACID Laboratory Sample # 88082005	Pentachlorophenol	7090	ND	4850	68	6000	85	21	47	17-109
	Phenol	7090	ND	4750	67	5180	73	9	35	26-90
	2-Chlorophenol	7090	ND	4050	57	4580	65	12	50	25-102
	4-Chloro-3-Methylphenol	7090	ND	5130	72	5950	84	15	33	26-103
	4-Nitrophenol	7090	ND	2940	42	3000	42	5	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

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.: 909

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5863	10-13-88	BNA	2	-	None Detected	-	-	88082102-88082104

1254

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.: 909

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0931	1-18-89	BNA	1	-	None Detected	-	-	88082104 REX

1255

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	909
		Matrix: (soil/water)	Soil
		Conc Unit:	ug/KG
Client:	ES Oak Ridge	Lab Sample ID:	Blank
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5863
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-02-88
		Date Analyzed:	10-13-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	14	(SepF/Cont/Conc)	

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.30	200	
-	Unknown	4.43	230	
-	Unknown	4.60	400	
-	Unknown	5.07	14000	
-	Unknown	6.32	630	
-	Unknown	6.36	167	
-	Unknown	6.58	200	
-	Unknown	6.86	400	
-	Unknown	6.92	270	
-	Unknown	7.01	170	
57-10-3	Hexadecanoic Acid	23.99	1100	
-	Unknown	28.71	530	
-	Unknown	35.34	200	
-	Unknown	35.66	15000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	909
		Matrix: (soil/water)	Soil
		Conc Unit:	ug/KG
Client:	ES Oak Ridge	Lab Sample ID:	88082102
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5861
	Suite F-103	Date Received:	08-25-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-02-88
		Date Analyzed:	10-13-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	17
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	17	(SepF/Cont/Conc)	Sonc

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.30	440	
-	Unknown	3.60	360	
-	Unknown	4.33	13000	
-	Unknown	4.40	240	
-	Unknown	4.93	10000	
-	Unknown	5.12	17000	
-	Unknown	6.18	1400	
-	Unknown	6.32	480	
-	Unknown	6.49	440	
-	Unknown	7.16	240	
57-10-3	Hexadecanoic Acid	24.01	2200	B
-	Unknown	28.71	2000	
-	Unknown	29.09	480	
-	Unknown	30.84	1200	
-	Unknown	32.12	520	
-	Unknown	35.34	880	
-	Unknown	35.61	29000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	909
		Matrix: (soil/water)	Soil
		Conc Unit:	ug/KG
Client:	ES Oak Ridge	Lab Sample ID:	88082103
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5862
	Suite F-103	Date Received:	08-25-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-02-88
		Date Analyzed:	10-13-88
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	9
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	14	(SepF/Cont/Conc)	Sonc

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	4.23	370	
-	Unknown	4.64	370	
-	Unknown	5.07	13000	
-	Unknown	6.32	520	
-	Unknown	6.58	180	
-	Unknown	6.86	330	
-	Unknown	6.92	220	
57-10-3	Hexadecanoic Acid	24.00	1800...B	
-	Unknown	28.71	1300	
-	Unknown	29.17	480	
-	Unknown	31.06	920	
-	Unknown	33.17	440	
-	Unknown	35.34	700	
-	Unknown	35.60	25000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	909
		Matrix: (soil/water)	Soil
		Conc Unit:	ug/KG
Client:	ES Oak Ridge	Lab Sample ID:	88092104,2252
Attn:	Bill Hayden		Blank REX
Address:	710 S. Illinois Avenue	Lab File ID:	S0931
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	12-19-88
		Date Analyzed:	01-18-89
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	N
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	14	(SepF/Cont/Conc)	Sonc

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.35	200	
-	Unknown	3.75	300	
-	Unknown	4.11	270	
-	Unknown	4.61	130	
-	Unknown	4.81	170	
-	Unknown	5.00	500	
-	Unknown	5.38	2500	
-	Unknown	5.75	16000	
-	Unknown	6.99	570	
-	Unknown	26.06	7600	
-	Unknown	26.46	230	
-	Unknown	28.79	830	
-	Unknown	29.57	2000	
-	Unknown	34.37	3000	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	909
		Matrix: (soil/water)	Soil
		Conc Unit:	ug/KG
Client:	ES Oak Ridge	Lab Sample ID:	88092104 REX
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0932
	Suite F-103	Date Received:	08-25-88
	Oak Ridge, Tn. 37830	Date Extracted:	12-19-88
		Date Analyzed:	01-18-89
		Date Reported:	04-05-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	8
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	18.	(SepF/Cont/Conc)	Sonc

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.36	220	
-	Unknown	4.32	620	
79-00-5	1,1,2-Trichloroethane	4.40	180	
-	Unknown	4.81	180	
127-18-4	Tetrachloroethene	5.00	180	
-	Unknown	5.33	2600	
-	Unknown	5.71	14000	
-	Unknown	6.98	620	
-	Unknown	23.52	180	
-	Unknown	23.76	260	
-	Unknown	24.91	150	
-	Unknown	26.05	5800	
-	Unknown	26.75	150	
-	Unknown	28.55	150	
-	Unknown	28.77	1100	
-	Unknown	29.57	3200	
-	Unknown	29.83	220	
-	Unknown	34.37	6900	

418.1 INITIAL & CONTINUING CALIBRATION DATA

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

Laboratory Sample No(s).:
88082099-88082101
88082000
88082102-88082104

Calibration Date: 9-19-88
Instrument I.D.: Perkin Elmer 257
Grating Infrared Spectrophotometer

Unit: mg/L
Date Reported: 11-09-88
R= 0.9992

Laboratory Supervisor Approval:

Standard	Concentration	Absorbance	/Continuous RF /Calibration /Verification
No. 1	0.59	0.093	
No. 2	1.2	0.176	RF = 7.39
No. 3	1.8	0.264	
No. 4	2.4	0.335	
Cont. Cal. No. 2 (88082099-88082101) (88082102-88082104)	1.2	0.174	100%
Cont. Cal. No. 2 (88082000)	1.2	0.165	100%

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:	9-27-88	
		To: 9-28-88	Time of Analysis:	03:13	
	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	1.59	292405	Y	4.4
Heptachlor	2.57			312200	2.57	328400	Y	5.2
Aldrin	3.19			259717	3.19	270933	Y	4.3
Hept. Epoxide	3.91			262500	3.91	275917	Y	5.1
Endosulfan I	4.89			240050	4.88	251733	Y	4.9
Dieldrin	5.73			227750	5.72	236067	Y	3.7
4,4'-DDE	5.78			243333				
Endrin	6.40			220663				
Endosulfan II	6.54			259925	6.52	271100	Y	4.3
4,4'-DDD	7.31			171750				
Endo. Sulfate	8.47			147217				
4,4'-DDT	9.65			168892	9.64	184950	Y	9.5
Methoxychlor	14.64			123600	14.62	132320	Y	7.1
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:	9-27-88
		To:	9-28-88	Time of Analysis:	12:14
	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	1.36	328519	Y	4.3
beta-BHC	1.45			151451	1.45	157634	Y	4.1
delta-BHC	1.64			206150	1.64	213150		
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	5.81	265400	Y	9.1
Endrin	6.40			220663	6.43	239683	Y	8.6
Endosulfan II	6.54			259925				
4,4'-DDD	7.31			171750	7.35	185883	Y	8.2
Endo. Sulfate	8.47			147217	8.51	164008	Y	11.4
4,4'-DDT	9.65			168892				
Methoxychlor	14.64			123600				
Endrin Ketone	10.90			275033	10.95	294292	Y	7.0
a. Chlordane	4.99			282450	5.02	299417	Y	6.0
g. Chlordane	4.50			267983	4.51	283233	Y	5.7
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:	9-27-88
	To:	9-28-88	Time of Analysis:	19:57
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	1.59	295637	Y	5.6
Heptachlor	2.57			312200	2.58	332667	Y	6.6
Aldrin	3.19			259717	3.20	275100	Y	5.9
Hept. Epoxide	3.91			262500	3.93	280200	Y	6.7
Endosulfan I	4.89			240050	4.90	255817	Y	6.6
Dieldrin	5.73			227750	5.75	240033		
4,4'-DDE	5.78			243333				
Endrin	6.40			220663				
Endosulfan II	6.54			259925	6.56	275842	Y	6.1
4,4'-DDD	7.31			171750				
Endo. Sulfate	8.47			147217				
4,4'-DDT	9.65			168892	9.68	187000	Y	10.7
Methoxychlor	14.64			123600	14.68	133458	Y	8.0
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.

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-65
Lab File ID: E5863
Matrix: soil
Level (low/med):
Date Analyzed: 10-13-88
Time Analyzed: 12:16
Instrument ID:
Date Reported:

Project: Duluth

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

Sample Number	Lab Sample ID	Lab File ID	Date of Analysis
DANGB-3-MW27-SS1	88082102	E5861	10-13-88
-SS2	88082103	E5862	10-13-88
-SS3	88082104	E5864, S0179	10-13-88, 10-14-88
DANGB-3-MW25-SS1-0-1'	88082146	S0156	10-13-88
-SS2-2-3'	88082147	S0157	10-13-88
-SS3 14-15'	88082148	S0158	10-13-88
DANGB-3-MW35-SS3A	88082130	E5865, S0608	10-13-88, 11-30-88
-SS2	88082131	E5866	10-13-88
-SS1	88082132	E5867, S0259	10-13-88, 10-27-88
-SS3	88082133	E5868, S0609	10-13-88, 11-30-88

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):
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	

1266

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	

1267

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 10/14/88 15:00

Lab ID >T2014::D1 Data Release Authorized By:

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	41.00 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	48.55	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	41.06 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	6.86 OK	
275	10.0 - 30.0% of mass 198	18.39 OK	
365	greater than 1.00% of mass 198	1.79 OK	
441	present, but less than mass 443	6.96 OK	
442	greater than 40.0% of mass 198	51.73 OK	
443	17.0 - 23.0% of mass 442	9.38 OK	(18.14) #2

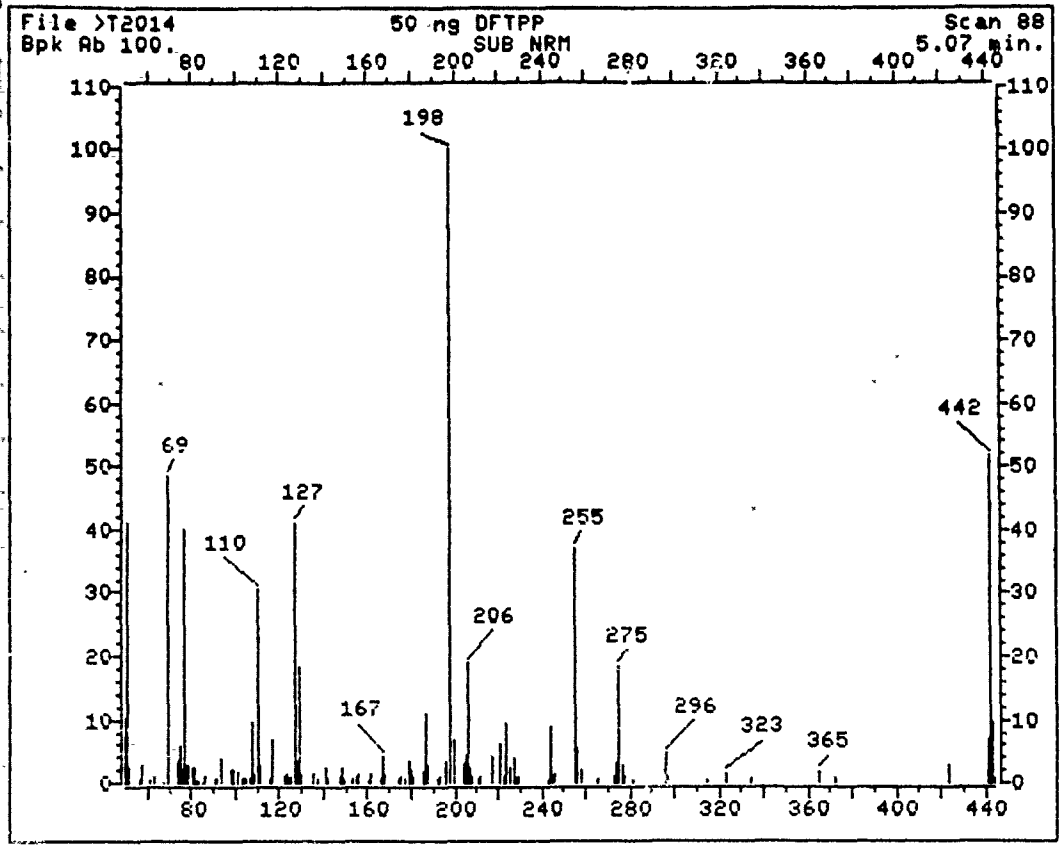
5 point 10/12/88

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	>T2014	10/14/88	15:00
SSTD060	50171		15:26
88082108	50172		16:25
88082109	50173		17:25
88082110	50174		18:25
88082116	50175		19:24
88082117	50176		20:24
88082118	50177		21:23
88082119	50178		22:23
88082104	50179		23:22
88081943	50180	10/15/88	00:22
88081953	50181		01:20
88081955	50182		02:19

another project



File: >T2014 Scan #: 88 Retn. time: 5.07

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
50.10	10.313	93.10	3.788	137.15	.912	192.05	.774	246.20	1.269
51.10	40.996	98.10	2.003	141.15	2.301	193.15	1.210	255.10	36.989
52.10	2.321	99.00	2.043	142.05	.912	196.20	3.431	256.10	5.633
56.20	.714	101.10	1.924	147.05	1.091	198.10	100.000	258.10	2.122
57.10	2.717	103.10	.793	148.05	2.380	199.10	6.862	265.10	.774
61.00	.575	104.10	.754	149.15	.774	204.10	3.114	273.10	1.111
63.10	.992	105.10	.912	153.05	.774	205.20	4.542	274.15	3.173
67.20	.040	106.20	.655	155.15	1.170	206.20	18.941	275.15	18.386
69.10	48.552	107.10	9.619	156.15	1.547	207.20	2.340	276.25	2.678
74.10	3.451	108.10	1.587	160.15	.417	208.10	1.190	277.25	1.230
75.10	5.970	110.10	30.484	161.05	1.448	210.90	.912	281.15	.476
76.20	2.043	111.10	2.955	166.15	.793	211.20	.932	296.15	4.820
77.10	40.024	116.20	.694	167.15	4.165	217.10	4.225	297.15	.754
78.10	2.856	117.10	6.823	168.15	1.488	221.10	6.287	315.15	.536
79.10	2.797	122.15	.952	174.05	.833	223.20	1.150	323.25	1.507
80.10	2.301	123.15	1.527	175.05	1.131	224.10	9.619	334.25	.833
81.10	2.321	124.05	.694	177.15	.893	225.20	2.400	365.20	1.785
82.10	.417	125.15	1.250	179.05	3.372	227.20	3.927	372.20	.793
83.10	.357	127.15	41.055	180.15	2.202	228.00	.674	423.20	2.816
85.10	.119	128.15	3.511	181.15	1.091	229.10	1.150	441.25	6.962
86.10	1.071	129.15	18.425	185.15	1.626	243.10	.555	442.25	51.726
91.10	.595	130.05	1.488	186.15	10.789	244.20	8.885	443.35	9.381
10	.694	135.05	1.567	187.15	2.955	245.10	1.210	444.25	.893

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 10/14/88

Contractor: ENGINEERING-SCIENCE Time: 15:26

Contract No: ---------- Laboratory ID: >S0171

Instrument ID: 1 Initial Calibration Date: 10/27/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.98289	9.00		
2-Fluorophenol	1.15802	1.20381	3.95		
bis(2-Chloroethyl)ether	1.11892	.97746	12.64		
Phenol	1.41657	1.42429	.54	*	
Phenol-d5	1.22488	1.10800	9.54		
Aniline	.54193	1.11476	105.70		
2-Chlorophenol	1.23175	1.22614	.46		
1,3-Dichlorobenzene	1.47535	1.46506	.70		
1,4-Dichlorobenzene	1.40530	1.37162	2.40	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.92283	26.58		
1,2-Dichlorobenzene	1.32240	1.38200	4.51		
2-Methylphenol	1.17367	1.19068	1.45		
3-&-4-Methylphenol	1.07139	1.34308	25.36		
bis(2-chloroisopropyl)Ether	2.15627	2.55853	18.66		
N-Nitroso-Di-n-Propylamine	.84050	.75725	9.90		**
Hexachloroethane	.53840	.53500	.63		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.40695	.95		
Nitrobenzene-d5	.39137	.39965	2.12		
2-Nitrophenol	.24657	.26419	7.15	*	
Isophorone	.74170	.74043	.17		
bis(2-Chloroethoxy)methane	.49386	.50554	2.37		
2,4-Dimethylphenol	.34849	.36396	4.44		
Benzoic Acid	.29725	.29677	.16		
2,4-Dichlorophenol	.56733	.56631	.18	*	
1,2,4-Trichlorobenzene	.36913	.39345	6.59		
Naphthalene	.94589	.88764	6.16		
4-Chloroaniline	.36309	.44804	23.40		
Hexachlorobutadiene	.20283	.22383	10.35	*	
4-Chloro-3-Methylphenol	.31360	.31077	.90	*	
2-Methylnaphthalene	.56397	.56074	.57		

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: 10/14/88

Contractor: ENGINEERING-SCIENCE Time: 15:26

Contract No: ---------- Laboratory ID: >S0171

Instrument ID: 1 Initial Calibration Date: 10/27/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.38097	28.84		**
2,4,6-Trichlorophenol	.42280	.44263	4.69	*	
2,4,5-Trichlorophenol	.52897	.50468	4.59		
2-Fluorobiphenyl	1.27220	1.13645	10.67		
2-Chloronaphthalene	1.23784	1.19790	3.23		
2-Nitroaniline	.47288	.48033	1.58		
Dimethylphthalate	1.40629	1.31578	6.44		
2,6-Dinitrotoluene	.37415	.38125	1.90		
Acenaphthylene	1.68918	1.61616	4.32		
3-Nitroaniline	.44557	.45160	1.35		
2,4-Dinitrophenol	.11898	.07168	39.75		**
Acenaphthene	1.13011	.96225	14.85	*	
Dibenzofuran	1.64131	1.56598	4.59		
2,4-Dinitrotoluene	.28418	.27858	1.97		
-Nitrophenol	.28450	.33327	17.14		**
Fluorene	1.12850	.96261	14.70		
Diethylphthalate	1.20939	1.05239	12.98		
4-Chlorophenyl-phenylether	.59183	.60799	2.73		
4-Nitroaniline	.35956	.43308	20.45		
2,4,6-Tribromophenol	.21023	.23650	12.49		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.48198	19.64	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.22309	4.73		
Hexachlorobenzene	.26273	.27628	5.16		
Pentachlorophenol	.14536	.14918	2.63	*	

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: 10/14/88

Contractor: ENGINEERING-SCIENCE Time: 15:26

Contract No: Laboratory ID: >S0171

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	.98260	5.00		
Anthracene	1.05155	.99533	5.35		
Di-n-Butylphthalate	1.51956	1.44505	4.90		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.11279	6.53	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
ndosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.02530	37.11		
Pyrene	1.56086	1.64562	5.43		
Terphenyl-d14	1.05835	1.15345	8.99		
Butylbenzylphthalate	1.03390	1.02788	.58		
3,3'-Dichlorobenzidine	.13689	.17950	31.12		
Chrysene	.99655	.98427	1.23		
Benzo(a)Anthracene	1.10407	1.12980	2.33		
bis(2-Ethylhexyl)Phthalate	1.21073	1.20998	.06		
Di-n-octylphthalate	3.40275	3.33324	2.04	*	
Benzo(a)Pyrene	1.32098	1.30253	1.40	*	
Benzo(b)Fluoranthene	1.60850	1.67342	4.04		
Indeno(1,2,3-cd)Pyrene	.96800	.98802	2.07		
Dibenzo(a,h)Anthracene	.87481	.89777	2.62		
Benzo(k)Fluoranthene	1.44370	1.29620	10.22		
Benzo(g,h,i)Perylene	.89761	.92840	3.43		

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

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

%Diff - % Difference from original average or curve

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

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

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

Sample No. (Standard): SSTD060 Date Analyzed: 10/14/88

Lab File ID (Standard): S0171 Time Analyzed: 15:26

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	40219	9.26	135714	12.89	78623	18.36
	UPPER LIMIT	80438	9.76	271428	13.39	157246	18.86
	LOWER LIMIT	20110	8.76	67857	12.39	39312	17.86
	EPA SAMPLE NO.						
Scl72 01	88082108	43830	9.25	158896	12.84	89537	18.34
3 02	88082109	43720	9.14	73326	12.71	56529	18.35
4 03	8808 2110	42463	9.26	157919	12.84	84731	18.35
5 04	8808 2116	46077	9.26	150422	12.88	68464	18.43
6 05	8808 2117	48532	9.26	175083	12.86	85225	18.38
7 06	8808 2118	50275	9.26	189987	12.84	102933	18.35
8 07	8808 2119	55017	9.22	79717	12.84	70833	18.34
9 08	8808 2104	44006	9.24	162007	12.83	85811	18.33
Scl8C 09	8808 1923	44176	9.26	157752	12.84	77530	18.33
1 10	8808 1953	46019	9.23	173420	12.82	89001	18.33
2 11	8808 1955	27653	9.01	65961*	12.56	51501	18.33
Scl73 12	8808 1956	44269	9.24	157402	12.84	80337	18.34
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: OR001

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

Sample No.(Standard): SSTD060 Date Analyzed: 10/14/88

Lab File ID (Standard): S0171 Time Analyzed: 15:26

Instrument ID: 1

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	135502	23.00	88793	31.48	51171	37.55
UPPER LIMIT	271004	23.50	177586	31.98	102342	38.05
LOWER LIMIT	67751	22.50	44397	30.98	25586	37.05
EPA SAMPLE NO.						
01 8808 2108	140732	23.00	97331	31.45	46091	37.52
02 8808 2109	109571	23.01	61812	31.50	27608	37.66
03 8808 2110	134970	22.99	85559	31.45	40929	37.53
04 8808 2116	106813	23.08	61311	31.46	54290	37.56
05 8808 2117	129745	23.02	93030	31.46	49755	37.56
06 8808 2118	153828	23.00	92070	31.45	50277	37.53
07 8808 2119	136914	23.00	90753	31.45	47047	37.54
08 8808 2104	126442	22.98	68603	31.43	36363	37.51
09 8808 1943	124690	22.98	72052	31.43	4089 *	37.51
10 8808 1953	137601	22.99	76956	31.43	20989 *	37.51
11 8808 1955	126279	22.98	76363	31.44	30544	37.52
12 8808 1956	120843	22.98	70245	31.43	32678	37.51
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 standard area.
LOWER LIMIT = - 50% of internal standard area.

Column used to flag internal standard area values with an asterisk

GC/MS TUNING AND MASS CALIBRATION

- Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/13/88 ~~7:30~~ - wrong time at log in : 7:30AM

Lab ID >D1013::01 Data Release Authorized By: Dawn Kuck

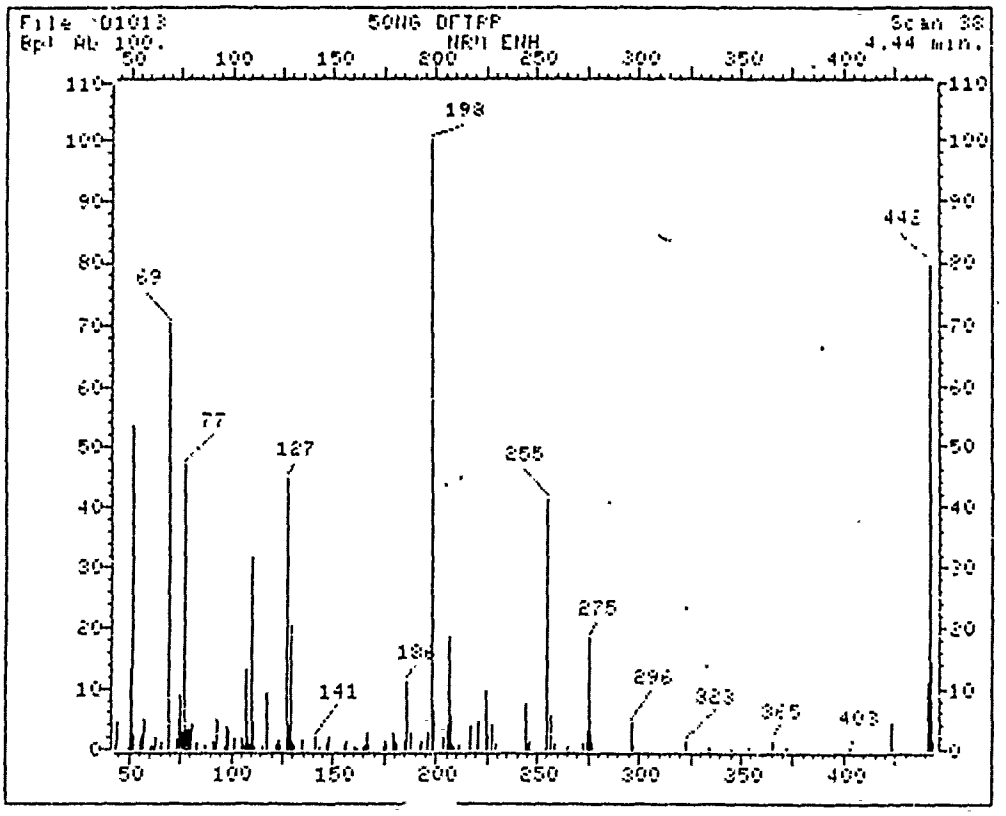
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	53.36 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	70.22	
70	less than 2.0% of mass 69	0.00 OK	(0.00) #1
127	40.0 - 60.0% of mass 198	44.75 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.18 OK	
275	10.0 - 30.0% of mass 199	18.18 OK	
365	greater than 1.00% of mass 198	1.60 OK	
441	present, but less than mass 443	10.99 OK	
442	greater than 40.0% of mass 198	79.52 OK	
443	17.0 - 23.0% of mass 442	14.24 OK	(17.91) #2

5 point
10/12/88

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

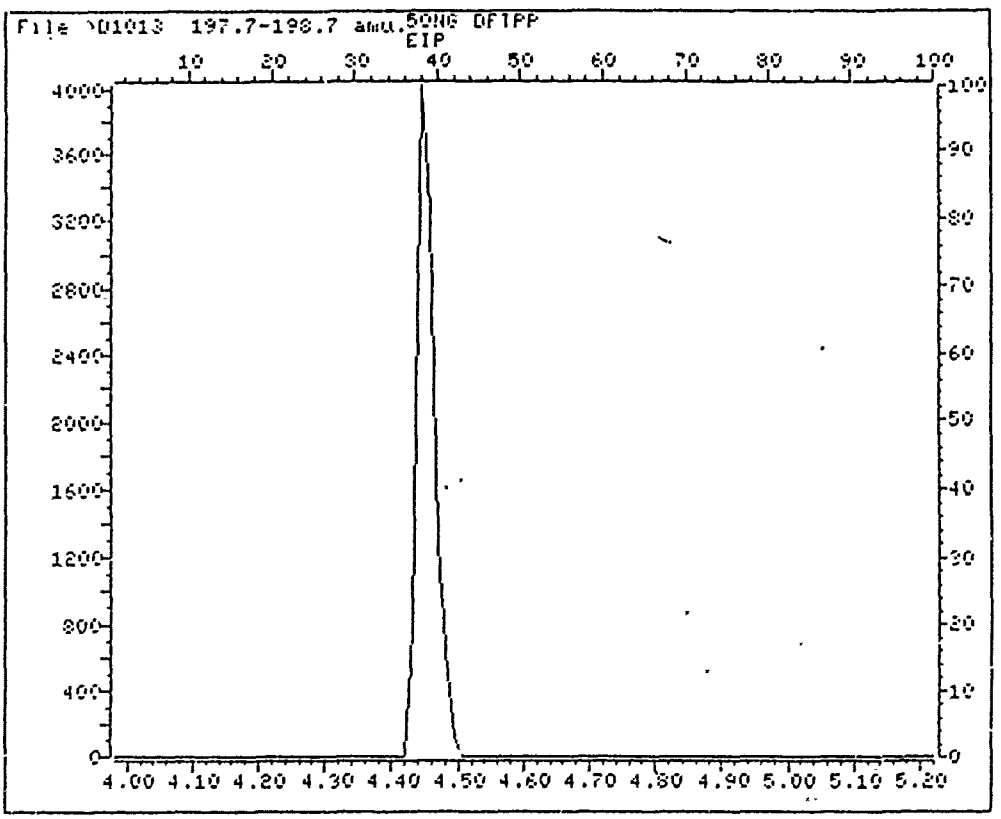
#1 - Value in parenthesis is % mass 69.
#2 - Value in parenthesis is % mass 442.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
SDNS DFTPP	>D1013	10/13/88	~~7:30~~	
60ng/L	>E5860		9:00	
88082102	>E5861		10:09	another project
88082102	>E5862		10:13	
2130-33 BLANK → SETBLK	>E5863		12:16	-SS out, use another project
88082104	>E5864		13:12	
88082130	>E5865		14:07	SS out, use RA 50608
88082131	>E5866		15:30	use
88082132	>E5867		16:25	SS out, use
88082133	>E5868		17:21	SS out, use RA 50609
88082097	>E5869		18:16	another project
88082098	>E5870		19:11	



File: >01013 Scan #: 38 Retn. time: 4.44

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.00	.894	87.05	.683	130.95	.844	196.00	2.880	258.00	1.068
44.00	4.382	91.05	1.539	134.95	1.601	197.90	100.000	265.00	.435
49.00	.509	92.05	1.006	140.95	2.110	198.90	6.182	272.90	.968
50.00	13.395	92.90	4.693	142.95	.310	203.85	2.222	274.30	3.091
51.00	53.356	97.00	.559	146.95	1.068	204.95	4.233	275.00	18.175
52.10	2.545	97.90	3.836	147.95	1.949	205.95	18.262	275.90	2.632
55.00	1.726	98.90	3.116	154.95	.894	206.95	5.649	276.95	1.179
55.95	2.458	101.00	1.887	156.05	1.539	207.95	.894	282.85	.211
57.05	4.916	105.00	1.726	159.85	.521	208.85	.546	295.95	4.358
59.85	.223	106.00	.397	161.05	.571	210.85	.646	296.95	.596
61.05	.795	107.00	13.023	161.65	.186	214.75	.137	323.00	1.366
61.95	.422	108.00	2.024	164.85	.459	216.95	3.973	333.90	.497
62.95	1.986	108.90	.720	165.95	.646	220.95	4.395	334.90	.174
65.05	.968	110.00	31.484	167.00	2.781	223.95	9.385	345.70	.161
68.95	70.217	111.00	4.569	167.90	.770	224.95	2.396	351.95	.261
72.95	1.788	111.90	.323	174.00	.422	226.95	4.221	353.95	.261
74.05	4.867	116.00	.646	174.90	1.378	228.95	1.130	364.95	1.601
74.95	8.876	117.00	8.740	175.90	.658	241.00	7.474	371.85	.410
76.05	2.682	117.90	.832	178.90	2.682	245.00	.869	382.85	.137
77.35	46.940	121.90	.881	179.90	1.577	245.90	1.316	402.90	.273
78.05	3.153	123.00	1.366	181.00	1.055	246.70	.137	423.00	4.358
78.95	3.625	123.90	.732	185.00	1.328	248.90	.211	422.95	.397
79.95	3.253	127.00	44.755	186.00	10.962	253.90	.161	440.95	10.967
80.95	4.221	128.00	3.712	187.00	2.843	254.10	.174	441.95	79.516
82.05	1.167	129.00	20.509	191.90	.732	254.90	11.006	442.95	14.240
83.05	.981	129.95	1.428	193.00	1.304	256.00	5.649	443.95	1.291


File D1013 197.7-198.7 amu.50NG DFTPP
EIP
10 20 30 40 50 60 70 80 90 100
4000 3600 3200 2800 2400 2000 1600 1200 800 400 0
100 90 80 70 60 50 40 30 20 10 0
4.00 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: 0 625 ACID AND BASE/NEUTRALS + EtPHENOL,UNSEt62-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File: CE5860
Injection Time: 881013 05:2:

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	1.24043	1.26231	1.76	Average	
2-Fluorophenol	1.41912	1.49459	5.32	Average	
bis(2-Chloroethyl)ether	1.41737	1.40795	.66	Average	
Phenol	1.78209	1.83917	3.20	Average	
Phenol-d5	1.35470	1.57691	16.33	Average	
Aniline	.74553	1.76309	137.16	Average	
2-Chlorophenol	1.32089	1.36756	3.53	Average	
1,3-Dichlorobenzene	1.51101	1.51989	.59	Average	
1,4-Dichlorobenzene	1.51574	1.53906	1.54	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.5c944	.50171	11.89	Average	
1,2-Dichlorobenzene	1.45179	1.47231	2.83	Average	
2-Methylphenol	1.42392	1.52548	7.13	Average	
3-&-4-Methylphenol	1.58423	1.60270	13.79	Average	(Conc=60.00)
bis(2-chloroisopropyl Ether	2.35723	2.34305	.60	Average	
N-Nitroso-Di-n-Propylamine	1.13410	1.30636	15.19	Average	
Hexachloroethane	.70056	.68778	1.82	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.56683	.63021	11.18	Average	
Nitrobenzene-d5	.49938	.52664	5.46	Average	
2-Nitrophenol	.22040	.24874	12.86	Average	
Isophorone	.87207	.94683	8.57	Average	
bis(2-Chloroethoxy)methane	.58240	.58854	1.11	Average	
2,4-Dimethylphenol	.40862	.43310	5.99	Average	
Benzoic Acid	.29595	.33789	14.17	Average	
2,4-Dichlorophenol	.53135	.57327	7.89	Average	
1,2,4-Trichlorobenzene	.31739	.32059	1.01	Average	
Naphthalene	.98196	.96919	1.40	Average	
4-Chloroaniline	.33116	.41349	24.86	Average	
Hexachlorobutadiene	.19552	.18764	.60	Average	
4-Chloro-3-methylphenol	28631	.32925	15.00	Average	
2-Methylnaphthalene	.54428	.55630	2.13	Average	
Hexachlorocyclopentadiene	.32289	.41355	24.23	Average	
2,4,6-Trichlorophenol	.35295	.36877	14.19	Average	
2,4,5-Trichlorophenol	.47539	.49651	.23	Average	
2-Fluorobiphenyl	1.26699	1.27749	.83	Average	
2-Chloronaphthalene	1.24693	1.24262	.31	Average	
2-Nitroaniline	.63129	.68419	8.37	Average	
Dimethylphthalate	1.35033	1.35557	1.90	Average	
2,6-Dinitrotoluene	.31816	.34914	9.74	Average	

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

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

%Diff - % Difference from original average or curve

Calibration Check Report

Title: L o25 ACID AND BASE/NEUTRALS + EtPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File: >E5869
Injection Time: 881013 05:26

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.65620	1.67293	.89	Average
3-Nitroaniline	.63702	.68200	7.06	Average
2,4-Dinitrophenol	.06753	.06932	20.50	Average
Acenaphthene	1.12644	1.09123	3.13	Average
Dibenzofuran	1.50204	1.49059	.76	Average
2,4-Dinitrotoluene	32099	.36078	12.39	Average
4-Nitrophenol	.18425	.17220	6.54	Average
Fluorene	1.09332	1.12833	3.20	Average
Diethylphthalate	1.32354	1.41247	6.72	Average
4-Chlorophenyl-phenylether	.48214	.51535	6.89	Average
4-Nitroaniline	.27495	.26428	3.88	Average
2,4,6-Tribromophenol	.14218	.16196	13.91	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
4-Nitrodiphenylamine	.44965	.54728	21.66	Average
4,6-Dinitro-2-Methylphenol	.08606	-	-	Average
4-Bromophenyl-phenylether	.22979	.25340	10.28	Average
Hexachlorobenzene	.28768	.31813	10.58	Average
Pentachlorophenol	.11390	.11141	2.19	Average
Phenanthrene	1.07960	1.13452	5.09	Average
Anthracene	1.13334	1.20079	5.95	Average
Di-n-Butylphthalate	1.71746	1.74039	1.34	Average
4,4'-Dibromobiphenyl	-	-	-	Average
Fluoranthene	1.17568	1.12146	4.61	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

Calibration Check Report

Title: 8 625 ACID AND BASE/NEUTRALS + EtPHENOL,DMSOP&2-NO2-4-METH
Calibrated: 881013 04:51

Check Standard Data File: >E5865
Injection Time: 881013 05:26

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.03775	.01391	63.16	Average
Pyrene	1.65647	1.76261	6.41	Average
Terphenyl-d14	1.09647	1.21572	10.88	Average
Butylbenzylphthalate	1.15097	1.21312	5.40	Average
3,3'-Dichlorobenzidine	.12990	.10034	22.75	Average
Chrysene	1.01423	1.02738	-1.30	Average
Benzo(a)Anthracene	1.09006	1.09927	.75	Average
bis(2-Ethylhexyl)Phthalate	1.34247	1.34465	.16	Average
Di-n-octylphthalate	3.72331	4.16529	11.87	Average
Benzo(a)Pyrene	1.27071	1.26964	.79	Average
Benzo(b)fluoranthene	1.48902	1.33380	10.42	Average
Indeno(1,2,3-cd)Pyrene	.82543	.77357	6.28	Average
Dibenzo(a,h)Anthracene	.78966	.82483	4.45	Average
Benzo(k)fluoranthene	1.51900	1.53913	1.33	Average
Benzo(g,h,i)Perylene	.74180	.71520	4.10	Average

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

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

%Diff - % Difference from original average or curve

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	70849	21.71	42667	30.08	21497	35.11
UPPER LIMIT	141698		85334		42994	
LOWER LIMIT	35425		21333		10748	
EPA SAMPLE NO.						
01 BLANK	86007	21.70	40482	30.07	20248	35.13
02 8808230	78134	21.71	38506	30.07	19174	35.10
03 2131	99875	21.70	49462	30.07	22453	35.11
04 2132	45305	21.70	21234*	30.08	8668*	35.13
05 2133	92365	21.74	44564	30.10	20505	35.16
06 ~~2092~~	~~73166~~	~~21.72~~	~~34876~~	~~30.07~~	~~15855~~	~~35.12~~
07 ~~2098~~	~~40877~~	~~21.71~~	~~37111~~	~~30.07~~	~~25439~~	~~35.12~~
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

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	37104	8.19	121656	11.72	54780	17.13
UPPER LIMIT	74208		243312		109560	
LOWER LIMIT	18552		60828		27390	
EPA SAMPLE NO.						
01 BLANK	46175	8.18	96544	11.70	56723	17.11
02 8708130	36629	8.17	125293	11.69	57107	17.10
03 2131	47155	8.19	169113	11.69	77849	17.11
04 2132	22669	8.19	76200	11.70	34390	17.11
05 2133	43292	8.21	151519	11.71	69803	17.14
06 2097	33253	8.19	114731	11.70	50377	17.12
07 2098	44127	8.19	176569	11.69	81222	17.12
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

DATA PACKAGE #20

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ENGINEERING-SCIENCE, INC.

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

Job No.: OR001

Work Order No.: 988

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 9-15-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092422	DANGB-4-MW10-GW-1	BA-I	9-14-88		10-20-88	
88092422	DANGB-4-MW10-GW-1	CD-F	9-14-88		10-24-88	
88092422	DANGB-4-MW10-GW-1	CR-F	9-14-88		11-01-88	
88092422	DANGB-4-MW10-GW-1	PB-F	9-14-88		10-26-88	
88092422	DANGB-4-MW10-GW-1	418.1	9-14-88	9-28-88	10-05-88	
88092422	DANGB-4-MW10-GW-1	8010	9-14-88		9-21-88	9-26-88
88092422	DANGB-4-MW10-GW-1	8020	9-14-88		9-21-88	
88092423	DANGB-3-MW25-GW-1	AS-F	9-14-88		10-26-88	
88092423	DANGB-3-MW25-GW-1	BA-I	9-14-88		10-20-88	
88092423	DANGB-3-MW25-GW-1	CD-F	9-14-88		10-24-88	
88092423	DANGB-3-MW25-GW-1	CR-F	9-14-88		11-01-88	
88092423	DANGB-3-MW25-GW-1	HG-C	9-14-88		10-07-88	
88092423	DANGB-3-MW25-GW-1	PB-F	9-14-88		10-26-88	
88092423	DANGB-3-MW25-GW-1	418.1	9-14-88	9-28-88	10-05-88	
88092423	DANGB-3-MW25-GW-1	8010	9-14-88		9-21-88	9-20-88
88092423	DANGB-3-MW25-GW-1	8020	9-14-88		9-21-88	
88092423	DANGB-3-MW25-GW-1	8080	9-14-88	9-19-88	10-16-88	
88092423	DANGB-3-MW25-GW-1	8270	9-14-88	9-19-88	11-29-88	
88092424	DANGB-4-MW11-GW-1	BA-I	9-14-88		10-20-88	
88092424	DANGB-4-MW11-GW-1	CD-F	9-14-88		10-24-88	
88092424	DANGB-4-MW11-GW-1	CR-F	9-14-88		11-01-88	
88092424	DANGB-4-MW11-GW-1	PB-F	9-14-88		10-26-88	
88092424	DANGB-4-MW11-GW-1	418.1	9-14-88	9-28-88	10-05-88	
88092424	DANGB-4-MW11-GW-1	8010	9-14-88		9-21-88	9-20-88
88092424	DANGB-4-MW11-GW-1	8020	9-14-88		9-21-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

Job No.: OR001

Work Order No.: 988

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38092425	DANGB-BR6	AS-F	9-14-88		10-26-88	
38092425	DANGB-BR6	BA-I	9-14-88		10-20-88	
38092425	DANGB-BR6	CD-F	9-14-88		10-24-88	
38092425	DANGB-BR6	CR-F	9-14-88		11-01-88	
38092425	DANGB-BR6	HG-C	9-14-88		10-07-88	
38092425	DANGB-BR6	PB-F	9-14-88		10-26-88	
38092425	DANGB-BR6	418.1	9-14-88	9-28-88	10-05-88	
38092425	DANGB-BR6	8010	9-14-88		9-21-88	9-20-88
38092425	DANGB-BR6	8020	9-14-88		9-21-88	
38092425	DANGB-BR6	8080	9-14-88	9-19-88	10-16-88	
38092425	DANGB-BR6	8270	9-14-88	9-19-88	10-28-88	
38092426	DANGB-3-MW26-GW-1	AS-F	9-14-88		10-26-88	
38092426	DANGB-3-MW26-GW-1	BA-I	9-14-88		10-20-88	
38092426	DANGB-3-MW26-GW-1	CD-F	9-14-88		10-24-88	
38092426	DANGB-3-MW26-GW-1	CR-F	9-14-88		11-01-88	
38092426	DANGB-3-MW26-GW-1	HG-C	9-14-88		10-07-88	
38092426	DANGB-3-MW26-GW-1	PB-F	9-14-88		10-26-88	
38092426	DANGB-3-MW26-GW-1	418.1	9-14-88	9-28-88	10-05-88	
38092426	DANGB-3-MW26-GW-1	8010	9-14-88		9-21-88	9-20-88
38092426	DANGB-3-MW26-GW-1	8020	9-14-88		9-21-88	
38092426	DANGB-3-MW26-GW-1	8080	9-14-88	9-19-88	10-16-88	
38092426	DANGB-3-MW26-GW-1	8270	9-14-88	9-19-88	10-28/11-29-88	
38092427	DANGB-3-MW53-GW-1	AS-F	9-14-88		10-26-88	
38092427	DANGB-3-MW53-GW-1	BA-I	9-14-88		10-20-88	
38092427	DANGB-3-MW53-GW-1	CD-F	9-14-88		10-24-88	
38092427	DANGB-3-MW53-GW-1	CR-F	9-14-88		11-01-88	
38092427	DANGB-3-MW53-GW-1	HG-C	9-14-88		10-07-88	
38092427	DANGB-3-MW53-GW-1	PB-F	9-14-88		10-26-88	
38092427	DANGB-3-MW53-GW-1	418.1	9-14-88	9-28-88	10-05-88	
38092427	DANGB-3-MW53-GW-1	8010	9-14-88		9-21-88	9-20-88
38092427	DANGB-3-MW53-GW-1	8020	9-14-88		9-21-88	
38092427	DANGB-3-MW53-GW-1	8080	9-14-88	9-19-88	10-15-88	
38092427	DANGB-3-MW53-GW-1	8270	9-14-88	9-19-88	11-23-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092422-88092427
WORK ORDER NO.: 988

These water samples were received at the ES Berkeley Laboratory on 9-15-88. They were received cold and intact.

ANALYSIS REPORT

RK ORDER NUMBER: 988
B NUMBER : ZB0000000440
RK ORDER DATE : 09/16/88

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: 2, UNITS: mg/L

ST COMPOUND	DANGB-4-MW10-GW-1 88092422	DANGB-3-MW25-GW-1 88092423	DANGB-4-MW11-GW-1 88092424	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
ID DIG FLAME	NA	NA	NA	NA	NA	NA
ID DIG FURNACE	NA	NA	NA	NA	NA	NA
SENIC		<0.005 N		<0.005 N	<0.005 N	<0.005 W,N
RIUM	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
DMIUM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ROMIUM	0.0022 B,W	<0.002	<0.002 W	<0.002W	<0.002W	<0.002W
RCURY		<.0002		<.0002	<.0002	<.0002
AD	<0.005W	<0.005	<0.005	<0.005	<0.005	<0.005

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 988
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/16/88

APPROVED BY
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-4-MW10-GW-1 88092422	DANGB-3-MW25-GW-1 88092423	DANGB-4-MW11-GW-1 88092424	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
18.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 988
3 NUMBER : ZB0000000440
RK ORDER DATE : 09/16/88

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/L, GROUP 8010

ST COMPOUND	DANGB-4-MW10-GW-1 88092422	DANGB-3-MW25-GW-1 88092423	DANGB-4-MW11-GW-1 88092424	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
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	ND	ND	ND	0.87	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	4.8	ND	ND	ND	ND
2-DICHLOROETHANE	ND	1.9	ND	ND	ND	ND
1-DICHLOROETHYLENE	ND	5.4	ND	ND	ND	ND
ANS-1,2-DICHLOROETHYLENE	ND	100	ND	ND	ND	ND
CHLOROMETHANE	0.40B	1.6B	0.37B	1.7B	0.93B	0.35B
2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 988

TEST COMPOUND	DANGB-4-MW10-GW-1 88092422	DANGB-3-MW25-GW-1 88092423	DANGB-4-MW11-GW-1 88092424	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
1,3-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
1,1,1-TRICHLOROETHANE	ND	3.5	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
ICHLOROETHYLENE	ND	790	ND	ND	0.76	0.91
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

RK ORDER NUMBER: 988
3 NUMBER : ZB0000000440
RK ORDER DATE : 09/16/88

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/L, GROUP 8020

ST COMPOUND	DANGB-4-MW10-GW-1 88092422	DANGB-3-MW25-GW-1 88092423	DANGB-4-MW11-GW-1 88092424	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
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

ORK ORDER NUMBER: 988
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/16/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

EST COMPOUND	DANGB-3-MW25-GW-1 88092423	DANGB-BR6 88092425	DANGB-3-MW26-GW-1 88092426	DANGB-3-MW53-GW-1 88092427
LDRIN	ND	ND	ND	ND
LPHA-BHC	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND
AMMA-BHC	ND	ND	ND	ND
HLORDANE	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND
,4'-DDT	ND	ND	ND	ND
IELDRIN	ND	ND	ND	ND
ENDOSULFAN I	ND	ND	ND	ND
NDOSULFAN II	ND	ND	ND	ND
NDOSULFAN SULFATE	ND	ND	ND	ND
NDRIN	ND	ND	ND	ND
ENDRIN ALDEHYDE	NA	NA	NA	NA
EPTACHLOR	ND	ND	ND	ND
EPTACHLOR EPOXIDE	ND	ND	ND	ND
KEPONE	ND	ND	ND	ND
METHOXYCHLOR	ND	ND	ND	ND
OXAPHENE	ND	ND	ND	ND
CB-1016	ND	ND	ND	ND
PCB-1221	ND	ND	ND	ND
CB-1232	ND	ND	ND	ND
CB-1242	ND	ND	ND	ND
CB-1248	ND	ND	ND	ND
PCB-1254	ND	ND	ND	ND
CB-1260	ND	ND	ND	ND

ND - Not Detected

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

ate Received: September 15, 1988
ate Reported: December 8, 1988

Work Order: 988
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88092423	88092425
ample No.:	DANGB-3-MW25-GW1	DANGB-BR6
ate Sampled:	09-14-88	09-14-88
ime Sampled:	10:15	08:15
ate Extracted:	09-19-88	09-19-88
ate Analyzed:	11-29-88	10-28-88

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

= Compound was detected in the blank.

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

Date Received: September 15, 1988 Work Order: 988
Date Reported: December 8, 1988 Job Number: OR001

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

Lab Number:	88092423	88092425
Sample No.:	DANGB-3-MW25-GW1	DANGB-BR6
Date Sampled:	09-14-88	09-14-88
Time Sampled:	10:15	08:15
Date Extracted:	09-19-88	09-19-88
Date Analyzed:	11-29-88	10-28-88

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

B = Compound was detected in the blank.

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

ate Received: September 15, 1988 Work Order: 988
ate Reported: December 8, 1988 Job Number: OR001

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

ab Number:	88092423	88092425
ample No.:	DANGB-3-MW25-GW1	DANGB-BR6
ate Sampled:	09-14-88	09-14-88
ime Sampled:	10:15	08:15
ate Extracted:	09-19-88	09-19-88
ate Analyzed:	11-29-88	10-28-88

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

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

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

Date Received: September 15, 1988 Work Order: 988
Date Reported: December 8, 1988 Job Number: OR001

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

Lab Number:	88092423	88092425
Sample No.:	DANGB-3-MW25-GW1	DANGB-BR6
Date Sampled:	09-14-88	09-14-88
Time Sampled:	10:15	08:15
Date Extracted:	09-19-88	09-19-88
Date Analyzed:	11-29-88	10-28-88

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

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

B = Compound was detected in the blank.

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

ate Received: September 15, 1988
ate Reported: December 8, 1988

Work Order: 988
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88092423	88092425
ample No.:	DANGB-3-MW25-GW1	DANGB-BR6
ate Sampled:	09-14-88	09-14-88
ime Sampled:	10:15	08:15
ate Extracted:	09-19-88	09-19-88
ate Analyzed:	11-29-88	10-28-88

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

Analyst

Laboratory Supervisor

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

)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: Water

Date Received: September 15, 1988
Date Reported: December 8, 1988

Work Order: 988
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88092426	8092427
Sample No.:	DANGB-3-MW26-GW1	DANGB-3-MW53-GW1
Date Sampled:	09-14-88	09-14-88
Time Sampled:	16:00	16:30
Date Extracted:	09-19-88	09-19-88
Date Analyzed:	10-28-88/11-29-88	11-23-88

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

B = Compound was detected in the blank.

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

ate Received: September 15, 1988
ate Reported: December 8, 1988

Work Order: 988
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88092426	88092427
ample No.:	DANGB-3-MW26-GW1	DANGB-3-MW53-GW1
ate Sampled:	09-14-88	09-14-88
ime Sampled:	16:00	16:30
ate Extracted:	09-19-88	09-19-88
ate Analyzed:	10-28-88/11-29-88	11-23-88

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

= Compound was detected in the blank.

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

Date Received: September 15, 1988 Work Order: 988
Date Reported: December 8, 1988 Job Number: OR001

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

Lab Number:	88092426	88092427
Sample No.:	DANGB-3-MW26-GW1	DANGB-3-MW53-GW1
Date Sampled:	09-14-88	09-14-88
Time Sampled:	16:00	16:30
Date Extracted:	09-19-88	09-19-88
Date Analyzed:	10-28-88/11-29-88	11-23-88

Compound	Detection Limits ug/L	Analytical Results ug/L	ug/L
Acetophenone	--*	ND	ND
Aniline	--*	ND	ND
4-Aminobiphenyl	--*	ND	ND
4-Chloroaniline	20	ND	ND
1-Chloronaphthalene	--*	ND	ND
Dibenzofuran	10	ND	ND
p-Dimethylaminoazobenzene	--*	ND	ND
7,12-Dimethylbenz(a)anthracene	--*	ND	ND
a- a-Dimethylphenethylamine	--*	ND	ND
nylamine	--*	ND	ND
phenylhydrazine	--*	ND	ND
E methanesulfonate	--*	ND	ND
3- anthrene	--*	ND	ND
Me... sulfonate	--*	ND	ND
2-Met... alene	10	ND	ND
1-Naphthylamine	--*	ND	ND
2-Naphthylamine	--*	ND	ND
2-Nitroaniline	50	ND	ND
3-Nitroaniline	50	ND	ND
4-Nitroaniline	50	ND	ND
N-Nitroso-di-n-butylamine	--*	ND	ND
N-Nitrosopiperidine	--*	ND	ND
Pentachlorobenzene	--*	ND	ND
Pentachloronitrobenzene	--*	ND	ND
Phenacetin	--*	ND	ND
2-Picoline	--*	ND	ND
Pronamide	--*	ND	ND
1,2,4,5-Tetrachlorobenzene	--*	ND	ND

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

B = Compound was detected in the blank.

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

ate Received: September 15, 1988 Work Order: 988
ate Reported: December 8, 1988 Job Number: OR001

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

ab Number:	88092426	88092427
ample No.:	DANGB-3-MW26-GW1	DANGB-3-MW53-GW1
ate Sampled:	09-14-88	09-14-88
ime Sampled:	16:00	16:30
ate Extracted:	09-19-88	09-19-88
ate Analyzed:	10-28-88/11-29-88	11-23-88

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

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

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

Date Received: September 15, 1988
Date Reported: December 8, 1988

Work Order: 988
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88092426	88092427
Sample No.:	DANGB-3-MW26-GW1	DANGB-3-MW53-GW1
Date Sampled:	09-14-88	09-14-88
Time Sampled:	16:00	16:30
Date Extracted:	09-19-88	09-19-88
Date Analyzed:	10-28-88/11-29-88	11-23-88

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

Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

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

ENGINEERING-SCIENCE

988

CHAIN OF CUSTODY RECORD

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470 7/7L	SW9310, 9315	SM429	REMARKS
9-14-88	1015	DANGB-4-MW10-GW-1	4				X	X	X			Do not analyze for 9060 and 7470.
9-14-88	1506	DANGB-3-MW25-GW-1	8		X	X	X	X	X			882423

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert L. Dan	9-14-88 1800	Fed Ex Airbill # 949031 4153			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathy Carter A	9-15-88 16:00	Samples were received cold + intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1304

ENGINEERING-SCIENCE

988

CHAIN OF CUSTODY RECORD

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470 7191	SW9310, 9315	SM428	REMARKS
9-14-88	0845	DANGB-A-MW11-GW-1	4				X	X	X			882424 Do not analyze SW7470 and SW7060.
9-14-88	0815	DANGB-BRG	8		X	X	X	X	X			882425

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-14-88 1500	Fed Ex Airbill # 949031415 3			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
			9-15-88 16:17	Samples received cold & intact

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1805

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

988

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

SAMPLER(S): (Signature) Kathy L Davi

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470, 7191	SW9310, 9315	SM429	REMARKS
9-14-88	0815	DANGB-1BR6	5	X								882425
9-14-88	0845	DANGB-4-MW11-GW-1	5	X								882424
9-14-88	1015	DANGB-4-MW10-GW-1	5	X								882422
9-14-88	1500	DANGB-3-MW25-GW-1	5	X								882423
9-14-88	1600	DANGB-3-MW26-GW-1	7	X			X	X				882426
9-14-88	1650	DANGB-3-MW53-GW-1	7	X			X	X				882427

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kathy L. Davi	9-14-88 1800	Fed Ex Airbill # 4490314153			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Rita Kattler	9/15/88/1040	samples received cold + intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

9031 1506

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

998

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	SM423	REMARKS
9-14-88	1600	DANGB-3-MW25-GW-1	6		X	X	X					882426
9-14-88	1630	DANGB-3-MW53-GW-1	6		X	X	X					882427
		[illegible]				X						

1307

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	9-14-88 1800	FedEx Airbill # 949031 4153			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[signature]	9/15/88 14:00	COLD, INTACT

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

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Street Address: 710 S. Illinois Ave

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

2 To (Recipient's Name) Please Print: [illegible] | Recipient's Phone Number (Very Important): (415) 74[illegible]

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8081

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.

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	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery 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	

1310

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

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092348-88092350, 88092354-88092355
88092388-88092390, 88092422-88092427, 88082189

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	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	

13111

A - See Case Narrative attached.

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

QUALITY CONTROL RESULTS SUMMARY
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):
88092423, 88092425-88092427, 88092433
88092357-88092359, 88092397-88092400
88092416-88092417, 88092454-88092457

QC Report No: CVM-W-0016-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-16-88
Date Reported: 1[illegible]-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	Spike Recovery PR	Notes
Mercury	88092423	88092423	10-07-88	10-07-88	245.1	<0.0002	<0.0002	<0.0002	NC	0.002	<0.0002	0.002	100	

1312

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092423-88092427, 88092433
88092509-88092511, 88092513, 88092515-88092516
88092346, 88092348, 88092350, 88092494-88092495

QC Report No: TPH-W-0070-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-05-88
Date Analyzed: 11-01-88
Date Reported: 11-15-88
Dilution Factor: NA

Laboratory Supervisor Approval:

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

1313

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

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

NA = Not Applicable
NC = Not Calculated
ND = Not Detected
MS = Spike Sample
MSD = Spike Duplicate
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):
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

1314

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.
15	9-21-88	VGC	Carbopack	75-09-2	Dichloromethane	5.3	0.25	88092422-88092427

1315

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 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 NGB

QC Report No.: OCP-W-0034-88
QC Sample No.: 88092306
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

1317

88-AI-DULU07/57.1

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, 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

1318

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:	9-19-88		
Date Analyzed (1):	10-15-88	Date Analyzed (2):	
Time Analyzed (1):	20:29	Time Analyzed (2):	
Instrument ID (1):	HP5890 #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
-	88092423	10-15-88		
-	88092425	10-15-88		
-	88092426	10-15-88		
-	88092427	10-15-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 988
EPA METHOD 8270 ANALYSIS

These samples were first extracted on September 19, 1988, and analyzed on October 28, 1988, all within holding times. Recoveries of surrogate spikes were outside EPA QC limits for the acid extract of sample 88092426 and the base neutral extract of 88092425. There was no more sample available for re-extraction. Area counts for one or more internal standards were outside EPA QC limits for the base neutral extract of the blank, 88092426 and both extracts of 88092423 and 88092427. These extracts were re-analyzed. Internal standard area counts for the second analysis met EPA criteria. Results of the second analysis are reported.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

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

Project: Duluth ANGB

QC Report No: BNA-W-0051-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-08-88
Date Prepared: 9-12-88
Date Analyzed: 10-21-88
Date Reported: 12-13-88
Dilution Factor: 1

Laboratory Supervisor Approval:

1321

QC Report for Laboratory Sample No(s):
88082305-88082306
88092291-88092293, 88092423-88092427

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	58.2	58	55.0	55	5	28	39-98
B/N	Acenaphthene	100	ND	56.5	56	56.5	57	2	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	59.2	59	59.0	59	0	38	24-96
Sample #	Pyrene	100	ND	77.1	77	79.0	79	3	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	71.8	72	70.6	71	1	38	41-116
88092291	1,4-Dichlorobenzene	100	ND	50.4	50	48.5	49	2	28	36-97
ACID	Pentachlorophenol	200	ND	105	52	114	57	9	50	9-103
Laboratory	Phenol	200	ND	72.3	36	52.3	26	32	42	12-89
Sample #	2-Chlorophenol	200	ND	92.4	46	63.6	32	36	40	27-123
	4-Chloro-3-Methylphenol	200	ND	114	57	95.2	48	17	42	23-97
88092291	4-Nitrophenol	200	ND	94.7	47	61.7	31	41	50	10-80

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

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

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

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

METHOD BLANK SUMMARY

Job No: OR001

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.: 988

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5980	10-28-88	BN	2	117-81-7	Bis(2-ethylhexyl)phthalate	8J	10	88092423, 88092425 88092426, 88092427
E5981	10-28-88	AC	2	-	None Detected	-	-	88092423, 88092425 88092426, 88092427
S0595	11-29-88	BN	1	117-81-7	Bis(2-ethylhexyl)phthalate	6J	10	88092423, 88092425 88092426, 88092427 (Re-analysis)

1322

J - See Legend attached

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092423 Blank
Attn:	Bill Hayden		88092425-27 Blank
Address:	710 S. Illinois Avenue	Lab File ID:	S0595/E5981
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	11-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	3	(SepF/Cont./Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.31	92	
79-01-6	Trichloroethene	3.41	12	
127-18-4	Tetrachloroethene	5.03	11	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092423 BI
Attn:	Bill Hayden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0597
	Suite F-103	Date Received:	09-15-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	11-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clear up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
79-01-6	Trichloroethene	3.36	31	
127-18-4	Tetrachloroethene	4.99	12	B
-	Unknown	14.01	10	
-	Unknown	22.40	16	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092423 AC
Attn:	Bill Havden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0596
	Suite F-103	Date Received:	09-15-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	11-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	5	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.27	5	
79-01-6	Trichloroethene	3.35	11	
127-18-4	Tetrachloroethene	5.00	13	B
-	Unknown	14.04	9	
-	Unknown	22.55	7	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092425 AC & BN
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	E5985/E5984
	Suite F-103	Date Received:	09-15-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	10-28-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	1	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	4.26	14	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092426
Attn:	Bill Hayden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0598
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	11-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.24	96	
79-01-6	Trichloroethene	3.34	12	
-	Unknown	4.10	7	
127-18-4	Tetrachloroethene	4.99	15	B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	988
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092427
Attn:	Bill Hayden		Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0587/S0588
	Suite F-103	Date Received:	09-15-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-19-88
		Date Analyzed:	11-23-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	X
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.24	46	
-	Unknown	3.32	88	
79-01-6	Trichloroethene	3.42	10	
127-18-4	Tetrachloroethene	5.04	11	B

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-80
Lab File ID: ES980/5981
Matrix: water
Level (low/med):
Date Analyzed: 10-28-88
Time Analyzed: 12:25, 13:19
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 -3-MW25-GW-1	8809242 3	ES982/83, 50596/97	10-28-88, 11-29-88
-BR6	8809242 5	ES985, ES984	10-28-88
-3-MW26-GW-1	8809242 6	ES986/87, 50595	10-28-88, 11-29-88
-3-MW53-GW-1	8809242 7	ES988/89, 50587/88	10-28-88, 11-23-88

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092422, 88092424-88092427, 88092433
88092509-88092511, 88092513, 88092515-88092516
88092346, 88092348, 88092350, 88092494-88092495

QC Report No: TPH-W-0070-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 9-28-88
Date Analyzed: 10-05-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092516	418.1	<1.5	<1.5	39.5	29.6	75	30.4	77	3	*

1330

* Reporting limit for the samples in this batch is provided by the sub-contract laboratory.

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

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

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

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

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092422-88092427, 88092433
88092509-88092511, 88092513, 88092515-88092516
88092346, 88092348, 88092350, 88092494-88092495

QC Report No: TPH-W-0070-88B
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-05-88
Date Analyzed: 11-01-88
Date Reported: 11-15-88
Dilution Factor: NA

Laboratory Supervisor Approval:

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

1331

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

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

NA = Not Applicable
NC = Not Calculated
ND = Not Detected
MS = Spike Sample
MSD = Spike Duplicate
SR = Sample Result
SA = Spike Added (Concentration)

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: >T1129 DFTPP Injection Date: 11/29/88

Instrument ID: 70 1 DFTPP Injection Time: 12:53

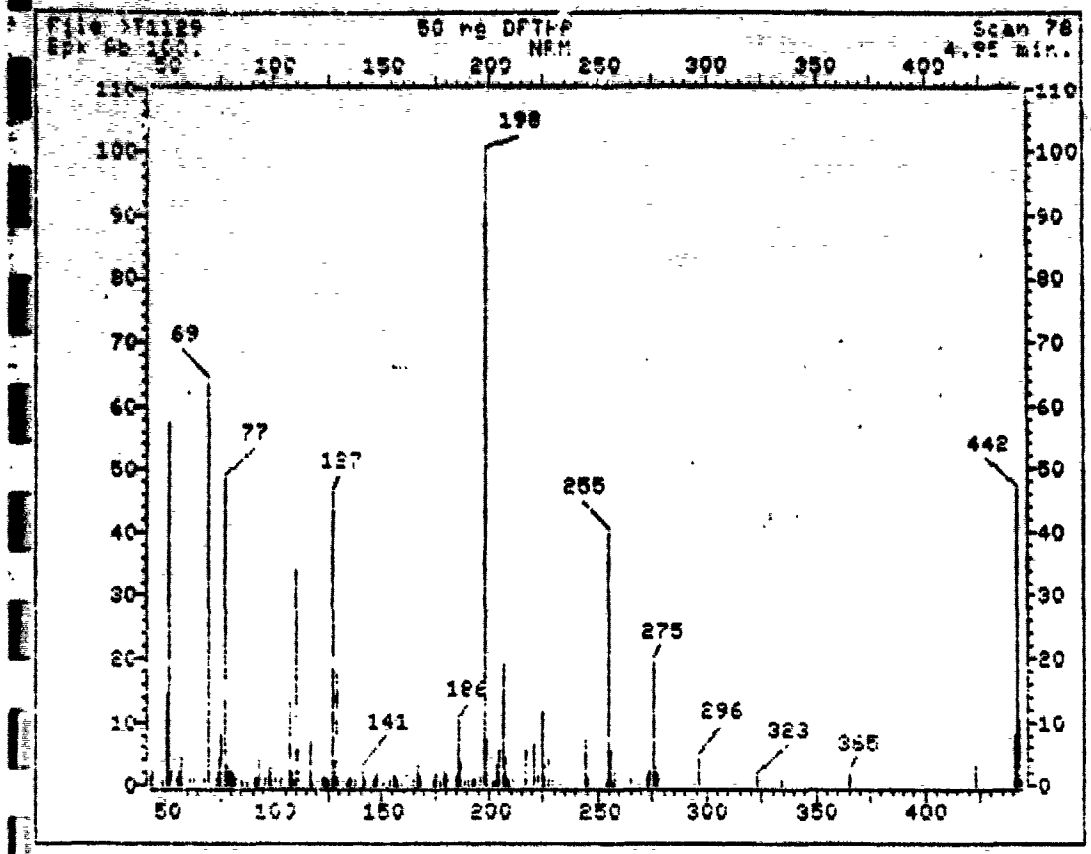
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	57.3
68	Less than 2.0% of mass 69	1.1(1.7)1
69	Mass 69 relative abundance	64.
70	Less than 2.0% of mass 69	0.0(0.0):
127	40.0 - 60.0% of mass 198	46.3
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.1
275	10.0 - 30.0% of mass 198	19.4
365	Greater than 1.00% of mass 198	1.85
441	Present, but less than mass 443	7.9
442	Greater than 40.0% of mass 198	46.7
443	17.0 - 23.0% of mass 442	10.3(22.1):

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

5 point 1c

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	>S0594	11/29/88	13:11
02	88092423,25-27 BLANK	>S0595	11/29/88	14:40
03	88092423 AC REANAL.	>S0596	11/29/88	15:38
04	88092423 BN REANAL.	>S0597	11/29/88	16:38
05	88092426 BN REANAL.	>S0598	11/29/88	17:36
06	88092450 1ml REANAL.	>S0599	11/29/88	18:36
07	88092809 1ml REANAL.	>S0600	11/29/88	19:35
08	88092688 AC REANAL.	>S0601	11/29/88	20:35
09	88092637 1ml REANAL.	>S0602	11/29/88	21:34
10	88092638 1ml REANAL.	>S0603	11/29/88	22:33
11	88092639 1ml REANAL.	>S0604	11/29/88	23:32
12	88092831 1ml REANAL.	>S0605	11/30/88	0:31
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				



File: T1129 Scan #: 78 Retn. time: 4.95

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.20	1.3[illegible]	[illegible]	.913	129.05	17.836	179.05	2.545	225.10	3.031
44.10	4.335	[illegible]	.495	130.05	2.001	180.15	1.943	227.10	4.463
49.00	.797	[illegible]	1.043	133.05	.583	185.05	1.419	229.10	1.302
50.10	14.41[illegible]	93.10	1.069	135.05	1.574	186.05	10.161	244.10	7.616
51.10	52.257	93.35	3.553	136.05	971	187.05	3.400	245.10	1.107
52.10	3.283	94.10	1.146	137.15	.690	189.05	.602	253.90	.466
55.10	1.107	98.10	3.253	141.05	2.642	190.95	.641	255.10	39.751
56.00	2.059	99.10	2.914	141.95	.874	192.05	.913	256.10	5.537
57.00	5.459	101.00	1.826	146.05	.602	193.05	1.360	257.00	.583
58.00	.641	103.00	.913	147.15	1.554	196.10	2.720	258.00	1.982
61.00	1.127	103.90	1.030	148.05	2.234	198.10	100.000	265.10	1.146
63.10	1.943	105.00	1.146	151.05	.408	199.10	7.053	273.10	1.574
67.90	1.088	107.00	12.901	153.15	.797	201.70	.583	274.15	2.662
69.00	63.746	108.10	2.312	155.15	1.515	203.10	.544	275.15	19.371
73.10	1.243	109.10	.661	156.05	1.438	204.10	3.147	276.15	2.075
73.90	4.197	110.00	33.945	157.25	.622	205.10	5.634	277.15	1.632
75.10	7.694	111.00	5.459	159.05	.427	206.20	18.866	296.05	4.294
77.10	43.242	117.00	6.820	160.95	1.613	207.20	4.507	323.15	1.302
78.20	3.109	118.05	.563	164.95	.699	208.10	1.107	334.05	.719
78.90	2.720	122.05	.933	167.05	3.225	209.00	.680	365.10	1.846
80.00	2.195	123.15	1.515	167.95	1.477	211.10	.777	423.20	3.031
81.00	3.555	124.15	1.069	168.95	.447	217.00	5.634	441.25	7.889
82.10	.933	126.95	.855	174.05	.758	221.20	6.548	442.25	46.687
83.00	1.671	127.05	46.260	175.05	1.807	223.10	1.341	443.25	10.317
84.90	.777	128.15	3.730	176.05	.719	224.10	11.638	444.25	.661
85.10	.816								

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 11/29/88

Contractor: ENGINEERING SCIENCE Time: 13:11

Contract No: _____ Laboratory ID: >S0594

Instrument ID: 4 Initial Calibration Date: 10/27/88 12/2

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.10048	22.05		
2-Fluorophenol	1.15802	1.32577	14.49		
bis(2-Chloroethyl)ether	1.11892	1.34300	20.03		
Phenol	1.41657	1.60943	13.62	*	
Phenol-d5	1.22488	1.26989	2.94		
Aniline	.54193	.51376	5.20		
2-Chlorophenol	1.23175	1.26912	2.95		
1,3-Dichlorobenzene	1.47535	1.42947	3.11		
1,4-Dichlorobenzene	1.40530	1.37671	2.03	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.71977	1.28		
1,2-Dichlorobenzene	1.32240	1.40802	6.47		
2-Methylphenol	1.17367	1.37464	17.12		
3-&-4-Methylphenol	1.07139	1.42122	32.65		
bis(2-chloroisopropyl)Ether	2.15627	3.48117	61.44		
N-Nitroso-di-n-Propylamine	.84059	.93592	11.35		**
Hexachloroethane	.55840	.63170	17.33		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.51425	27.57		
Nitrobenzene-d5	.39157	.48923	25.00		
2-Nitrophenol	.24657	.26242	6.43	*	
Isophorone	.74170	.92269	24.43		
bis(2-Chloroethoxy)methane	.49386	.56581	14.57		
2,4-Dimethylphenol	.34849	.40818	17.13		
Benzoic Acid	.25725	.36941	24.28		
2,4-Dichlorophenol	.56733	.57232	.88	*	
1,2,4-Trichlorobenzene	.36915	.34954	5.31		
Naphthalene	.94589	.95786	1.26		
4-Chloroaniline	.36309	.35192	3.08		
hexachlorobutadiene	.20283	.20934	3.21	*	
4-Chloro-3-Methylphenol	.31360	.33532	6.93	*	
2-Methylnaphthalene	.56397	.60875	7.94		

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
BSL Compounds

Case No: _____ Calibration Date: 11/29/88

Contractor: Engineering Science Time: 13:11

Contract No: _____ Laboratory ID: >S0594

Instrument ID: 4 Initial Calibration Date: 10/17/88 12

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29566	.35723	20.82		**
2,4,6-Trichlorophenol	.42280	.38109	9.87	*	
2,4,5-Trichlorophenol	.52897	.43149	18.43		
2-Fluorobiphenyl	1.27220	1.04204	18.09		
2-Chloronaphthalene	1.23784	1.09070	11.89		
2-Nitroaniline	.47288	.62152	31.50		
Dimethylphthalate	1.43629	1.03268	26.57		
2,6-Dinitrotoluene	.37415	.32688	12.63		
Acenaphthylene	1.68918	1.49916	11.84		
3-Nitroaniline	.44557	.53988	19.14		
2,4-Dinitrophenol	.11898	.13910	16.91		**
Acenaphthene	1.13011	.95135	15.82	*	
Dibenzofuran	1.64151	1.52425	7.15		
2,4-Dinitrotoluene	.28413	.34978	23.09		
4-Nitrophenol	.28450	.25226	11.33		**
Fluorene	1.12950	.94188	16.64		
Diethylphthalate	1.20939	1.03544	14.38		
4-Chlorophenyl-phenylether	.59183	.52515	11.26		
4-Nitroaniline	.35936	.29065	19.17		
2,4,6-Trinitrophenol	21437	23149	10.11		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.38911	3.66	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.22329	4.83		
Hexachlorobenzene	.26273	.28156	7.17		
Pentachlorophenol	.14536	.17237	18.58	*	

RF - Response Factor from daily standard file at 80.00 mg/L

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

%Diff - % Difference from original average or curve

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

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/29/88

Contractor: ENGINEERING-SCIENCE Time: 13:11

Contract No: Laboratory ID: >S0594

Instrument ID: 2 Initial Calibration Date: 10/27/88 10/28

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.06377	2.85		
Anthracene	1.05155	.94176	10.44		
Di-n-Butylphthalate	1.51956	1.49261	1.77		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.15689	2.82	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.12761	217.20		
Pyrene	1.56055	1.45997	6.45		
Terphenyl-d14	1.05835	1.03549	2.16		
Butylbenzylphthalate	1.03390	1.00111	3.17		
3,3'-Dichlorobenzidine	.13539	.21615	59.36		
Chrysene	.99655	.99954	.30		
Benzo(a)Anthracene	1.10407	1.13226	2.55		
Bis(2-Ethylhexyl)Phthalate	1.21073	1.17604	2.86		
Di-n-octylphthalate	2.40275	2.86314	19.16	*	
Benzo(a)Pyrene	1.32095	1.28001	3.10	*	
Benzo(b)Fluoranthene	1.60350	1.61868	.64		
Indeno(1,2,3-cd)Pyrene	.96300	1.16928	20.79		
Dibenzo(a,h)Anthracene	.87481	.97419	11.36		
Benzo(k)Fluoranthene	1.44370	1.19493	17.23		
Benzo(g,h,i)Perylene	.89761	1.03922	14.77		

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 (**)

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0594 Date Analyzed:11/29/88

Instrument ID: 70 1 Time Analyzed: 13:11

		IS1(DCB)			IS2(NPT)			IS3(ANT)	
		AREA #		RT	AREA #		RT	AREA #		RT
	12 HOUR STD	112073.		9.11	390824.		12.73	242973.		18.20
	UPPER LIMIT	224146.			781648.			485946.		
	LOWER LIMIT	56036.			195412.			121486.		
	SAMPLE NO.									
01	88092423,25-	155178.		9.09	583798.		12.71	341699.		18.19
02	88092423 AC	125459.		9.08	500330.		12.69	287289.		18.16
03	88092423 BN	136935.		9.08	514757.		12.70	306049.		18.16
04	88092426 BN	135320.		9.08	504586.		12.70	308657.		18.17
05	88092460 1ml	116514.		9.07	454129.		12.67	259169.		18.17
06	88092809 1ml	60321.		8.97	283879.		12.68	188242.		18.15
07	88092688 AC	106420.		9.08	391639.		12.70	228563.		18.17
08	88092637 1ml	88167.		9.08	339138.		12.68	199114.		18.16
09	88092638 1ml	93149.		9.07	356464.		12.68	208362.		18.16
10	88092639 1ml	90028.		9.09	357705.		12.70	207629.		18.17
11	88092831 1ml	108516.		9.09	430225.		12.68	250039.		18.15
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										

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

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

Column used to flag internal standard area values with an asterisk.

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:Engineering Science Contract:_____.

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

Lab File ID (Standard): >S0594 Date Analyzed:11/29/88

Instrument ID: 70 1 Time Analyzed: 13:11

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
12 HOUR STD	386681.	22.83	300109.	31.31	226527.	37.28
UPPER LIMIT	773362.		600218.		453054.	
LOWER LIMIT	193340.		150055.		113264.	
EPA SAMPLE NO.						
01 88092423.25-	547293.	22.84	443851.	31.28	193948.	37.29
02 88092423 AC	489925.	22.83	434665.	31.26	188260.	37.25
03 88092423 BN	502550.	22.83	450713.	31.27	182305.	37.26
04 88092426 BN	505353.	22.83	441915.	31.27	178192.	37.26
05 88092460 1ml	431371.	22.82	394145.	31.26	106581.*	37.24
06 88092809 1ml	359641.	22.82	357755.	31.27	244548.	37.24
07 88092688 AC	371808.	22.83	339621.	31.27	149833.	37.26
08 88092637 1ml	340496.	22.82	316849.	31.25	155452.	37.24
09 88092638 1ml	345407.	22.81	295452.	31.26	135408.	37.24
10 88092639 1ml	353405.	22.83	323135.	31.28	175379.	37.27
11 88092831 1ml	435107.	22.81	370949.	31.27	172255.	37.29
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 10/28/88 10:58

Lab ID >D1028::01 Data Release Authorized By: Laura Kuck

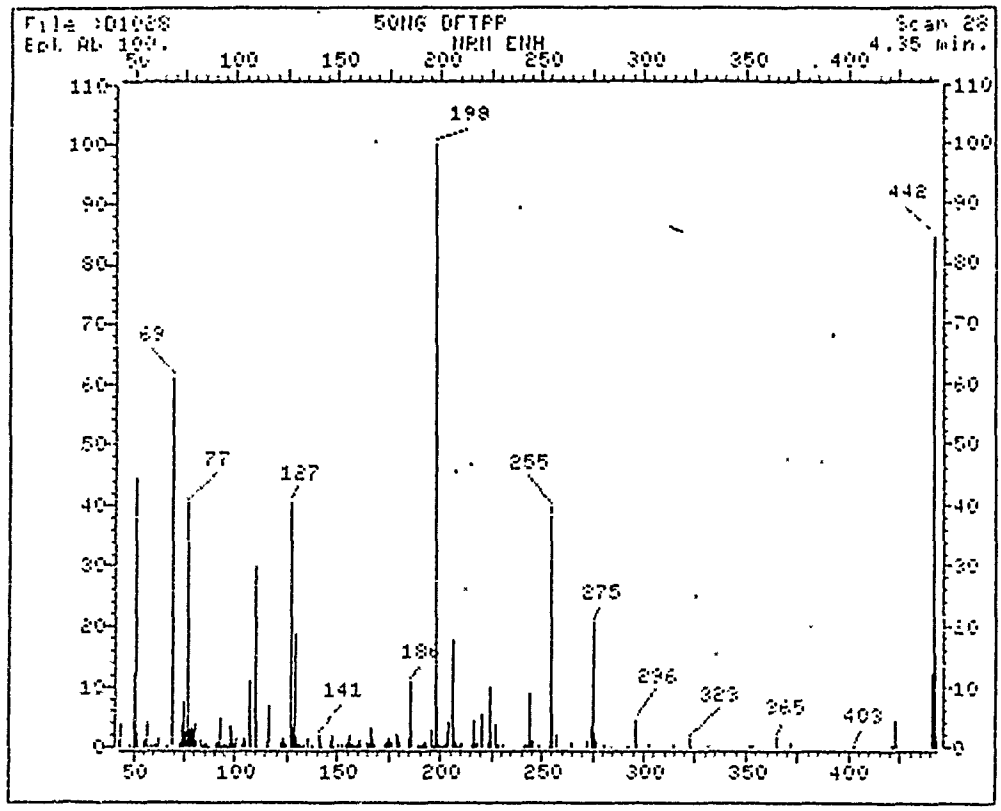
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	44.34 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	60.91	
70	less than 2.0% of mass 69	.38 OK	(.6237) #1
127	40.0 - 60.0% of mass 198	40.37 OK	
197	less than 1.0% of mass 198	.14 OK	
198	base 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	20.67 OK	
365	greater than 1.00% of mass 198	1.62 OK	
441	present, but less than mass 443	12.31 OK	
442	greater than 40.0% of mass 198	84.28 OK	
443	17.0 - 23.0% of mass 442	15.72 OK	(18.65) #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.

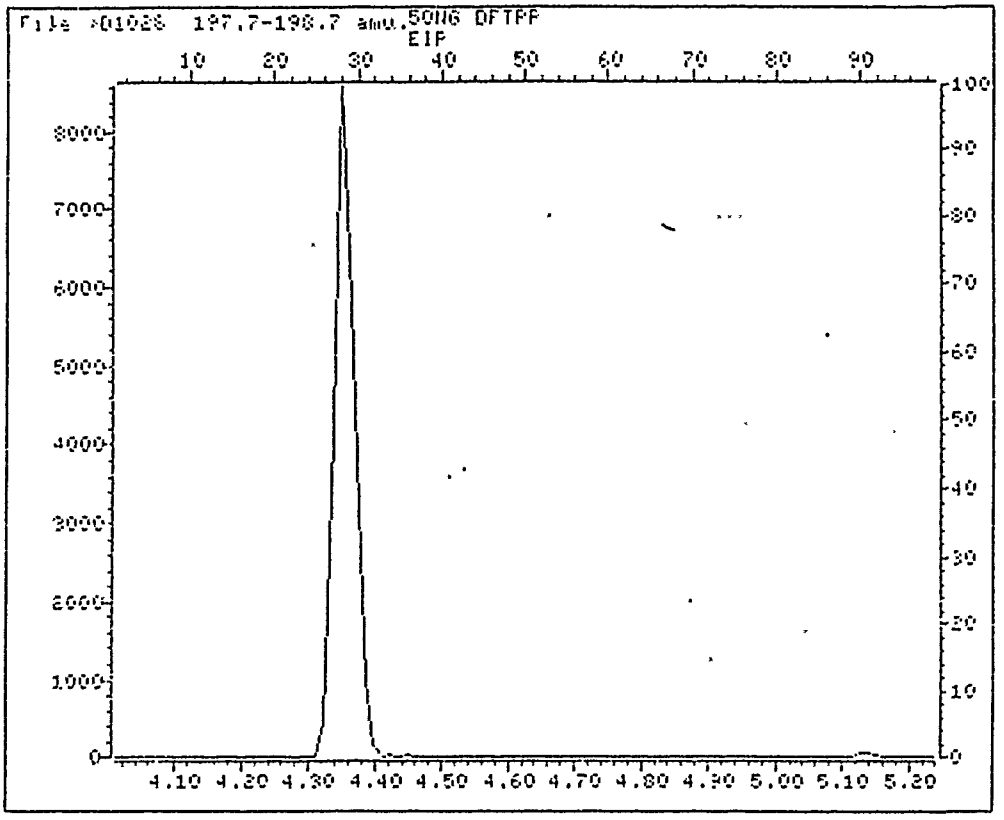
SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS	
SONG DFTPP	>D1028	10/28/88	10:58	
60ng/l std	E5979		11:17	
BLK 88092423-7BN	E5980		12:25	IS out, see 50596 good
BLK 88092423-7AC	E5981		13:19	IS out, see 50597
88092423 BN	E5982		14.14	IS out, see 50596
" AC	E5983		15:17	SS out ~~reext~~ ~~ISout~~ use
88092425 BN	E5984		16:11	use
" AC	E5985		17:06	IS out, see 50598
88092426 BN	E5986		18:01	SS out, ~~reext~~, ~~ISout~~ use
" AC	E5987		18:56	SS out reanalysis, ~~ISout~~
88092427 BN	E5988		19:50	IS out, see 50587
" AC	E5989		20:45	IS out
another project 88092275	E5990		21:40	SS out reext IS out
88092296	E5991		22:35	



File:)01028 Scan #: 28 Retn. time: 4.35

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
43.10	1.077	90.95	.775	142.95	.239	195.90	2.727	255.90	5.407
44.10	3.933	92.05	.656	146.95	1.202	196.70	.141	257.90	2.014
48.00	.390	92.90	4.808	147.95	1.743	197.90	100.000	259.00	.213
50.00	12.271	94.00	.125	148.95	.193	199.00	6.541	264.90	.827
51.10	44.336	95.00	.343	150.95	.260	199.90	.349	273.00	.984
52.10	2.342	96.00	.323	152.95	.541	201.00	.219	274.00	3.518
52.90	.094	97.10	.182	154.05	.369	201.60	.177	275.00	20.670
55.10	1.213	97.90	3.565	154.95	.853	202.95	.317	276.00	2.581
56.05	1.592	98.90	2.841	155.95	1.618	203.95	2.477	276.85	1.265
57.05	4.017	99.90	.468	156.95	.364	204.95	4.168	280.95	.328
57.95	.114	101.00	1.691	157.75	.312	205.95	17.636	284.95	.120
58.95	.291	102.90	.531	157.95	.135	206.95	3.258	292.05	.057
59.95	.130	104.00	1.280	159.05	.255	207.95	.911	292.95	.239
61.05	.578	105.00	1.244	159.85	.489	208.85	.130	295.95	4.460
62.05	.567	107.00	10.991	160.95	1.015	209.95	.286	296.95	.427
63.05	1.759	108.00	1.915	162.05	.349	210.65	.276	302.95	.380
63.65	.114	110.00	29.819	164.95	.687	210.95	.801	314.90	.328
66.05	.058	111.00	4.231	165.95	.437	215.95	.291	323.00	1.436
67.25	.172	116.00	.807	167.00	3.247	216.85	4.486	323.90	.167
68.95	60.913	117.00	6.718	168.00	1.311	217.85	.479	331.70	.052
70.05	.380	122.00	.609	168.90	.271	218.85	.703	340.90	.109
70.95	.239	123.00	1.488	172.90	.453	220.95	5.360	351.85	.505
73.15	.723	124.00	.729	173.90	.671	222.95	.744	352.85	.234
74.05	3.934	125.00	.468	175.00	1.296	223.95	9.731	353.85	.479
75.05	7.390	127.00	40.373	176.00	.609	224.95	2.305	364.85	1.624
76.05	2.503	128.00	3.273	176.90	.703	226.95	3.664	371.95	.853
77.05	40.227	129.00	18.526	178.90	2.217	228.05	.401	382.95	.104
78.05	2.683	129.95	1.702	180.00	1.613	228.85	.520	401.90	.177

79.05	3.565	130.95	.463	181.00	.697	239.95	.343	402.80	.338
79.95	2.628	131.95	.432	185.00	1.327	240.90	.239	403.90	.094
81.05	3.742	133.05	.109	186.00	10.845	241.90	.364	420.90	.536
82.05	.984	133.95	.578	187.00	2.753	242.90	.156	421.90	.317
83.05	.999	135.05	1.478	189.00	.432	244.00	8.821	423.00	4.600
84.05	.312	135.95	.520	190.00	.080	245.00	1.051	423.95	.781
85.05	.578	136.95	.474	191.00	.427	245.90	1.197	440.95	12.307
86.05	.796	138.05	.109	192.00	.874	248.70	.343	441.95	84.279
86.95	.208	140.95	1.879	193.00	.812	254.00	.172	442.95	15.716
88.05	.082	141.95	.692	194.00	.135	254.90	39.602	443.95	1.754


File >01028 197.7-198.7 amu.50NG DFTPP
EIP
10 20 30 40 50 60 70 80 90
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: D 625 ACID AND BASE/NEUTRALS + C(PHENOL,DNSAP82-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File:)C5979
Injection Time: 881028 11:17

Compound	$\overline{RF}$	RF	%Diff	Calib Meth	
N-Nitroso-Dimethylamine	1.24043	1.26042	1.61	Average	
2-Fluorophenol	1.41912	1.51466	6.73	Average	
bis(2-Chloroethyl)ether	1.41737	1.33573	5.76	Average	
Phenol	1.78209	1.68536	5.43	Average	
Phenol-d5	1.35470	1.55397	14.71	Average	
Aniline	.74553	.64279	13.78	Average	
2-Chlorophenol	1.32089	1.39666	5.74	Average	
1,3-Dichlorobenzene	1.51101	1.49342	1.16	Average	
1,4-Dichlorobenzene	1.51574	1.45394	4.08	Average	
Benzyl Chloride	-	-	-	Average	
Benzyl Alcohol	.56944	.50619	11.11	Average	
1,2-Dichlorobenzene	1.45179	1.51793	4.56	Average	
2-Methylphenol	1.42392	1.48146	4.04	Average	
3-&-4-Methylphenol	1.58422	1.29283	18.39	Average	(Conc=60.00)
bis(2-chloroisopropyl)Ether	2.35722	2.57341	9.17	Average	
N-Nitroso-Di-n-Propylamine	1.13410	1.36769	20.60	Average	
Hexachloroethane	.70056	.68436	2.31	Average	
Dibromochloropropane	-	-	-	Average	
Nitrobenzene	.56683	.67024	18.24	Average	
Nitrobenzene-d5	.49938	.51679	9.49	Average	
2-Nitrophenol	.22040	.25737	16.77	Average	
Isophorone	.87207	1.02069	17.04	Average	
bis(2-Chloroethoxy)methane	.58240	.66663	14.46	Average	
2,4-Dimethylphenol	.40862	.44936	9.97	Average	
Benzoic Acid	.29595	.27954	5.55	Average	
2,4-Dichlorophenol	.53135	.54963	3.44	Average	
1,2,4-Trichlorobenzene	.31739	.34004	7.14	Average	
Naphthalene	.98196	.98756	.57	Average	
4-Chloroaniline	.33116	.39956	20.65	Average	
Hexachlorobutadiene	.18652	.19335	3.66	Average	
4-Chloro-3-Methylphenol	.28631	.34324	19.88	Average	
2-Methylnaphthalene	.54468	.58910	8.15	Average	
Hexachlorocyclopentadiene	.33289	.38065	14.35	Average	
2,4,6-Trichlorophenol	.32295	.36224	12.16	Average	
2,4,5-Trichlorophenol	.49539	.48328	2.44	Average	
2-Fluorobiphenyl	1.26699	1.15011	9.23	Average	
2-Chloronaphthalene	1.24653	1.15500	7.34	Average	
2-Nitroaniline	.63129	.66654	5.58	Average	
Dimethylphthalate	1.33033	1.33143	.08	Average	
2,6-Dinitrotoluene	.31816	.40952	28.71	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

Calibration Check Report

File: D 625 ACID AND BASE/NEUTRALS + EXPHENOL,DNSBP&2-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File:)E5979
Injection Time: 881028 11:17

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Acenaphthylene	1.65820	1.51467	8.66	Average
3-Nitroaniline	.63702	.69162	8.57	Average
2,4-Dinitrophenol	.05753	.05838	1.49	Average
Acenaphthene	1.12644	1.01410	9.97	Average
Dibenzofuran	1.50204	1.52102	1.26	Average
2,4-Dinitrotoluene	.32099	.38965	21.39	Average
4-Nitrophenol	.18425	.15905	13.68	Average
Fluorene	1.09332	1.08982	.32	Average
Diethylphthalate	1.32354	1.21456	8.23	Average
4-Chlorophenyl-phenylether	.48214	.42952	10.91	Average
4-Nitroaniline	.27435	.31754	15.49	Average
2,4,6-Tribromophenol	.14218	.15519	9.15	Average
1,2-Diphenylhydrazine	-	-	-	Average
Alpha-BHC	-	-	-	Average
Beta-BHC	-	-	-	Average
Gamma-BHC	-	-	-	Average
Delta-BHC	-	-	-	Average
Heptachlor	-	-	-	Average
Aldrin	-	-	-	Average
N-Nitrosodiphenylamine	.44983	.47348	5.26	Average
4,6-Dinitro-2-Methylphenol	.08606	-	-	Average
4-Bromophenyl-phenylether	.22979	.25917	12.79	Average
Hexachlorobenzene	.28768	.32419	12.69	Average
Pentachlorophenol	.11390	.09584	15.86	Average
Phenanthrene	1.07960	1.07792	.16	Average
Anthracene	1.13334	1.10152	2.54	Average
Di-n-Butylphthalate	1.71746	1.90315	10.81	Average
4,4'-Dibromobiphenyl	-	-	-	Average
Fluoranthene	1.17568	1.13136	3.77	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

1344

Calibration Check Report

Title: D 625 ACID AND BASE/NEUTRALS + ClPHENOL,DNSOP&2-NO2-4-MEPH
Calibrated: 881013 04:31

Check Standard Data File:)E5979
Injection Time: 881028 11:17

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
Benzidine	.03775	.02571	31.90	Average
Pyrene	1.65647	1.77006	6.86	Average
Terphenyl-d14	1.09647	1.29993	18.56	Average
Butylbenzylphthalate	1.15097	1.43920	25.04	Average
3,3'-Dichlorobenzidine	.12990	.23567	81.42	Average
Chrysene	1.01423	1.00087	1.32	Average
Benzo(a)Anthracene	1.09006	1.19166	9.32	Average
bis(2-Ethylhexyl)Phthalate	1.34247	1.77741	32.40	Average
Di-n-octylphthalate	3.72331	4.57043	22.75	Average
Benzo(a)Pyrene	1.27071	1.21146	4.66	Average
Benzo(b)Fluoranthene	1.48902	1.45206	2.48	Average
Indeno(1,2,3-cd)Pyrene	.82543	.99874	21.00	Average
Dibenzo(a,h)Anthracene	.78966	.75640	4.21	Average
Benzo(k)Fluoranthene	1.51900	1.36036	10.44	Average
Benzo(g,h,i)Perylene	.74580	.73864	.96	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

1345

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	95542	8.06	320742	11.60	181736	16.99
UPPER LIMIT	191084		641484		363472	
LOWER LIMIT	47771		160371		90868	
EPA SAMPLE NO.						
01 8809323-27 MWBLK	141322	8.05	511119	11.55	262254	16.97
02 " PC BLK	140176	8.06	547854	11.55	288294	16.98
03 SW092423 BN	136627	8.06	533283	11.55	273022	16.96
04 " AC	136745	8.05	519359	11.54	275702	16.96
05 SW092425 BN	119953	8.04	468273	11.54	251051	16.96
06 " AC	128490	8.06	498853	11.55	268129	16.98
07 SW092426 BN	128884	8.04	487637	11.54	263876	16.96
08 " AC	150938	8.05	566370	11.55	288549	16.97
09 SW092427 BN	157851	8.04	590488	11.54	322347	16.96
10 " AC	140827	8.05	548986	11.54	290795	16.96
11 8809227-5	99847	8.03	374504	11.48	208140	16.90
12 8809229-6	96103	8.03	371154	11.50	186478	16.94
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): _____ 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	243695	21.59	141364	29.98	376893	34.93
UPPER LIMIT	487390		282728		753786	
LOWER LIMIT	121847		70682		188446	
EPA SAMPLE NO.						
01 SY092Y23-2 DN	BLK 390617	21.57	247523	29.94	#164972	34.94
02 " AC BLK	424604	21.58	312323	29.96	236743	34.95
03 SB092Y23 DN	407808	21.58	256977	29.96	#165186	34.95
04 " AC	402375	21.56	270130	29.94	185225 R	34.94
05 SB092Y25 DN	363423	21.56	224429	29.44	148732	34.93
06 " AC	416010	21.58	252964	29.96	193496	34.95
07 SB092426 DN	423302	21.56	310156*	29.95	205693	34.94
08 " AC	441795	21.57	328794*	29.95	230900	34.95
09 SB092427 DN	511317*	21.56	325170*	29.94	210671	34.94
10 " AC	463217	21.56	275395	29.94	168263*	34.92
11 SB092275	301026	21.57	190236	29.92	99299*	34.88
12 SB092276	219365	21.54	191525	29.94	98626*	34.91
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

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DATA PACKAGE #21

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ES
ENGINEERING-SCIENCE, INC.

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

Job No.: OR001

Work Order No.: 1001

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 9-17-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092487	DANGB-3-MW27-GW-1	AS-F	9-15-88		10-15-88	
88092487	DANGB-3-MW27-GW-1	BA-I	9-15-88		10-13-88	
88092487	DANGB-3-MW27-GW-1	CD-F	9-15-88		10-20-88	
88092487	DANGB-3-MW27-GW-1	CR-F	9-15-88		10-16-88	
88092487	DANGB-3-MW27-GW-1	HG-C	9-15-88		10-14-88	
88092487	DANGB-3-MW27-GW-1	PB-F	9-15-88		10-16-88	
88092487	DANGB-3-MW27-GW-1	8010	9-15-88		9-21-88	9-20-88
88092487	DANGB-3-MW27-GW-1	8020	9-15-88		9-21-88	
88092488	DANGB-3-MW33-GW-1	AS-F	9-15-88		10-15-88	
88092488	DANGB-3-MW33-GW-1	BA-I	9-15-88		10-13-88	
88092488	DANGB-3-MW33-GW-1	CD-F	9-15-88		10-20-88	
88092488	DANGB-3-MW33-GW-1	CR-F	9-15-88		10-16-88	
88092488	DANGB-3-MW33-GW-1	HG-C	9-15-88		10-14-88	
88092488	DANGB-3-MW33-GW-1	PB-F	9-15-88		10-16-88	
88092488	DANGB-3-MW33-GW-1	8010	9-15-88		9-21-88	9-20-88
88092488	DANGB-3-MW33-GW-1	8020	9-15-88		9-21-88	
88092488	DANGB-3-MW33-GW-1	8080	9-15-88	9-22-88	10-16-88	
88092488	DANGB-3-MW33-GW-1	8270	9-15-88	9-22-88	10-29-88	
88092489	DANGB-TB7	8010	9-13-88		9-21-88	9-20-88
88092489	DANGB-TB7	8020	9-13-88		9-21-88	
88092490	DANGB-3-MW29-GW-1	8080	9-15-88	9-22-88	10-16-88	10-20-88
88092490	DANGB-3-MW29-GW-1	8270	9-15-88	9-22-88	10-29-88	
88092491	DANGB-FB10	8010	9-15-88		9-26-88	9-27-88
88092491	DANGB-FB10	8020	9-15-88		9-26-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092487-88092491
WORK ORDER NO.: 1001

These water samples were received at the ES Berkelev Laboratory on 9-17-88. They were received cold and intact.

Sample DANGB-3-MW29-GW-1 was not analyzed due to breakage that occurred at the laboratory.

ENGINEERING-SCIENCE INC.
03/09/89

ANALYSIS REPORT

WORK ORDER NUMBER: 1001
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

TASK: 2, UNITS: mg/L

TEST COMPOUND	DANGB-3-MW27-GW-1 88092487	DANGB-3-MW33-GW-1 88092488
ACID DIG FLAME	NA	NA
ACID DIG FURNACE	NA	NA
ARSENIC	<0.01	<0.01
BARIUM	<0.2	<0.2
CADMIUM	<0.005	<0.005
CHROMIUM	<0.01	<0.01
MERCURY	<.0002	<.0002
LEAD	<0.005	<0.005

ANALYSIS REPORT

)RK ORDER NUMBER: 1001
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 3, UNITS: mg/L

'EST COMPOUND	DANGB-3-MW33-GW-1 88092488	DANGB-3-MW29-GW-1 88092490
-18.1 PETROLEUM HYDROCARBONS	NT	NT

ANALYSIS REPORT

WORK ORDER NUMBER: 1001
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB-3-MW27-GW-1 88092487	DANGB-3-MW33-GW-1 88092488	DANGB-TB7 88092489	DANGB-FB10 88092491
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	1.2	0.25	ND	ND
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	0.50B	0.50B	0.80B	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 1001

:ST COMPOUND	DANGB-3-MW27-GW-1 88092487	DANGB-3-MW33-GW-1 88092488	DANGB-TB7 88092489	DANGB-FB10 88092491
,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

ANALYSIS REPORT

WORK ORDER NUMBER: 1001
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB-3-MW27-GW-1 88092487	DANGB-3-MW33-GW-1 88092488	DANGB-TB7 88092489	DANGB-FB10 88092491
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

ANALYSIS REPORT

)RK ORDER NUMBER: 1001
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/17/88

APPROVED BY _____
Lab Supervisor

:PORT DATA:
; 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 8080

'EST COMPOUND	DANGB-3-MW33-GW-1 88092488	DANGB-3-MW29-GW-1 88092490
ALDRIN	ND	ND
ALPHA-BHC	ND	ND
BETA-BHC	ND	ND
DELTA-BHC	ND	ND
GAMMA-BHC	ND	ND
CHLORDANE	ND	ND
4,4'-DDD	ND	ND
4,4'-DDE	ND	ND
4,4'-DDT	ND	ND
DIELDRIN	ND	ND
ENDOSULFAN I	ND	ND
ENDOSULFAN II	ND	ND
ENDOSULFAN SULFATE	ND	ND
ENDRIN	ND	ND
ENDRIN ALDEHYDE	NA	NA
HEPTACHLOR	ND	ND
HEPTACHLOR EPOXIDE	ND	ND
KEPONE	NA	NA
METHOXYCHLOR	ND	ND
TOXAPHENE	ND	ND
PCB-1016	ND	ND
PCB-1221	ND	ND
PCB-1232	ND	ND
PCB-1242	ND	ND
PCB-1248	ND	ND
PCB-1254	ND	ND
PCB-1260	ND	ND

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

Date Received: September 17, 1988
Date Reported: December 8, 1988

Work Order: 1001
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88082488	88082490
Sample No.:	DANGB-3-MW33-GW1	DANGB-3-MW29-GW1
Date Sampled:	09-15-88	09-15-88
Time Sampled:	16:15	11:35
Date Extracted:	09-22-88	09-22-88
Date Analyzed:	10-29-88	10-29-88

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

B = Compound was detected in the blank.

Base Neutrals - SW 8270
Matrix: Water
(continued)

ate Received: September 17, 1988 Work Order: 1001
ate Reported: December 8, 1988 Job Number: OR001

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

ab Number:		88082488	88082490
ample No.:		DANGB-3-MW33-GW1	DANGB-3-MW29-GW1
ate Sampled:		09-15-88	09-15-88
ime Sampled:		16:15	11:35
ate Extracted:		09-22-88	09-22-88
ate Analyzed:		10-29-88	10-29-88
ompound	Detection Limits ug/L	ANALYTICAL RESULTS ug/L	ug/L
henanthrene	10	ND	ND
nthracene	10	ND	ND
ibutyl phthalate	10	ND	ND
luoranthene	10	ND	ND
-Chlorophenyl phenyl ether	10	ND	ND
yrene	10	ND	ND
utyl Benzyl phthalate	10	ND	ND
is(2-ethylhexyl) phthalate	10	ND	ND
nrysene	10	ND	ND
-Bromophenyl phenyl ether	10	ND	ND
enzo(a)anthracene	10	ND	ND
i-n-octylphthalate	10	ND	ND
enzo(b)fluoranthene	10	ND	ND
enzo(k)fluoranthene	10	ND	ND
enzidine	60	ND	ND
,3'-Dichlorobenzidine	20	ND	ND
enzo(a)pyrene	10	ND	ND
ndeno(1,2,3-cd)pyrene	10	ND	ND
ibenzo(a,h)anthracene	10	ND	ND
enzo(ghi)perylene	10	ND	ND
enzyl Alcohol	20	ND	ND

= Compound was detected in the blank.

Base Neutrals - SW 8270
Matrix: Water
(continued)

Date Received: September 17, 1988 Work Order: 1001
Date Reported: December 8, 1988 Job Number: OR001

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

Lab Number:	88082488	88082490
Sample No.:	DANGB-3-MW33-GW1	DANGB-3-MW29-GW1
Date Sampled:	09-15-88	09-15-88
Time Sampled:	16:15	11:35
Date Extracted:	09-22-88	09-22-88
Date Analyzed:	10-29-88	10-29-88

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

EPA has not yet determined detection limits for these compounds.

* = Compound was detected in the blank.

Pesticides and PCBs - SW 8270
Matrix: Water

ate Received: September 17, 1988
ate Reported: December 8, 1988

Work Order: 1001
Job Number: OR001

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

ATTN:Mr. Bill Hayden

ab Number:	88082488	88082490
ample No.:	DANGB-3-MW33-GW1	DANGB-3-MW29-GW1
ate Sampled:	09-15-88	09-15-88
ime Sampled:	16:15	11:35
ate Extracted:	09-22-88	09-22-88
ate Analyzed:	10-29-88	10-29-88

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

EPA has not yet determined detection limits for these compounds.

= Compound was detected in the blank.

Acid Extractables -- SW 8270
Matrix: Water

Date Received: September 17, 1988
Date Reported: December 8, 1988

Work Order: 1001
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88082488	88082490
Sample No.:	DANGB-3-MW33-GW1	DANGB-3-MW29-GW1
Date Sampled:	09-15-88	09-15-88
Time Sampled:	16:15	11:35
Date Extracted:	09-22-88	09-22-88
Date Analyzed:	10-29-88	10-29-88

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

Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

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

1001

CHAIN OF CUSTODY RECORD

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7479	SW9310, 9315	SM429	SHIP TO:
OR001	Duluth ANGB/Duluth, Mn.										ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA 94710

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7479	SW9310, 9315	SM429	REMARKS
9-15-88	1135	DANGB-3-MW29-GW-1	6		X	X	X			8824	90	RESAMPLED MW29
9-15-88	1155	DANGB-FB10	2	X						8824	91	Field blank for resampled MW29.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kbely L Dan	9-15-88 1800	Fed Ex Airbill # 7790314120			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		[illegible]	9/17/88 13:50	Samples received cold and intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

1364

ENGINEERING-SCIENCE

(00)

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature)

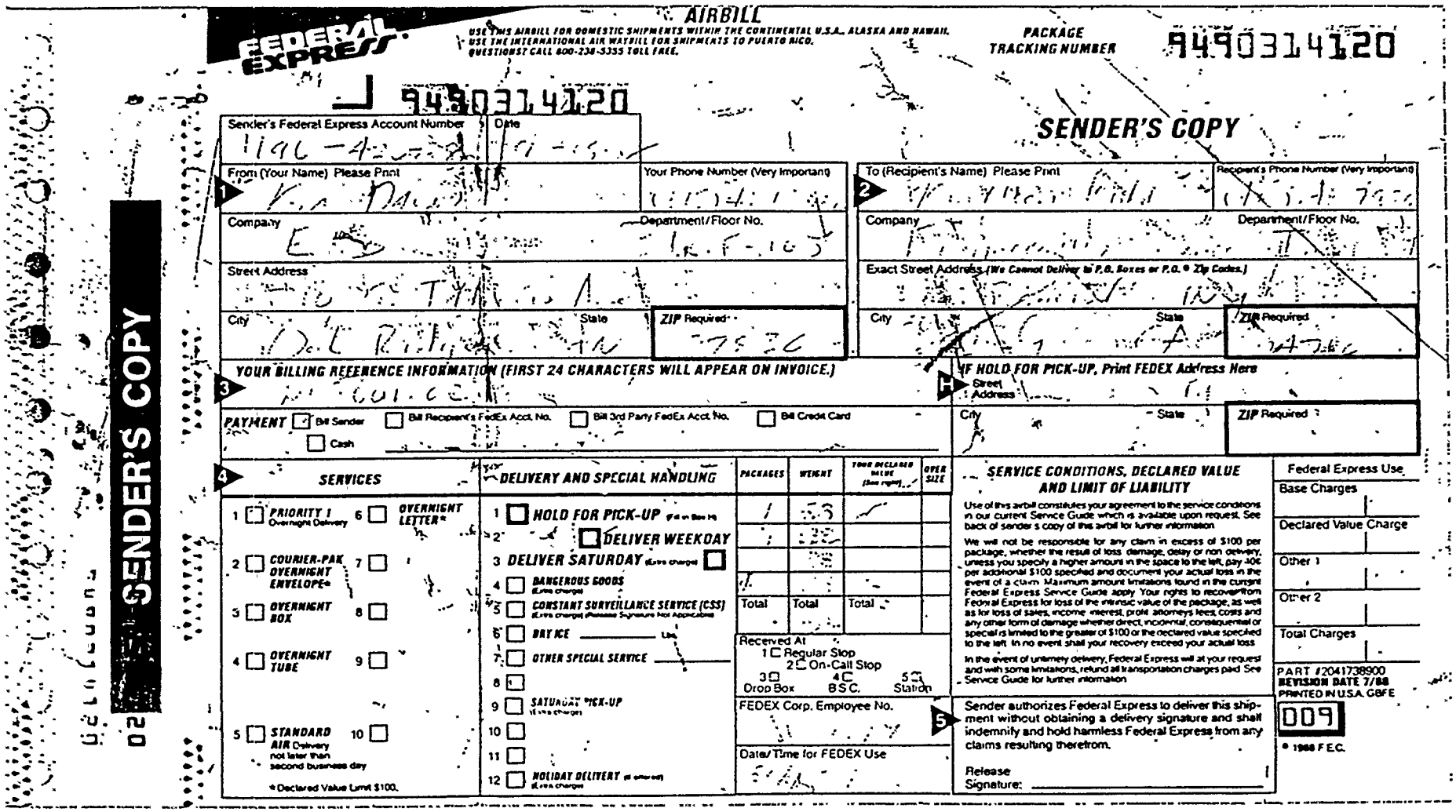
SHIP TO:
ENGINEERING-SCIENCE LABORATORY, INC.
600 Bancroft Way
Berkeley, CA 94710

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 6010, 7060, 7131	SW7421, 7470, 7191	SW9310, 9315	SM429	REMARKS
9-15-88	1215	DANGB-3-MW27-GW-1	7	X				X	X			882487 Could not get enough sample for 608, 625, 418.1 today.
9-15-88	1615	DANGB-3-MW33-GW-1	13	X	X	X	X	X	X			882488
9-13-88	0900	DANGB-TB7	3	X								882489

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	9-15-88 1800	Fed Ex Airbill # 9490314120			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Delores M. Navarro	9/17/88 13:50	samples received cold and intact.

1365



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02

1366

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: AAF-W-0053-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092487	88092487	10-15-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.041	102	
Cadmium	88092487	88092487	10-20-88	NA	6010	<0.005	<0.05	<0.05	NC	0.010	<0.05	0.0114	114	
Chromium	88092487	88092487	10-16-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0216	108	
Lead	88092487	88092487	10-16-88	NA	7421	<0.005	<0.05	<0.005	NC	0.020	<0.05	0.0222	111	

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)

1367

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

Project: Duluth ANGB

QC Report No: CVM-W-0031-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092487	88092487	10-14-88	NA	254.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

1398

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: ICP-W-0060-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth..ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092487	88092487	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.198	99	

1369

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):
88092487-88092495
88092509-88092516
88092523-88092526

QC Report No: VGC-W-0048-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092525	1,1-Dichloroethane	10	ND	9.26	93	9.54	95	3	26	70-130
	Trichloroethene	10	ND	9.89	99	10.3	103	4	19	65-131
	Chlorobenzene	10	ND	10.4	104	10.3	103	1	40	59-137
	Aromatics: 8020									
88092525	Benzene	10	ND	8.84	88	10.6	106	18	20	56-146
	Toluene	10	ND	10.1	101	10.1	101	0	41	42-150
	Chlorobenzene	10	ND	10.1	101	10.1	101	0	36	76-133

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

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

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

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

1370

METHOD BLANK SUMMARY

Job No: OR001

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

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-25-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
15	9-21-88	VGC	Carbopack	75-09-2	Dichloromethane	5.3	0.25	88092487-88092489 88092492
49	9-23-88	VGC	Carbopack	75-09-2	Dichloromethane	28	0.25	88092493
32	9-26-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092491
				67-66-3	Chloroform	0.14	0.05	
				127-18-4	Tetrachloroethylene	0.11	0.03	
45	9-20-88	VGC	Vocol	75-09-2	Dichloromethane	4.2	0.25	88092494-88092495

1371

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

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

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

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

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

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

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

RPD: 1 out of 6 outside limits

Spike Recovery: 1 out of 12 outside limits

1373

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

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

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

RPD: 2 out of 6 outside limits

Spike Recovery: 0 out of 12 outside limits

1374

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:	9-22-88		
Date Analyzed (1):	10-16-88	Date Analyzed (2):	10-19-88
Time Analyzed (1):	00:13	Time Analyzed (2):	22:46
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
-	88092488	10-16-88	88092490	10-20-88
-	88092490	10-16-88		

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
WORK ORDER NO(S). 1001
EPA METHOD 8270 ANALYSIS

These samples were first extracted on September 22, 1988, and analyzed on October 29, 1988, all within holding times. Area counts for one or more internal standards were outside EPA QC limits for the base neutral extract of sample 88092490. This extract was re-analyzed. Internal standard area counts met EPA criteria in the second analysis. Two or more surrogate spike recoveries were below EPA QC limits for the base neutral fraction of the blank. The extract was re-analyzed. Surrogate spike recoveries met EPA criteria in the second analysis. The base neutral MSD was analyzed shortly after the expiration of the 12-hour time period. All matrix and surrogate spike recoveries met EPA criteria. The solution deteriorated before it could be re-analyzed. The sixth internal standard in the acid MSD had low area counts in both the first analysis and the re-analysis. Note that no acid spike recoveries are calculated using the sixth internal standard.

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

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

Project: Duluth ANGB

QC Report No: BNA-W-0061-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-17-88
Date Prepared: 9-22-88
Date Analyzed: 11-23-88
Date Reported: 03-23-89
Dilution Factor: NA

Laboratory Supervisor Approval:

137

QC Report for Laboratory Sample No(s):
88092490, 88092488, 88092494-88092495
88092508, 88092511, 88092573-88092579

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	70.4	70	66.7	67	5	28	39-98
B/N	Acenaphthene	100	ND	68.2	68	67.4	67	1	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	62.0	62	61.5	62	1	38	24-96
Sample #	Pyrene	100	ND	78.4	78	70.2	70	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	73.6	74	70.2	70	5	38	41-116
88092490	1,4-Dichlorobenzene	100	ND	62.9	63	61.5	62	2	28	36-97
ACID	Pentachlorophenol	200	ND	46.7	23	62.2	31	28	50	9-103
Laboratory	Phenol	200	ND	99.0	49	115	58	15	42	12-89
Sample #	2-Chlorophenol	200	ND	120	60	128	64	2	40	27-123
	4-Chloro-3-Methylphenol	200	ND	138	69	120	60	14	42	23-97
88092490	4-Nitrophenol	200	ND	101	50	139	70	32	50	10-80

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

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

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

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

METHOD BLANK SUMMARY

Job No: OR001

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

Project: Duluth ANGB

Work Order No.: 1001

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 3-23-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
S0288	10-29-88	AC	1	-	None Detected	-	-	88082488, 88082490
S0592	11-24-88	BN	1	117-81-7	Bis(2-ethylhexyl)phthalate	15	10	88082488, 88082490

1378

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092488,90 BN Blank
Address:	710 S. Illinois Avenue	Lab File ID:	S0289
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-22-88
		Date Analyzed:	10-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	2	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
108-88-3	Toluene	4.39	9	
127-18-4	Tetrachloroethene	5.10	51	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092488,90 BN
Attn:	Bill Hayden		Blank Re-analysis
Address:	710 S. Illinois Avenue	Lab File ID:	S0592
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-22-88
		Date Analyzed:	11-24-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	4	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.26	140	
-	Unknown	3.30	5	
79-01-6	Trichloroethene	3.38	14	
127-18-4	Tetrachloroethene	5.02	15	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092488 AC
Address:	710 S. Illinois Avenue	Lab File ID:	S0286
	Suite F-103	Date Received:	09-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-22-88
		Date Analyzed:	10-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	1	(SepF/Cont/Conc)SepF	

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.10	24	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092488 BN
Attn:	Bill Hayden		
Address:	710 S. Illinois Avenue	Lab File ID:	S0287
	Suite F-103	Date Received:	09-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-22-88
		Date Analyzed:	10-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	2	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.11	15	B
-	Unknown Chlorinated Aromatic	22.54	100	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Client Sample ID:	
Attn:	Bill Hayden	Lab Sample ID:	88092490
Address:	710 S. Illinois Avenue	Lab File ID:	S0591/S0290
	Suite F-103	Date Received:	09-17-88
	Oak Ridge, Tn. 37830	Date Extracted:	09-22-88
		Date Analyzed:	11-23-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	9	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	3.24	67	
-	Unknown	3.32	200	
79-01-6	Trichloroethene	3.42	25	
108-88-3	Toluene	4.33	5	
127-18-4	Tetrachloroethene	5.04	29	B
-	Unknown	14.04	22	
-	Unknown	38.44	4	
-	Unknown	40.14	5	
-	Unknown	40.87	6	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:	OR001	Work Order No.:	1001
		Matrix: (soil/water)	Water
		Sample Wt/vol:	1000 ml
Client:	ES Oak Ridge	Lab Sample ID:	88092488,2490
Attn:	Bill Hayden		AC Blank
Address:	710 S. Illinois Avenue	Lab File ID:	S0288
	Suite F-103	Date Received:	NA
	Oak Ridge, Tn. 37830	Date Extracted:	09-02-88
		Date Analyzed:	10-29-88
		Date Reported:	03-29-89
Project:	Duluth ANGB	Dilution Factor:	1
		% Moisture: dec:	
		not dec:	
		GPC Clean up: (Y/N)	N
		Extraction:	
# TICs Found:	1	(SepF/Cont/Conc)	SepF

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
-	Unknown	5.11	16	

PESTICIDE/PCB STANDARDS 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

Instrument ID: HP5890 #2
GC Column ID: OV-1

Date Reported: 11-11-88

	Date(s) of Analysis	From: 10-15-88	Date of Analysis:	10-16-88
		To: 10-16-88	Time of Analysis:	04:34
	Time(s) of Analysis	From: 00:15	Lab Sample ID: (Standard)	
		To: 22:38		

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.36	1.35	1.37	409400	1.36	465467	Y	13.7
beta-BHC	1.46	1.45	1.47	192400	1.46	208850	Y	8.5
delta-BHC	1.65	1.63	1.67	253250	1.65	285333	Y	12.7
gamma-BHC	1.60	1.58	1.62	373467				
Heptachlor	2.59	2.56	2.62	437033				
Aldrin	3.22	3.19	3.25	338667				
Hept. Epoxide	3.94	3.90	3.98	339067				
Endosulfan I	4.92	4.87	4.97	308533				
Dieldrin	5.77	5.71	5.83	298200				
4,4'-DDE	5.84	5.78	5.90	307867	5.83	349900	Y	13.6
Endrin	6.46	6.40	6.52	280717	6.44	321500	Y	14.5
Endosulfan II	6.58	6.51	6.65	328575				
4,4'-DDD	7.39	7.32	7.46	228992	7.37	248292	Y	8.4
Endo. Sulfate	8.55	8.46	8.64	184175	8.53	217683	N	18.2
4,4'-DDT	9.73	9.63	9.83	302108				
Methoxychlor	14.75	14.60	14.90	163335				
Endrin Ketone	11.00	10.89	11.11	351392	10.97	401442	Y	14.2
a. Chlordane	5.04	4.99	5.09	364700	5.03	409483	Y	12.2
g. Chlordane	4.54	4.49	4.59	351066	4.53	395883	Y	12.8
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: HP5890 #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: 11-11-88

Project: Duluth ANGB

	Date(s) of Analysis	From:	10-15-88	Date of Analysis:	10-16-88		
		To:	10-16-88	Time of Analysis:	21:06		
	Time(s) of Analysis	From:	00:15	Lab Sample ID: (Standard)			
		To:	22:38				

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.36	1.35	1.37	409400				
beta-BHC	1.46	1.45	1.47	192400				
delta-BHC	1.65	1.63	1.67	253250				
gamma-BHC	1.60	1.58	1.62	373467	1.60	396633	Y	6.2
Heptachlor	2.59	2.56	2.62	437033	2.59	454733	Y	4.0
Aldrin	3.22	3.19	3.25	338667	3.22	359100	Y	6.0
Hept. Epoxide	3.94	3.90	3.98	339067	3.94	364967	Y	7.6
Endosulfan I	4.92	4.87	4.97	308533	4.92	331400	Y	7.4
Dieldrin	5.77	5.71	5.83	298200	5.77	314017	Y	5.3
4,4'-DDE	5.84	5.78	5.90	307867				
Endrin	6.46	6.40	6.52	280717				
Endosulfan II	6.58	6.51	6.65	328575	6.58	351458	Y	7.0
4,4'-DDD	7.39	7.32	7.46	228992				
Endo. Sulfate	8.55	8.46	8.64	184175				
4,4'-DDT	9.73	9.63	9.83	302108	9.73	286258	Y	5.2
Methoxychlor	14.75	14.60	14.90	163335	14.75	172323	Y	5.6
Endrin Ketone	11.00	10.89	11.11	351392				
a. Chlordane	5.04	4.99	5.09	364700				
g. Chlordane	4.54	4.49	4.59	351066				
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: HP5890 #2
GC Column ID: Mixed

Client: ES Oak Ridge
Attn: Bill Hayden
Address: /10 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Date Reported: 11-11-88

Project: Duluth ANGB

	Date(s) of Analysis	From:	10-15-88	Date of Analysis:	10-16-88
		To:	10-16-88	Time of Analysis:	22:01
	Time(s) of Analysis	From:	00:15	Lab Sample ID: (Standard)	
		To:	22:38		

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.36	1.35	1.37	409400				
beta-BHC	1.46	1.45	1.47	192400				
delta-BHC	1.65	1.63	1.67	253250				
gamma-BHC	1.60	1.58	1.62	373467	1.61	411100	Y	10.1
Heptachlor	2.59	2.56	2.62	437033	2.60	480717	Y	10.0
Aldrin	3.22	3.19	3.25	338667	3.23	406550		20.0
Hept. Epoxide	3.94	3.90	3.98	339067	3.96	374083	Y	10.3
Endosulfan I	4.92	4.87	4.97	308533	4.94	337267	Y	9.3
Dieldrin	5.77	5.71	5.83	298200	5.79	325900	Y	9.3
4,4'-DDE	5.84	5.78	5.90	307867				
Endrin	6.46	6.40	6.52	280717				
Endosulfan II	6.58	6.51	6.65	328575	6.60	355517	Y	8.2
4,4'-DDD	7.39	7.32	7.46	228992				
Endo. Sulfate	8.55	8.46	8.64	184175				
4,4'-DDT	9.73	9.63	9.83	302108	9.76	301667	Y	0.1
Methoxychlor	14.75	14.60	14.90	163335	14.79	174475	Y	6.8
Endrin Ketone	11.00	10.89	11.11	351392				
a. Chlordane	5.04	4.99	5.09	364700				
g. Chlordane	4.54	4.49	4.59	351066				
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.
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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.

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PESTICIDE/PCB STANDARDS

ɔ No.: OR001

Instrument ID: HP5890 #2
GC Column ID: OV-1

ient: ES Oak Ridge
.tn: Bill Hayden
:dress: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

Date Reported: 11-11-88

roject: Duluth ANGB

	Date(s) of Analysis	From:	10-15-88	Date of Analysis:	10-16-88
		To:	10-16-88	Time of Analysis:	22:38
	Time(s) of Analysis	From:	00:15	Lab Sample ID:	
		To:	22:38	(Standard)	

Compound	RT	RT Window From	RT Window To	Calibration Factor	RT	Calibration Factor	QNT Y/N	%D
alpha-BHC	1.36	1.35	1.37	409400	1.37	450833	Y	10.1
beta-BHC	1.46	1.45	1.47	192400	1.46	208583	Y	8.4
delta-BHC	1.65	1.63	1.67	253250	1.65	277283	Y	9.5
gamma-BHC	1.60	1.58	1.62	373467				
Heptachlor	2.59	2.56	2.62	437033				
Aldrin	3.22	3.19	3.25	338667				
Hept. Epoxide	3.94	3.90	3.98	339067				
Endosulfan I	4.92	4.87	4.97	308533				
Dieldrin	5.77	5.71	5.83	298200				
4,4'-DDE	5.84	5.78	5.90	307867	5.85	345083	Y	12.1
Endrin	6.46	6.40	6.52	280717	6.47	323817	Y	15.4
Endosulfan II	6.58	6.51	6.65	328575				
4,4'-DDD	7.39	7.32	7.46	228992	7.40	266208	Y	16.3
Endo. Sulfate	8.55	8.46	8.64	184175	8.56	211133	Y	14.6
4,4'-DDT	9.73	9.63	9.83	302108				
Methoxychlor	14.75	14.60	14.90	163335				
Endrin Ketone	11.00	10.89	11.11	351392	11.02	392933	Y	11.8
a. Chlordane	5.04	4.99	5.09	364700	5.05	403517	Y	10.6
g. Chlordane	4.54	4.49	4.59	351066	4.54	387800	Y	10.5
Toxaphene								
Aroclor-1016								
Aroclor-1221								
Aroclor-1232								
Aroclor-1242								
Aroclor-1248								
Aroclor-1254								
Aroclor-1260								

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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.

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GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date & Time 10/29/88 10:45

Lab ID >I1029::03 Data Release Authorized By:

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	46.37 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	54.78	
70	less than 2.0% of mass 69	.06 OK	(.1[illegible]) #1
127	40.0 - 60.0% of mass 198	43.11 OK	
197	less than 1.0% of mass 198	.34 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.07 OK	
275	10.0 - 30.0% of mass 198	16.18 OK	
365	greater than 1.00% of mass 198	1.49 OK	
441	present, but less than mass 443	6.44 OK	
442	greater than 40.0% of mass 198	45.07 OK	
443	17.0 - 23.0% of mass 442	8.00 OK	(17.74) #2

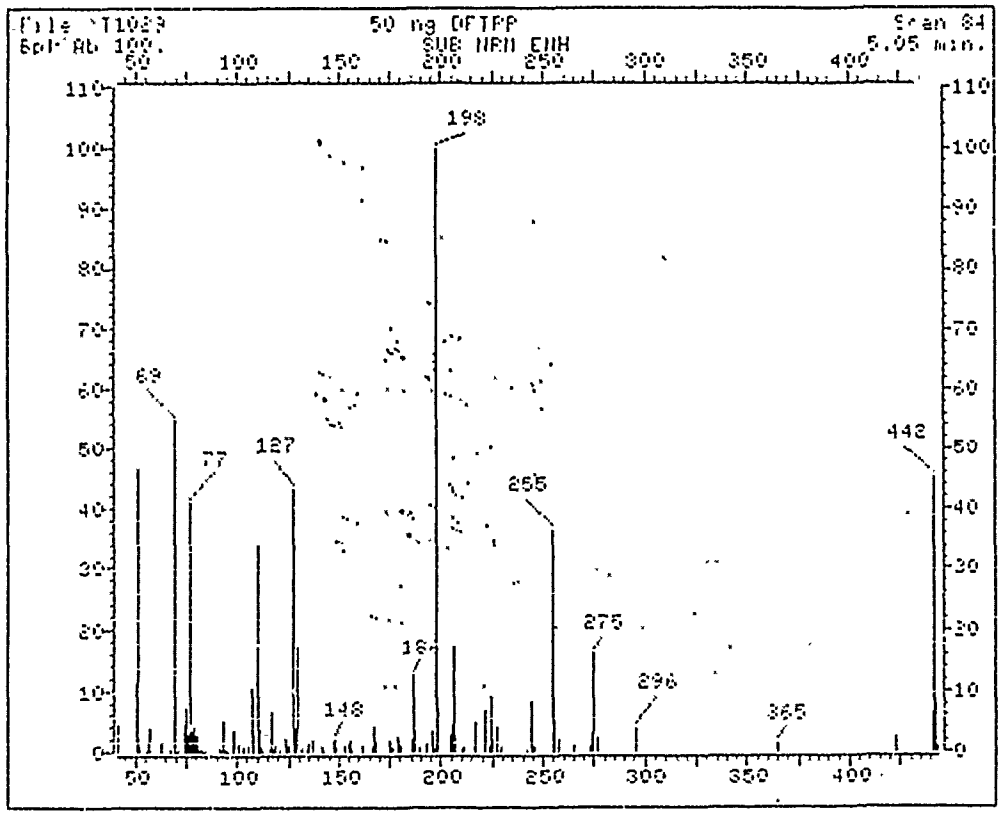
5 point 10/12/88

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	>I1029	10/29/88	10:45
STD 0608	S0283		11:03
8809247[illegible] AC	S0284		12:15
8809247[illegible] BW	S0285		13:14
8809248[illegible] AC	S0286		14:13
8809248[illegible] BW	S0287		15:13
8809248[illegible] AC BLK	S0288		16:12
8809248[illegible] BW BLK	S0289		17:11
8809249[illegible] AC	S0290		18:10
8809249[illegible] BW	S0291		19:09
8809249[illegible] ACMS	S0292		20:08
8809249[illegible] BWMS	S0293		21:07
8809249[illegible] ACMSD	S0294		22:07
8809249[illegible] BWMSD	S0295		23:06

another project



File: >T1029 Scan #: 84 Retn. time: 5.05

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	4.604	83.10	.459	119.05	1.331	168.05	1.903	223.00	1.088
43.10	.066	84.10	.056	121.15	.291	175.05	1.763	224.00	9.226
50.10	11.261	85.00	.488	123.15	2.269	176.05	.797	225.00	2.175
51.10	46.367	91.10	.759	124.05	.750	177.05	.750	227.00	4.135
52.10	2.485	92.00	.319	125.15	1.481	179.05	2.353	229.00	.910
53.00	.291	93.10	5.176	127.05	43.113	180.05	1.725	242.10	.225
55.10	.084	94.00	.347	128.15	3.779	180.85	1.041	244.00	8.345
56.00	1.360	95.00	.516	129.05	17.450	185.05	2.007	245.10	.975
57.10	3.704	96.10	.131	131.05	.281	186.05	12.424	246.00	1.238
58.00	.263	98.10	3.572	134.15	.347	186.95	3.497	255.00	36.353
63.00	1.575	99.00	3.610	135.05	1.510	188.95	.703	256.00	5.120
67.10	.572	101.00	1.632	137.15	1.650	193.05	1.491	257.90	2.072
69.00	54.777	103.00	.731	142.05	.703	196.00	3.591	264.90	.975
70.00	.056	103.90	.638	142.65	.244	196.80	.338	272.90	.963
71.10	.459	105.10	1.125	147.15	1.782	198.00	100.000	273.90	3.150
74.10	4.604	107.10	10.549	148.05	2.147	199.00	7.070	275.05	16.184
75.10	7.323	108.00	2.888	149.05	.684	204.00	2.654	276.05	2.382
76.00	2.672	110.00	33.915	153.15	1.013	205.10	4.519	295.95	3.957
77.10	40.928	111.00	3.638	155.05	1.331	206.10	17.253	365.00	1.491
78.10	3.469	112.00	.778	156.05	1.800	207.10	2.719	422.90	2.363
79.00	4.191	112.90	.197	156.95	.581	210.00	.263	441.05	6.442
80.10	2.729	115.80	.516	161.15	1.219	211.10	.835	442.05	15.073
81.10	2.625	117.00	6.517	166.15	.675	217.00	4.941	443.05	7.998
82.00	.581	117.80	.291	167.05	4.069	221.10	6.929	444.05	.844

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/29/88

Contractor: ENGINEERING-SCIENCE Time: 11:03

Contract No: Laboratory ID: >S0283

Instrument ID: 1 Initial Calibration Date: 10/13/88 12 D80

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.63269	29.83		
2-Fluorophenol	1.15802	.97598	15.72		
bis(2-Chloroethyl)ether	1.11892	.69169	38.18		
Phenol	1.41657	1.01917	28.05	*	
Phenol-d5	1.22488	.95373	22.14		
Aniline	.54193	.40360	25.52		
2-Chlorophenol	1.23175	.97498	20.85		
1,3-Dichlorobenzene	1.47535	1.06970	27.50		
1,4-Dichlorobenzene	1.49530	1.04071	25.94	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.57708	20.85		
1,2-Dichlorobenzene	1.32240	1.08352	18.06		
2-Methylphenol	1.17367	1.01327	13.67		
3-&-4-Methylphenol	1.07139	.98027	8.51		
bis(2-chloroisopropyl)Ether	2.15627	1.98117	8.12		
N-Nitroso-Di-n-Propylamine	.84050	.60685	27.80	**	
Hexachloroethane	.53840	.43075	19.99		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.31205	22.59		
Nitrobenzene-d5	.39137	.30772	21.38		
2-Nitrophenol	.24657	.20493	16.89	*	
Isophorone	.74170	.62960	15.11		
bis(2-Chloroethoxy)methane	.49386	.38663	21.71		
2,4-Dimethylphenol	.34849	.29790	14.52		
Benzoic Acid	.29725	.21859	26.46		
2,4-Dichlorophenol	.56733	.48788	14.00	*	
1,2,4-Trichlorobenzene	.36913	.29288	20.66		
Naphthalene	.94589	.67842	28.28		
4-Chloroaniline	.36309	.29365	19.13		
Hexachlorobutadiene	.20283	.17052	15.93	*	
4-Chloro-3-Methylphenol	.31360	.27237	13.15	*	
2-Methylnaphthalene	.56397	.46751	17.14		

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
#5k Compounds

Case No: Calibration Date: 10/29/88

Contractor: ENGINEERING-SCIENCE Time: 11:03

Contract No: Laboratory ID:)S0283

Instrument ID: (Initial Calibration Date: 10/13/88 10/25/88

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

Compound	RF	$\overline{RF}$	%Diff.	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.24856	15.94		**
2,4,6-Trichlorophenol	.42280	.31846	24.68	*	
2,4,5-Trichlorophenol	.52897	.39460	25.40		
2-Fluorobiphenyl	1.27220	.80642	36.61		
2-Chloronaphthalene	1.23784	.82290	33.52		
2-Nitroaniline	.47288	.34636	26.76		
Dimethylphthalate	1.40629	.92771	34.03		
2,6-Dinitrotoluene	.37415	.28905	22.75		
Acenaphthylene	1.68918	1.07416	36.41		
3-Nitroaniline	.44557	.31738	28.77		
2,4-Dinitrophenol	.11898	.07808	34.38		**
Acenaphthene	1.13011	.68204	39.65	*	
Dibenzofuran	1.64131	1.12401	31.52		
2,4-Dinitrotoluene	.28418	.19752	30.50		
4-Nitrophenol	.28450	.15962	43.89		**
Fluorene	1.12850	.63893	43.38		
Diethylphthalate	1.20939	.72756	39.84		
4-Chlorophenyl-phenylether	.59183	.41048	30.64		
4-Nitroaniline	.35956	.24587	31.62		
2,4,6-Tribromophenol	.21023	.17063	18.84		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.34293	14.88	*	
4,6-Dinitro-2-methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.19096	10.59		
Hexachlorobenzene	.26273	.24082	8.34		
Pentachlorophenol	.14536	.11278	22.41	*	

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 (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/29/88

Contractor: ENGINEERING-SCIENCE Time: 11:03

Contract No: Laboratory ID:)S0283

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	.74341	28.13		
Anthracene	1.05155	.83424	20.67		
Di-n-Butylphthalate	1.51956	1.21006	20.37		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	.89416	24.86	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.03074	23.59		
Pyrene	1.56986	1.17084	24.99		
Terphenyl-d14	1.05835	.83737	20.88		
Butylbenzylphthalate	1.03390	.79444	23.16		
3,3'-Dichlorobenzidine	.13689	.16827	22.92		
Chrysene	.99655	.78768	20.96		
Benzo(a)Anthracene	1.10107	.83940	23.97		
bis(2-Ethylhexyl)Phthalate	1.21873	.97876	19.16		
Di-n-octylphthalate	3.49275	2.21120	35.02	*	
Benzo(a)Pyrene	1.32098	1.00593	23.85	*	
Benzo(b)Fluoranthene	1.69950	.98945	38.49		
Indeno(1,2,3-cd)Pyrene	.96900	.85453	11.72		
Dibenzo(a,h)Anthracene	.87481	.80530	7.95		
Benzo(k)Fluoranthene	1.44370	1.05734	26.76		
Benzo(g,h,i)Perylene	.89761	.81029	9.73		

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 Contract: ORØØ1

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

Sample No. (Standard): SSTD060 Date Analyzed: 10/29/88

Lab File ID (Standard): S0283 Time Analyzed: 11:03

Instrument ID: 1

	EPA SAMPLE NO.	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	69954	9.28	238625	12.92	158951	18.40
	UPPER LIMIT	139908	9.78	477250	13.42	317902	18.90
	LOWER LIMIT	34977	8.78	119313	12.42	79476	17.90
01	88092471 AC	67985	9.21	257011	12.86	143405	18.32
02	88092471 BN	62250	9.20	220382	12.86	136488	18.34
03	88092488 AC	58113	9.20	162929	12.91	127992	18.33
04	88092488 BN	62395	9.20	223234	12.86	134997	18.33
S0285-05	88092489 AC BLK	59963	9.22	169034	12.90	128564	18.35
S0289-06	88092490 BN BLK	64631	9.20	207875	12.88	132283	18.33
S0290-07	88092492 AC	67092	9.19	257424	12.87	138189	18.30
S0291-08	88092490 BN	55464	9.22	159673	12.91	113713	18.33
S0292-09	88092490 AC MS	59773	9.19	208036	12.86	125721	18.29
S0293-10	88092490 BN MS	61956	9.18	211422	12.82	125216	18.29
S0294-11	88092490 AC MSD	53787	9.18	182099	12.87	111079	18.28
S0295-12	88092490 BN MSD	57769	9.18	223714	12.82	116858	18.28
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							

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

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

Column used to flag internal standard area values with an asterisk

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0001

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

Sample No.(Standard): SSTD060 Date Analyzed: 10/29/88

Lab File ID (Standard): S0283 Time Analyzed: 11:03

Instrument ID: |

		IS4(PHN) AREA #	IS4(PHN) RT	IS5(CRY) AREA #	IS5(CRY) RT	IS6(PRY) AREA #	IS6(PRY) RT
	12 HOUR STD	233727	23.08	162876	31.55	122270	37.71
	UPPER LIMIT	467454	23.58	325752	32.05	244540	38.21
	LOWER LIMIT	116864	22.58	81438	31.05	61135	37.21
	EPA SAMPLE NO.						
01	8809247I AC	216917	23.02	123814	31.49	80213	37.67
02	8809247I BN	195845	23.06	111084	31.50	65327	37.70
03	8809248 AC	186193	23.02	103213	31.51	66542	37.68
04	8809248 BN	195399	22.98	123489	31.47	76080	37.61
S0288 05	8809248.90 AC BLK	185858	23.04	103256	31.54	61841	37.71
S0289 06	8809248.90 BN BLK	192157	23.03	107460	31.52	63540	37.73
S0290 07	8809249O AC	194670	23.01	99729	31.49	61852	37.69
S0291 08	8809249O BN	166805	23.08	97109	31.55	59154*	37.73
S0292 09	8809249OAC MS	185088	22.97	115808	31.46	69604	37.64
S0293 10	8809249OBN MS	191742	23.02	113482	31.49	66633	37.66
S0294 11	8809249OAC MSD	158391	22.98	85077	31.44	50072*	37.68
S0295 12	8809249OBN MSD	178183	23.03	101425	31.52	61313	37.71
	13						
	14						
	15						
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	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: >T1123 DFTPP Injection Date: 11/23/88

Instrument ID: 70 1 DFTPP Injection Time: 13:57

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	55.2
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	43.3
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	7.0
275	10.0 - 30.0% of mass 198	18.5
365	Greater than 1.00% of mass 198	1.62
441	Present, but less than mass 443	7.1
442	Greater than 40.0% of mass 198	43.8
443	17.0 - 23.0% of mass 442	8.5(19.5)2

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

SPoint 10/12

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

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED	
01	80 ug/ml BNA STD	>S0582	11/23/88	14:18	
02	88082151 REX 1ml +IS	>S0583	11/23/88	15:25	another
03	88092203 1ml REANAL.	>S0584	11/23/88	16:50	
04	88092275 1ml REANAL.	>S0585	11/23/88	17:49	another
05	88092320 1ml REANAL.	>S0586	11/23/88	18:48	
06	88092427 AC REANAL.	>S0587	11/23/88	19:48	
07	88092427 BN REANAL.	>S0588	11/23/88	20:47	
08	88092490 AC MSD REAN	>S0589	11/23/88	21:47	
09	88092490 BN MSD REAN	>S0590	11/23/88	22:46	
10	88092490 BN REANALYS	>S0591	11/23/88	23:45	
11	88092488,90 BN BLANK	>S0592	11/24/88	0:44	
12	88081896 MSD REANAL.	>S0593	11/24/88	1:43	another
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/23/88

Contractor: ENGINEERING-SCIENCE Time: 14:18

Contract No: Laboratory ID:)S0582

Instrument ID: 1 Initial Calibration Date: 10/12/88 12/20

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.01880	12.99		
2-Fluorophenol	1.15802	1.28651	11.10		
bis(2-Chloroethyl)ether	1.11892	1.21002	8.14		
Phenol	1.41657	1.43946	1.62	*	
Phenol-d5	1.22488	1.20889	1.31		
Aniline	.54193	.51340	5.26		
2-Chlorophenol	1.23175	1.21907	1.03		
1,3-Dichlorobenzene	1.47535	1.41896	3.82		
1,4-Dichlorobenzene	1.40530	1.35041	3.91	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.68094	6.60		
1,2-Dichlorobenzene	1.32240	1.38380	4.64		
2-Methylphenol	1.17367	1.25939	7.30		
3-6-4-Methylphenol	1.07139	1.33048	24.18		
bis(2-chloroisopropyl)Ether	2.15627	3.31026	53.52		
N-Nitroso-Di-n-Propylamine	.84050	.87182	3.73		**
Hexachloroethane	.53840	.58182	8.06		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.48005	19.08		
obenzene-d5	.39137	.45495	16.24		
-Nitrophenol	.24657	.26034	5.59	*	
Isophorone	.74170	.84382	13.77		
bis(2-Chloroethoxy)methane	.49366	.54666	10.69		
2,4-Dimethylphenol	.34849	.39919	14.55		
Benzoic Acid	.29725	.36502	22.80		
2,4-Dichlorophenol	.56733	.55776	1.69	*	
1,2,4-Trichlorobenzene	.36913	.35368	4.19		
Naphthalene	.94589	.93690	.95		
4-Chloroaniline	.36309	.35662	1.78		
Hexachlorobutadiene	.20283	.21844	7.70	*	
4-Chloro-3-Methylphenol	.31360	.35550	13.36	*	
2-Methylnaphthalene	.56397	.59514	5.53		

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: 11/23/88

Contractor: ENGINEERING-SCIENCE Time: 14:18

Contract No: ---------- Laboratory ID: >S0582

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.40017	35.34		**
2,4,6-Trichlorophenol	.42280	.39890	5.65	*	
2,4,5-Trichlorophenol	.52897	.45488	14.01		
2-Fluorobiphenyl	1.27220	1.07995	15.11		
2-Chloronaphthalene	1.23784	1.12211	9.35		
2-Nitroaniline	.47288	.61193	29.41		
Dimethylphthalate	1.40629	1.26473	10.07		
2,6-Dinitrotoluene	.37415	.32979	11.85		
Acenaphthylene	1.68918	1.51312	10.42		
3-Nitroaniline	.44557	.53410	19.87		
2,4-Dinitrophenol	.11898	.13820	16.16		**
Acenaphthene	1.13011	.94933	16.00	*	
Dibenzofuran	1.64131	1.54377	5.94		
2,4-Dinitrotoluene	.28418	.33432	17.65		
4-Nitrophenol	.28450	.27823	2.20		**
Fluorene	1.12850	.93980	16.72		
Diethylphthalate	1.20939	1.05517	12.75		
4-Chlorophenyl-phenylether	.59183	.53320	9.91		
4-Nitroaniline	.35956	.35602	.99		
2,4,6-Tribromophenol	.21023	.24403	16.08		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.44914	11.49	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23357	9.65		
Hexachlorobenzene	.26273	.29171	11.03		
Pentachlorophenol	.14536	.15899	9.38	*	

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 (**)

1398

Continuing Calibration Check
HSL Compounds

Case No: ---------- Calibration Date: 11/23/88

Contractor: ENGINEERING-SCIENCE Time: 14:18

Contract No: ---------- Laboratory ID: 250582

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	1.01222	2.14		
Anthracene	1.05155	.99911	4.99		
Di-n-Butylphthalate	1.51956	1.42007	6.55		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.10949	6.80	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.11687	190.51		
Pyrene	1.56086	1.52755	2.13		
Terphenyl-d14	1.05835	1.14501	8.19		
Butylbenzylphthalate	1.03390	1.02287	1.07		
3,3'-Dichlorobenzidine	.13689	.24249	77.15		
Chrysene	.99655	.97014	2.65		
Benzo(a)Anthracene	1.10407	1.10945	.49		
bis(2-Ethylhexyl)Phthalate	1.21073	1.19368	1.41		
Di-n-octylphthalate	3.40275	2.96565	12.85	*	
Benzo(a)Pyrene	1.32098	1.25447	5.04	*	
Benzo(b)Fluoranthene	1.60850	1.57313	2.20		
Indeno(1,2,3-cd)Pyrene	.96200	1.16842	20.70		
Dibenzo(a,h)Anthracene	.87481	1.01669	16.22		
Benzo(k)Fluoranthene	1.44370	1.22617	15.07		
Benzo(g,h,i)Perylene	.89761	1.03235	15.01		

PF - 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): >S0582 Date Analyzed:11/23/88

Instrument ID: 70 1 Time Analyzed: 14:18

	IS1(DCB)		IS2(NPT)		IS3(ANT)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	110161.	9.13	378239.	12.75	225146.	18.22
UPPER LIMIT	220322.		756478.		450292.	
LOWER LIMIT	55080.		189119.		112573.	
SAMPLE NO.						
01 88082151 REX	90368.	9.10	353995.	12.70	192264.	18.19
02 88092203 lml	77375.	8.99	342570.	12.54	126515.	18.22
03 88092275 lml	103775.	9.08	403682.	12.71	225212.	18.18
04 88092320 lml	113901.	9.10	448035.	12.70	251239.	18.19
05 88092427 AC	150437.	9.10	581669.	12.71	317484.	18.19
06 88092427 BN	155825.	9.10	562689.	12.71	338558.	18.19
07 88092490 AC	88412.	9.10	326598.	12.72	164266.	18.18
08 88092490 BN	86492.	9.09	324925.	12.70	176608.	18.18
09 88092490 BN	82891.	9.09	297377.	12.73	167281.	18.19
10 88092488,90	95681.	9.10	330243.	12.73	178938.	18.20
11 88081896 MSD	110299.	9.11	16247.*	12.72	0.*	0.00
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

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

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

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name:Engineering Science Contract:_____.

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

Lab File ID (Standard): >S0582 Date Analyzed:11/23/88

Instrument ID: 70 1 Time Analyzed: 14:18

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
12 HOUR STD	370099.	22.86	259398.	31.32	184115.	37.31
UPPER LIMIT	740198.		518796.		368230.	
LOWER LIMIT	185049.		129699.		92058.	
EPA SAMPLE NO.						
01 88082151 REX	277522.	22.84	203069.	31.28	122158.	37.29
02 88092203 1ml	242424.	22.87	208016.	31.30	114199.	37.32
03 88092275 1ml	321444.	22.84	255289.	31.29	111029.	37.29
04 88092320 1ml	408339.	22.84	320851.	31.29	154639.	37.28
05 88092427 AC	525322.	22.85	371218.	31.30	149209.	37.31
06 88092427 BN	548249.	22.85	403509.	31.30	179537.	37.31
07 88092490 AC	281822.	22.83	196396.	31.29	34247.*	37.35
08 88092490 BN	307045.	22.86	220190.	31.30	54237.*	37.35
09 88092490 BN	273616.	22.87	190480.	31.31	37583.*	37.36
10 88092488,90	315459.	22.88	240348.	31.29	99003.	37.32
11 88081896 MSD	31388.*	22.84	19490.*	31.30	464.*	37.34
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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: >T1212 DFTPP Injection Date: 12/12/88

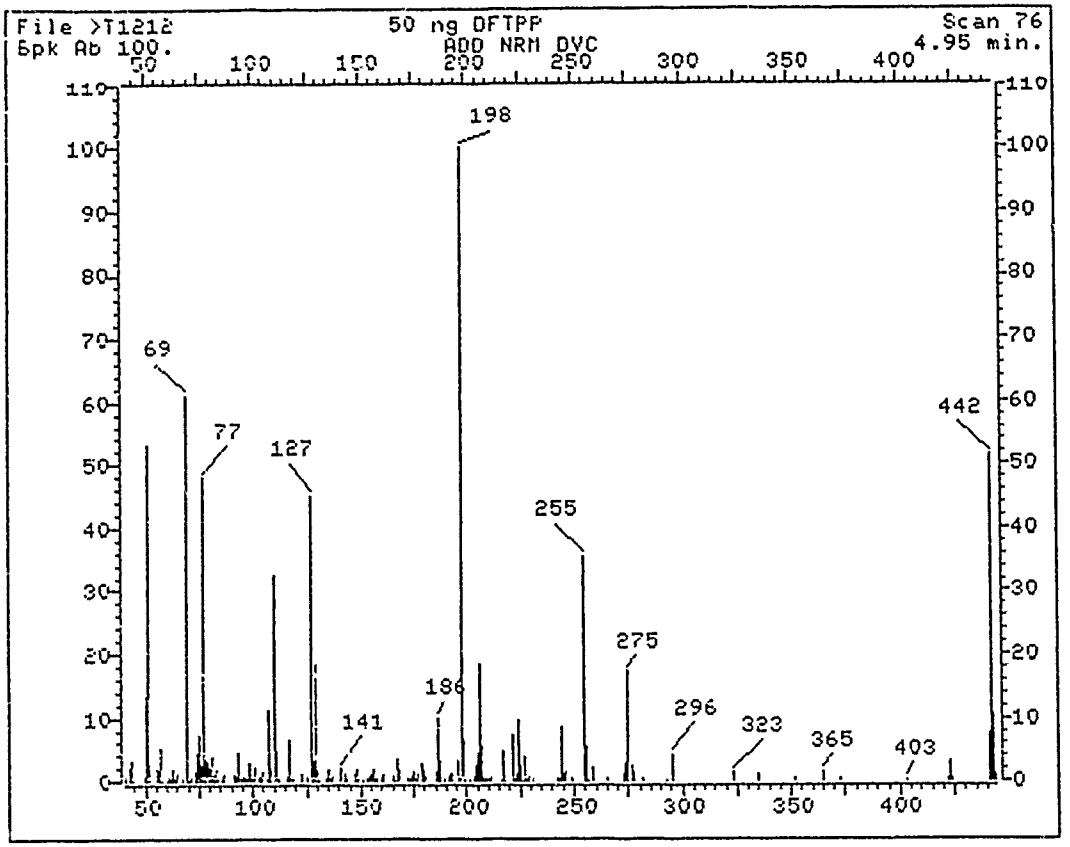
Instrument ID: 70 1 DFTPP Injection Time: 12:03

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	53.0
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	61.
70	Less than 2.0% of mass 69	.2(.4)1
127	40.0 - 60.0% of mass 198	45.1
197	Less than 1.0% of mass 198	.3
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.4
275	10.0 - 30.0% of mass 198	17.2
365	Greater than 1.00% of mass 198	1.60
441	Present, but less than mass 443	7.4
442	Greater than 40.0% of mass 198	51.4
443	17.0 - 23.0% of mass 442	10.5(20.4)

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

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	>S0695	12/12/88	12:26
02	88081946 1ml REANAL.	>S0696	12/12/88	13:38
03	88092490 AC BLK MS	>S0697	12/12/88	14:50
04	88092490 BN BLK MS	>S0698	12/12/88	15:49
05	88092490 AC BLK MSD	>S0699	12/12/88	16:52
06	88092490 BN BLK MSD	>S0700	12/12/88	17:51
07	88092556,58,73-75 BN BLK RA	>S0701	12/12/88	18:51
08	88092576 AC REANAL.	>S0702	12/12/88	19:51
09	88092576 BN REANAL.	>S0703	12/12/88	20:50
10	88113080-83 AC BLANK	>S0704	12/12/88	21:49
11	88113080-83 BN BLANK	>S0705	12/12/88	22:49
12	88113080 AC 1ml	>S0706	12/12/88	23:48
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22				



File: >T1212 Scan #: 76 Retn. time: 4.95

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	.816	86.10	.983	131.05	.206	186.05	10.031	230.70	.186
43.10	2.044	87.00	.206	134.05	.379	187.05	3.149	231.20	.411
44.10	2.969	91.10	1.073	135.15	1.870	189.05	.463	242.00	.578
45.10	.186	92.00	.771	136.15	.482	191.05	.784	243.00	.578
49.10	.893	93.00	4.338	137.05	.655	192.05	1.067	244.10	8.457
50.10	13.200	94.00	.308	141.15	1.999	193.15	1.009	245.10	1.150
51.10	52.979	95.10	.752	142.15	1.003	196.10	3.220	246.00	1.517
52.10	2.731	96.10	.919	143.15	.283	196.80	.341	249.00	.296
55.10	2.198	96.20	.418	147.15	1.112	198.10	100.000	255.10	35.255
56.10	1.883	96.90	.296	148.05	1.761	199.10	6.381	256.10	5.610
57.10	5.006	97.20	.366	148.95	.465	200.10	.533	257.10	.238
58.00	.193	98.00	2.918	151.05	.174	201.40	.206	258.10	1.960
60.10	.186	99.10	2.705	153.05	.553	201.60	.218	265.10	.476
61.20	.925	100.00	.308	154.05	.636	203.10	.713	273.10	1.131
62.20	.328	101.10	2.211	155.05	1.035	204.20	2.526	274.15	2.905
63.10	1.870	103.00	.816	156.15	1.697	205.10	4.486	275.15	17.152
64.10	.366	104.00	.700	157.15	.347	206.10	18.283	276.15	2.301
65.00	1.009	105.00	1.356	157.85	.257	207.10	5.353	277.15	1.395
67.20	.321	106.10	.283	160.15	.630	208.20	.604	281.15	.283
69.00	60.960	107.00	11.169	161.05	.977	209.10	.347	293.05	.251
69.80	.154	108.00	1.947	165.15	.688	210.40	.398	296.05	4.151
70.10	.218	110.00	32.530	166.05	.167	211.10	.848	297.15	.251
70.90	.636	111.10	4.762	167.15	3.605	216.00	.161	323.15	1.375
73.10	1.510	112.10	.437	168.05	1.787	217.10	4.775	334.15	1.003
74.10	4.543	116.00	.893	172.15	.463	218.10	.598	352.10	.353
75.00	7.294	116.20	.508	173.05	.308	221.20	7.159	365.10	1.600

77.10	47.966	118.05	.392	175.05	1.266	222.10	.289	403.10	.193
78.10	3.874	119.15	.296	176.05	.283	223.20	1.022	422.10	.257
79.00	3.781	122.15	.810	177.15	.945	224.10	9.466	423.10	3.065
80.10	2.185	123.05	1.247	178.35	.154	225.10	2.442	424.10	.289
81.00	3.727	125.15	.803	179.05	2.847	226.10	.231	441.25	7.371
82.00	1.189	127.05	45.061	180.05	1.838	227.10	3.759	442.25	51.353
83.10	1.619	128.15	3.265	181.05	.913	228.10	.437	443.25	10.456
84.00	.315	129.05	18.354	185.05	1.504	229.10	.913	444.25	.945
85.10	.925	130.15	1.838						

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/12/88

Contractor: ENGINEERING-SCIENCE Time: 12:26

Contract No: Laboratory ID: >S0695

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.14361	26.83		
2-Fluorophenol	1.15802	1.44569	24.84		
bis(2-Chloroethyl)ether	1.11892	1.16253	3.90		
Phenol	1.41657	1.63200	15.21	*	
Phenol-d5	1.22488	1.47079	20.08		
Aniline	.54193	.57836	6.72		
2-Chlorophenol	1.23175	1.28520	4.34		
1,3-Dichlorobenzene	1.47535	1.41057	4.39		
1,4-Dichlorobenzene	1.40530	1.36197	3.08	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.80825	10.86		
1,2-Dichlorobenzene	1.32240	1.44740	9.45		
2-Methylphenol	1.17367	1.62145	38.15		
3-&-4-Methylphenol	1.07139	1.47211	37.40		
bis(2-chloroisopropyl)Ether	2.15627	3.52153	63.32		
N-Nitroso-Di-n-Propylamine	.84059	.94432	12.35		**
Hexachloroethane	.53840	.58979	9.55		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.58690	45.59		
Nitrobenzene-d5	.39137	.47054	20.23		
2-Nitrophenol	.24657	.26986	9.45	*	
Isophorone	.74170	.93181	25.63		
bis(2-Chloroethoxy)methane	.49386	.60737	22.99		
2,4-Dimethylphenol	.34849	.43669	25.31		
Benzoic Acid	.29725	.37463	26.03		
2,4-Dichlorophenol	.56733	.58998	3.99	*	
1,2,4-Trichlorobenzene	.36913	.33729	8.63		
Naphthalene	.94589	.96141	1.64		
4-Chloroaniline	.36309	.37674	3.76		
Hexachlorobutadiene	.20283	.20112	.85	*	
4-Chloro-3-Methylphenol	.31360	.34493	9.99	*	
2-Methylnaphthalene	.56397	.60321	6.96		

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 (**)

1405

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/12/88

Contractor: ENGINEERING-SCIENCE Time: 12:26

Contract No: Laboratory ID: >S0695

Instrument ID: A Initial Calibration Date: 10/12/88 12/20

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.29034	1.81		**
2,4,6-Trichlorophenol	.42280	.39314	7.02	*	
2,4,5-Trichlorophenol	.52897	.45145	14.65		
2-Fluorobiphenyl	1.27220	1.10578	13.08		
2-Chloronaphthalene	1.23784	1.07869	12.86		
2-Nitroaniline	.47288	.60353	27.63		
Dimethylphthalate	1.40629	1.25087	11.05		
2,6-Dinitrotoluene	.37415	.35425	5.32		
Acenaphthylene	1.68918	1.48707	11.96		
3-Nitroaniline	.44557	.61460	37.94		
2,4-Dinitrophenol	.11898	.11732	1.39		**
Acenaphthene	1.13011	.96538	14.58	*	
Dibenzofuran	1.64131	1.51553	7.66		
2,4-Dinitrotoluene	.28418	.32379	13.94		
4-Nitrophenol	.28450	.20909	26.51		**
Fluorene	1.12850	.91912	18.55		
Diethylphthalate	1.20939	1.06955	11.56		
4-Chlorophenyl-phenylether	.59183	.48639	17.82		
4-Nitroaniline	.35956	.24529	31.78		
2,4,6-Tribromophenol	.21023	.18566	11.69		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47780	18.60	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23431	10.00		
Hexachlorobenzene	.26273	.27960	6.42		
Pentachlorophenol	.14536	.14228	2.12	*	

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 (**)

1406

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 12/12/88

Contractor: ENGINEERING-SCIENCE Time: 12:26

Contract No: Laboratory ID: >S0695

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	1.03988	.54		
Anthracene	1.05155	1.07866	2.58		
Di-n-Butylphthalate	1.51956	1.40664	7.43		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.14507	3.81	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.03980	1.08		
Pyrene	1.56086	1.63251	4.59		
Terphenyl-d14	1.05835	1.15156	8.81		
Butylbenzylphthalate	1.03390	1.09198	5.62		
3,3'-Dichlorobenzidine	.13689	.21635	58.04		
Chrysene	.99655	1.01433	1.78		
Benzo(a)Anthracene	1.10407	1.11777	1.24		
bis(2-Ethylhexyl)Phthalate	1.21073	1.27685	5.46		
Di-n-octylphthalate	3.40275	3.51457	3.29	*	
Benzo(a)Pyrene	1.32098	1.28330	2.85	*	
Benzo(b)Fluoranthene	1.60850	1.64318	2.16		
Indeno(1,2,3-cd)Pyrene	.96800	1.17578	21.46		
Dibenzo(a,h)Anthracene	.87481	.96221	9.99		
Benzo(k)Fluoranthene	1.44370	1.35704	6.00		
Benzo(g,h,i)Perylene	.89761	.85339	4.93		

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 (**)

1407

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0695 Date Analyzed:12/12/88

Instrument ID: 70 1 Time Analyzed: 12:26

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	150067.	9.10	508687.	12.72	327542.	18.20
UPPER LIMIT	300134.		1017374.		655084.	
LOWER LIMIT	75033.		254344.		163771.	
SAMPLE NO.						
01 88081946 1ml	171949.	8.90	582233.	12.72	269315.	18.21
02 88092490 AC	133851.	9.23	485033.	12.94	229866.	18.35
03 88092490 BN	137356.	9.10	522629.	12.72	280388.	18.20
04 88092490 AC	131373.	9.10	480265.	12.82	232304.	18.21
05 88092490 BN	129703.	9.11	474739.	12.74	254225.	18.20
06 88092556,58,	108787.	9.16	312185.	12.85	218133.	18.29
07 88092576 AC	125579.	9.14	477698.	12.85	237660.	18.27
08 88092576 BN	150290.	9.11	524945.	12.77	281434.	18.26
09 88113080-83	125415.	9.13	498029.	12.84	256277.	18.27
10 88113080-83	144919.	9.13	489220.	12.79	287886.	18.28
11 88113080 AC	141560.	9.13	449050.	12.80	288793.	18.24
12						
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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): >S0695 Date Analyzed: 12/12/88

Instrument ID: 70 1 Time Analyzed: 12:26

	IS4(PHN)		IS5(CRY)		IS3(PRY)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	471409.	22.85	308347.	31.32	184622.	37.41
UPPER LIMIT	942818.		616694.		369244.	
LOWER LIMIT	235705.		154173.		92311.	
EPA SAMPLE NO.						
01 88081946 1ml	376572.	22.87	139326.*	31.33	36657.*	37.45
02 88092490 AC	406909.	23.04	213083.	31.53	80005.*	37.64
03 88092490 BN	445639.	22.94	238630.	31.41	90973.*	37.54
04 88092490 AC	389693.	22.90	209036.	31.41	71658.*	37.56
05 88092490 BN	391867.	22.97	204062.	31.42	46053.*	37.60
06 88092556,58,	318169.	23.01	172186.	31.42	68829.*	37.58
07 88092576 AC	358438.	22.97	177287.	31.43	56414.*	37.61
08 88092576 BN	423774.	22.95	242871.	31.38	43934.*	37.53
09 88113080-83	376720.	22.96	181338.	31.41	100067.	37.53
10 88113080-83	419881.	22.96	232429.	31.40	133007.	37.51
11 88113080 AC	424287.	22.91	204775.	31.39	115749.	37.49
12						
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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 11/04/88 12:38

Lab ID >11104::AQ Data Release Authorized By: [signature]

m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	41.37 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	50.99	
70	less than 2.0% of mass 69	.99 OK	(1.775) #1
127	40.0 - 60.0% of mass 198	42.05 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	7.48 OK	
275	10.0 - 30.0% of mass 198	17.62 OK	
365	greater than 1.00% of mass 198	1.71 OK	
441	present, but less than mass 443	8.36 OK	
442	greater than 40.0% of mass 198	54.84 OK	
443	17.0 - 23.0% of mass 442	11.37 OK	(20.73) #2

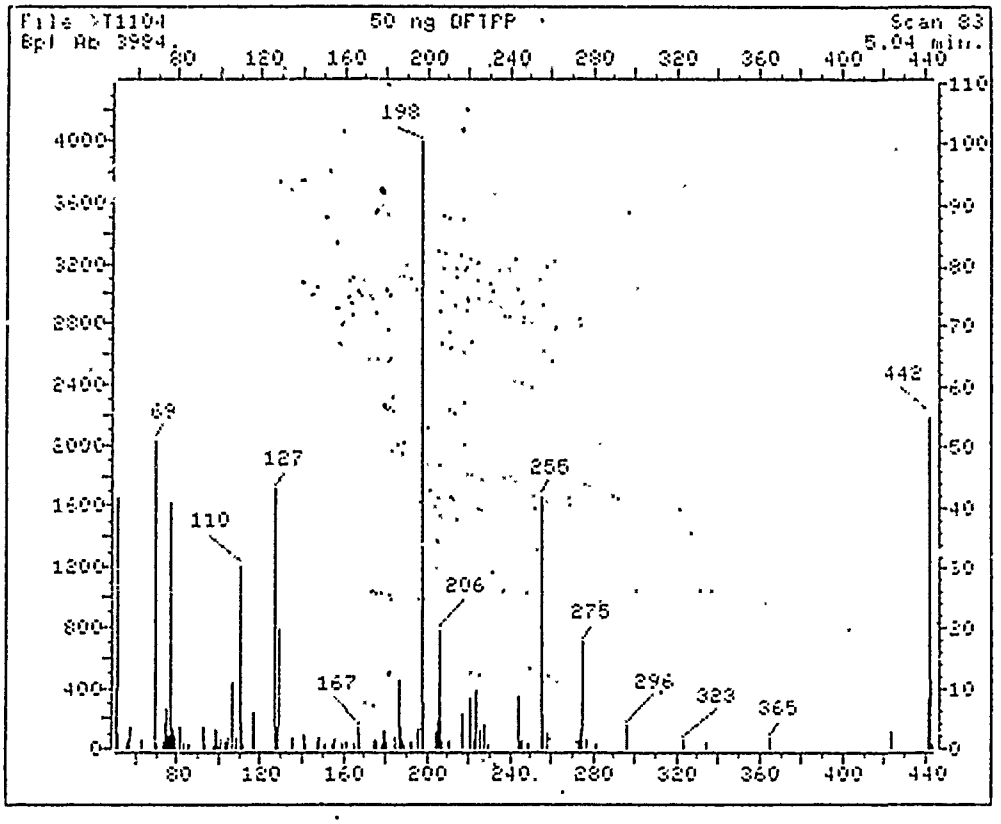
10/12/88
Spin

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	>11104	11/04/88	12:38
CCSD866	50352		12:56
88092537 AC	50353		14:01
88C92537 BN	50354		15:03
88092203 REX	50355		16:02
88C92538 AC	50356		17:02
88C92538 BN	50357		18:02
88C92456 BN MB	50358		19:01
88C93490 BN MB	50359		20:00
88C92556 AC	50360		21:00
88C92556 BN	50361		22:00
88C92558 AC	50362		22:58
88092536 BN	50363		23:57

another project



File: >T1104 Scan #: 83 Retn. time: 5.04

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
50.10	9.839	93.00	3.564	142.05	.879	188.05	1.330	245.00	1.004
51.10	41.365	94.00	.753	147.05	1.205	188.95	.728	245.90	1.606
52.10	2.585	97.20	.577	148.05	1.782	191.95	1.054	248.70	.678
55.10	1.079	98.00	3.087	151.05	.678	193.15	1.004	255.00	41.792
56.00	1.330	99.00	2.811	154.95	.929	196.10	3.288	256.00	5.622
57.10	3.389	100.00	.552	155.95	1.406	198.00	100.000	258.00	2.585
62.10	1.581	100.90	1.456	159.95	.602	199.00	7.430	272.90	1.330
69.00	50.904	102.90	1.004	160.95	1.079	204.10	2.912	274.05	3.163
70.00	.904	104.00	.954	164.95	.904	205.10	4.543	275.05	17.620
75.10	1.230	105.10	1.707	167.05	3.464	206.10	19.403	277.05	1.606
76.10	4.016	107.00	11.019	167.95	2.410	207.00	4.644	280.95	.828
77.10	6.491	108.10	2.009	173.95	1.004	208.10	1.029	296.05	3.665
78.10	2.083	110.00	30.321	175.05	1.381	210.90	1.004	323.05	1.431
79.10	40.789	111.10	3.991	175.95	1.104	217.00	5.422	334.05	.954
80.10	3.389	112.10	.703	177.95	.929	221.00	8.032	365.00	1.707
81.00	3.087	117.00	5.773	179.05	2.786	223.00	1.481	423.00	2.861
82.00	2.008	122.05	42.846	180.05	2.661	224.00	9.563	441.05	8.358
83.00	3.740	126.95	3.338	180.95	1.029	225.10	3.037	442.05	54.844
84.00	1.079	129.05	19.528	184.95	1.682	227.60	3.840	443.05	11.370
85.10	.879	134.95	1.632	186.05	11.295	228.90	.853	444.15	.778
85.90	.879	141.05	2.033	187.05	3.489	244.10	8.459		

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/01/88

Contractor: ENGINEERING-SCIENCE Time: 12:56

Contract No: Laboratory ID:)S0352

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	.90469	.80181	11.38		
2-Fluorophenol	1.15802	1.22702	5.96		
bis(2-Chloroethyl)ether	1.11892	.97148	13.18		
Phenol	1.41657	1.35075	4.65	*	
Phenol-d5	1.22488	1.16412	4.96		
Aniline	.54195	.58188	7.37		
2-Chlorophenol	1.23175	1.29094	4.81		
1,3-Dichlorobenzene	1.47535	1.40152	5.00		
1,4-Dichlorobenzene	1.40530	1.39686	.60	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.76745	5.27		
1,2-Dichlorobenzene	1.32240	1.42740	7.94		
2-Methylphenol	1.17367	1.30246	10.97		
3-&-4-Methylphenol	1.07139	1.31648	22.88		
bis(2-chloroisopropyl)Ether	2.15627	2.51071	16.44		
N-Nitroso-Di-n-Propylamine	.84050	.81345	3.22		**
Hexachloroethane	.53840	.55391	2.88		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.39755	1.38		
Nitrobenzene-d5	.39137	.38689	1.15		
2-Nitrophenol	.24657	.26988	9.45	*	
Isophorone	.74170	.79343	6.97		
bis(2-Chloroethoxy)methane	.49386	.49076	.63		
2,4-Dimethylphenol	.34849	.38038	9.15		
Benzoic Acid	.29725	.02110	92.90		
2,4-Dichlorophenol	.56733	.62253	9.73	*	
1,2,4-Trichlorobenzene	.36913	.36791	.33		
Naphthalene	.94589	.84780	10.37		
4-Chloroaniline	.36309	.39413	8.55		
Hexachlorobutadiene	.20283	.20814	2.62	*	
4-Chloro-3-Methylphenol	.31360	.30800	1.78	*	
2-Methylnaphthalene	.56397	.58369	3.50		

$\overline{RF}$ - Response Factor from daily standard file at 60.00 ng/L

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

%Diff - % Difference from original average or curve

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

1412

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/04/88

Contractor: ENGINEERING-SCIENCE Time: 12:56

Contract No: Laboratory ID: >S0352

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
Hexachlorocyclopentadiene	.36568	.32811	10.97		**
2,4,6-Trichlorophenol	.42280	.41553	1.72	*	
2,4,5-Trichlorophenol	.52897	.41553	21.45		
2-Fluorobiphenyl	1.27220	1.01028	20.59		
2-Chloronaphthalene	1.23784	1.10871	10.43		
2-Nitroaniline	.47288	.48136	1.79		
Dimethylphthalate	1.40629	1.30180	7.22		
2,6-Dinitrotoluene	.37415	.39724	6.17		
Acenaphthylene	1.68918	1.44525	14.44		
3-Nitroaniline	.44557	.46610	4.67		
2,4-Dinitrophenol	.11898	.08652	27.28		**
Acenaphthene	1.13011	.90576	19.85	*	
Dibenzofuran	1.64131	1.53530	6.46		
2,4-Dinitrotoluene	.28418	.29335	3.23		
4-Nitrophenol	.28450	.22639	20.42		**
Fluorene	1.12850	.84925	24.75		
Diethylphthalate	1.20939	1.03011	14.82		
4-Chlorophenyl-phenylether	.59182	.55769	5.77		
4-Nitroaniline	.35956	.27739	22.85		
2,4,6-Tribromophenol	.21023	.22148	5.35		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.43387	7.70	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23102	8.45		
Hexachlorobenzene	.26273	.28552	8.67		
Pentachlorophenol	.14536	.15283	5.14	*	

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

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

%Diff - % Difference from original average or curve

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

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/04/88

Contractor: ENGINEERING-SCIENCE Time: 12:56

Contract No: Laboratory ID: >S0352

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

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

Compound	RF	$\overline{RF}$	%Diff	CCC	SPCC
Phenanthrene	1.03431	.93489	9.61		
Anthracene	1.05155	1.06451	1.24		
Di-n-Butylphthalate	1.51956	1.60426	5.57		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.17402	1.38	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.09281	130.69		
Pyrene	1.56086	1.46853	6.04		
Terphenyl-d14	1.05835	1.03555	2.15		
Butylbenzylphthalate	1.03390	1.01039	2.27		
3,3'-Dichlorobenzidine	.13689	.24589	79.63		
Chrysene	.99855	1.04768	5.13		
Benzo(a)Anthracene	1.10107	1.18955	7.74		
bis(2-Ethylhexyl)Phthalate	1.21073	1.19613	1.20		
Di-n-octylphthalate	3.40275	2.59652	23.69	*	
Benzo(a)Pyrene	1.32098	1.35669	2.70	*	
Benzo(b)Fluoranthene	1.60850	2.81518	75.02		
Indeno(1,2,3-cd)Pyrene	.96800	1.49587	54.53		
Dibenzo(a,h)Anthracene	.87491	1.15506	32.04		
Benzo(k)Fluoranthene	1.44378	2.81518	95.00		
Benzo(g,h,i)Perylene	.89761	.71626	20.20		

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 (**)

1414

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR0401

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

Sample No. (Standard): SSTD060 Date Analyzed: 11/4/88

Lab File ID (Standard): S0352 Time Analyzed: 12:56

Instrument ID: 1

		IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
	12 HOUR STD	75654	9.24	267087	12.88	168279	18.35
	UPPER LIMIT	151308	9.74	534174	13.38	336558	18.85
	LOWER LIMIT	37827	8.74	133544	12.38	84140	17.85
	EPA SAMPLE NO.						
S0353 01	8809253 7 AC	81581	9.24	286951	12.87	175676	18.34
54 02	8809253 7 BN	69259	9.26	230649	12.88	156246	18.34
55 03	88092203	68173	9.23	232597	12.87	146097	18.36
56 04	8809253 8 AC	76537	9.24	259329	12.87	159456	18.35
57 05	8809253 8 BN	83723	9.25	291457	12.87	169307	18.34
58 06	8809245 6 BN RA	67877	9.24	232235	12.88	141958	18.35
59 07	8809249 0 BN MS	49677	9.23	167426	12.88	103477	18.32
60 08	8809255 6 AC	55011	9.25	152395	12.94	115908	18.35
61 09	8809255 6 BN	60601	9.28	204227	12.91	125205	18.38
62 10	8809255 8 AC	51081	9.27	164978	12.97	106953	18.38
63 11	8809255 8 BN	56224	9.34	150843	12.94	131057	18.39
12							
13							
14							
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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: ORØØ1

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

Sample No. (Standard): SSTDØ6Ø Date Analyzed: 11/4/88

Lab File ID (Standard): S0352 Time Analyzed: 12:56

Instrument ID: 1

	IS4(PHN) AREA #	RT #	IS5(CRY) AREA #	RT	IS4(PRY) AREA #	RT
12 HOUR STD	271670	22.99	206029	31.48	175836	37.63
UPPER LIMIT	543340	23.49	412058	31.98	351672	38.13
LOWER LIMIT	135835	22.49	103015	30.98	87918	37.13
EPA SAMPLE NO.						
S0353 01 8809Ø537 AC	282373	23.00	236097	31.46	138092	37.61
54 02 8809Ø537 BN	267794	23.01	222214	31.49	146317	37.60
55 03 88092203	225072	23.03	173365	31.47	97272	37.62
56 04 88092538 AC	256369	23.00	205279	31.47	132271	37.63
57 05 88092538 BN	265926	23.00	213796	31.47	117898	37.62
58 06 88092456 BN LAB	224398	23.02	172843	31.48	108729	37.65
59 07 88092490 BN MED	159740	23.05	111157	31.52	59475*	37.70
60 08 88092556 AC	176670	23.03	137661	31.49	98224	37.67
61 09 88092556 BN	184901	23.03	144632	31.50	102662	37.66
62 10 88092558 AC	159642	23.07	117318	31.56	82066*	37.72
63 11 88092536 BN	240172	23.03	213589	31.48	138547	37.66
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

File: CONTCHL
24 Oct 88

continuing 50.d che
9/26/85

VOLATILE CONTINUING CALIBRATION CHECK

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/26/88 _____

LAB FILE ID: 61,62 Init. Calib. Date(s): 9/19/88 9/23/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	0.32	0.44	38
bis (2-chloroethoxy methane			
bis (2-chloroisopropyl ether			
Bromobenzene	1.4	0.99	29
Bromodichloromethane	3.7	3.2	14
Bromoform	1.7	1.6	6
Bromomethane	0.40	0.12	70
Carbon tetrachloride	4.2	3.6	14
Chloroacetaldehyde			
Chlorobenzene	1.4	1.2	14
Chloroethane	0.72	0.34	53
Chloroform	3.9	3.7	5
1-Chorohexane	1.2	0.83	31
2-Chloroethyl vinyl ether			
Chloromethane	0.46	0.26	43
Chloromethyl methyl ether			
o_,m_,& p_Chlorotoluenes	4.6	3.3	28
Dibromochloromethane	3.7	3.3	11
Dibromomethane	3.2	2.1	34
1,2_Dichlorobenzene	2.5	2.1	16
1,3_Dichlorobenzene	2.1	1.9	10
1,4_Dichlorobenzene	2.3	1.7	26
Dichlorodifluormethane			
1,1_Dichloroethane	2.4	1.8	25
1,2_Dichloroethane	2.6	1.5	4
1,1_Dichloroethylene	2.6	1.9	27
trans_1,2_dichloroethylene	2.4	1.9	21
Dichloromethane	4.1	2.0	51
1,2_Dichloropropane	2.5	1.8	28
1,3_Dichloropropylene	5.9	4.1	31
1,1,2,2_Tetrachloroethane	7.5	6.2	17
1,1,1,2_Tetrachloroethane	5.2	3.6	31
Tetrachloroethylene	7.5	6.2	17
1,1,1_Trichloroethane	3.0	2.6	13
1,1,2_Trichloroethane	5.9	4.1	31
Trichloroethylene	4.0	2.8	30
Trichlorofluormethane	2.3	1.9	17
Trichloropropane	2.1	1.4	33
Vinyl chloride	0.94	0.69	26

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): 9/26/88 _____

LAB FILE ID: 61 Ini alib. Date(s): 9/19/88 _____

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.9	4.2	14
Chlorobenzene	5.3	4.7	11
1,2_Dichlorobenzene	4.4	3.6	18
1,3_Dichlorobenzene	5.0	4.2	16
1,4_Dichorobenzene	4.1	3.4	17
Ethyl Bezene	4.4	3.1	30
Toluene	3.9	3.5	10
Xylenes	13	11	15

DATA PACKAGE #22

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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 9-20-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092523	DANGB-2-MW2-GW1	BA-I	9-19-88		10-13-88	
88092523	DANGB-2-MW2-GW1	CD-F	9-19-88		10-26-88	
88092523	DANGB-2-MW2-GW1	CR-F	9-19-88		10-16-88	
88092523	DANGB-2-MW2-GW1	PB-F	9-19-88		10-21-88	
88092523	DANGB-2-MW2-GW1	418.1	9-19-88	10-05-88	10-08-88	
88092523	DANGB-2-MW2-GW1	8010	9-19-88		9-27-88	9-21/26/27-88
88092523	DANGB-2-MW2-GW1	8020	9-19-88		9-27-88	9-21/26-88
88092523	DANGB-2-MW2-GW1	8270	9-19-88		9-24-88	10-31-88
88092524	DANGB-2-MW1-GW1	BA-I	9-19-88		10-13-88	
88092524	DANGB-2-MW1-GW1	CD-F	9-19-88		10-26-88	
88092524	DANGB-2-MW1-GW1	CR-F	9-19-88		10-16-88	
88092524	DANGB-2-MW1-GW1	PB-F	9-19-88		10-21-88	
88092524	DANGB-2-MW1-GW1	418.1	9-19-88		10-08-88	
88092524	DANGB-2-MW1-GW1	8010	9-19-88		9-23-88	9-21-88
88092524	DANGB-2-MW1-GW1	8020	9-19-88		9-23-88	
88092524	DANGB-2-MW1-GW1	8270	9-19-88		9-24-88	10-31-88

* If applicable

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.
88092525	DANGB-3-MW28-GW1	AS-F	9-19-88		10-15-88	
88092525	DANGB-3-MW28-GW1	BA-I	9-19-88		10-13-88	
88092525	DANGB-3-MW28-GW1	CD-F	9-19-88		10-26-88	
88092525	DANGB-3-MW28-GW1	CR-F	9-19-88		10-16-88	
88092525	DANGB-3-MW28-GW1	HG-C	9-19-88		10-14-88	
88092525	DANGB-3-MW28-GW1	PB-F	9-19-88		10-21-88	
88092525	DANGB-3-MW28-GW1	418.1	9-19-88	10-05-88	10-08-88	
88092525	DANGB-3-MW28-GW1	8010	9-19-88		9-21-88	9-27-88
88092525	DANGB-3-MW28-GW1	8020	9-19-88		9-21-88	
88092525	DANGB-3-MW28-GW1	8080	9-19-88	9-23-88	10-24-88	
88092525	DANGB-3-MW28-GW1	8270	9-19-88	9-24-88	10-31-88	
88092526	DANGB-3-MW31-GW1	AS-F	9-19-88		10-15-88	
88092526	DANGB-3-MW31-GW1	BA-I	9-19-88		10-13-88	
88092526	DANGB-3-MW31-GW1	CD-F	9-19-88		10-26-88	
88092526	DANGB-3-MW31-GW1	CR-F	9-19-88		10-16-88	
88092526	DANGB-3-MW31-GW1	HG-C	9-19-88		10-14-88	
88092526	DANGB-3-MW31-GW1	PB-F	9-19-88		10-21-88	
88092526	DANGB-3-MW31-GW1	418.1	9-19-88	10-05-88	10-08-88	
88092526	DANGB-3-MW31-GW1	8010	9-19-88		9-23-88	9-27-88
88092526	DANGB-3-MW31-GW1	8020	9-19-88		9-23-88	
88092526	DANGB-3-MW31-GW1	8080	9-19-88	9-23-88	10-24-88	10-26-88
88092526	DANGB-3-MW31-GW1	8270	9-19-88	9-24-88	10-31-88	

* If applicable

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.
88092527	DANGB-3-MW35-GW1	AS-F	9-19-88		10-16-88	
88092527	DANGB-3-MW35-GW1	BA-I	9-19-88		10-13-88	
88092527	DANGB-3-MW35-GW1	CD-F	9-19-88		10-26-88	
88092527	DANGB-3-MW35-GW1	CR-F	9-19-88		10-16-88	
88092527	DANGB-3-MW35-GW1	HG-C	9-19-88		10-14-88	
88092527	DANGB-3-MW35-GW1	PB-F	9-19-88		10-21-88	
88092527	DANGB-3-MW35-GW1	418.1	9-19-88	10-05-88	10-08-88	
88092527	DANGB-3-MW35-GW1	8010	9-19-88		9-27-88	9-23-88
88092527	DANGB-3-MW35-GW1	8020	9-19-88		9-27-88	
88092527	DANGB-3-MW35-GW1	8080	9-19-88	9-23-88	10-24-88	10-25-88
88092527	DANGB-3-MW35-GW1	8270	9-19-88	9-24-88	10-31-88	
88092528	DANGB-BR8	AS-F	9-19-88		10-15-88	
88092528	DANGB-BR8	BA-I	9-19-88		10-13-88	
88092528	DANGB-BR8	CD-F	9-19-88		10-26-88	
88092528	DANGB-BR8	CR-F	9-19-88		10-16-88	
88092528	DANGB-BR8	HG-C	9-19-88		10-14-88	
88092528	DANGB-BR8	PB-F	9-19-88		10-21-88	
88092528	DANGB-BR8	418.1	9-19-88	10-05-88	10-08-88	
88092528	DANGB-BR8	8020	9-19-88		9-23-88	
88092528	DANGB-BR8	8080	9-19-88	9-23-88	10-24-88	
88092528	DANGB-BR8	8270	9-19-88	9-24-88	10-31-88	
88092529	DANGB-BR7	418.1	9-16-88	10-05-88	10-08-88	
88092530	DANGB-3-MW27-GW1	418.1	9-19-88	10-05-88	10-08-88	
88092531	DANGB-FB12	8010, 8020	9-19-88		9-27-88	9-28-88
88092532	DANGB-TB9	8010, 8020	9-19-88		9-23-88	9-23-88

88092528 DANGB-BR8 8010 9-19-88

included also GP 12/21/88

* If applicable

ANALYSIS REPORT

ORK ORDER NUMBER: 1010
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/20/88

APPROVED BY
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 2, UNITS: mg/L

EST COMPOUND	DANGB-2-MW2-GW-1 88092523	DANGB-2-MW1-GW-1 88092524	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
CID DIG FLAME	NA	NA	NA	NA	NA	NA
CID DIG FURNACE	NA	NA	NA	NA	NA	NA
RSENIC			<0.01	<0.01	<0.01	<0.01
ARIUM	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
ADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
HROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
ERCURY			<.0002	<.0002	<.0002	<.0002
EAD	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1010
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

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

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710 S. ILLINOIS AVE. STE. S103
OAK RIDGE, TN 37830

OF REPORT COPIES: 1

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

TASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-2-MW2-GW-1 88092523	DANGB-2-MW1-GW-1 88092524	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
418.1 PETROLEUM HYDROCARBONS	<1.5	<1.5	<1.5	1.5	1.5	1.5

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1010

ASK: 3, UNITS: mg/L

TEST COMPOUND	DANGB-BR7 88092529	DANGB-3-MW27-GW-1 88092530
418.1 PETROLEUM HYDROCARBONS	<1.5	<1.5

U - Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1010
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB-2-MW2-GW-1 88092523	DANGB-2-MW1-GW-1 88092524	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
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	0.33B	0.30B	ND	12B
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	8.9	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND	1.0	ND
TRANS-1,2-DICHLOROETHYLENE	1200	0.63	ND	ND	ND	ND
DICHLOROMETHANE	0.42B	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1010

EST COMPOUND	DANGB-2-MW2-GW-1 88092523	DANGB-2-MW1-GW-1 88092524	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND	ND
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	0.88	ND
,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	0.32	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND	ND	ND
INYL CHLORIDE	3.1	ND	ND	ND	ND	ND

D - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1010

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

TEST COMPOUND	DANGB-FB12 88092531	DANGB-TB9 88092532
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
BROMOETHANE	ND	ND
CARBON TETRACHLORIDE	ND	ND
CHLORACETALDEHYDE	ND	ND
CHLORAL	ND	ND
CHLOROBENZENE	ND	ND
CHLOROETHANE	ND	ND
CHLOROFORM	14	ND
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	ND	ND
1,1-DICHLOROETHYLENE	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND
DICHLOROMETHANE	3.7B	1.2B
1,2-DICHLOROPROPANE	ND	ND
1,3-DICHLOROPROPYLENE	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND
TETRACHLOROETHYLENE	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND
TRICHLOROETHYLENE	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND
TRICHLOROPROPANE	ND	ND
VINYL CHLORIDE	ND	ND

ND - Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1010
OB NUMBER : ZB0000000440
ORK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

EST COMPOUND	DANGB-2-MW2-GW-1 88092523	DANGB-2-MW1-GW-1 88092524	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
ENZENE	ND	ND	ND	ND	ND	ND
HLOROBENZENE	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
OLUENE	ND	ND	ND	ND	ND	ND
YLENES	ND	ND	ND	ND	ND	ND

) - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1010

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

TEST COMPOUND	DANGB-FB12 88092531	DANGB-TB9 88092532
BENZENE	ND	ND
CHLOROBENZENE	ND	ND
1,2-DICHLOROBENZENE	ND	ND
1,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
ETHYL BENZENE	ND	ND
TOLUENE	ND	ND
XYLENES	ND	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1010
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/20/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

:ST COMPOUND	DANGB-3-MW28-GW-1 88092525	DANGB-3-MW31-GW-1 88092526	DANGB-3-MW35-GW-1 88092527	DANGB-BR8 88092528
.DRIN	ND	ND	ND	ND
.PHA-BHC	ND	ND	ND	ND
ETA-BHC	ND	ND	ND	ND
ELTA-BHC	ND	ND	ND	ND
\MMA-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
:ELDRIN	ND	ND	ND	ND
\DOSULFAN I	ND	ND	ND	ND
)DOSULFAN II	ND	ND	ND	ND
)DOSULFAN SULFATE	ND	ND	ND	ND
)DRIN	ND	ND	ND	ND
)DRIN ALDEHYDE	NA	NA	NA	NA
:PTACHLOR	ND	ND	ND	ND
:PTACHLOR EPOXIDE	ND	ND	ND	ND
:PONE	NA	NA	NA	NA
:THOXYCHLOR	ND	ND	ND	ND
)XAPHENE	ND	ND	ND	ND
:B-1016	ND	ND	ND	ND
:B-1221	ND	ND	ND	ND
:B-1232	ND	ND	ND	ND
:B-1242	ND	ND	ND	ND
:B-1248	ND	ND	ND	ND
:B-1254	ND	ND	ND	ND
:B-1260	ND	ND	ND	ND

) - Not Detected

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092523	88092524
Sample No.:	DANGB-2-MW2-GW-1	DANGB-2-MW1-GW-1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	15:30	16:05
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

Date Received: September 20, 1988 Work Order: 1010
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:	88092523	88092524
Sample No.:	DANGB-2-MW2-GW-1	DANGB-2-MW1-GW-1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	15:30	16:05
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	10 B	15 B
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092523	88092524
Sample No.:	DANGB-2-MW2-GW-1	DANGB-2-MW1-GW-1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	15:30	16:05
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092523	88092524
Sample No.:	DANGB-2-MW2-GW-1	DANGB-2-MW1-GW-1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	15:30	16:05
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092523	88092524
Sample No.:	DANGB-2-MW2-GW-1	DANGB-2-MW1-GW-1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	15:30	16:05
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092525	88092526
Sample No.:	DANGB-3-MW28-GW1	DANGB-3-MW31-GW1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	10:35	09:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092525	88092526
Sample No.:	DANGB-3-MW28-GW1	DANGB-3-MW31-GW1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	10:35	09:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	23 B	62 B
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphtnalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092525	88092526
Sample No.:	DANGB-3-MW28-GW1	DANGB-3-MW31-GW1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	10:35	09:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092525	88092526
Sample No.:	DANGB-3-MW28-GW1	DANGB-3-MW31-GW1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	10:35	09:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092525	88092526
Sample No.:	DANGB-3-MW28-GW1	DANGB-3-MW31-GW1
Date Sampled:	9-19-88	9-19-88
Time Sampled:	10:35	09:45
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092527	88092528
Sample No.:	DANGB-3-MW35-GW1	DANGB-BR8
Date Sampled:	9-19-88	9-19-88
Time Sampled:	11:45	08:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
Job Number: OR001

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

ATTN: Mr. Bill Hayden

Lab Number:	88092527	88092528
Sample No.:	DANGB-3-MW35-GW1	DANGB-BR8
Date Sampled:	9-19-88	9-19-88
Time Sampled:	11:45	08:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

Compound	Detection Limits ug/L	ANALYTICAL RESULTS (dry weight) ug/L	ug/L
Phenanthrene	10	ND	ND
Anthracene	10	ND	ND
Dibutyl phthalate	10	ND	ND
Fluoranthene	10	ND	ND
4-Chlorophenyl phenyl ether	10	ND	ND
Pyrene	10	ND	ND
Butyl Benzyl phthalate	10	ND	ND
Bis(2-ethylhexyl) phthalate	10	ND	18 B
Chrysene	10	ND	ND
4-Bromophenyl phenyl ether	10	ND	ND
Benzo(a)anthracene	10	ND	ND
Di-n-octylphthalate	10	ND	ND
Benzo(b)fluoranthene	10	ND	ND
Benzo(k)fluoranthene	10	ND	ND
Benzidine	60	ND	ND
3,3'-Dichlorobenzidine	20	ND	ND
Benzo(a)pyrene	10	ND	ND
Indeno(1,2,3-cd)pyrene	10	ND	ND
Dibenzo(a,h)anthracene	10	ND	ND
Benzo(ghi)perylene	10	ND	ND
Benzyl Alcohol	20	ND	ND

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

Date Received: September 20, 1988
Date Reported: December 9, 1968

Work Order: 1010
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:	88092527	88092528
Sample No.:	DANGB-3-MW35-GW1	DANGB-BR8
Date Sampled:	9-19-88	9-19-88
Time Sampled:	11:45	08:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092527	88092528
Sample No.:	DANGB-3-MW35-GW1	DANGB-BR8
Date Sampled:	9-19-88	9-19-88
Time Sampled:	11:45	08:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

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

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

Date Received: September 20, 1988
Date Reported: December 9, 1988

Work Order: 1010
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:	88092527	88092528
Sample No.:	DANGB-3-MW35-GW1	DANGB-BR8
Date Sampled:	9-19-88	9-19-88
Time Sampled:	11:45	08:00
Date Extracted:	9-24-88	9-24-88
Date Analyzed:	10-31-88	10-31-88

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

Analyst

Laboratory Supervisor

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

B = Compound was detected in the blank.

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

ENGINEERING-SCIENCE

1010

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) Kberly Z. Da				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	EPA 600	EPA 625	EPA 418.1	SW 8010, 7000-7191	SW7421, 7420-7191	SW9310, 9315	SM420	REMARKS
9-19-88	1530	DANGB-2-MW2-GW-1	6			X	X	X	X			
9-19-88	1605	DANGB-2-MW4-GW-1	6			X	X	X	X			

1198

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Kberly Z Da	9-19-88 1800	Fed Ex Airbill # 949031 0012			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Valerie Navarro	09/21/88 11:40	Samples cold + intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1010

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: SW8020, 8030	EPA 601	EPA 602	EPA 624.1	SW 8010, 7840, 7151	SW7421, 7470, 7191	SW9310, 9315	SM429	REMARKS
9-7-88	1035	DANGB-3-MW28-GW1	8		Z	Z	Z	1	1			882525
9-15-88	0945	DANGB-3-MW31-GW1	2					1	1			882526
9-19-88	1145	DANGB-3-~~MW31~~ MW35 DN 9/20/88 -GW1	2					1	1			[illegible]
												correction made on DANGB-3 MW35-GW1 as per Kathleen's conversation w/ Joanne Beuler.

9/19/88 Johanna Beuler

1449

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Beuler	9-19-88 1220	FEC AIRBRIDGE 9490310012			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Dolores Tavarone	09/20/88 11:28	Samples received cold + intact.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1010

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	SW1030, 8020	EPA 601	EPA 625	EPA 418.1	SW 8010, 7060, 7091	SW7421, 7470	SW9310, 9315	SM429	REMARKS
9/19/88	0945	DANGB-3-MW31-GW1	6		2	2	2					382526
9/19/88	1145	DANGB-3-MW35-GW1	6		2	2	2					382527

1450

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9/19/88 1730	FEC Airbill # 9490310012			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Floyd Abney	9-20-88 1120	SAMPLES RECEIVED COLD AND INTACT.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

1010

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Johanna Burke

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

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 608	EPA 625	EPA 418.1	SW 8010, 7060, 7131	SW7421, 7470, 7421	SW9020, 9315	SM420	REMARKS
9-16-88	0800	DANGB-BR7	1				1					882529 Sitting at Room Temp for 36 hours
9-19-88	0800	DANGB-BR8	8		2	2	2	1	1			882528
9-16-88	1930	DANGB-3-MW27-GW1	2				2					882530

1451

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Burke	9-19-88 1730	FEC Airbill # 949031001 2			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Floyd Abney	9-20-88 11:40	SAMPLES RECEIVED COLD AND INTACT.

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

1010

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

SAMPLER(S): (Signature) Johanna Beck

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

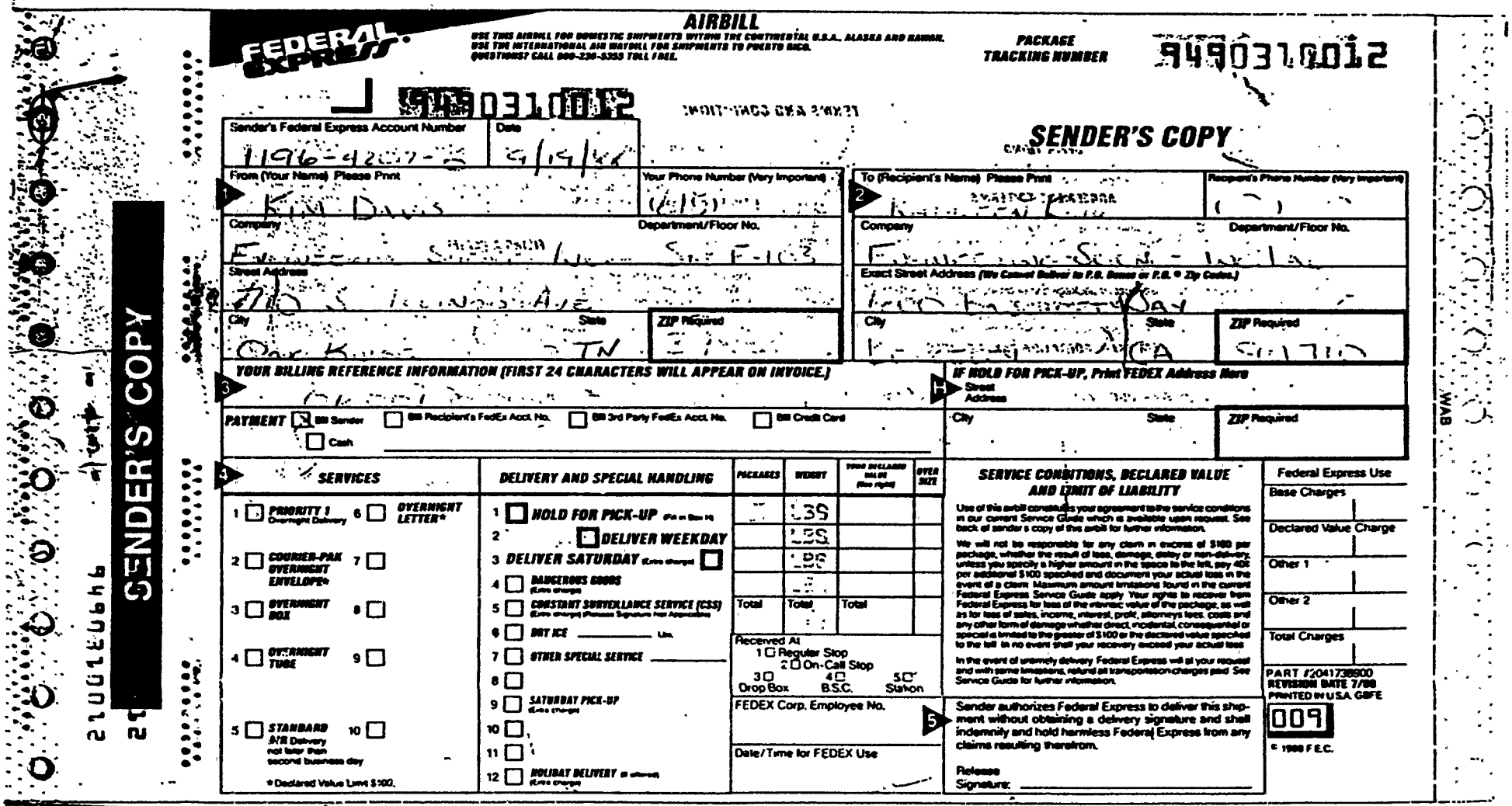
DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	WATER ANALYSES REQUIRED: SW8010, 8020	EPA 630	EPA 625	EPA 418.1	SW 8015, 7060, 7131	SW7421, 7470	SW8330, 9310	SM420	REMARKS
9-19-88	0800	DANGB-BR8	5	5								882528
9-19-88	0915	DANGB-3-MW31-GW1	5	5								882526
9-19-88	1035	DANGB-3-MW28-GW1	5	5								882525
9-19-88	1145	DANGB-3-MW35-GW1	5	5								882527
9-19-88	1205	DANGB-FB12	2	2								882531
9-19-88	0900	DANGB-~~FB8~~ DN TB9	3	3								correction made per tc
9-19-88	1605	DANGB-2-MW1-GW1	5	5								[illegible]
9-19-88	1530	DANGB-2-MW2-GW1	5	5								[illegible]

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9-19

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Johanna Beck	9-19-88 1730	FEC Airbill # 9490310012			
Relinquished by: (Signature)	Date/Tim	Received for Laboratory by: (Signature)	Date/Time	Remarks	
		Floyd Abney	9-20-88 1045	ARRIVED COLD AND INTACT	

Distribution: Original Accompanies Shipment, Copy to Coordinator Fiel[illegible]



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 949031012

949031012

SENDER'S COPY

Sender's Federal Express Account Number: 1196-4207-2 | Date: 6/19/92

1 From (Your Name) Please Print: Kim Davis | Your Phone Number (Very Important)

Company: Federal Express Corp. | Department/Floor No.: Sup. F-103

Street Address: 710 S. Illinois Ave.

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

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

Company: Federal Express Corp. | Department/Floor No.:

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

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

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

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

5 SERVICES

1 ☐ PRIORITY 1 Overnight Delivery
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*
3 ☐ OVERNIGHT BOX
4 ☐ OVERNIGHT TUBE
5 ☐ STANDARD A.M. 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 11)
2 ☐ DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charges) ☐
4 ☐ DANGEROUS GOODS (Extra charges)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges) (Requires 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	LBS		
	LBS		
	LBS		
Total	Total	Total	

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

FEDEX Corp. Employee No.

Date/Time for FEDEX Use

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

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

We will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay or non-delivery, unless you specify a higher amount in the space to the left, pay 40¢ per additional $100 specified and document your actual loss in the event of a claim. Maximum amount limitations found in the current Federal Express Service Guide apply. Your rights to recover from Federal Express for loss of the intrinsic value of the package, as well as for loss of sales, income, interest, profit, 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

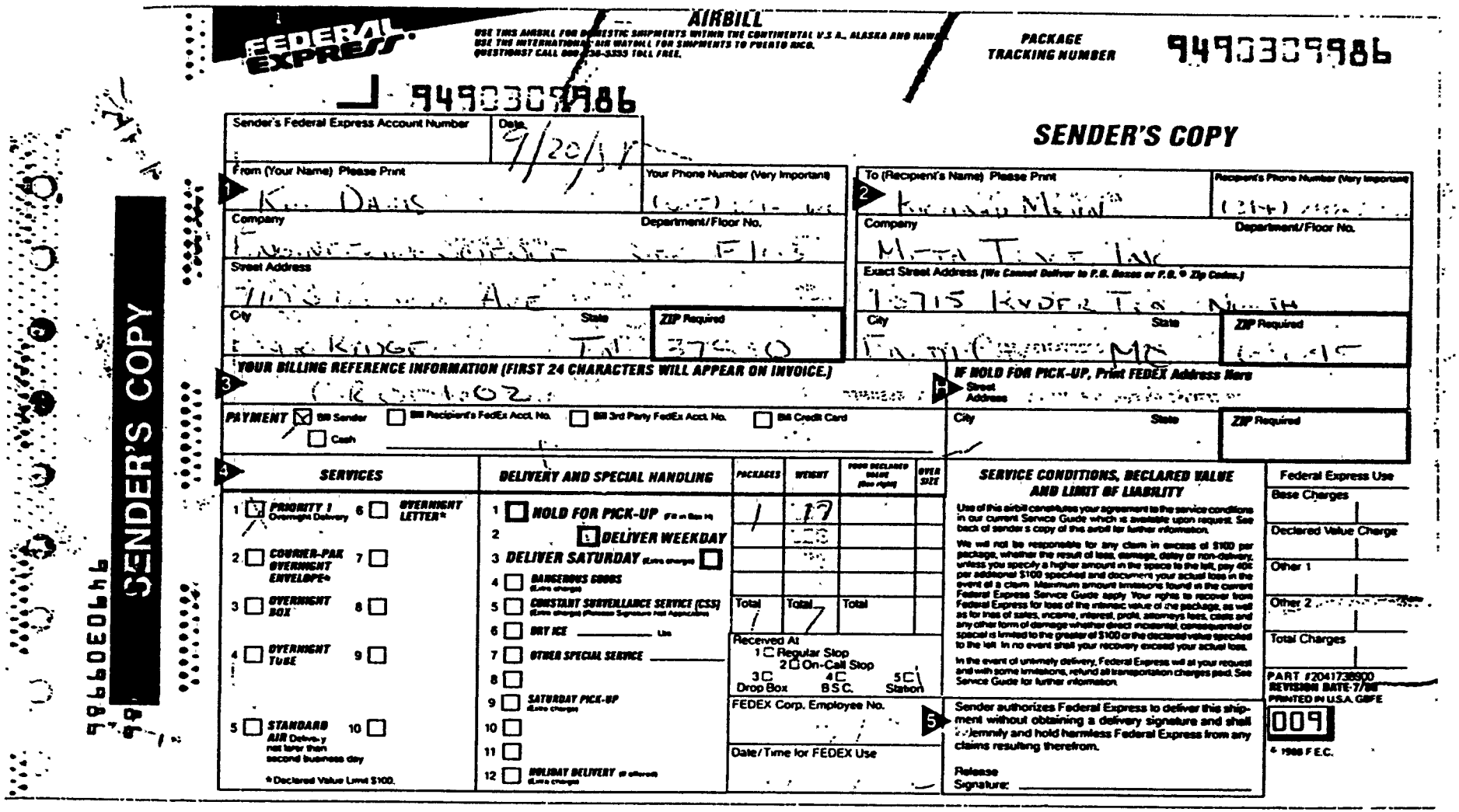
Base Charges	
Declared Value Charge	
Other 1	
Other 2	
Total Charges	

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

SENDER'S COPY

1453



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 949030986

949030986

SENDER'S COPY

Sender's Federal Express Account Number

Date 9/20/[illegible]

1 From (Your Name) Please Print: K. Davis

Your Phone Number (Very Important)

Company: [illegible]

Department/Floor No.: [illegible] Fl.

Street Address: [illegible]

City: [illegible] State: TN ZIP Required: 37[illegible]

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

Recipient's Phone Number (Very Important)

Company: MTA Tire Inc

Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1615 Kyle Tire North

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

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

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. ☐ Bill 3rd Party FedEx Acct. No. ☐ Bill Credit Card ☐ Cash

4 SERVICES	DELIVERY AND SPECIAL HANDLING	PACKAGES	WEIGHT	YOUR DECLARED VALUE (See Right)	OVER SIZE
1 ☒ PRIORITY 1 Overnight Delivery	1 ☐ HOLD FOR PICK-UP	1	17		
2 ☐ COURIER-PAK OVERNIGHT ENVELOPE*	2 ☒ DELIVER WEEKDAY				
3 ☐ OVERNIGHT BOX	3 DELIVER SATURDAY (Extra charges) ☐				
4 ☐ OVERNIGHT TUBE	4 ☐ DANGEROUS GOODS (Extra charges)				
5 ☐ STANDARD AIR Delivery not later than second business day	5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charges Recipient Signature Not Applicable)				
6 ☐ OVERNIGHT LETTER*	6 ☐ DRY ICE ____ Lbs.				
7 ☐	7 ☐ OTHER SPECIAL SERVICE ____				
8 ☐	8 ☐				
9 ☐	9 ☐ SATURDAY PICK-UP (Extra charges)				
10 ☐	10 ☐				
	11 ☐				
	12 ☐ HOLIDAY DELIVERY (Extra charges)				
	Total	1	17	Total	

* Declared Value Limit $100.

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

FEDEX Corp. Employee No.

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-7/88
PRINTED IN U.S.A. GBFE

009

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SENDER'S COPY 949030986

1454

IF

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BLANK

Name: Engineering Science Contract: OR0001

Code: _____ Case No.: 1010 SAS No.: _____ Job No.: _____

Matrix: (soil/water) Water Lab Sample ID: 8809253-2531 AC BN BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6028 tE6322

Level: (low/med) low Date Received: _____

Moisture: not dec._____ dec._____ Date Extracted: 9-24-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/31/88

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

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	4.24	17	
2.		unknown	28.87	6	
3.					
4.					
5.					
6.					
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8.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: PA88-2-MW2-GW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092523 A

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6035

Level: (low/med) low Date Received: 9-20-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-24-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/31/88

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

Number TICs found: 3 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.94	21	
2.	127-18-4	tetrachloroethene	4.12	14	
3.		unknown	4.44	12	
4.					
5.					
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7.					
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EPA SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANGB-2-MW2 -GW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092523 BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6036

Level: (low/med) low Date Received: 9-20-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-24-88

Extraction: (SepF. Cont/Sonc) SepF Date Analyzed: 10/31/88

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

Number TICs found: 5 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.97	55	
2.	127-18-4	tetrachloroethene	4.12	12	
3.		unknown	4.47	40	
4.	79-34-5	1,1,2,2-tetrachloroethane	5.91	4	
5.		unknown	28.79	5	
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EPA SAMPLE NO.

DMW8-2-MW8-GW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092524 AC

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6037

Level: (low/med) low Date Received: 9-20-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-24-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/31/88

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

Number TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.95	22	
2.	127-18-4	tetrachloroethene	4.18	18	
3.		unknown	4.45	14	
4.		unknown	19.67	7	
5.					
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IF

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DANGB-2-MW11-GW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 8809252 BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6038

Level: (low/med) low Date Received: 9-20-88

Moisture: not dec. _____ dec. _____ Date Extracted: 9-24-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 10/31/88

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

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

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	3.81	9	
2.		unknown	4.05	200	
3.	127-18-4	tetrachloroethene	4.15	16	
4.		unknown	4.57	180	
5.		↓	4.60	4	
6.			4.70	15	
7.	79-34-5	1,1,2,2-tetrachloroethane	5.92	17	
8.		unknown	6.06	5	
9.		↓	7.66	6	
10.			26.36	6	
11.			28.80	5	
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB-3-MW2D-GW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: _____

Sample wt/vol: 1000 (g/mL) mL Lab File ID: 88092525 Ac

Level: (low/med) low Date Received: E6039

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-20-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 9-24-88

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

Number TICs found: 5 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	4.09	12	
2.		unknown	19.62	9	
3.			25.46	25	
4.			28.84	110	
5.			30.83	4	
6.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: DANGB-3-MW18-GW1

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: 1010 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 88092525 BN

Sample wt/vol: 1000 (g/mL) mL Lab File ID: E6040

Level: (low/med) low Date Received: 9-20-88

% Moisture: not dec. _____ dec. _____ Date Extracted: 9-24-88

Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 11/1/88

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

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	127-18-4	tetrachloroethene	6.10	13	
2.					
3.					
4.					
5.					
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DANGB-3-MW31
- GW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 1

Project Nc:
Sample Matrix: WATER
Conc. Unit: µg/L
Work Order No: 1010
Lab Sample ID: 88092526 ACID
Lab File ID: 5031Z
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: —

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.10	14	

DANGB-3-MW31
GW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES. OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 3

Project No:
Sample Matrix: WATER
Conc. Unit: µg/L
Work Order No: 1010
Lab Sample ID: 88092526 BASE/NEUTRAL
Lab File ID: S0313
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: ——

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.11	15	
	Unknown	5.64	6	
	↓	28.82	10	
		30.18	4	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANOB-3-MW35 -GW1

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 9

Project No:
Sample Matrix: ~~88092507~~ WATER
Conc. Unit: µG/L
Work Order No: 1010
Lab Sample ID: 88092507 ACID
Lab File ID: S0314
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: —

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	4.88	25	
127-18-4	Tetrachloroethene	5.11	14	
	Unknown	5.44	17	
		7.09	7	
		30.28	220	
		32.13	4	
		32.32	16	
		33.06	27	
		~~34.19~~ 42.27	4	

DANGB-3-MW35
_EW1

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES; OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 8

Project No:
Sample Matrix: WATER
Conc. Unit: UG/L
Work Order No: 1010
Lab Sample ID: 8809252? BASE/NEUTRAL
Lab File ID: S0315
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: ——

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
	Unknown	4.20	6	
	↓	4.65	17	
		4.88	27	
127-18-4	Tetrachloroethene	5.11	17	
	Unknown	5.45	26	
79-34-5	1,1,2,2 - Tetrachloroethane	7.08	13	
	Unknown	30.19	66	
	↓	33.05	6	

DAN08-BR8

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 2

Project Nc:
Sample Matrix: WATER
Conc. Unit: ug/L
Work Order No: 1010
Lab Sample ID: 8809252S ACID
Lab File ID: 50316
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: —

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloro ethene	5.10	14	
	Unknown	13.11.	7	

DANB.BRB

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client: ES: OAK RIDGE
Attn:
Address:

Project: DULUTH

TICs Found: 1

Project No:
Sample Matrix: WATER
Conc. Unit: ug/L
Work Order No: 1010
Lab Sample ID: 8809 2528 BASE/Neutral
Lab File ID: 50317
Date Received: 9-20-88
Date Extracted: 9-24-88
Date Analyzed: 10/31/88
Date Reported:
Dilution Factor: 1
% Moisture: ——

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
127-18-4	Tetrachloroethene	5.11	14	

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

QC Report No: AAF-W-0053-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88092487	88092487	10-15-88	NA	7060	<0.01	<0.01	<0.01	NC	0.040	<0.01	0.041	102	
Cadmium	88092487	88092487	10-20-88	NA	6010	<0.005	<0.05	<0.05	NC	0.010	<0.05	0.0114	114	
Chromium	88092487	88092487	10-16-88	NA	6010	<0.01	<0.01	<0.01	NC	0.020	<0.01	0.0216	108	
Lead	88092487	88092487	10-16-88	NA	7421	<0.00	<0.05	<0.005	NC	0.020	<0.05	0.0222	111	

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

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

C1 = Concentration One
C2 = Concentration Two

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

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

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

QC Report No: ICP-W-0060-38
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Barium	88092487	88092487	10-13-88	NA	6010	<0.2	<0.2	<0.2	NC	2.0	<0.2	0.198	99	

1469

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

QC Report No: CVM-W-0031-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: 9-17-88
Date Reported: 2-27-89
Dilution Factor: NA

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092487-88092488, 88092492, 88092494-88092495
88092509-88092511, 88092513-88092516
88092523-88092528, 88092546-88092547

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Mercury	88092487	88092487	10-14-88	NA	254.1	<0.0002	<0.0002	<0.0002	NC	0.0010	<0.0002	0.00091	91	

1470

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):
88092487-88092495
88092509-88092516
88092523-88092526

QC Report No: VGC-W-0048-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092525	1,1-Dichloroethane	10	ND	9.26	93	9.54	95	3	26	70-130
	Trichloroethene	10	ND	9.89	99	10.3	103	4	19	65-131
	Chlorobenzene	10	ND	10.4	104	10.3	103	1	40	59-137
	Aromatics: 8020									
88092525	Benzene	10	ND	8.84	88	10.6	106	18	20	56-146
	Toluene	10	ND	10.1	101	10.1	101	0	41	42-150
	Chlorobenzene	10	ND	10.1	101	10.1	101	0	36	76-133

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

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

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

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

1471

QUALITY CONTROL RESULTS SUMMARY
VOLATILE ORGANICS
EPA 8010/8020

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092527-88092528, 8809253:-88092532
88092546-88092551, 88092573-88092577

QC Report No: VGC-W-0044-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: 9-22-88
Date Prepared: NA
Date Analyzed: 10-03-88
Date Reported: 10-25-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092576	1,1-Dichloroethane	10	ND	9.82	98	9.96	100	1	26	70-130
	Trichloroethene	10	ND	10.3	103	10.2	102	1	19	65-131
	Chlorobenzene	10	ND	10.5	105	10.3	103	2	40	59-137
	Aromatics: 8020									
88092576	Benzene	10	ND	10.0	100	10.1	101	1	20	56-146
	Toluene	10	ND	10.1	101	9.85	98	3	41	42-150
	Chlorobenzene	10	ND	10.6	106	9.71	97	9	36	76-133

1472

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

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

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

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

METHOD BLANK SUMMARY

Job No: OR001

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

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
Date Reported: 10-25-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
67	9-27-88	VGC	Carbopack	75-09-2	Dichloromethane	3.2	0.25	88092523, 88092527 88092531
49	9-23-88	VGC	Carbopack	75-09-2	Dichloromethane	0.8	0.25	88092532, 88092524
08	9-23-88	VGC	Vocol	75-09-2	Dichloromethane	11	0.25	88092526, 88092528
				67-66-3	Chloroform	0.18	0.05	
				127-18-4	Tetrachloroethylene	0.46	0.03	
64	9-21-88	VGC	Vocol	75-09-2	Dichloromethane	3.1	0.25	88092525
				67-66-3	Chloroform	0.37	0.05	

1473

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

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

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

RPD: 1 out of 6 outside limits

1474

Spike Recovery: 1 out of 12 outside limits

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
WATER

Job No: OR001

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

Project: Duluth ANGB

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

Laboratory Supervisor Approval:

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

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

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

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

RPD: 2 out of 6 outside limits

1475

Spike Recovery: 0 out of 12 outside limits

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

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

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

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

PESTICIDE 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: Water
Level (low/med): Low
Extraction:
(SepF/Cont/Sonc): Sonc
Date Reported: 11-03-88

Date Extracted: 9-23-88
Date Analyzed (1): 10-24-88
Time Analyzed (1): 01:03
Instrument ID (1): 5890 #2
GC Column ID (1): OV-1

Date Analyzed (2): 10-20-88
Time Analyzed (2): 00:39
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
-	88092511	10-24-88	88092511	10-25-88
-	88092513	10-24-88	88092513	10-25-88
-	88092514	10-24-88	88092514	10-25-88
-	88092515	10-24-88	88092515	10-25-88
-	88092516	10-24-88	88092516	10-25-88
-	88092517	10-24-88	88092526	10-25-88
-	88092526	10-24-88	88092527	10-25-88
-	88092527	10-24-88		
-	88092528	10-24-88		
-	88092525	10-24-88		

QUALITY CONTROL RESULTS SUMMARY
EPA METHOD 625/8270

Job No.: OR001

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

Project: Duluth ANGB

QC Report No: BNA-W-0049-88
Sample Matrix: Water
Conc. Unit: ug/L
Date Received: NA
Date Prepared: 9-20-88
Date Analyzed: 9-24-88
Date Reported: 12-13-88
Dilution Factor: NA

Laboratory Supervisor Approval:

QC Report for Laboratory Sample No(s):
88092513-88092516, 88092523-88092528
88092546-88092551

1478

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limits RPD	RECOVERY
	1,2,4-Trichlorobenzene	100	ND	74.9	75	78.2	78	4	28	39-98
B/N	Acenaphthene	100	ND	67.9	68	72.7	73	7	31	46-118
Laboratory	2,4-Dinitrotoluene	100	ND	83.4	83	87.6	88	6	38	24-96
Sample #	Pyrene	100	ND	67.8	68	75.6	76	11	31	26-127
	N-Nitroso-di-n-Propylamine	100	ND	82.0	82	101	101	20	38	41-116
88092516	1,4-Dichlorobenzene	100	ND	62.6	63	70.7	71	12	28	36-97
ACID	Pentachlorophenol	200	ND	77.4	39	93.3	47	19	50	9-103
Laboratory	Phenol	200	ND	73.9	37	68.1	34	8	42	12-89
Sample #	2-Chlorophenol	200	ND	126	63	110	55	14	40	27-123
	4-Chloro-3-Methylphenol	200	ND	194	97	190	95	2	42	23-97
88092516	4-Nitrophenol	200	ND	53.5	27	40.9	20	29	50	10-80

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

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

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

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

METHOD BLANK SUMMARY

Job No: OR001

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

Project: Duluth ANGB

Sample Matrix: Water
Conc. Unit: ug/L
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.
E6054	11-01-88	AC	2	-	None Detected	-	-	88092513-88092516 88092523-88092528 88092546-88092551
E6028	10-30-88	BN	2	117-81-7	Bis(2ethylhexyl)phthalate	18	10	88092513-88092516 88092523-88092528 88092546-88092551

1479

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092523-88092532
WORK ORDER NO.: 1010

These water samples were received at the ES Berkeley Laboratory on 9-20-88. They were received cold and intact.

SEMIVOLATILE METHOD BLANK SUMMARY
4B

Job No.:

Client:
Attn:
Address:

Work Order No.:
Lab Sample No.: 03-86
Lab File ID: E6322/E6028
Matrix: water
Level (low/med):
Date Analyzed: 11-23-88, 10-31-88
Time Analyzed: 04:27
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-GW3B-GW-1	88092513	S0321, E6025	11-1-88, 10-31-88
-3-MW54-GW-1	88092514	E6050, E6026	11-1-88, 10-31-88
-3-GW3A-GW-1	88092515	E6027/79, E6051	10-31-88, 11-1-88
-3-GW3D-GW-1	88092516	E6047, E6044	11-1-88
-3-GW3D-GW-1	88092516MS	E6048, E6045	11-1-88
-3-GW3D-GW-1	88092516MSD	E6049, E6046	11-1-88
-2-MW2-GW-1	88092523	E6035, E6036	10-31-88
-2-MW1-GW-1	88092524	E6037, E6038	10-31-88
-3-MW28-GW1	88092525	E6039, E6040	10-31-88
-3-MW31-GW1	88092526	S0312, S0313	10-31-88
-3-MW35-GW1	88092527	S0314, S0315	"
-BR8	88092528	S0316, S0317	"
-BR9	88092546	S0322, S0323	11-1-88
-2-MW37-GW1	88092547	S0324, S0325	11-1-88
-2-MW41-GW1	88092548	S0326, S0327	11-1-88
-2-GW2E-GW1	88092549	S0328, S0329	11-1-88, 11-2-88
-2-MW40-GW1	88092550	S0330, E6078	11-2-88
-2-MW55-GW1	88092551	E6052, E6323	11-1-88, 11-23-88

QUALITY CONTROL RESULTS SUMMARY
ENVIRONMENTAL QUALITY PARAMETERS
PETROLEUM HYDROCARBONS

Job No.: OR001

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
88092523-88092530
88092546-88092551

QC Report No: TPH-W-0073-88
Sample Matrix: Water
Conc. Unit: mg/L
Date Received: NA
Date Prepared: 10-05-88
Date Analyzed: 10-08-88
Date Reported: 11-01-88
Dilution Factor: NA

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
Blank	418.1	<1.5	<1.5	39.5	42.6	108	38.2	97	11	*

1482

* See Case Narrative attached.

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

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

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

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

GC/MS TUNING AND MASS CALIBRATION

Decafluorotriphenylphosphine (DFTPP)

Case No. 123456 Contractor Engineering Scien Contract No. 99999999

Instrument ID #1 Date / Time 10/31/88 14:09

Lab ID >T1031::SC Data Release Authorized By: _____

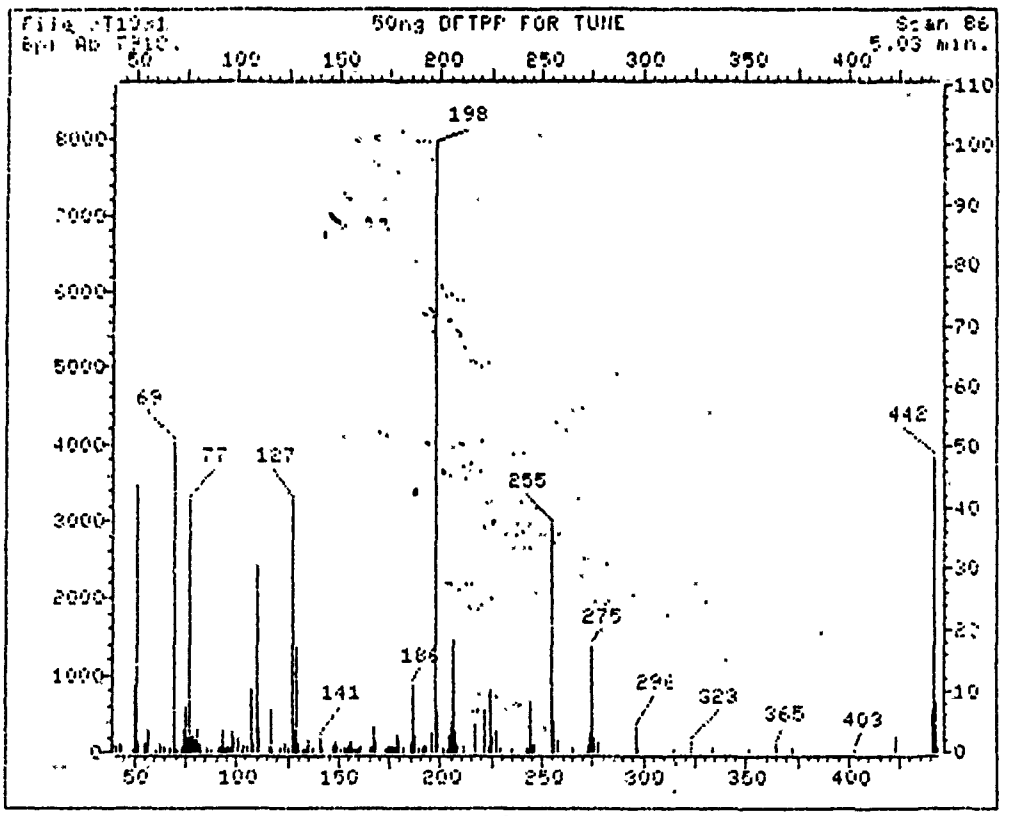
m/z	ION ABUNDANCE CRITERIA	%RELATIVE ABUNDANCE	
51	30.0 - 60.0% of mass 198	43:52 OK	
68	less than 2.0% of mass 69	0.00 OK	(0.00) #1
69	mass 69 relative abundance	50.77	
70	less than 2.0% of mass 69	.51 OK	(.9950) #1
127	40.0 - 60.0% of mass 198	41.17 OK	
197	less than 1.0% of mass 198	0.00 OK	
198	base peak, 100% relative abundance	100.00 OK	
199	5.0 - 9.0% of mass 198	6.35 OK	
275	10.0 - 30.0% of mass 198	17.48 OK	
365	greater than 1.00% of mass 198	1.33 OK	
441	present, but less than mass 443	6.98 OK	
442	greater than 40.0% of mass 198	48.07 OK	
443	17.0 - 23.0% of mass 442	8.20 OK	(17.05) #2

Spoon 10/2/88

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	>T1031	10/31/88	14:09	
8809237	SC309		15:50	another project
8809237B	SC310		16:57	
8809237C	SC311		17:57	
8809252 AC	SC312		18:56	
8809252 BJ	SC313		19:56	
8809252 AI	SC314		20:57	
8809252 BN	SC315		21:56	
8809252 AC	SC316		22:56	
8809252 BN	SC317		23:56	
8808173 REX	SC318	11/1/88	00:56	another project
8808173 RE BK	SC319	11/1/88	01:55	
3STD 50ng	SC308	10/31/88	14:29	



File: 911031 Scan #: 86 Relm. time: 5.03

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	1.124	87.00	.379	133.15	.379	178.15	.783	235.00	.404
43.20	1.389	91.00	.783	134.05	.669	179.05	2.917	242.00	.758
44.00	.998	92.10	.745	135.05	1.642	180.05	1.667	243.20	.480
45.10	.543	93.00	3.435	137.05	.631	181.05	.821	244.00	8.159
50.10	10.766	94.00	.442	140.95	2.142	185.05	1.642	245.00	1.023
51.10	43.521	95.10	.745	142.05	.821	186.05	11.051	246.00	1.604
52.10	1.920	96.10	.985	147.05	1.200	186.95	2.842	255.00	37.156
55.10	1.516	97.10	.530	148.05	1.920	189.05	.631	256.00	5.279
56.00	1.516	98.00	3.044	149.05	.960	190.35	.606	258.00	2.147
57.10	3.801	99.00	2.526	151.15	.518	192.05	1.086	265.00	.864
61.00	.581	101.00	1.995	153.05	.669	193.05	1.061	273.00	1.212
63.10	1.288	103.10	.568	154.05	.442	196.00	3.195	274.05	2.968
65.10	1.023	104.00	1.145	154.95	1.124	198.00	100.000	275.05	17.479
67.10	.606	105.10	1.288	155.95	1.781	199.00	6.353	276.05	2.475
69.00	50.770	107.00	10.179	157.05	.631	201.50	.720	277.05	1.017
70.10	.505	108.10	1.440	157.85	.417	203.10	.493	296.05	4.029
71.10	.543	110.00	30.475	158.05	.379	204.10	2.852	297.05	.682
73.00	.745	111.00	4.105	159.05	.265	205.10	4.711	315.05	.467
74.10	3.700	116.00	.657	159.95	.733	206.10	18.351	323.05	1.743
75.00	7.412	117.00	6.858	161.05	.935	207.10	3.385	333.95	.834
76.20	2.299	117.95	.480	165.05	.682	208.00	1.036	351.95	.316
77.10	41.159	122.05	.682	166.15	.707	211.10	.859	365.00	1.326
78.00	2.336	123.15	1.465	167.05	4.218	217.00	4.622	372.10	.871
79.50	2.842	125.05	.669	168.05	1.659	221.00	6.896	402.90	.569
80.00	2.096	127.05	41.172	172.95	.518	223.00	.947	423.00	2.614
81.10	3.709	128.05	3.344	174.05	.821	224.00	16.205	441.05	6.984
82.00	1.301	129.05	17.214	175.05	1.137	225.00	2.299	442.05	48.068
83.10	1.377	130.05	1.490	176.15	.796	227.00	3.524	443.05	8.197

Continuing Calibration Check
NSL Compounds

Case No: _____ Calibration Date: 10/31/88

Contractor: ENGINEERING SCIENCE Time: 14:29

Contract No: _____ Laboratory ID: >S0308

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.91167	1.11		
2-Fluorophenol	1.15802	1.38353	19.47		
bis(2-Chloroethyl)ether	1.11892	1.00836	9.88		
Phenol	1.41657	1.52438	7.61	*	
Phenol-d5	1.22488	1.38873	13.38		
Aniline	.54193	.61712	13.87		
2-Chlorophenol	1.23175	1.34032	8.81		
1,3-Dichlorobenzene	1.47535	1.45166	1.61		
1,4-Dichlorobenzene	1.40530	1.38079	1.74	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.64946	10.92		
1,2-Dichlorobenzene	1.32240	1.48325	12.16		
2-Methylphenol	1.17367	1.40217	19.47		
3-&-4-Methylphenol	1.07139	1.29843	21.19		
bis(2-chloroisopropyl)Ether	2.15627	2.54858	18.19		
N-Nitroso-Di-n-Propylamine	.84050	.75788	9.83		**
Hexachloroethane	.53840	.56852	5.59		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.42799	6.17		
Nitrobenzene-d5	.39137	.40983	4.72		
2-Nitrophenol	.24657	.28686	16.34	*	
Isophorone	.74170	.72135	2.74		
bis(2-Chloroethoxy)methane	.49386	.53725	8.79		
2,4-Dimethylphenol	.34849	.37017	6.22		
Benzoic Acid	.29725	.32136	8.11		
2,4-Dichlorophenol	.56733	.62790	10.68	*	
1,2,4-Trichlorobenzene	.36913	.38008	2.96		
Naphthalene	.94589	.91465	3.30		
4-Chloroaniline	.36309	.39839	9.72		
Hexachlorobutadiene	.20283	.21543	6.21	*	
4-Chloro-3-Methylphenol	.31360	.36681	16.97	*	
2-Methylnaphthalene	.56397	.61033	8.22		

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: 10/31/88

Contractor: ENGINEERING-SCIENCE Time: 14:29

Contract No: _____ Laboratory ID: >S0308

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Hexachlorocyclopentadiene	.29568	.36837	24.58		**
2,4,6-Trichlorophenol	.42280	.34081	19.39	*	
2,4,5-Trichlorophenol	.52897	.63075	19.24		
2-Fluorobiphenyl	1.27220	1.13185	11.03		
2-Chloronaphthalene	1.23784	1.12395	9.20		
2-Nitroaniline	.47288	.46494	1.68		
Dimethylphthalate	1.40629	1.27103	9.62		
2,6-Dinitrotoluene	.37415	.36418	2.66		
Acenaphthylene	1.68918	1.46587	13.22		
3-Nitroaniline	.44557	.42714	4.14		
2,4-Dinitrophenol	.11898	.13616	14.44		**
Acenaphthene	1.13011	.92812	17.87	*	
Dibenzofuran	1.64131	1.49623	8.84		
2,4-Dinitrotoluene	.28418	.26441	6.96		
4-Nitrophenol	.28450	.18785	33.97		**
Fluorene	1.12850	.88638	21.46		
Diethylphthalate	1.20939	.99028	18.12		
4-Chlorophenyl-phenylether	.59183	.54703	7.57		
4-Nitroaniline	.35956	.36356	1.11		
2,4,6-Tribromophenol	.21023	.21531	2.41		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.44177	9.66	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23829	11.87		
Hexachlorobenzene	.26273	.29193	11.12		
Pentachlorophenol	.14536	.14842	2.10	*	

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: 10/31/88

Contractor: ENGINEERING-SCIENCE Time: 14:29

Contract No: Laboratory ID: >S0308

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	.98975	4.31		
Anthracene	1.05155	1.04774	.36		
Di-n-Butylphthalate	1.51956	1.55334	2.22		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.10117	7.50	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.13722	241.10		
Pyrene	1.56086	1.52601	2.23		
Terphenyl-d14	1.05835	1.07355	1.44		
Butylbenzylphthalate	1.03390	1.03295	.09		
3,3'-Dichlorobenzidine	.13689	.23325	70.39		
Chrysene	.99655	.96581	3.08		
Benzo(a)Anthracene	1.10407	1.08733	1.52		
bis(2-Ethylhexyl)Phthalate	1.21073	1.25570	3.71		
Di-n-octylphthalate	3.40275	2.93812	13.65	*	
Benzo(a)Pyrene	1.32098	1.28282	2.89	*	
Benzo(b)Fluoranthene	1.60850	1.31345	18.34		
Indeno(1,2,3-cd)Pyrene	.96800	1.40038	44.67		
Dibenzo(a,h)Anthracene	.87481	1.04573	19.54		
Benzo(k)Fluoranthene	1.44370	1.30791	9.41		
Benzo(g,h,i)Perylene	.89761	1.09884	22.42		

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

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

%Diff - % Difference from original average of curve

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

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: OR01

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

Sample No. (Standard): SSTD069 Date Analyzed: 10/31/88

Lab File ID (Standard): S0308 Time Analyzed: 14:29

Instrument ID: 1

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
12 HOUR STD	70612	9.24	234798	12.84	149106	18.31
UPPER LIMIT	141224	9.71	469596	13.34	298212	18.81
LOWER LIMIT	35306	8.71	117399	12.34	74553	17.81
EPA SAMPLE NO.						
S0309 01 88092371	85856	9.18	183476	12.80	134682	18.30
S0310 02 88092378	103549	9.19	231653	12.80	186089	18.30
S0311 03 88092375-MATRIX BLK	115016	9.19	294739	12.80	220057	18.31
S0312 04 88092526 AC	65412	9.19	195801	12.85	124947	18.32
S0313 05 88092596 BN	64394	9.18	213097	12.83	125592	18.32
S0314 06 88092527 AC	69653	9.19	211171	12.82	131953	18.29
S0315 07 88092527 BN	63855	9.19	192022	12.84	117025	18.31
S0316 08 88092528 AC	65091	9.19	164300	12.87	121886	18.32
S0317 09 88092528 BN	73245	9.19	227968	12.84	140690	18.32
S0318 10 88081731 REX	46640	9.04	133235	12.65	80126	18.33
S0319 11 88081731 BLK REX	61830	9.18	122897	12.81	97253	18.31
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: OR0001

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

Sample No.(Standard): STD060 Date Analyzed: 10/31/88

Lab File ID (Standard): SQ308 Time Analyzed: 14:29

Instrument ID: 1

	EPA SAMPLE NO.	IS4(PHN) AREA #	IS4(PHN) RT	IS5(CRY) AREA #	IS5(CRY) RT	IS4(PRY) AREA #	IS4(PRY) RT
	12 HOUR STD	221595	22.97	149730	31.45	108544	37.59
	UPPER LIMIT	443190	23.47	299460	31.95	217088	38.09
	LOWER LIMIT	110798	22.47	74865	30.95	54272	37.09
SQ309 01	8809237I	235881	22.97	160543	31.43	73787	37.57
SQ310 02	8809237S	341228	22.98	213810	31.42	113440	37.56
SQ311 03	8809236 H 1778 BLK	396643	22.97	269902	31.44	164955	37.60
SQ312 04	8809252G AC	182990	22.99	106636	31.42	65340	37.60
SQ313 05	8809252G BN	181953	23.01	113204	31.44	76830	37.56
SQ314 06	8809252I AC	201085	22.95	136523	31.43	88875	37.55
SQ315 07	8809252I BN	177850	22.98	115539	31.43	68693	37.57
SQ316 08	8809253S AC	169319	23.01	94372	31.48	60338	37.64
SQ317 09	8809253S BN	212998	23.01	150213	31.45	106030	37.59
SQ318 10	8808173I Rex	158006	22.98	108391	31.43	64756	37.58
SQ319 11	8808173I Rex Dup	166677	22.98	105272	31.42	58865	37.57
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						

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

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

Column used to flag internal standard area values with an asterisk

24 OCT 88

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName: _____ Contract: _____

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

Instrument ID.: Carbopak Calibration Date(s): 9/19/88 9/23/88

LAB FILE ID:
RRF 50= 67 , 52

RRF10= 70 , 50 RRF20= 71 , 51
RRF100= 72 , 53 RRF200= 73 , 54

COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	% RSD
Benzyl chloride	0.31	0.27	0.34	0.40	0.3(	0.32	15
bis (2-chloroethoxy methane	0.03	0.03	0.05	0.04	0.06	0.042	33
bis (2-chloroispropyl ether	0.24	0.27	0.26	0.24	0.30	0.26	9.7
Bromobenzene	1.7	1.4	1.2	1.5	1.3	1.4	14
Bromodichloromethane	3.9	4.0	4.0	3.8	2.9	3.7	13
Bromoform	1.6	1.2	2.0	2.2	1.7	1.7	22
Bromomethane	—	0.43	0.23	0.20	0.16	0.20	60
Carbon tetrachloride	4.8	4.6	4.3	4.2	3.5	4.2	14
Chloroacetaldehyde	0.001	0.002	0.001	0.005	0.000	001	66
Chlorobenzene	1.5	1.3	1.2	1.5	1.1	1.4	14
Chloroethane	0.7	0.5	0.96	0.65	0.49	072	24
Chloroform	2.4	5.2	4.7	4.2	3.0	3.9	30
1-Chorohexane	1.7	1.2	1.0	1.2	0.97	1.2	24
2-Chloroethyl vinyl ether	0.03	0.03	0.05	0.04	0.06	042	32
Chloromethane	0.5	0.4	0.6	0.4	0.4	0.46	18
Chloromethyl methyl ether	0.13	0.21	0.22	0.16	0.15	0.17	25
o_,m_,& p_Chlorotoluenes	5.8	4.9	4.0	4.3	3.5	4.6	18
Dibromochloromethane	3.6	3.9	4.0	4.0	3.0	3.7	11
Dibromomethane	3	3.3	2.9	3.2	2.7	3.2	15
1,2_Dichlorobenzene	2.7	2.7	2.6	2.6	1.8	2.5	15
1,3_Dichlorobenzene	2.2	2.2	2.7	2.8	1.6	2.1	24
1,4_Dichlorobenzene	2.3	2.3	2.4	2.2	2.2	2.3	4.2
Dichlorodifluormethane	0.53	0.49	0.50	0.57	0.64	0.54	12
1,1_Dichloroethane	2.5	2.5	2.6	2.4	1.8	2.4	13
1,2_Dichloroethane	2.1	2.3	2.9	2.6	1.9	2.6	14
1,1_Dichloroethylene	2.8	2.7	2.9	2.5	2.0	2.6	14
trans_1,2_dichloroethylene	2.2	2.6	2.7	2.4	1.9	2.4	13
Dichloromethane	5.3	4.9	4.2	3.2	2.2	4.1	33
1,2_Dichloropropane	2.8	2.7	2.6	2.5	1.9	2.5	13
1,3_Dichloropropylene	7.9	6.5	5.2	5.5	4.4	5.9	23
1,1,2,2_Tetrachloroethane	9.5	8.3	7.9	7.4	5.2	7.5	18
1,1,1,2_Tetrachloroethane	7.1	5.6	4.5	4.3	3.5	5.2	24
Tetrachloroethylene	8.5	8.3	7.9	7.4	5.2	7.5	18
1,1,1_Trichloroethane	3.2	3.3	3.3	3.0	2.2	3.0	15
1,1,2_Trichloroethane	7.7	6.5	6.2	5.5	4.4	5.9	23
Trichloroethylene	4.6	4.5	4.2	3.9	2.9	4.0	12
Trichlorofluormethane	2.4	2.4	2.6	2.2	1.8	2.3	13
Trichloropropane	2.5	2.3	1.8	2.1	1.7	2.1	16
Vinyl chloride	1.0	1.0	1.1	0.87	0.72	0.94	16

file: 8020CAL
21 Oct 88

a|9|99

VOLATILE ORGANICS INITIAL CALIBRATION DATA

LabName:_____ Contract:_____

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

Instrument ID.: CARbopak Calibration Date(s): 9/19/89 _____

LAB FILE ID: RRF10= 70 RRF20= 71
RRF 50= 67 RRF100= 72 RRF200= 73

	COMPOUND	RRF10	RRF20	RRF 50	RRF100	RRF200	$\overline{RRF}$	%RSD	SD
	Benzene	6.5	5.6	4.3	4.4	3.6	4.9	24	1.2
	Chlorobenzene	5.6	5.9	5.4	5.2	4.2	5.3	12	0.65
o	1,2_Dichlorobenzene	4.9	4.2	5.0	4.4	3.4	4.4	15	0.64
m	1,3_Dichlorobenzene	7.1	4.7	4.8	4.8	3.8	5.0	24	1.2
p	1,4_Dichlorobenzene	5.3	3.6	4.2	3.9	3.4	4.1	19	0.78
	Ethyl Benzene	5.1	4.5	6.2	3.5	2.8	4.4	25	1.1
	Toluene	4.1	4.2	3.9	3.9	3.2	3.9	11	0.41
	Xylenes	17	13	12	12	10	13	21	2.6

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE_____ Contract: _____

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

Instrument ID: vocol _____ Calibration Date(s) 9/21/88

LAB FILE ID: 61,62 Init. Calib. Date(s): 9/9/88, 9/14/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzyl chloride	4.56	6.10	-33.77
bis (2-choroethoxy) methane	0.12		NA
bis (2-choroisopropyl ether	0.12		NA
Bromobenzene	3.08	3.10	-0.71
Bromodichloromethane	4.72	4.50	4.74
Bromoform	3.13	3.10	0.91
Bromomethane	0.43	0.62	-43.78
Carbon tetrachloride	4.59	4.60	-0.24
Chloroacetaldehyde	0.07		NA
Chlorobenzene	1.34	1.10	17.85
Chloroethane	0.73	0.88	-20.32
Chloroform	6.20	3.90	37.05
1-Chorohexane	0.82	0.89	-8.01
2-Chloroethyl vinyl ether	0.12		NA
Chloromethane	1.84	2.21	-20.35
Chloromethyl methyl ether	0.02		NA
o-,m-,& p-Chlorotoluenes	3.34	3.40	-1.86
Dibromochloromethane	4.42	4.40	0.44
Dibromomethane	3.06	2.90	5.17
1,2-Dichlorobenzene	2.44	2.10	13.77
1,3-Dichlorobenzene	1.53	1.80	-17.52
1,4-Dichlorobenzene	1.47	1.80	-22.65
Dichlorodifluormethane	0.54		NA
1,1-Dichloroethane	2.41	2.40	0.28
1,2-Dichloroethane	3.68	3.40	7.60
1,1-Dichloroethylene	0.77	1.30	-68.08
trans-1,2-dichloroethylene	2.15	2.40	-11.54
Dichloromethane	1.36	2.70	-99.11
1,2-Dichloropropane	3.07	2.80	8.65
1,3-Dichloropropylene	0.47	0.49	-3.38
1,1,2,2-Tetrachloroethane	4.08	3.50	14.17
1,1,1,2-Tetrachloroethane	4.83	4.60	4.76
Tetrachloroethylene	4.65	4.80	-3.16
1,1,1-Trichloroethane	2.62	2.50	4.48
1,1,2-Trichloroethane	4.42	4.70	-6.43
Trichloroethylene	3.90	3.80	2.53
Trichlorofluormethane	0.66	0.64	2.38
Trichloropropane	3.08	3.10	-0.71
Vinyl chloride	1.84	1.35	26.41

VOLATILE CONTINUING CALIBRATION CHECK

LabName: ENGINEERING SCIENCE_____ Contract:_____

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

Instrument ID.:_____ Calibration Date(s): 9/21/88

LAB FILE ID: RRF 50 61_____ Init cal = 9/19/88

COMPOUND	$\overline{RRF}$	RRF50	%D
Benzene	4.42	5.20	17.65
Chlorobenzene	4.67	5.30	13.49
1,2_Dichlorobenzene	3.72	4.40	18.28
1,3_Dichlorobenzene	4.09	4.90	19.80
1,4_Dichorobenzene	3.28	4.00	21.95
Ethyl Benzene	3.05	3.50	14.75
Toluene	3.60	4.10	13.89
Xylenes	10.15	12.00	18.23

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DATA PACKAGE #23

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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.: 924

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 8-29-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88102156	DANGB3-MW31-SS1-0-1'	AS-F	8-27-88		10-10-88	
88102156	DANGB3-MW31-SS1-0-1'	BA-I	8-27-88		10-20-88	
88102156	DANGB3-MW31-SS1-0-1'	CD-F	8-27-88		10-19-88	
88102156	DANGB3-MW31-SS1-0-1'	CR-F	8-27-88		10-19-88	
88102156	DANGB3-MW31-SS1-0-1'	HG-C	8-27-88		9-21-88	
88102156	DANGB3-MW31-SS1-0-1'	PB-F	8-27-88		10-13-88	
88102156	DANGB3-MW31-SS1-0-1'	418.1	8-27-88	9-21-88	9-22-88	
88102156	DANGB3-MW31-SS1-0-1'	MOIS	8-27-88		9-07-88	
88102156	DANGB3-MW31-SS1-0-1'	8010	8-27-88		9-06-88	9-07-88
88102156	DANGB3-MW31-SS1-0-1'	8020	8-27-88		9-06-88	9-07-88
88102156	DANGB3-MW31-SS1-0-1'	8080	8-27-88	9-07-88	10-05-88	
88102156	DANGB3-MW31-SS1-0-1'	8270	8-27-88	9-06-88	10-14-88	
88102157	DANGB3-MW31-SS2-9-10'	AS-F	8-27-88		10-10-88	
88102157	DANGB3-MW31-SS2-9-10'	BA-I	8-27-88		10-20-88	
88102157	DANGB3-MW31-SS2-9-10'	CD-F	8-27-88		10-19-88	
88102157	DANGB3-MW31-SS2-9-10'	CR-F	8-27-88		10-19-88	
88102157	DANGB3-MW31-SS2-9-10'	HG-C	8-27-88		9-21-88	
88102157	DANGB3-MW31-SS2-9-10'	PB-F	8-27-88		10-13-88	
88102157	DANGB3-MW31-SS2-9-10'	418.1	8-27-88	9-21-88	9-22-88	
88102157	DANGB3-MW31-SS2-9-10'	MOIS	8-27-88		9-07-88	
88102157	DANGB3-MW31-SS2-9-10'	8010	8-27-88		9-06-88	9-07-88
88102157	DANGB3-MW31-SS2-9-10'	8020	8-27-88		9-06-88	9-07-88
88102157	DANGB3-MW31-SS2-9-10'	8080	8-27-88	9-07-88	10-05-88	
88102157	DANGB3-MW31-SS2-9-10'	8270	8-27-88	9-06-88	10-14-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

Job No.: OR001

Work Order No.: 924

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
38102158	DANGB3-MW28-SS1-0-1'	AS-F	8-27-88		10-10-88	
38102158	DANGB3-MW28-SS1-0-1'	BA-I	8-27-88		10-20-88	
38102158	DANGB3-MW28-SS1-0-1'	CD-F	8-27-88		10-19-88	
38102158	DANGB3-MW28-SS1-0-1'	CR-F	8-27-88		10-19-88	
88102158	DANGB3-MW28-SS1-0-1'	HG-C	8-27-88		9-21-88	
88102158	DANGB3-MW28-SS1-0-1'	PB-F	8-27-88		10-13-88	
88102158	DANGB3-MW28-SS1-0-1'	418.1	8-27-88	9-21-88	9-22-88	
88102158	DANGB3-MW28-SS1-0-1'	MOIS	8-27-88		9-07-88	
88102158	DANGB3-MW28-SS1-0-1'	8010	8-27-88		9-06-88	9-07-88
88102158	DANGB3-MW28-SS1-0-1'	8020	8-27-88		9-06-88	9-07-88
88102158	DANGB3-MW28-SS1-0-1'	8080	8-27-88	9-07-88	10-05-88	
88102158	DANGB3-MW28-SS1-0-1'	8270	8-27-88	9-06-88	10-14-88	
88102159	DANGB3-MW28-SS2-2-3'	AS-F	8-27-88		10-10-88	
88102159	DANGB3-MW28-SS2-2-3'	BA-I	8-27-88		10-20-88	
88102159	DANGB3-MW28-SS2-2-3'	CD-F	8-27-88		10-19-88	
88102159	DANGB3-MW28-SS2-2-3'	CR-F	8-27-88		10-19-88	
88102159	DANGB3-MW28-SS2-2-3'	HG-C	8-27-88		9-21-88	
88102159	DANGB3-MW28-SS2-2-3'	PB-F	8-27-88		10-13-88	
88102159	DANGB3-MW28-SS2-2-3'	418.1	8-27-88	9-21-88	9-22-88	
88102159	DANGB3-MW28-SS2-2-3'	MOIS	8-27-88		9-07-88	
88102159	DANGB3-MW28-SS2-2-3'	8010	8-27-88		9-06-88	9-07-88
88102159	DANGB3-MW28-SS2-2-3'	8020	8-27-88		9-06-88	9-07-88
88102159	DANGB3-MW28-SS2-2-3'	8080	8-27-88	9-07-88	10-05-88	
88102159	DANGB3-MW28-SS2-2-3'	8270	8-27-88	9-06-88	10-17-88	

* If applicable

Job No.: OR001

Work Order No.: 924

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88102160	DANGB3-MW28-SS3-14-15'	AS-F	8-27-88		10-10-88	
88102160	DANGB3-MW28-SS3-14-15'	BA-I	8-27-88		10-20-88	
88102160	DANGB3-MW28-SS3-14-15'	CD-F	8-27-88		10-19-88	
88102160	DANGB3-MW28-SS3-14-15'	CR-F	8-27-88		10-19-88	
88102160	DANGB3-MW28-SS3-14-15'	HG-C	8-27-88		9-21-88	
88102160	DANGB3-MW28-SS3-14-15'	PB-F	8-27-88		10-13-88	
88102160	DANGB3-MW28-SS3-14-15'	418.1	8-27-88	9-21-88	9-22-88	
88102160	DANGB3-MW28-SS3-14-15'	MOIS	8-27-88		9-07-88	
88102160	DANGB3-MW28-SS3-14-15'	8010	8-27-88		9-06-88	9-07-88
88102160	DANGB3-MW28-SS3-14-15'	8020	8-27-88		9-06-88	9-07-88
88102160	DANGB3-MW28-SS3-14-15'	8080	8-27-88	9-07-88	10-05-88	
88102160	DANGB3-MW28-SS3-14-15'	8270	8-27-88	9-06-88	10-17-88	
88102161	DANGB3-MW33-SS1-0-1'	AS-F	8-27-88		10-10-88	
88102161	DANGB3-MW33-SS1-0-1'	BA-I	8-27-88		10-20-88	
88102161	DANGB3-MW33-SS1-0-1'	CD-F	8-27-88		10-19-88	
88102161	DANGB3-MW33-SS1-0-1'	CR-F	8-27-88		10-19-88	
88102161	DANGB3-MW33-SS1-0-1'	HG-C	8-27-88		9-21-88	
88102161	DANGB3-MW33-SS1-0-1'	PB-F	8-27-88		10-13-88	
88102161	DANGB3-MW33-SS1-0-1'	418.1	8-27-88	9-21-88	9-22-88	
88102161	DANGB3-MW33-SS1-0-1'	MOIS	8-27-88		9-07-88	
88102161	DANGB3-MW33-SS1-0-1'	8010	8-27-88		9-07-88	9-07-88
88102161	DANGB3-MW33-SS1-0-1'	8020	8-27-88		9-07-88	9-07-88
88102161	DANGB3-MW33-SS1-0-1'	8080	8-27-88	9-07-88	10-05-88	
88102161	DANGB3-MW33-SS1-0-1'	8270	8-27-88	9-06-88	10-17-88	

* If applicable

Job No.: OR001

Work Order No.: 924

Project: Duluth ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88102162	DANGB3-MW33-SS2-11-12'	AS-F	8-27-88		10-10-88	
88102162	DANGB3-MW33-SS2-11-12'	BA-I	8-27-88		10-20-88	
88102162	DANGB3-MW33-SS2-11-12'	CD-F	8-27-88		10-19-88	
88102162	DANGB3-MW33-SS2-11-12'	CR-F	8-27-88		10-19-88	
88102162	DANGB3-MW33-SS2-11-12'	HG-C	8-27-88		9-21-88	
88102162	DANGB3-MW33-SS2-11-12'	PB-F	8-27-88		10-13-88	
88102162	DANGB3-MW33-SS2-11-12'	418.1	8-27-88	9-21-88	9-22-88	
88102162	DANGB3-MW33-SS2-11-12'	MOIS	8-27-88		9-07-88	
88102162	DANGB3-MW33-SS2-11-12'	8010	8-27-88		9-07-88	9-08-88
88102162	DANGB3-MW33-SS2-11-12'	8020	8-27-88		9-07-88	9-08-88
88102162	DANGB3-MW33-SS2-11-12'	8080	8-27-88	10-29-88	11-30-88	
88102162	DANGB3-MW33-SS2-11-12'	8270	8-27-88	10-29-88	11-30-88	
8810216	DANGB3-MW33-SS3-20-21'	AS-F	8-27-88		10-10-88	
8810216	DANGB3-MW33-SS3-20-21'	BA-I	8-27-88		10-20-88	
8810216	DANGB3-MW33-SS3-20-21'	CD-F	8-27-88		10-19-88	
8810216	DANGB3-MW33-SS3-20-21'	CR-F	8-27-88		10-19-88	
8810216	DANGB3-MW33-SS3-20-21'	HG-C	8-27-88		9-21-88	
8810216	DANGB3-MW33-SS3-20-21'	PB-F	8-27-88		10-13-88	
8810216	DANGB3-MW33-SS3-20-21'	418.1	8-27-88	9-21-88	9-22-88	
8810216	DANGB3-MW33-SS3-20-21'	MOIS	8-27-88		9-07-88	
8810216	DANGB3-MW33-SS3-20-21'	8010	8-27-88		9-07-88	9-08-88
8810216	DANGB3-MW33-SS3-20-21'	8020	8-27-88		9-07-88	9-08-88
8810216	DANGB3-MW33-SS3-20-21'	8080	8-27-88	10-29-88	11-02-88	
8810216	DANGB3-MW33-SS3-20-21'	8270	8-27-88	10-29-88	11-02-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88102156-88102163
WORK ORDER NO.: 924

These soil samples were received at the ES Berkeley Laboratory on 8-29-88. They were received cold and intact.

Samples 88102159-88102161 were first analyzed, by method 8270, one day out of holding time. Results of the first analysis of samples 88102162 and 88102163 showed low surrogate spike recoveries. The samples were re-extracted and analyzed out of holding time. Good surrogate recoveries were obtained from analysis of the second extracts. The only target compound found was a small amount of bis(2-ethylhexyl)phthalate in sample 88102162. The results from the second extraction are reported.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88082159-88082163
WORK ORDER NO.: 924

Samples 88082159 and 88082161 were first analyzed one day out of holding time. Results of the first analysis of samples 88082162 and 88082163 showed low surrogate spike recoveries. The samples were re-extracted and analyzed out of holding time. Good surrogate recoveries were obtained from analysis of the second extract. The only target compound found was a small amount of bis(2-ethylhexyl)phthalate in sample 88082162. The results from the second extraction are reported.

ANALYSIS REPORT

)RK ORDER NUMBER: 924
JOB NUMBER : ZB0000000440
)RK ORDER DATE : 10/13/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 2, UNITS: MG/KG

EST COMPOUND	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2-2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
ACID DIG SOIL	NA	NA	NA	NA	NA	NA
RSENIC	<5.0NE	<5.0NE	<5.0NE	<5.0NE	<5.0NE	<5.0NE
ARIUM	69.5	47.7	121	66.6	45.8	102
CADMIUM	7.5N	8.9N	11.0N	7.3N	8.7N	8.7N
HROMIUM	38.3	29.8	40.1	31.9	28.6	39.7
ERCURY	<0.1	<0.1	0.28	<0.1	<0.1	<0.1
LEAD	6.4N	4.5N	9.5N	6.2N	3.8N	12.9

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

SK: 2, UNITS: MG/KG

ST COMPOUND	DANGB3-MW33-SS2-11-12' 88102162	DANGB3-MW33-SS3-20-21' 88102163
ID DIG SOIL	NA	NA
SENIC	<5.0NE	<5.0NE
RIUM	44.5	30.4
DMIUM	8.8N	8.1N
ROMIUM	27.7	27.3
RCURY	<0.1	<0.1
AD	4.3N	3.9N

ANALYSIS REPORT

ORK ORDER NUMBER: 924
JOB NUMBER : ZB0000000440
ORK ORDER DATE : 10/13/88

APPROVED BY _____
Lab Supervisor

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ES OAK RIDGE/DULUTH ANGB
10 S. ILLINOIS AVE. STE. S103
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BILL HAYDEN

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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	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2-2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
418.1 PETROLEUM HYDROCARBONS	<100	<100	<100	<100	<100	<100
MOISTURE	19.0	10.2	34.6	12.8	8.0	25.6

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

SK: 3, UNITS: mg/Kg

ST COMPOUND	DANGB3-MW33-SS2-11-12' 88102162	DANGB3-MW33-SS3-20-21' 88102163
8.1 PETROLEUM HYDROCARBONS	<100	<100
MOISTURE	8.8	9.9

ANALYSIS REPORT

ORK ORDER NUMBER: 924
JOB NUMBER : ZB0000000440
ORK ORDER DATE : 10/13/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
10 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

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

ASK: 4, UNITS: UG/KG, GROUP 8080

EST COMPOUND	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2-2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
ALDRIN	ND	ND	ND	ND	ND	ND
LPHA-BHC	ND	ND	ND	ND	ND	ND
BETA-BHC	ND	ND	ND	ND	ND	ND
DELTA-BHC	ND	ND	ND	ND	ND	ND
AMMA-BHC	ND	ND	ND	ND	ND	ND
HLORDANE	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
NDOSULFAN II	ND	ND	ND	ND	ND	ND
ENDOSULFAN SULFATE	ND	ND	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	ND	ND
NDRIN ALDEHYDE	NA	NA	NA	NA	NA	NA
EPTACHLOR	ND	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	ND	ND	ND	ND	ND	ND
EPONE	NA	NA	NA	NA	NA	NA
ETHOXYCHLOR	ND	ND	ND	ND	ND	ND
TOXAPHENE	ND	ND	ND	ND	ND	ND
PCB-1016	ND	ND	ND	ND	ND	ND
CB-1221	ND	ND	ND	ND	ND	ND
CB-1232	ND	ND	ND	ND	ND	ND
PCB-1242	ND	ND	ND	ND	ND	ND
CB-1248	ND	ND	ND	ND	ND	ND
CB-1254	ND	ND	ND	ND	ND	ND
PCB-1260	ND	ND	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

SK: 4, UNITS: UG/KG, GROUP 8080

ST COMPOUND	DANGB3-MW33-SS2-11-12' 88102162	DANGB3-MW33-SS3-20-21' 88102163
DRIN	ND	ND
PHA-BHC	ND	ND
TA-BHC	ND	ND
LTA-BHC	ND	ND
MMA-BHC	ND	ND
LORDANE	ND	ND
4'-DDD	ND	ND
4'-DDE	ND	ND
4'-DDT	ND	ND
ELDRIN	ND	ND
DOSULFAN I	ND	ND
DOSULFAN II	ND	ND
DOSULFAN SULFATE	ND	ND
DRIN	ND	ND
DRIN ALDEHYDE	NA	NA
PTACHLOR	ND	ND
PTACHLOR EPOXIDE	ND	ND
PONE	NA	NA
THOXYCHLOR	ND	ND
XAPHENE	ND	ND
B-1016	ND	ND
B-1221	ND	ND
B-1232	ND	ND
B-1242	ND	ND
B-1248	ND	ND
B-1254	ND	ND
B-1260	ND	ND

ANALYSIS REPORT

ORK ORDER NUMBER: 924
JOB NUMBER : ZB0000000440
ORK ORDER DATE : 10/13/88

APPROVED BY _____
Lab Supervisor

REPORT DATA:
ES OAK RIDGE/DULUTH ANGB
10 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

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

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

EST COMPOUND	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2-2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
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
BROMOBENZENE	ND	ND	ND	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND
ROMOFORM	ND	ND	ND	ND	ND	ND
BROMOETHANE	ND	ND	ND	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND	ND	ND	ND
CHLORAL	ND	ND	ND	ND	ND	ND
HLOROBENZENE	ND	ND	ND	ND	ND	ND
HLOROETHANE	ND	ND	ND	ND	ND	ND
HLOROFORM	ND	0.43B	ND	ND	0.24B	ND
1-CHLOROHEXANE	ND	ND	ND	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND	ND	ND	ND
HLOROMETHANE	ND	ND	ND	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND	ND	ND	ND
HLOROTOLUENE	ND	ND	ND	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND
DIBROMOMETHANE	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
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
ICHLOROMETHANE	5.9B	2.3B	3.1B	2.2B	1.7B	3.9B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

ST COMPOUND	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2 2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
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
RICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	0.66	ND	ND	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND	ND	ND
NYL CHLORIDE	ND	ND	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

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

TEST COMPOUND	DANGB3-MW33-SS2-11-12' 88102162	DANGB3-MW33-SS3-20-21' 88102163
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
CHLORACETALDEHYDE	ND	ND
CHLORAL	ND	ND
CHLOROBENZENE	ND	ND
CHLOROETHANE	ND	ND
CHLOROFORM	ND	ND
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	ND	ND
1,1-DICHLOROETHYLENE	ND	ND
TRANS-1,2-DICHLOROETHYLENE	ND	ND
DICHLOROMETHANE	2.6B	4.1B
1,2-DICHLOROPROPANE	ND	ND
1,3-DICHLOROPROPYLENE	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND
1,1,1,2-TETRACHLOROETHANE	ND	ND
TETRACHLOROETHYLENE	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND
TRICHLOROETHYLENE	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND
TRICHLOROPROPANE	ND	ND
VINYL CHLORIDE	ND	ND

ANALYSIS REPORT

)RK ORDER NUMBER: 944
)B NUMBER : ZB0000000440
)RK ORDER DATE : 10/13/88

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	DANGB3-MW31-SS1-0-1' 88102156	DANGB3-MW31-SS2-9-10' 88102157	DANGB3-MW28-SS1-0-1' 88102158	DANGB3-MW28-SS2-2-3' 88102159	DANGB3-MW28-SS3-14-15' 88102160	DANGB3-MW33-SS1-0-1' 88102161
: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	9.8	60	5.5	60	23	150
'LENES	ND	ND	ND	ND	ND	ND

ANALYSIS REPORT FOR WORK ORDER NUMBER 924

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

TEST COMPOUND	DANGB3-MW33-SS2-11-12' 88102162	DANGB3-MW33-SS3-20-21' 88102163
ENZENE	ND	ND
CHLOROBENZENE	ND	ND
,2-DICHLOROBENZENE	ND	ND
,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
THYL BENZENE	ND	ND
OLUENE	28	9.4
XYLENES	ND	ND

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

ate Received: August 29, 1988
ate Reported: December 8, 1988

Work Order: 924
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:	88082156	88082157
ample No.:	DANGB3-MW31-SS1- 0-1'	DANGB3-MW31-SS2- 9-10'
ate Sampled:	8-27-88	8-27-88
ime Sampled:	08:25	08:41
ate Extracted:	9-06-88	9-06-88
ate Analyzed:	10-14-88	10-14-88
ercent Moisture:	19	10

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

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

ate Received: August 29, 1988 Work Order: 924
Date Reported: December 8, 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:	88082156	88082157
Sample No.:	DANGB3-MW31-SS1- 0-1'	DANGB3-MW31-SS2- 9-10'
ate Sampled:	8-27-88	8-27-88
ime Sampled:	08:25	08:41
Date Extracted:	9-06-88	9-06-88
ate Analyzed:	10-14-88	10-14-88
ercent Moisture:	19	10

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
henanthrene	330	ND	ND
nthracene	330	ND	ND
Dibutyl phthalate	330	ND	ND
luoranthene	330	ND	ND
-Chlorophenyl phenyl ether	330	ND	ND
Pyrene	330	ND	ND
utyl Benzyl phthalate	330	ND	ND
is(2-ethylhexyl) phthalate	330	ND	ND
Chrysene	330	ND	ND
4-Bromophenyl phenyl ether	330	ND	ND
enzo(a)anthracene	330	ND	ND
i-n-octylphthalate	330	ND	ND
Benzo(b)fluoranthene	330	ND	ND
enzo(k)fluoranthene	330	ND	ND
enzidine	2000	ND	ND
3,3'-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
Benzo(ghi)perylene	330	ND	ND
enzyl Alcohol	660	ND	ND

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

ıte Received: August 29, 1988
ıte Reported: December 8, 1988

Work Order: 924
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88082156	88082157
ample No.:	DANGB3-MW31-SS1- 0-1'	DANGB3-MW31-SS2- 9-10'
ate Sampled:	8-27-88	8-27-88
ime Sampled:	08:25	08:41
ate Extracted:	9-06-88	9-06-88
ate Analyzed:	10-14-88	10-14-88
ercent Moisture:	19	10

ɔmpound	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
conamide	--*	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

Date Received: August 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082156	88082157
Sample No.:	DANGB3-MW31-SS1- 0-1'	DANGB3-MW31-SS2- 9-10'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	08:25	08:41
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-14-88
Percent Moisture:	19	10

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

ate Received: August 29, 1988
ite Reported: December 8, 1988

Work Order: 924
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:	88082156	88082157
ample No.:	DANGB3-MW31-SS1- 0-1'	DANGB3-MW31-SS2- 9-10'
ate Sampled:	8-27-88	8-27-88
ime Sampled:	08:25	08:41
ate Extracted:	9-06-88	9-06-88
ate Analyzed:	10-14-88	10-14-88
ercent Moisture:	19	10

mpound	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 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082158	88082159
Sample No.:	DANGB3-MW28-SS1- 0-1'	DANGB3-MW28-SS2- 2-3'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	11:30	11:50
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-17-88
Percent Moisture:	35	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

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

Date Received: August 29, 1988 Work Order: 924
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:	88082158	88082159
Sample No.:	DANGB3-MW28-SS1- 0-1'	DANGB3-MW28-SS2- 2-3'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	11:30	11:50
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-17-88
Percent Moisture:	35	13

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 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082158	88082159
Sample No.:	DANGB3-MW28-SS1- 0-1'	DANGB3-MW28-SS2- 2-3'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	11:30	11:50
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-17-88
Percent Moisture:	35	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.

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

Date Received: August 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082158	88082159
Sample No.:	DANGB3-MW28-SS1- 0-1'	DANGB3-MW28-SS2- 2-3'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	11:30	11:50
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-17-88
Percent Moisture:	35	13

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 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082158	88082159
Sample No.:	DANGB3-MW28-SS1- 0-1'	DANGB3-MW28-SS2- 2-3'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	11:30	11:50
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-14-88	10-17-88
Percent Moisture:	35	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
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

ıte Received: August 29, 1988
ıte Reported: December 8, 1988

Work Order: 924
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ab Number:	88082160	88082161
ample No.:	DANGB3-MW28-SS3- 14-15'	DANGB3-MW33-SS1- 0-1'
ıte Sampled:	8-27-88	8-27-88
ime Sampled:	12:05	14:52
ıte Extracted:	9-06-88	9-06-88
ıte Analyzed:	10-17-88	10-17-88
ercent Moisture:	8	26

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
ıs(2-chloroethyl)ether	330	ND	ND
,2-Dichlorobenzene	330	ND	ND
-Nitrosodimethylamine	330	ND	ND
ıs(2-chloroisopropyl)ether	330	ND	ND
-Nitrosodi-n-propylamine	330	ND	ND
exachlorobutadiene	330	ND	ND
,2,4-Trichlorobenzene	330	ND	ND
ıtrobenzene	330	ND	ND
sophorone	330	ND	ND
aphthalene	330	ND	ND
ıs(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
ıuorene	330	ND	ND
,4-Dinitrotoluene	330	ND	ND
iethyl phthalate	330	ND	ND
-Nitrosodiphenylamine	330	ND	ND
exachlorobenzene	330	ND	ND

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

Date Received: August 29, 1988 Work Order: 924
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:	88082160	88082161
Sample No.:	DANGB3-MW28-SS3- 14-15'	DANGB3-MW33-SS1- 0-1'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	12:05	14:52
Date Extracted:	9-06-88	9-06-88
Date Analyzed:	10-17-88	10-17-88
Percent Moisture:	8	26

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)

ıte Received: August 29, 1988
ıte Reported: December 8, 1988

Work Order: 924
Job Number: OR001

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

ATTN: Mr. Bill Hayden

ıb Number:	88082160	88082161
ımple No.:	DANGB3-MW28-SS3- 14-15'	DANGB3-MW33-SS1- 0-1'
ıte Sampled:	8-27-88	8-27-88
ime Sampled:	12:05	14:52
ıte Extracted:	9-06-88	9-06-88
ıte Analyzed:	10-17-88	10-17-88
ercent Moisture:	8	26

ɔmpound	Detection Limits ug/kg	Analytical Results (dry weight) ug/kg	ug/kg
ɔetophenone	--*	ND	ND
ıiline	--*	ND	ND
-Aminobiphenyl	--*	ND	ND
-Chloroaniline	660	ND	ND
-Chloronaphthalene	--*	ND	ND
ɔbenzofuran	330	ND	ND
-Dimethylaminoazobenzene	--*	ND	ND
,12-Dimethylbenz(a)anthracene	--*	ND	ND
-,a-Dimethylphenethylamine	--*	ND	ND
ɔphenylamine	--*	ND	ND
,2-Diphenylhydrazine	--*	ND	ND
ɔhyl methanesulfonate	--*	ND	ND
-Methylcholanthrene	--*	ND	ND
ɛthyl 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
ɛntachlorobenzene	--*	ND	ND
ɛntachloronitrobenzene	--*	ND	ND
ıenacetin	--*	ND	ND
-Picoline	--*	ND	ND
ɔonamide	--*	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

Date Received: August 29, 1988 Work Order: 924
Date Reported: December 8, 1988 Job Number: OR001

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

Lab Number:	88082160	88082161
Sample No.:	DANGB3-MW28-SS3- 14-15'	DANGB3-MW33-SS1- 0-1'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	12:05	14:52
ate Extracted:	9-06-88	9-06-88
ate Analyzed:	10-17-88	10-17-88
Percent Moisture:	8	26

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
lpha-BHC	--*	ND	ND
Gamma-BHC	--*	ND	ND
eta-BHC	660	ND	ND
eptachlor	330	ND	ND
Delta-BHC	500	ND	ND
ldrin	330	ND	ND
eptachlor epoxide	330	ND	ND
ndosulfan I	--*	ND	ND
Dieldrin	500	ND	ND
,4'-DDE	1000	ND	ND
ndrin	--*	ND	ND
Endosulfan II	--*	ND	ND
,4'-DDD	500	ND	ND
,4'-DDT	830	ND	ND
Endosulfan Sulfate	1000	ND	ND
ndrin aldehyde	--*	ND	ND
ndrin Ketone	--*	ND	ND
hlordane	2000	ND	ND
Methoxychlor	--*	ND	ND
oxaphene	2000	ND	ND
roclor-1016	2000	ND	ND
Aroclor-1221	2000	ND	ND
roclor-1232	2000	ND	ND
roclor-1242	2000	ND	ND
Aroclor-1248	2000	ND	ND
Aroclor-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

ate Received: August 29, 1988
ate Reported: December 8, 1988

Work Order: 924
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:	88082160	88082161
ample No.:	DANGB3-MW28-SS3- 14-15'	DANGB3-MW33-SS1- 0-1'
ate Sampled:	8-27-88	8-27-88
ime Sampled:	12:05	14:52
ate Extracted:	9-06-88	9-06-88
ate Analyzed:	10-17-88	10-17-88
ercent Moisture:	8	26

ompound	Detection Limits ug/kg	ANALYTICAL RESULTS (dry weight) ug/kg	ug/kg
-Chlorophenol	330	ND	ND
-Nitrophenol	330	ND	ND
ienol	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 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082162	88082163
Sample No.:	DANGB3-MW33-SS2- 11-12'	DANGB3-MW33-SS3- 20-21'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	15:25	15:55
Date Extracted:	09-06-88	10-29-88
Date Analyzed:	11-30-88	11-02-88
Percent Moisture:	9	10

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)

te Received: August 29, 1988 Work Order: 924
te Reported: December 8, 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

) Number:	88082162	88082163
mple No.:	DANGB3-MW33-SS2- 11-12'	DANGB3-MW33-SS3- 20-21'
te Sampled:	8-27-88	8-27-88
me Sampled:	15:25	15:55
te Extracted:	09-06-88	10-29-88
te Analyzed:	11-30-88	11-02-88
rcent Moisture:	9	10

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	610	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

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

Date Received: August 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082162	88082163
Sample No.:	DANGB3-MW33-SS2- 11-12'	DANGB3-MW33-SS3- 20-21'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	15:25	15:55
Date Extracted:	09-06-88	10-29-88
Date Analyzed:	11-30-88	11-02-88
Percent Moisture:	9	10

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
4-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

te Received: August 29, 1988
te Reported: December 8, 1988

Work Order: 924
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:	88082162	88082163
mple No.:	DANGB3-MW33-SS2- 11-12'	DANGB3-MW33-SS3- 20-21'
te Sampled:	8-27-88	8-27-88
me Sampled:	15:25	15:55
te Extracted:	09-06-88	10-29-88
te Analyzed:	11-30-88	11-02-88
rcent Moisture:	9	10

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.

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

Date Received: August 29, 1988
Date Reported: December 8, 1988

Work Order: 924
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:	88082162	88082163
Sample No.:	DANGB3-MW33-SS2- 11-12'	DANGB3-MW33-SS3- 20-21'
Date Sampled:	8-27-88	8-27-88
Time Sampled:	15:25	15:55
Date Extracted:	09-06-88	10-29-88
Date Analyzed:	11-30-88	11-02-88
Percent Moisture:	9	10

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
4,6-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.

= 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

CHAIN OF CUSTODY RECORD

10/2 924-1

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED: SW8010, 8020	SW8080	SW8270	EPA 418.1	SW6010, 7080, 7191	SW7131, 7421, 7471		SHIP TO: ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710
OR001	Duluth ANGB/Duluth, Mn.									
SAMPLER(S): (Signature) J. L. Harden Erika Rodas										
DATE	TIME	SAMPLE DESCRIPTION								REMARKS
8/27/88	0825	DANGB 3MW31 SS1 0-1'	1	X						302156
	0825	DANGB 3MW31 SS1 0-1'	1		X	X	X	X	X	
	0841	DANGB 3MW31 SS2 9-10'	1	X						302157
	0841	DANGB 3MW31 SS2 9-10'	1		X	X	X	X	X	
	1130	DANGB 3MW28 SS1 0-1'	1	X						302158
	1130	DANGB 3MW28 SS1 0-1'	1		X	X	X	X	X	
	1150	DANGB 3MW28 SS2 2-3'	1	X						302159
	1150	DANGB 3MW28 SS2 2-3'	1		X	X	X	X	X	
	1205	DANGB 3MW28 SS3 14-15'	1	X						302160
	1205	DANGB 3MW28 SS3 14-15'	1		X	X	X	X	X	
	1452	DANGB 3MW33 SS1 0-1	1	X						302161
	1452	DANGB 3MW33 SS1 0-1	1		X	X	X	X	X	
	1525	DANGB 3MW33 SS2 11-12'	1	X						302162
	1525	DANGB 3MW33 SS2 11-12'	1		X	X	X	X	X	
	1555	DANGB 3MW33 SS3 20-21'	1	X						302163

1584

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
J. L. Harden	8/29/88 1700				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathie C. Todd	8/29/88 1510	Rec'd cold + intact

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

2 of 2 924-2

JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED	SHIP TO:
0R001	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, 6020	SW8080	SW8270	EPA 418.1	SW6010, 7060, 7191	SW7131, 7421, 7471			REMARKS
8/27/88	1555	DANGB3 HA03 SS3 20-21	1		X	X	X	X	X			832163

1563

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	8/27/88 1700				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
		Kathie C. Kuda	8/29/88 1510	Rec'd cold + intact

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PACKAGE TRACKING NUMBER 8689872925

8689872925

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Sender's Federal Express Account Number: 1196-4207-8
Date: 8/27/88

1 From (Your Name) Please Print: J D HARDEMAN
Your Phone Number (Very Important): (408) 375-0774
Company: ES
Department/Floor No.:
Street Address: 710 S. Illinois St.
City: Oak Ridge
State: TN.
ZIP Required: 37830

2 To (Recipient's Name) Please Print: Kathleen KIDD
Recipient's Phone Number (Very Important): (415) 841-7353
Company: E.S. Laboratory 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): OR001

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.

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1 ☐ HOLD FOR PICK-UP (If no Box H)
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3 DELIVER SATURDAY (Extra charge) ☐
4 ☐ DANGEROUS GOODS (Extra charge)
5 ☐ CONSTANT SURVEILLANCE SERVICE (CSS) (Extra charge) (Signature Not Applicable)
6 ☐ DRY ICE ____ Lbs.
7 ☐ OTHER SPECIAL SERVICE
8 ☐
9 ☐ SATURDAY PICK-UP (Extra charge)
10 ☐
11 ☐
12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

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

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

FEDEX Corp. Employee No.:
Date/Time for FEDEX Use:

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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.

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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: _____

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Other 2	
Total Charges	

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REVISION DATE 1/88
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8689872925

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BLANK

Lab Name: ENGINEERING SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 8808B2115-2119 2108-21K 2156-63 BLANK

Sample wt/vol: 30 (g/mL) g Lab File ID: E5875

Level: (low/med) low Date Received: —

% Moisture: not dec. — dec. — Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/14/88

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

Number TICs found: 13 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown alkene mol.wt. 98	4.23	270	
2.		unknown	4.45	600	
3.			4.67	730	
4.			5.14	22,000	
5.			6.36	1000	
6.			6.61	130.	
7.			6.90	530	
8.			6.96	400	
9.	57-10-3	hexadecanoic acid	24.03	830	
10.		unknown	28.76	730	
11.			33.22	160	
12.			35.46	150	
13.			35.71	12,000	
14.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANGB-MW31-SS1-0'-1'

Lab Name: ENGINEERING-SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082156

Sample wt/vol: 30 (g/mL) g Lab File ID: E5876

Level: (low/med) low Date Received: 8/29/88

Moisture: not dec. 19.0 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/14/88

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	4.25	FN ~~2900~~ 2700	
2.			4.65	780	
3.			5.13	23,000	
4.			6.19	200	
5.	79-34-5	1,1,2,2-tetrachloroethane	6.24	240	
6.		unknown	6.34	620	
7.			6.89	160	
8.			6.95	160	
9.	57-10-3	hexadecanoic acid	24.06	2200	
10.		unknown	26.46	290	
11.			28.77	530	
12.			29.09	700	
13.			31.13	370	
14.			32.18	330	
15.			33.90	320	
16.			35.78	24000	
17.			37.28	350	
18.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANGB3-MW31-SS2-9-10'

Lab Name: ENGINEERING-SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082157

Sample wt/vol: 30 (g/mL) g Lab File ID: E5877

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 10.2 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/14/88

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

Number TICs found: 12 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.73	1000	
2.			5.19	27000	
3.			6.36	1100	
4.			6.89	440	
5.			6.96	300	
6.	57-10-3	hexadecanoic acid	24.07	2000	
7.		unknown acid	26.46	220	
8.		unknown	28.76	1100	
9.			30.67	170	
10.			32.19	150	
11.			33.22	350	
12.			35.67	8600	
13.					
14.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DANGB3-MW28-SS1-0-1'

Lab Name: ENGINEERING-SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082158

Sample wt/vol: 30 (g/mL) g Lab File ID: E5878

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 34.6 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/14/88

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

Number TICs found: 22 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.42	24,000	
2.			4.55	2400	
3.			4.86	8700	
4.			5.23	35,000	
5.			6.26	41,000	
6.			6.55	850	
7.			7.28	3700	
8.			7.44	660	
9.			7.52	660	
10.			10.16	410	
11.			12.57	460	
12.			12.70	4700	
13.			13.24	1700	
14.	57-10-3	hexadecanoic acid	24.05	1600	
15.		unknown	25.69	1700	
16.			28.01	1200	
17.			28.25	1100	
18.			28.52	640	
19.			31.13	520	
20.			32.17	620	
21.			35.71	17,000	
22.			38.48	670	
23.					
24.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DAN6B3-MW28-SS2-2-3'

Lab Name: ENGINEERING SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082159

Sample wt/vol: 30 (g/mL) G Lab File ID: E5880

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 13 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/17/88

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

Number TICs found: 15 CONCENTRATION UNITS: (ug/L or ug/Kg) ~~ug/Kg~~ G

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.46	160	
2.		unknown	4.74	610	
3.		unknown	5.20	26,000	
4.		unknown	6.36	460	
5.		unknown	6.90	270	
6.		unknown	6.96	190	
7.	57-10-3	hexadecanoic acid	24.09	1600	
8.		unknown	26.71	190	
9.					
10.		unknown	28.77	900	
11.		unknown	29.09	320	
12.		unknown	32.18	150	
13.		unknown	33.23	260	
14.		unknown alkane	34.78	320	
15.		unknown	35.69	7500	
16.		unknown	38.43	160	
17.					
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EPA SAMPLE NO.

DANGB3-MW28-SS3 14-15'

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082160

Sample wt/vol: 30 (g/mL) gm Lab File ID: E5881

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 8.0 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/17/88

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

Number TICs found: 12 CONCENTRATION UNITS: (ug/L or ug/Kg): ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.47	140	
2.			4.72	690	
3.			5.16	19,000	
4.			6.34	430	
5.			7.76	180	
6.	84-66-2	Diethyl phthalate	18.85	140	
7.	57-10-3	hexadecanoic acid	24.06	1400	
8.		unknown	26.50	160	
9.			28.76	580	
10.			29.37	180	
11.			33.24	430	
12.			35.80	21,000	
13.					
14.					
15.					
16.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DAN633-MW33-SS1-0-1'

Lab Name: ENGINEERING-SCIENCE Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082161

Sample wt/vol: 30 (g/mL) g Lab File ID: E5882

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 26 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 10/17/88

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

Number TICs found: 22 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.33	9400	
2.		unknown	4.37	340	
3.		unknown	4.81	3500	
4.		unknown	5.19	29000	
5.		unknown	5.33	600	
6.		unknown	6.22	900	
7.	79-34-5	1122-tetrachloro-ethane	6.26	310	
8.		unknown	6.36	640	
9.					
10.		unknown	6.55	510	
11.		unknown	23.24	300	
12.		unknown	23.51	470	
13.	57-10-3	hexadecanoic acid	24.07	2100	
14.		unknown	25.65	430	
15.		unknown ester of octadecanoic acid	25.72	430	
16.		unknown	26.49	470	
17.		unknown	28.18	380	
18.		unknown alkane	32.18	660	
19.		unknown	33.91	570	
20.		unknown alkane	34.77	330	
21.		unknown	35.75	15000	
22.		unknown	37.29	540	
23.		unknown alkane	38.48	510	
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project: Duluth

TICs Found: 12

Project No:
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 924
Lab Sample ID: E5883
Lab File ID: 88082162
Date Received: 8-29-88
Date Extracted: 9-6-88
Date Analyzed: 10-17-88
Date Reported: 3-2-89
Dilution Factor: 1
% Moisture: 9

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown alkyl pentene C_7H_{14}	4.26	1800	
2.		unknown	4.46	1100	
3.		unknown	4.71	840	
4.		unknown	5.17	23,000	
5.		unknown	6.35	290	
6.		unknown alkyl acid $C_{16}H_{32}O_2$	24.07	1600	
7.		unknown	26.48	180	
8.		unknown	28.77	1100	
9.		unknown	32.19	330	
10.		unknown	33.24	340	
11.		unknown	35.46	480	
12.		unknown	35.70	11,000	
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EPA SAMPLE NO.

DAUGB3_MW33+
SS2-11-12'

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88092162 REANAL.

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0610

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 8.8 dec. _____ Date Extracted: 9/6/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/30/88

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	3.72	440	
2.			3.92	550	
3.			4.11	1000	
4.			4.42	150	
5.			4.87	4400	
6.			5.07	1500	
7.			5.26	1400	
8.			5.79	16,000	
9.			6.72	150	
10.	79-34-5	1,1,2,2-tetrachloroethane	7.00	160	
11.	57-10-3	hexadecanoic acid	24.97	1300	
12.		unknown	27.71	150	
13.			29.74	2000	
14.			34.64	1000	
15.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Job No.:

Client:
Attn:
Address:

Project: Duluth

TICs Found: 8

Project No:
Sample Matrix: Soil
Conc. Unit: ug/kg
Work Order No: 924
Lab Sample ID: E5884
Lab File ID: 880821B3
Date Received: 8-29-88
Date Extracted: 9-6-88
Date Analyzed: 10-17-88
Date Reported: 3-2-89
Dilution Factor: 100
% Moisture: 10

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown alkyl pentene C_7H_{14}	4.12	520	
2.		unknown	4.35	300	
3.		unknown	4.59	260	
4.		unknown	4.97	19,000	
5.		unknown	6.31	190	
6.		unknown alkyl acid $C_{16}H_{32}O_2$	24.02	890	
7.		unknown	28.77	410	
8.		unknown	35.62	8500	
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10.					
11.					
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

DAN683-MW33-SS3-20-21'

Lab Name: Engineering Science Contract: _____

Lab Code: _____ Case No.: 924 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Soil Lab Sample ID: 88082163 Rpt

Sample wt/vol: 30 (g/mL) gm Lab File ID: S0339

Level: (low/med) low Date Received: 8/29/88

% Moisture: not dec. 9.9 dec. _____ Date Extracted: 10/29/88

Extraction: (SepF/Cont/Sonc) Sonc Date Analyzed: 11/2/88

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

Number TICs found: 10 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		unknown	4.29	1400	
2.			4.96	440	
3.			5.19	1100	
4.			5.72	5900	
5.			7.25	180	
6.	57-10-3	hexadecanoic acid	25.12	920	
7.		unknown	29.91	1700	
8.			30.18	150	
9.			32.20	~~630~~ 180	
10.			34.86	630	
11.					
12.					
13.					
14.					
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CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
Samples No.: 88081969-88081977
Samples No.: 88082043-88082049
Samples No.: 88082099-88082104
Samples No.: 88082130-88082133
Samples No.: 88082146-88082148

The results obtained for the laboratory control sample (LCS) analyzed with these samples for the analyte Mercury 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. The Mercury LCS was prepared at a concentration exceeding the linear range of the test.

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
QC REPORT NO(S).: ICP-S-0034-88
QC REPORT NO(S).: AAF-S-0034-88

As a result of extreme sample matrix interference, dilution was required for sample analysis. The reporting limit and MDL for the analyte(s) listed have increased as shown.

Analyte	Reporting Limit	MDL
Arsenic	10 mg/Kg	5.0 mg/Kg

The sample used for QC analysis contained concentrations equal to or greater than four times the spike concentration. Data are reported unflagged for the analyte(s): Lead.

Sample results for lead are reported from Furnace analysis for the following Sample No(s).:

88082156, 88082161.

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):
88082156-88082163, 88082186-88082188
88082192-88082199

QC Report No: ICP-S-0034-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-29-88
Date Reported: 10-28-88
Dilution Factor: NA
%Moisture: 19.0

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	Notes
Barium	88082156	88082156	10-20-88	10-11-88	SW6010	<20	69.5	63.4	9	247	69.5	333	107	
Cadmium	88082156	88082156	10-20-88	10-11-88	SW6010	<0.5	7.5	7.2	4	6.2	7.5	10.6	50N	
Chromium	88082156	88082156	10-20-88	10-11-88	SW6010	<1.0	38.3	36.5	5	24.7	38.3	57.8	79	
Lead	88082156	88082156	10-22-88	10-11-88	SW6010	<10	11.6	<10	NC	61.7	11.6	65.6	88	A

1550

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

QC Report for Laboratory Sample No(s):
88082156-88082163, 88082186-88082188

QC Report No: AAF-S-0034-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-29-88
Date Reported: 10-28-88
Dilution Factor: See Notes
%Moisture: 19.0

Laboratory Supervisor Approval:

Analyte	Laboratory Duplicates	Sample Nos. Spike	Date Anal	Date Prep	Anal Method	Blank	Duplicate C1	Duplicate C2	Duplicate RPD	Spike Recovery SA	Spike Recovery SR	Spike Recovery SSR	Spike Recovery PR	Notes
Arsenic	88082156	88082156	10-10-88	9-29-88	7060	<0.5	<5.0E	<5.0E	NC	4.94	2.34E	11.8	191N	DF=10
Lead	88082156	88082156	10-20-88	9-29-88	7421	<0.5	6.4	6.3	2	6.17	6.4	20.8	233N	DF=NA

1551

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

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):
88082130-88082133, 88082146-88082152
88082156-88082163

QC Report No: CVM-S-0014-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-26-88
Date Reported: 10-13-88
Dilution Factor: NA
%Moisture: 8.4

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	88082130	88082130	9-21-88	9-21-88	7471	<0.1	<0.1	<0.1	NC	1.09	<0.1	1.14	105	

1552

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
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):
88082130-88082133, 88082146-88082151
88082156-88082163

QC Report No: TPH-S-0055-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 8-26-88
Date Prepared: 9-19-88
Date Analyzed: 9-20-88
Date Reported: 9-27-88
Dilution Factor: 6
%Moisture: 7.5

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88082132	418.1	<100	130	1100	710	65	770	70	8	*

1553

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* Percent recovery and relative percent difference 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):
88082130-88082133, 88082146-88082151
88082156-88082163

QC Report No: TPH-S-0055-88B
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 9-19-88
Date Analyzed: 9-20-88
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	860	86	760	76	12	

1554

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-1103
Oak Ridge, Tn. 37830

Project: Duluth ANGB

QC Report for Laboratory Sample No(s).:
88082146-88082148
88082156-88082163

QC Report No: VGC-S-0040-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-02-88
Date Prepared: NA
Date Analyzed: 9-09-88
Date Reported: 10-06-88
Dilution Factor: NA
% Moisture: 34.6

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88082158	1,1-dichloroethane	15.3	ND	18.7	122	17.3	113	8	20	58-124
	Trichlcroethene	15.3	ND	12.6	82	11.3	74*	11	16	75-110
	Chlorobenzene	15.3	ND	12.8	84	11.6	76	10	21	71-125
	Aromatics: 8020									
88082158	Benzene	15.3	ND	13.2	86	11.7	76	12	26	75-123
	Toluene	15.3	ND	13.2	86	12.0	78*	10	16	79-115
	Chlorobenzene	15.3	ND	12.8	84	11.7	76*	9	24	82-112

1555

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* Asterisked values are outside of laboratory QC limits. Analysis of spiked blanks shows the laboratory to be in control.

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).:
88082146-88082148
88082156-88082163

QC Report No: VGC-S-0040-88B
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: NA
Date Prepared: NA
Date Analyzed: 9-09-88
Date Reported: 10-06-88
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	10.7	107	9.2	92	15	20	58-124
	Trichloroethene	10	ND	10.0	100	10.0	100	0	16	75-110
	Chlorobenzene	10	ND	9.5	95	10.6	106	11	21	71-125
	Aromatics: 8020									
Blank	Benzene	10	ND	10.2	102	9.7	97	5	26	75-123
	Toluene	10	ND	10.2	102	9.7	97	5	16	79-115
	Chlorobenzene	10	ND	10.1	101	9.9	99	2	24	82-112

1556

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY

QC REPORT NO.: VGC-S-0040-88
QC REPORT NO.: VGC-S-0040-88B

The quality control sample for this batch is from a different Martin Marietta project. Asterisked values are outside ES Laboratory QC limits. Analysis of s ike blanks 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: 10-07-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
59	9-06-88	VGC	Carbopack	79-09-2	Dichloromethane	1.7	0.5	88082146-88082149
				67-66-3	Chloroform	0.2	0.05	88082156-88082163

1558

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 for Laboratory Sample No(s).:
88082156-88082163
88082186-88082188
88082250-88082254

QC Report No.: OCP-S-0035-88B
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	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):
88082156-88082163
88082186-88082188

QC Report No: BNA-S-0042-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 8-26-88
Date Prepared: 9-06-88
Date Analyzed: 10-14-88
Date Reported: 12-08-88
Dilution Factor: NA
%Moisture: 17

Laboratory Supervisor Approval:

1563

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88082115	1,2,4-Trichlorobenzene	4020	ND	2460	61	2310	57	6	23	38-107
	Acenaphthene	4020	ND	2020	50	1920	48	5	19	31-137
	2,4-Dinitrotoluene	4020	ND	3410	85	2920	73	15	47	28-89
	Pyrene	4020	ND	3300	82	3450	86	4	36	35-142
	N-Nitroso-di-n-Propylamine	4020	ND	3700	92	3790	94	2	38	41-126
	1,4-Dichlorobenzene	4020	ND	1710	43	1380	34	21	27	28-104
ACID Laboratory Sample # 88082115	Pentachlorophenol	8030	ND	8750	109	8470	105	3	47	17-109
	Phenol	8030	ND	6140	76	5300	66	15	35	26-90
	2-Chlorophenol	8030	ND	4740	59	3950	49	18	50	25-102
	4-Chloro-3-Methylphenol	8030	ND	5420	67	5060	63	7	33	26-103
	4-Nitrophenol	8030	ND	2640	33	3080	38	15	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

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):
88082130Re, 88082133Re, 88082162Re,
88082163Re, 88082186Re, 88082198Re,
88092203Re, 88092223Re, 88092224Re, 88092226Re

QC Report No: BNA-S-0058-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 08-29-88
Date Prepared: 10-29-88
Date Analyzed: 11-21-88
Date Reported: 04-22-89
Dilution Factor: NA
%Moisture: 10

Laboratory Supervisor Approval:

1564

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
B/N Laboratory Sample # 88082163Re	1,2,4-Trichlorobenzene	3700	ND	1630	44	2040	55	22	23	38-107
	Acenaphthene	3700	ND	2690	73	2240	61	17	19	31-137
	2,4-Dinitrotoluene	3700	ND	2570	69	1990	54	25	47	28-89
	Pyrene	3700	ND	3060	82	2570	69	17	36	35-142
	N-Nitroso-di-n-Propylamine	3700	ND	3182	86	2610	70	20	38	41-126
	1,4-Dichlorobenzene	3700	ND	2170	58	1890	51	14	27	28-104
ACID Laboratory Sample # 88082163Re	Pentachlorophenol	7410	ND	6830	97	4790	65	35	47	17-109
	Phenol	7410	ND	5720	77	5290	71	7	35	26-90
	2-Chlorophenol	7410	ND	4760	64	4370	59	8	50	25-102
	4-Chloro-3-Methylphenol	7410	ND	5720	77	4530	61	23	33	26-103
	4-Nitrophenol	7410	ND	6440	87	4640	63	32	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

Sample Matrix: Soil
Conc. Unit: ug/KG
Date Reported: 01-09-89

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
E5875	10-14-88	BNA	2	-	None Found	-	-	88082156-88082163

1565

TILE CONTINUING CALIBRATION CHECK

ame: _____ Contract: _____

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

rument ID: carbopak _____ Calibration Date(s): 9/6/88

3 FILE ID: 56,57 _____ Init. Calib. Date(s): 9/2/88, 9/2/85

POUND	RRF	RRF50	%D
zyl chloride	0.08		100.00
(2-chloroethoxy) nane	0.04		100.00
(2-chloroisopropyl er	0.26		100.00
mobenzene	1.17	0.76	34.55
modichloromethane	4.54	4.24	6.51
moform	3.48	3.04	12.58
nomethane	0.38	0.08	78.76
bon tetrachloride	4.58	4.85	-6.00
oroacetaldehyde	ERR		ERR
orobenzene	1.48	1.58	-6.61
oroethane	0.58	0.69	-18.78
oroform	4.89	4.86	0.67
orohexane	1.02	1.07	-5.00
loroethyl vinyl ether	0.04		100.00
oromethane	0.49	0.35	29.58
oromethyl methyl ether	0.17		100.00
m_,& p_Chlorotoluenes	4.06	3.64	10.43
omochloromethane	5.29	3.16	40.35
omomethane	3.56	2.71	23.98
_Dichlorobenzene	2.72	3.23	-18.66
_Dichlorobenzene	2.42	2.59	-7.03
_Dichlorobenzene	2.36	2.97	-25.55
loradifluormethane	0.54		100.00
_Dichloroethane	2.58	2.33	9.61
_Dichloroethane	3.23	3.24	-0.39
_Dichloroethylene	2.79	2.54	8.66
s_1,2_dichloroethylene	2.99	2.64	11.95
loromethane	3.07	4.72	-53.90
_Dichloropropane	2.67	2.58	3.38
_Dichloropropylene	5.98	5.22	12.72
,2,2_Tetrachloroethane	9.09	10.69	-17.52
,1,2_Tetrachloroethane	4.51	4.83	-7.05
rachloroethylene	9.10	10.69	-17.52
,1_Trichloroethane	3.43	3.20	6.88
,2_Trichloroethane	5.98	5.22	12.71
chloroethylene	4.32	4.65	-7.52
chlorofluoromethane	2.76	2.32	16.17
chloropropene	3.33	3.25	2.33
	1.43	0.64	55.2%

LATILE CONTINUING CALIBRATION CHECK

Name: ENGINEERING SCIENCE_____ Contract:_____

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

Instrument ID.: carbopak Calibration Date(s): 9/6/88 _____

FILE ID: RRF 50 __56_____ Init. Calib: Dates(s) 9/2/88

MPOUND	RRF	RRF50	%D
enzene	5.93	5.71	-3.74
lorobenzene	4.90	4.75	-3.06
2_Dichlorobenzene	3.97	3.92	-1.34
3_Dichlorobenzene	3.57	4.38	22.55
4_Dichorobenzene	3.83	3.58	-6.44
hyl Benzene	3.32	3.08	-7.13
luene	3.79	3.75	-1.06
lenes	12.16	11.13	-8.51

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DATA PACKAGE #24

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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 9-28-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092799	DANGB-2-SL7-SD1	AS-F	9-26-88		10-17-88	
88092799	DANGB-2-SL7-SD1	BA-I	9-26-88		10-17-88	
88092799	DANGB-2-SL7-SD1	CD-F	9-26-88		10-19-88	
88092799	DANGB-2-SL7-SD1	CR-F	9-26-88		10-18-88	
88092799	DANGB-2-SL7-SD1	HG-C	9-26-88		10-17-88	
88092799	DANGB-2-SL7-SD1	PB-F	9-26-88		10-18-88	
88092799	DANGB-2-SL7-SD1	418.1	9-26-88	10-18-88	10-25-88	
88092799	DANGB-2-SL7-SD1	MOIS	9-26-88		10-10-88	
88092799	DANGB-2-SL7-SD1	8010	9-26-88		10-06-88	10-06-88
88092799	DANGB-2-SL7-SD1	8020	9-26-88		10-06-88	
88092799	DANGB-2-SL7-SD1	8270	9-26-88			

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

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.
88092800	DANGB-2-SL6-SD1	AS-F	9-26-88		10-17-88	
88092800	DANGB-2-SL6-SD1	BA-I	9-26-88		10-17-88	
38092800	DANGB-2-SL6-SD1	CD-F	9-26-88		10-19-88	
38092800	DANGB-2-SL6-SD1	CR-F	9-26-88		10-18-88	
38092800	DANGB-2-SL6-SD1	HG-C	9-26-88		10-17-88	
38092800	DANGB-2-SL6-SD1	PB-F	9-26-88		10-19-88	
38092800	DANGB-2-SL6-SD1	418.1	9-26-88	10-18-88	10-25-88	
38092800	DANGB-2-SL6-SD1	MOIS	9-26-88		10-10-88	
38092800	DANGB-2-SL6-SD1	8010	9-26-88		10-06-88	10-06-88
38092800	DANGB-2-SL6-SD1	8020	9-26-88		10-06-88	
38092800	DANGB-2-SL6-SD1	8270	9-26-88			
38092801	DANGB-2-SL29-SD1	AS-F	9-26-88		10-18-88	
38092801	DANGB-2-SL29-SD1	BA-I	9-26-88		10-17-88	
38092801	DANGB-2-SL29-SD1	CD-F	9-26-88		10-20-88	
38092801	DANGB-2-SL29-SD1	CR-F	9-26-88		10-20-88	
38092801	DANGB-2-SL29-SD1	HG-C	9-26-88		10-17-88	
38092801	DANGB-2-SL29-SD1	PB-F	9-26-88		10-25-88	
38092801	DANGB-2-SL29-SD1	418.1	9-26-88	10-18-88	10-25-88	
38092801	DANGB-2-SL29-SD1	MOIS	9-26-88		10-10-88	
38092801	DANGB-2-SL29-SD1	8010	9-26-88		10-06-88	10-06-88
38092801	DANGB-2-SL29-SD1	8020	9-26-88		10-06-88	
38092801	DANGB-2-SL29-SD1	8270	9-26-88			
38092802	DANGB-3-SL28-SD1	AS-F	9-26-88		10-18-88	
38092802	DANGB-3-SL28-SD1	BA-I	9-26-88		10-17-88	
38092802	DANGB-3-SL28-SD1	CD-F	9-26-88		10-27-88	
38092802	DANGB-3-SL28-SD1	CR-F	9-26-88		10-18-88	
38092802	DANGB-3-SL28-SD1	HG-C	9-26-88		10-17-88	
38092802	DANGB-3-SL28-SD1	PB-F	9-26-88		10-25-88	
38092802	DANGB-3-SL28-SD1	418.1	9-26-88	10-18-88	10-25-88	
38092802	DANGB-3-SL28-SD1	MOIS	9-26-88		10-10-88	
38092802	DANGB-3-SL28-SD1	8010	9-26-88		10-06-88	10-06-88
38092802	DANGB-3-SL28-SD1	8020	9-26-88		10-06-88	
8092802	DANGB-3-SL28-SD1	8270	9-26-88			

If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

ES
ENGINEERING-SCIENCE, INC.

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

Job No.: CL115.05

Copy: Chris Raddell

Project: Rickenbacker ANGB

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092803	DANGB-3-SL10-SD1	AS-F	9-26-88		10-17-88	
88092803	DANGB-3-SL10-SD1	BA-I	9-26-88		10-17-88	
88092803	DANGB-3-SL10-SD1	CD-F	9-26-88		10-27-88	
88092803	DANGB-3-SL10-SD1	CR-F	9-26-88		10-19-88	
88092803	DANGB-3-SL10-SD1	HG-C	9-26-88		10-20-88	
88092803	DANGB-3-SL10-SD1	PB-F	9-26-88		10-18-88	
88092803	DANGB-3-SL10-SD1	418.1	9-26-88	10-18-88	10-25-88	
88092803	DANGB-3-SL10-SD1	MOIS	9-26-88		10-10-88	
88092803	DANGB-3-SL10-SD1	8010	9-26-88		10-06-88	10-06-88
88092803	DANGB-3-SL10-SD1	8020	9-26-88		10-06-88	
88092803	DANGB-3-SL10-SD1	8270	9-26-88			
88092804	DANGB-3-SL9-SD1	AS-F	9-26-88		10-17-88	
88092804	DANGB-3-SL9-SD1	BA-I	9-26-88		10-17-88	
88092804	DANGB-3-SL9-SD1	CD-F	9-26-88		10-19-88	
88092804	DANGB-3-SL9-SD1	CR-F	9-26-88		10-19-88	
88092804	DANGB-3-SL9-SD1	HG-C	9-26-88		10-17-88	
88092804	DANGB-3-SL9-SD1	PB-F	9-26-88		10-25-88	
88092804	DANGB-3-SL9-SD1	418.1	9-26-88	10-18-88	10-25-88	
88092804	DANGB-3-SL9-SD1	MOIS	9-26-88		10-10-88	
88092804	DANGB-3-SL9-SD1	8010	9-26-88		10-06-88	10-06-88
88092804	DANGB-3-SL9-SD1	8020	9-26-88		10-06-88	
88092804	DANGB-3-SL9-SD1	8270	9-26-88			
88092805	DANGB-3-SL8-SD1	AS-F	9-26-88		10-18-88	
88092805	DANGB-3-SL8-SD1	BA-I	9-26-88		10-17-88	
88092805	DANGB-3-SL8-SD1	CD-F	9-26-88		10-27-88	
88092805	DANGB-3-SL8-SD1	CR-F	9-26-88		10-19-88	
88092805	DANGB-3-SL8-SD1	HG-C	9-26-88		10-20-88	
88092805	DANGB-3-SL8-SD1	PB-F	9-26-88		10-18-88	
88092805	DANGB-3-SL8-SD1	418.1	9-26-88	10-18-88	10-25-88	
88092805	DANGB-3-SL8-SD1	MOIS	9-26-88		10-10-88	
88092805	DANGB-3-SL8-SD1	8010	9-26-88		10-06-88	10-06-88
88092805	DANGB-3-SL8-SD1	8020	9-26-88		10-06-88	

* If applicable

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092799-88092805
WORK ORDER NO.: 1063

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

ANALYSIS REPORT

WORK ORDER NUMBER: 1063
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 2, UNITS: MG/KG

EST COMPOUND	DANGB-2-SL7-SD1 88092799	DANGB-2-SL8-SD1 88092800	DANGB-2-SL29-SD1 88092801	DANGB-3-SL28-SD1 88092802	DANGB-3-SL10-SD1 88092803	DANGB-3-SL9-SD1 88092804
ACID DIG SOIL	NA	NA	NA	NA	NA	NA
BARIUM	45.0	53.9	52.2	45.0	39.0	63.0
CADMIUM	<0.61	<0.87	<0.88	<0.67	<0.67	<0.66
CHROMIUM	20 N	19.0 N	21.9 *	15.6 *	22.9 *	27.4 *
LEAD	4.3	4.8	6.7 S	6.1.	20.2	6.3 S

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1063

ASK: 2, UNITS: MG/KG

TEST COMPOUND	DANGB-3-SL8-SD1 88092805
ACID DIG SOIL	NA
BARIUM	53.7
CADMIUM	4.4
CHROMIUM	54.6*
LEAD	478

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1063
OB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

ASK: 3, UNITS: mg/Kg

EST COMPOUND	DANGB-2-SL7-SD1 88092799	DANGB-2-SL6-SD1 88092800	DANGB-2-SL29-SD1 88092801	DANGB-3-SL28-SD1 88092802	DANGB-3-SL10-SD1 88092803	DANGB-3-SL9-SD1 88092804
418.1 PETROLEUM HYDROCARBONS	<100	<100	120	170	150	110
MOISTURE	21.5	16.9	22.5	11.4	12.6	13.4

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1063

ASK: 3, UNITS: mg/Kg

TEST COMPOUND	DANGB-3-SL8-SD1 88092805
8.1 PETROLEUM HYDROCARBONS	2000
MOISTURE	18.5

- Not Detected

ANALYSIS REPORT

WORK ORDER NUMBER: 1063
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB-2-SL7-SD1 88092799	DANGB-2-SL6-SD1 88092800	DANGB-2-SL29-SD1 88092801	DANGB-3-SL28-SD1 88092802	DANGB-3-SL10-SD1 88092803	DANGB-3-SL9-SD1 88092804
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
,-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
,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHANE	ND	ND	ND	ND	ND	5.6
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND	ND	ND	16
TRANS-1,2-DICHLOROETHYLENE	ND	ND	ND	ND	ND	ND
DICHLOROMETHANE	52B	65B	51B	41B	37B	36B
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1063

EST COMPOUND	DANGB-2-SL7-SD1 88092799	DANGB-2-SL6-SD1 88092800	DANGB-2-SL29-SD1 88092801	DANGB-3-SL28-SD1 88092802	DANGB-3-SL10-SD1 88092803	DANGB-3-SL9-SD1 88092804
,3-DICHLOROPROPYLENE	ND	ND	ND	ND	ND	ND
,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
,1,1,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND
ETRACHLOROETHYLENE	ND	ND	ND	ND	ND	5.1
,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	240
,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
RICHLOROETHYLENE	0.26	ND	ND	ND	ND	ND
RICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND
RICHLOROPROPANE	ND	ND	ND	ND	ND	ND
INYL CHLORIDE	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1063

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

TEST COMPOUND	DANGB-3-SL8-SD1 88092805
BENZYL CHLORIDE	ND
BIS (2-CHLOROETHOXY)METHANE	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND
BROMOBENZENE	ND
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOETHANE	ND
CARBON TETRACHLORIDE	ND
CHLORACETALDEHYDE	ND
CHLORAL	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
-CHLOROHEXANE	ND
2-CHLOROETHYL VINYL ETHER	ND
CHLOROMETHANE	ND
CHLOROMETHYL METHYL ETHER	ND
CHLOROTOLUENE	ND
DIBROMOCHLOROMETHANE	ND
IBROMOMETHANE	ND
,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
ICHLORODIFLUOROMETHANE	ND
,1-DICHLOROETHANE	ND
1,2-DICHLOROETHANE	ND
,1-DICHLOROETHYLENE	ND
RANS-1,2-DICHLOROETHYLENE	ND
ICHLOROMETHANE	23B
1,2-DICHLOROPROPANE	ND
,3-DICHLOROPROPYLENE	ND
,1,2,2-TETRACHLOROETHANE	ND
1,1,1,2-TETRACHLOROETHANE	ND
TETRACHLOROETHYLENE	ND
,1,1-TRICHLOROETHANE	ND
,1,2-TRICHLOROETHANE	ND
TRICHLOROETHYLENE	ND
TRICHLOROFLUOROMETHANE	ND
RICHLOROPROPANE	ND
INYL CHLORIDE	ND

ND - Not Detected

ANALYSIS REPORT

)RK ORDER NUMBER: 1063
)B NUMBER : ZB0000000440
)RK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

)SK: 4, UNITS: ug/Kg, GROUP 8020

ST COMPOUND	DANGB-2-SL7-SD1 88092799	DANGB-2-SL6-SD1 88092800	DANGB-2-SL29-SD1 88092801	DANGB-3-SL28-SD1 88092802	DANGB-3-SL10-SD1 88092803	DANGB-3-SL9-SD1 88092804
)NZENE	ND	ND	ND	ND	ND	ND
(LOROBENZENE	ND	ND	ND	ND	ND	ND
2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND
'HYL BENZENE	ND	ND	ND	ND	ND	ND
)LUENE	ND	ND	ND	ND	ND	ND
'LENES	ND	ND	ND	ND	ND	ND

- Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1063

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

TEST COMPOUND	DANGB-3-SL8-SD1 88092805
BENZENE	ND
CHLOROBENZENE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
ETHYL BENZENE	ND
TOLUENE	ND
XYLENES	ND

ND - Not Detected

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092799	88092800
Sample No.:	DANGB-2-SL7-SD1	DANGB-2-SL6-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:45	09:30
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	17

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-Cnloronaphtnalene	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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092799	88092800
Sample No.:	DANGB-2-SL7-SD1	DANGB-2-SL6-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:45	09:30
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	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

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092799	88092800
Sample No.:	DANGB-2-SL7-SD1	DANGB-2-SL6-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:45	09:30
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	17

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092799	88092800
Sample No.:	DANGB-2-SL7-SD1	DANGB-2-SL6-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:45	09:30
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	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.

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092799	88092800
Sample No.:	DANGB-2-SL7-SD1	DANGB-2-SL6-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:45	09:30
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	17

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 29, 1988
Date Reported: December 9, 1988
Work Order: 1063
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:	88092801	88092802
Sample No.:	DANGB-2-SL29-SD1	DANGB-3-SL28-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:00	14:20
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	11

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-c oethyl)ether	330	ND	ND
1,2-Dic enzene	330	ND	ND
N-Nitro ethylamine	330	ND	ND
Bis(2-ch opyl)ether	330	ND	ND
N-Nitros amine	330	ND	ND
Hexachlorob	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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092801	88092802
Sample No.:	DANGB-2-SL29-SD1	DANGB-3-SL28-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:00	14:20
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	11

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092801	88092802
Sample No.:	DANGB-2-SL29-SD1	DANGB-3-SL28-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:00	14:20
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	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
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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092801	88092802
Sample No.:	DANGB-2-SL29-SD1	DANGB-3-SL28-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:00	14:20
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	11

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092801	88092802
Sample No.:	DANGB-2-SL29-SD1	DANGB-3-SL28-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	10:00	14:20
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	22	11

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092803	88092804
Sample No.:	DANGB-3-SL10-SD1	DANGB-3-SL9-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	14:00	10:00
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	13	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

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

Date Received: September 29, 1988 Work Order: 1063
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:	88092803	88092804
Sample No.:	DANGB-3-SL10-SD1	DANGB-3-SL9-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	14:00	10:00
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	13	13

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	16
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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092803	88092804
Sample No.:	DANGB-3-SL10-SD1	DANGB-3-SL9-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	14:00	10:00
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	13	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.

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092803	88092804
Sample No.:	DANGB-3-SL10-SD1	DANGB-3-SL9-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	14:00	10:00
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	13	13

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092803	88092804
Sample No.:	DANGB-3-SL10-SD1	DANGB-3-SL9-SD1
Date Sampled:	9-26-88	9-26-88
Time Sampled:	14:00	10:00
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	13	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
2-Methyl-4,6-Dinitrophenol	1600	ND	ND
Pentachlorophenol	1600	ND	ND
4-Nitrophenol	1600	ND	ND
Benzoic Acid	1600	ND	ND
2-Methylphenol	330	ND	ND
3- & 4-Methylphenol	330	ND	ND
2,3,4,6-Tetrachlorophenol	--*	ND	ND
2,4,5-Trichlorophenol	330	ND	ND

Laura Kuck
Analyst

Laboratory Supervisor

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

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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092805
Sample No.:	DANGB-3-SL8-SD1
Date Sampled:	9-26-88
Time Sampled:	15:30
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
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-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 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092805
Sample No.:	DANGB-3-SL8-SD1
Date Sampled:	9-26-88
Time Sampled:	15:30
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
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	330
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: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092805
Sample No.:	DANGB-3-SL8-SD1
Date Sampled:	9-26-88
Time Sampled:	15:30
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
Percent Moisture:	18

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

1601

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

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092805
Sample No.:	DANGB-3-SL8-SD1
Date Sampled:	9-26-88
Time Sampled:	15:30
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
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

1602

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

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

Date Received: September 29, 1988
Date Reported: December 9, 1988

Work Order: 1063
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:	88092805
Sample No.:	DANGB-3-SL8-SD1
Date Sampled:	9-26-88
Time Sampled:	15:30
Date Extracted:	10-07-88
Date Analyzed:	11-15-88
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	
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.

1604

ENGINEERING-SCIENCE

CHAIN OF CUSTODY RECORD

1063

ES JOB NO.	PROJECT NAME/LOCATION	NO. OF CONTAINERS	SOILS ANALYSES REQUIRED	SHIP TO:
OH001	Duluth ANGB/Duluth, Mn.		SW8010, 8020 / SW8080 / SW8270 / EPA 418.1 / SW8010, [redacted] 7191 / SW7131, 7421	ENGINEERING-SCIENCE LABORATORY, INC. 600 Bancroft Way Berkeley, CA. 94710
SAMPLERS: (Signature)				

DATE	TIME	SAMPLE DESCRIPTION	NO. OF CONTAINERS	SW8010, 8020	SW8080	SW8270	EPA 418.1	SW8010, [redacted] 7191	SW7131, 7421	REMARKS
9/26	10:45	DAUGB-2-SL9-SD1	1		X	X	X	X		882799
9/26	10:45	DAUGB-2-SL9-SD1	1	X						
9/26	9:30	DAUGB-2-SL6-SD1	1		X	X	X	X		882800
9/26	9:30	DAUGB-2-SL6-SD1	1	X						
9/26	10:30	DAUGB-2-SL39-SD1	1	X						882801
9/26	10:00	DAUGB-2-SL29-SD1	1		X	X	X	X		
9/26	14:20	DAUGB-3-SL28-SD1	1		X	X	X	X		882802
9/26	14:00	DAUGB-3-SL10-SD1	1	X						882803
9/26	14:20	DAUGB-3-SL28-SD1	1	X						
9/26	16:00	DAUGB-3-SL9-SD1	1		X	X	X	X		882804
9/26	11:00	DAUGB-3-SL10-SD1	1	X		X	X	X	X	
9/26	16:12	DAUGB-3-SL7-SD1	1	X						
9/26	15:30	DAUGB-3-SL8-SD1	1	X						882805
9/26	15:20	DAUGB-3-SL3-SD1	1			X	X	X	X	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jo Ann Thornton	9/26 6:00P	Hal L. Abney 9/29/88 0830			
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks	

Distrib: Hard Out w/ samples; 1st Copy to Coordinator Field Files

QUALITY CONTROL RESULTS SUMMARY
METALS

Job No.: OR001.02

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

Project: Duluth ANGB

QC Report for Laboratory Sample No(s):
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

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
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):
88092801-88092805, 88092737

QC Report No: AAF-S-0052-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-28-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 43.2

Laboratory Supervisor Approval:

7091

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	88092801	88092801	10-18-88	NA	7060	<1.0	<1.42	<1.42	NC	14.1	<1.42	11.9	84	
Cadmium	88092801	88092801	10-20-88	NA	7131	<0.50	<0.88	<0.88	NC	3.52	<0.88	3.87	110	
Chromium	88092801	88092801	10-20-88	NA	6010	<1.0	21.9	16.9	26*	7.04	21.9	30.2	118	
Lead	88092801	88092801	10-25-88	NA	7421	<0.50	6.76S	7.88	15	7.04	6.76S	12.7	85	

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

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092737, 88092801-88092805

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
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	Duplicate 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	

1609

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):
88092801-88092805, 88092737

QC Report No: ICP-S-0048-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-28-88
Date Reported: 1-31-89
Dilution Factor: NA
Moisture: 43.2

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	88092801	88092801	10-17-88	NA	6010	<20	52.2	60.2	1	704	52.2	732	97	

1910

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

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

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

LC11

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):
88092801-88092805, 88092737

QC Report No: CVM-S-0028-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: 9-28-88
Date Reported: 1-31-89
Dilution Factor: NA
%Moisture: 43.2

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	88092801	88092801	10-17-88	NA	7471	<0.10	<0.18	<0.18	NC	0.88	<0.18	0.88	100	

1612

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):
88092781-88092783
88092799-88092805

QC Report No: TPH-S-0080-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 10-18-88
Date Analyzed: 10-25-88
Date Reported: 11-08-88
Dilution Factor: 6
%Moisture: 7.0

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092782	418.1	<100	100	1100	610	46	430	30	35	*
Blank	418.1	<100	<100	1000	860	86	770	77	11	

ES13

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The relative percent difference for the matrix sample exceeds the ES Laboratory limit.
A blank spike analysis shows the laboratory to be in control.

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

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

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

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

QUALITY CONTROL RESULTS SUMMARY
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).:
88092799-88092805

QC Report No: VGC-S-0059-88
Sample Matrix: Soil
Conc. Unit: ug/KG
Date Received: 9-28-88
Date Prepared: NA
Date Analyzed: 10-09-88
Date Reported: 11-02-88
Dilution Factor: NA
% Moisture: 11.4

Laboratory Supervisor Approval:

Laboratory Sample No.	Compound	SA	SR	MS	PR	MSD	PR	RPD	ES RPD	QC Limits %Recovery
	Halocarbons: 8010									
88092802	1,1-dichloroethane	11.3	ND	11.3	100	11.2	99	1	20	58-124
	Trichloroethene	11.3	ND	10.6	94	10.6	94	0	16	75-110
	Chlorobenzene	11.3	ND	10.6	94	10.6	94	0	21	71-125
	Aromatics: 8020									
88092802	Benzene	11.3	ND	10.4	92	10.4	92	0	26	75-123
	Toluene	11.3	ND	10.5	93	10.6	94	1	16	79-115
	Chlorobenzene	11.3	ND	10.5	93	10.8	96	3	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: 11-02-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
69	10-6-88	VGC	Carbopack	75-09-2 107-06-2	Dichloromethane 1,2-Dichloromethane	11 0.37	0.25 0.03	88092799-88092805

1615

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:

1616

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.: 88092805
WORK ORDER NO.: 1063

When sample 88092805 was first analyzed, the area counts for the sixth internal standard was low. A second analysis gave the same result, indicating a matrix effect. Since no target compounds were found in this sample, the results should not be affected.

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

1618

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):
88092781-88092783
88092799-88092805

QC Report No: TPH-S-0080-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 10-18-88
Date Analyzed: 10-25-88
Date Reported: 11-08-88
Dilution Factor: 6
%Moisture: 7.0

Laboratory Supervisor Approval:

Laboratory Sample No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
88092782	418.1	<100	100	1100	610	46	430	30	35	*
Blank	418.1	<100	<100	1000	860	86	770	77	11	

1019

NOTE: If % moisture is reported, results are presented on a dry-weight basis.
* The relative percent difference for the matrix sample exceeds the ES Laboratory limit.
A blank spike analysis shows the laboratory to be in control.

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

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

MS = Spike Sample
MSD = Spike Duplicate

SR = Sample Result
SA = Spike Added (Concentration)

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

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: >T1115 DFTPP Injection Date: 11/15/88

Instrument ID: 70 1 DFTPP Injection Time: 12:02

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	54.1
68	Less than 2.0% of mass 69	1.0(1.5)1
69	Mass 69 relative abundance	64.
70	Less than 2.0% of mass 69	0.0(0.0)1
127	40.0 - 60.0% of mass 198	46.1
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.2
275	10.0 - 30.0% of mass 198	16.3
365	Greater than 1.00% of mass 198	1.95
441	Present, but less than mass 443	6.5
442	Greater than 40.0% of mass 198	44.3
443	17.0 - 23.0% of mass 442	8.2(18.5)2

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

Spoint 10/12/88

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

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED	
01	60 ug/ml BNA STD	>S0533	11/15/88	12:18	
02	88092756 1ml + IS	>S0534	11/15/88	13:36	another project
03	88092757 1ml + IS	>S0535	11/15/88	14:36	
04	88092758 1ml + IS	>S0536	11/15/88	16:06	
05	88092759 1ml + IS	>S0537	11/15/88	17:04	
06	88092799 1ml + IS	>S0538	11/15/88	18:04	
07	88092800 1ml + IS	>S0539	11/15/88	19:04	
08	88092801 1ml + IS	>S0540	11/15/88	20:03	
09	88092802 1ml + IS	>S0541	11/15/88	21:02	
10	88092803 1ml + IS	>S0542	11/15/88	22:02	
11	88092804 1ml + IS	>S0543	11/15/88	23:01	
12	88092805 1ml + IS	>S0544	11/16/88	0:01	
13					
14					
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16					
17					
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19					
20					
21					
22					

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 11/15/88

Contractor: ENGINEERING-SCIENCE | Time: 12:18

Contract No: | Laboratory ID: >S0533

Instrument ID: 2 | Initial Calibration Date: 10/13/88

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	.16029	82.22		
2-Fluorophenol	1.15802	.51265	55.73		
bis(2-Chloroethyl)ether	1.11892	1.43874	28.58		
Phenol	1.41657	1.36725	3.48	*	
Phenol-d5	1.22488	1.23795	1.07		
Aniline	.54193	.47227	12.85		
2-Chlorophenol	1.23175	1.20081	2.51		
1,3-Dichlorobenzene	1.47535	1.47853	.22		
1,4-Dichlorobenzene	1.40530	1.44377	2.74	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.83273	14.22		
1,2-Dichlorobenzene	1.32240	1.63588	23.71		
2-Methylphenol	1.17367	1.80101	53.45		
3-&-4-Methylphenol	1.07139	1.90981	78.25		
bis(2-chloroisopropyl)Ether	2.15627	3.96392	83.83		
N-Nitroso-Di-n-Propylamine	.84050	1.26879	50.96		**
Hexachloroethane	.53840	.99939	85.62		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.45079	11.83		
Nitrobenzene-d5	.39137	.42286	8.04		
2-Nitrophenol	.24657	.24842	.75	*	
Isophorone	.74170	.71003	4.27		
bis(2-Chloroethoxy)methane	.49386	.61077	23.67		
2,4-Dimethylphenol	.34849	.36585	4.98		
Benzoic Acid	.29725	.27017	9.11		
2,4-Dichlorophenol	.56733	.51873	8.57	*	
1,2,4-Trichlorobenzene	.36913	.31748	13.99		
Naphthalene	.94589	.95770	1.25		
4-Chloroaniline	.36309	.36756	1.23		
Hexachlorobutadiene	.20283	.15709	22.55	*	
4-Chloro-3-Methylphenol	.31360	.34056	8.60	*	
2-Methylnaphthalene	.56397	.60966	8.10		

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: 11/15/88

Contractor: ENGINEERING SCIENCE Time: 12:18

Contract No: ---------- Laboratory ID: >S0533

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	.25729	12.98		**
2,4,6-Trichlorophenol	.42280	.37532	11.23	*	
2,4,5-Trichlorophenol	.52897	.44484	15.90		
2-Fluorobiphenyl	1.27220	1.13943	10.44		
2-Chloronaphthalene	1.23784	1.17391	5.16		
2-Nitroaniline	.47288	.55839	18.08		
Dimethylphthalate	1.40629	1.27836	9.10		
2,6-Dinitrotoluene	.37415	.36141	3.40		
Acenaphthylene	1.68918	1.63752	3.06		
3-Nitroaniline	.44557	.54059	21.33		
2,4-Dinitrophenol	.11898	.13791	15.91		**
Acenaphthene	1.13011	1.04381	7.64	*	
Dibenzofuran	1.64131	1.55876	5.03		
2,4-Dinitrotoluene	.28418	.35220	23.94		
4-Nitrophenol	.28450	.25771	9.41		**
Fluorene	1.12850	1.03950	7.89		
Diethylphthalate	1.20939	1.12640	6.86		
4-Chlorophenyl-phenylether	.59183	.52002	12.13		
4-Nitroaniline	.35956	.32824	8.71		
2,4,6-Tribromophenol	.21023	.15751	25.08		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.45819	13.73	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.20284	4.78		
Hexachlorobenzene	.26273	.24459	6.90		
Pentachlorophenol	.14536	.13557	6.73	*	

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

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

%Diff - % Difference from original average or curve

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

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/15/88

Contractor: ENGINEERING-SCIENCE Time: 12:18

Contract No: Laboratory ID: >S0533

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

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.05584	2.08		
Anthracene	1.05155	1.11695	6.22		
Di-n-Butylphthalate	1.51956	1.80720	18.93		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.16453	2.18	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.01995	50.41		
Pyrene	1.56086	1.55359	.47		
Terphenyl-d14	1.05835	1.00843	4.72		
Butylbenzylphthalate	1.03390	1.22045	18.04		
3,3'-Dichlorobenzidine	.13689	.15251	11.41		
Chrysene	.99655	1.01734	2.09		
Benzo(a)Anthracene	1.10407	1.15369	4.49		
bis(2-Ethylhexyl)Phthalate	1.21073	1.47275	21.64		
Di-n-octylphthalate	3 40275	4.09325	20.29	*	
Benzo(a)Pyrene	1.32098	1.33360	.95	*	
Benzo(b)Fluoranthene	1.60850	1.65422	2.84		
Indeno(1,2,3-cd)Pyrene	.96800	.90973	6.02		
Dibenzo(a,h)Anthracene	.87481	.82925	5.21		
Benzo(k)Fluoranthene	1.44370	1.41855	1.74		
Benzo(g,h,i)Perylene	.89761	.83422	7.06		

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): >S0533 Date Analyzed:11/15/88

Instrument ID: 70 1 Time Analyzed: 12:18

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
12 HOUR STD	27733.	9.14	182133.	12.74	108055.	18.20
UPPER LIMIT	55466.		364266.		216110.	
LOWER LIMIT	13867.		91067.		54028.	
SAMPLE NO.						
01 88092756 1ml	26321.	9.11	188785.	12.69	108101.	18.17
02 88092757 1ml	22012.	9.11	165783.	12.69	99027.	18.17
03 88092758 1ml	21368.	9.11	121499.	12.70	90650.	18.18
04 88092759 1ml	19852.	9.11	144444.	12.70	95432.	18.18
05 88092799 1ml	20240.	9.12	148921.	12.70	99312.	18.19
06 88092800 1ml	15553.	9.13	104958.	12.70	75115.	18.19
07 88092801 1ml	17191.	9.12	121613.	12.70	82784.	18.19
08 88092802 1ml	15845.	9.13	105827.	12.70	72245.	18.18
09 88092803 1ml	15532.	9.14	110310.	12.71	75905.	18.19
10 88092804 1ml	18994.	9.13	134911.	12.71	88047.	18.19
11 88092805 1ml	19574.	9.15	143014.	12.73	84935.	18.27
12						
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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): >S0533 Date Analyzed: 11/15/88

Instrument ID: 70 1 Time Analyzed: 12:18

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS3(PRY) AREA #	RT
	12 HOUR STD	150930.	22.84	111521.	31.30	71072.	37.26
	UPPER LIMIT	301860.		223042.		142144.	
	LOWER LIMIT	75465.		55760.		35536.	
	EPA SAMPLE NO.						
01	88092756 1ml	169180.	22.82	120335.	31.26	73334.	37.21
02	88092757 1ml	155838.	22.82	109842.	31.25	66220.	37.19
03	88092758 1ml	163686.	22.82	135347.	31.26	81498.	37.22
04	88092759 1ml	162511.	22.83	138671.	31.27	83317.	37.22
05	88092799 1ml	167509.	22.82	135689.	31.27	88243.	37.22
06	88092800 1ml	128735.	22.83	124340.	31.28	56563.	37.22
07	88092801 1ml	141578.	22.82	122525.	31.27	56438.	37.22
08	88092802 1ml	122241.	22.83	113184.	31.28	52458.	37.23
09	88092803 1ml	138150.	22.85	119430.	31.29	55151.	37.29
10	88092804 1ml	154464.	22.83	128924.	31.29	58927.	37.28
11	88092805 1ml	55959.	23.10	58683.	31.43	22931.*	37.43
12							
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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.

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: >T1201 DFTPP Injection Date: 12/01/88

Instrument ID: 70 1 DFTPP Injection Time: 10:25

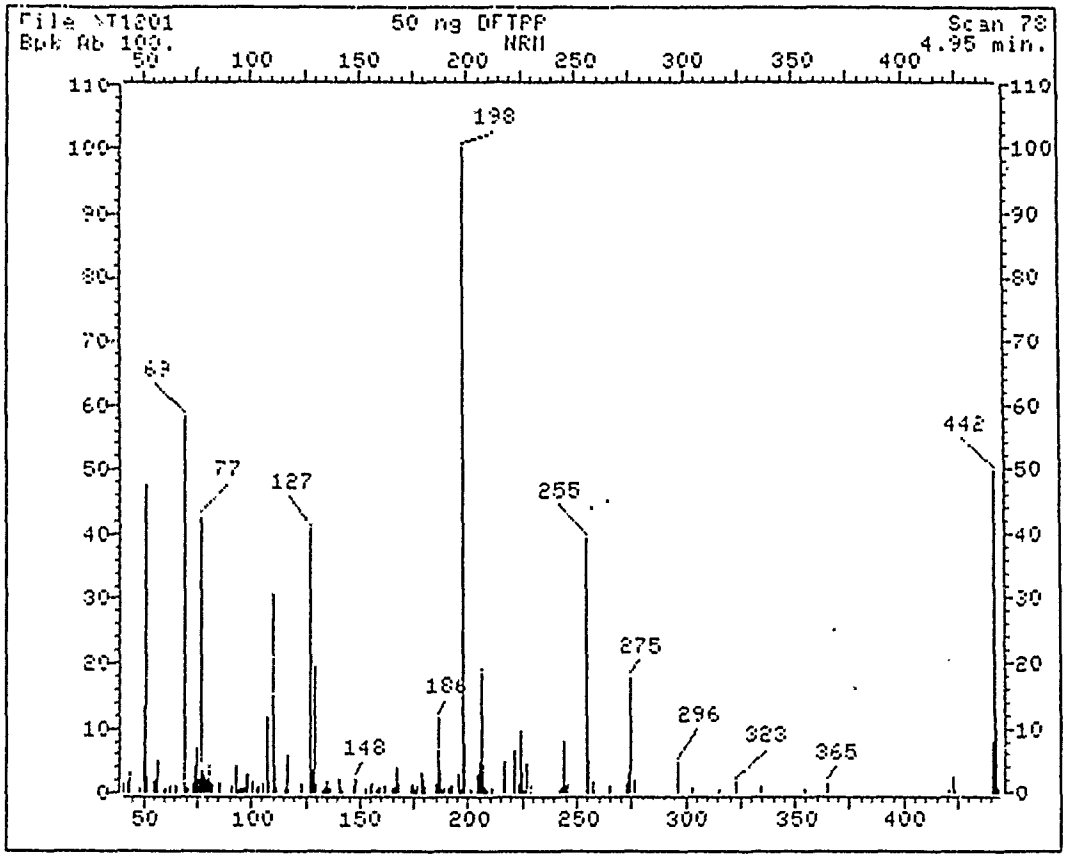
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	47.3
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	58.
70	Less than 2.0% of mass 69	.7(1.3)
127	40.0 - 60.0% of mass 198	40.6
197	Less than 1.0% of mass 198	.6
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.6
275	10.0 - 30.0% of mass 198	17.7
365	Greater than 1.00% of mass 198	1.45
441	Present, but less than mass 443	7.8
442	Greater than 40.0% of mass 198	49.8
443	17.0 - 23.0% of mass 442	10.0(20.0)2

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

5 pc

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	>S0618	12/01/88	10:43
02	88103044 AC 1ml	>S0619	12/01/88	11:47
03	88103044 BN 1ml	>S0620	12/01/88	12:47
04	88103045 AC 1ml	>S0621	12/01/88	13:47
05	88103045 BN 1ml	>S0622	12/01/88	14:47
06	88103047 AC 1ml	>S0623	12/01/88	15:47
07	88103047 BN 1ml	>S0624	12/01/88	16:46
08	88103048 AC 1ml	>S0625	12/01/88	17:46
09	88103048 BN 1ml	>S0626	12/01/88	18:46
10	88103049 AC 1ml	>S0627	12/01/88	19:45
11	88103049 BN 1ml	>S0628	12/01/88	20:45
12	88092805 1ml REANAL.	>S0629	12/01/88	21:44
13				
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16				
17				
18				
19				
20				
21				
22				



File: >T1201 Scan #: 78 Retn. time: 4.95

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.10	1.302	86.00	.679	136.05	.637	187.05	3.393	243.20	.609
43.10	1.690	91.00	.969	137.05	.679	187.95	.346	244.10	7.907
44.10	3.019	93 10	4.307	140.95	2.036	189.15	.748	245.10	1.149
48.90	.817	94.10	.568	142.05	.900	191.05	.623	246.10	1.454
50.10	13.295	95.00	.679	142.95	.526	192.15	1.094	255.10	39.233
51.10	47.320	96.00	.900	147.05	1.191	193.15	1.233	256.10	5.276
52.10	2.617	97.00	.609	148.05	2.147	196.10	2.825	258.00	1.690
55.10	1.786	98.10	2.839	152.95	.789	196.90	.582	259.00	.360
56.10	2.230	99.10	2.659	155.05	1.025	198.10	100.000	265.10	.983
57.10	5.179	101.10	1.676	156.05	1.579	199.10	7.589	273.00	1.288
60.10	.568	103.10	.831	158.05	.429	201.60	.540	274.15	3.102
61.00	.803	104.00	1.177	158.95	.623	201.80	.526	275.15	17.740
63.10	1.371	105.10	1.316	160.05	.845	204.10	2.853	276.15	2.160
65.20	.956	107.00	11.467	161.15	1.066	205.10	4.695	277.05	1.606
69.00	58.191	108.00	1.870	161.75	.305	206.10	19.152	296.15	4.805
70.00	.748	110.00	30.508	161.95	.305	207.10	4.335	303.15	.595
71.10	.872	111.10	4.251	165.05	.803	208.10	1.108	315.15	.429
73.10	1.357	112.00	.595	166.05	.886	209.00	.499	323.15	1.620
74.10	4.127	116.00	.706	167.05	3.850	210.60	.582	334.15	1.025
75.00	6.772	116.90	5.941	168.05	1.523	210.90	.748	354.30	.512
76.10	2.188	117.95	.374	174.15	1.066	217.10	4.764	365.10	1.454
77.10	42.446	123.15	1.329	175.05	1.316	221.10	6.467	421.20	.415
78.00	3.434	127.05	40.631	176.15	.499	223.10	1.482	423.10	2.548
79.10	2.797	128.15	3.587	177.05	1.011	224.10	9.639	424.20	.526
80 10	2.257	129.05	19.249	179.05	3.157	225.10	3.227	441.25	7.783
81.00	4 071	130.05	1.496	180.05	1.994	226.20	.388	442.25	49.758

HSL Compounds

Case No: Calibration Date: 12/01/88

Contractor: ENGINEERING - SCIENCE Time: 10:43

Contract No: Laboratory ID: >S0618

Instrument ID: 1 Initial Calibration Date: 10/12/88 12/2

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
N-Nitroso-Dimethylamine	.90169	1.00200	11.12		
2-Fluorophenol	1.15802	1.32723	14.61		
bis(2-Chloroethyl)ether	1.11892	1.18897	6.18		
Phenol	1.41657	1.56014	10.14	*	
Phenol-d5	1.22488	1.16494	4.89		
Aniline	.54193	.46779	13.68		
2-Chlorophenol	1.23175	1.26754	2.91		
1,3-Dichlorobenzene	1.47535	1.40440	4.81		
1,4-Dichlorobenzene	1.40530	1.43749	2.29	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.72906	.60267	17.34		
1,2-Dichlorobenzene	1.32240	1.42778	7.97		
2-Methylphenol	1.17367	1.65501	41.01		
3-&-4-Methylphenol	1.07139	1.39023	29.76		
bis(2-chloroisopropyl)Ether	2.15627	3.45750	60.35		
N-Nitroso-Di-n-Propylamine	.84050	.96233	14.49		**
Hexachloroethane	.53840	57899	7.54		
Dibromochloropropane	-	-	-		
Nitrobenzene	.40312	.49368	22.47		
Nitrobenzene-d5	.39137	.45339	15.84		
2-Nitrophenol	.24657	.26156	6.08	*	
Isophorone	.74170	.83342	12.37		
bis(2-Chloroethoxy)methane	.49386	.55098	11.57		
2,4-Dimethylphenol	.34849	.40824	17 15		
Benzoic Acid	.29725	.37451	25.99		
2,4-Dichlorophenol	.56733	.56968	.41	*	
1,2,4-Trichlorobenzene	.36913	.33628	8.90		
Naphthalene	.94589	.95472	.93		
4-Chloroaniline	.36309	.33929	6.56		
Hexachlorobutadiene	.20283	.20554	1.34	*	
4-Chloro-3-Methylphenol	.31360	.37304	18.96	*	
2-Methylnaphthalene	.56397	.59036	4.68		

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: 12/01/88

Contractor: ENGINEERING-SCIENCE Time: 10:43

Contract No: Laboratory ID: >S0618

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
Hexachlorocyclopentadiene	.29568	.28712	2.89		**
2,4,6-Trichlorophenol	.42280	.41173	2.62	*	
2,4,5-Trichlorophenol	.52897	.47765	9.70		
2-Fluorobiphenyl	1.27220	1.12240	11.77		
2-Chloronaphthalene	1.23784	1.09432	11.59		
2-Nitroaniline	.47288	.60078	27.05		
Dimethylphthalate	1.40629	1.30815	6.98		
2,6-Dinitrotoluene	.37415	.35941	3.94		
Acenaphthylene	1.68918	1.57961	6.49		
3-Nitroaniline	.44557	.60564	35.92		
2,4-Dinitrophenol	.11898	.10856	8.76		**
Acenaphthene	1.13011	.97491	13.73	*	
Dibenzofuran	1.64131	1.53146	6.69		
2,4-Dinitrotoluene	.28418	.32108	12.99		
4-Nitrophenol	.28450	.20429	28.19		**
Fluorene	1.12858	.98140	13.04		
Diethylphthalate	1.20939	1.11640	7.69		
4-Chlorophenyl-phenylether	.59183	.54233	8.36		
4-Nitroaniline	.35956	.32898	8.50		
2,4,6-Tribromophenol	.21023	.19717	6.22		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.40286	.47663	18.31	*	
4,6-Dinitro-2-Methylphenol	.10514	-	-		
4-Bromophenyl-phenylether	.21301	.23033	8.13		
Hexachlorobenzene	.26273	.27786	5.76		
Pentachlorophenol	.14536	.15663	7.75	*	

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: 12/01/88

Contractor: ERT-ENGINEERING-SCIENCE | Time: 10:43

Contract No: | Laboratory ID: >S0618

Instrument ID: A | Initial Calibration Date: 10/13/88 (10?)

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

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Phenanthrene	1.03431	1.04108	.65		
Anthracene	1.05155	1.07420	2.15		
Di-n-Butylphthalate	1.51956	1.45404	4.31		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.19047	1.18511	.45	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.04023	.21134	425.33		
Pyrene	1.56986	1.49500	4.22		
Terphenyl-d14	1.05835	1.05009	.78		
Butylbenzylphthalate	1.03390	1.01039	2.27		
3,3'-Dichlorobenzidine	.13689	.25871	89.99		
Chrysene	.99655	1.00683	1.03		
Benzo(a)Anthracene	1.10407	1.13998	3.25		
bis(2-Ethylhexyl)Phthalate	1.21073	1.13386	6.35		
Di-n-octylphthalate	3.40275	2.91426	14.36	*	
Benzo(a)Pyrene	1.32098	1.28281	2.89	*	
Benzo(b)Fluoranthene	1.60850	1.47270	8.44		
Indeno(1,2,3-cd)Pyrene	.96800	1.14898	18.70		
Dibenzo(a,h)Anthracene	.87481	1.00091	14.41		
Benzo(k)Fluoranthene	1.44370	1.35261	6.31		
Benzo(g,h,i)Perylene	.89761	.88806	1.06		

RF - Response Factor from daily standard file at 80.00 mg/l

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

%Diff - % Difference from original average or curve

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

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Engineering Science Contract: _____.

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

Lab File ID (Standard): >S0618 Date Analyzed:12/01/88

Instrument ID: 70 1 Time Analyzed: 10:43

	IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	112253.	9.10	382948.	12.72	237539.	18.19
	UPPER LIMIT	224506.		765896.		475078.	
	LOWER LIMIT	56126.		191474.		118770.	
	SAMPLE NO.						
01	88103044 AC	111750.	9.10	347264.	12.78	224602.	18.22
02	88103044 BN	111197.	9.10	382155.	12.76	240646.	18.23
03	88103045 AC	113923.	9.11	397554.	12.76	235182.	18.21
04	88103045 BN	107346.	9.11	408891.	12.76	230011.	18.22
05	88103047 AC	136402.	9.10	475056.	12.75	293134.	18.21
06	88103047 BN	123881.	9.10	467043.	12.73	269218.	18.21
07	88103048 AC	109960.	9.11	391617.	12.75	226783.	18.22
08	88103048 BN	104032.	9.10	386345.	12.75	223654.	18.22
09	88103049 AC	107812.	9.11	391256.	12.78	223791.	18.22
10	88103049 BN	106834.	9.11	379568.	12.76	224775.	18.22
11	88092805 1ml	109382.	9.12	401454.	12.72	185747.	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 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): >S0618 Date Analyzed:12/01/88

Instrument ID: 70 1 Time Analyzed: 10:43

		IS4(PHN)		IS5(CRY)		IS3(PRY)	
		AREA #	RT	AREA #	RT	AREA #	RT
	12 HOUR STD	371488.	22.83	278535.	31.31	194023.	37.35
	UPPER LIMIT	742976.		557070.		388046.	
	LOWER LIMIT	185744.		139268.		97012.	
	EPA SAMPLE NO.						
01	88103044 AC	367705.	22.89	248885.	31.32	165782.	37.37
02	88103044 BN	391759.	22.91	263466.	31.33	167384.	37.38
03	88103045 AC	386460.	22.88	268261.	31.33	178784.	37.37
04	88103045 BN	364694.	22.89	262383.	31.33	175565.	37.37
05	88103047 AC	487950.	22.89	345162.	31.32	227671.	37.36
06	88103047 BN	437899.	22.88	324828.	31.32	214448.	37.35
07	88103048 AC	374925.	22.89	263656.	31.34	169197.	37.37
08	88103048 BN	364820.	22.87	253390.	31.31	172475.	37.36
09	88103049 AC	365235.	22.89	255886.	31.33	169179.	37.37
10	88103049 BN	359225.	22.90	253632.	31.33	159502.	37.36
11	88092805 1ml	265632.	22.99	181345.	31.40	74390.*	37.44
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

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DATA PACKAGE #25

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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 9-28-88.

Sample Preparation Data

Laboratory Sample No.	Client Sample ID	Test	Date collected	Date* extracted	Date analyzed	Date* 2nd col.
88092781	DANGB-4-SL16	BA-I	9-27-88		10-17-88	
88092781	DANGB-4-SL16	CD-F	9-27-88		10-19-88	
88092781	DANGB-4-SL16	CR-F	9-27-88		10-18-88	
88092781	DANGB-4-SL16	PB-F	9-27-88		10-18-88	
88092781	DANGB-4-SL16	418.1	9-27-88	10-18-88	10-25-88	
88092781	DANGB-4-SL16	MOIS	9-27-88		10-10-88	
88092781	DANGB-4-SL16	8010	9-27-88		10-06-88	10-06-88
88092781	DANGB-4-SL16	8020	9-27-88		10-06-88	

* 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.
38092782	DANGB-SGC4-SS1 Resample	AS-F	9-27-88		10-17-88	
38092782	DANGB-SGC4-SS1 Resample	BA-I	9-27-88		10-17-88	
38092782	DANGB-SGC4-SS1 Resample	CD-F	9-27-88		10-27-88	
38092782	DANGB-SGC4-SS1 Resample	CR-F	9-27-88		10-18-88	
38092782	DANGB-SGC4-SS1 Resample	HG-C	9-27-88		10-17-88	
38092782	DANGB-SGC4-SS1 Resample	PB-F	9-27-88		10-20-88	
38092782	DANGB-SGC4-SS1 Resample	418.1	9-27-88	10-18-88	10-25-88	
38092782	DANGB-SGC4-SS1 Resample	MOIS	9-27-88		10-10-88	
38092782	DANGB-SGC4-SS1 Resample	8010	9-27-88		10-06-88	10-06-88
38092782	DANGB-SGC4-SS1 Resample	8020	9-27-88		10-06-88	
38092782	DANGB-SGC4-SS1 Resample	8080	9-27-88	10-07-88	10-25-88	10-26-88
38092782	DANGB-SGC4-SS1 Resample	8270	9-27-88	10-07-88	11-15-88	

* 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.
88092783	DANGB-SGC4-SS2 Resample	AS-F	9-27-88		10-17-88	
88092783	DANGB-SGC4-SS2 Resample	BA-I	9-27-88		10-17-88	
88092783	DANGB-SGC4-SS2 Resample	CD-F	9-27-88		10-27-88	
88092783	DANGB-SGC4-SS2 Resample	CR-F	9-27-88		10-18-88	
88092783	DANGB-SGC4-SS2 Resample	HG-C	9-27-88		10-17-88	
88092783	DANGB-SGC4-SS2 Resample	PB-F	9-27-88		10-25-88	
88092783	DANGB-SGC4-SS2 Resample	418.1	9-27-88	10-18-88	10-25-88	
88092783	DANGB-SGC4-SS2 Resample	MOIS	9-27-88		10-10-88	
88092783	DANGB-SGC4-SS2 Resample	8010	9-27-88		10-06-88	10-06-88
88092783	DANGB-SGC4-SS2 Resample	8020	9-27-88		10-06-88	
88092783	DANGB-SGC4-SS2 Resample	8080	9-27-88	10-07-88	10-25-88	10-26-88
88092783	DANGB-SGC4-SS2 Resample	8270	9-27-88	10-07-88	11-15-88	

* If applicable

A SUBSIDIARY OF THE PARSONS CORPORATION

CASE NARRATIVE
QUALITY CONTROL RESULTS SUMMARY
SAMPLE NO(S).: 88092781-88092783
WORK ORDER NO.: 1057

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

ENGINEERING-SCIENCE INC. PAGE 1
11/08/88

ANALYSIS REPORT

ORK ORDER NUMBER: 1057
JOB NUMBER : ZB0000000440 APPROVED BY _____
WORK ORDER DATE : 09/28/88 Lab Supervisor

EPORT DATA:
ES OAK RIDGE/DULUTH ANGB
710 S. ILLINOIS AVE. STE. S103
AK RIDGE, TN 37830
LL 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-4-SL16-SD1 88092781	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
ID DIG SOIL	NA	NA	NA
ARSENIC		1.4 B	1.2 B
BARIUM	199	37.8	39.5
CADMIUM	< 0.78	2.5	3.4
CHROMIUM	21.3N	17.7 N	15.6 N
MERCURY		<0.11	<0.11
LEAD	9.6	22.4	41.2 S

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1057
B NUMBER : ZB0000000440
RK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

SK: 3, UNITS: mg/Kg

ST COMPOUND	DANGB-4-SL16-SD1 88092781	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
8.1 PETROLEUM HYDROCARBONS	160	100	<100
MOISTURE	56.2*	7.0*	7.5*

- Not Detected

ANALYSIS REPORT

ORK ORDER NUMBER: 1057
JOB NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

APPROVED BY _____
Lab upervisor

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

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

OF REPORT COPIES: 1

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

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

TEST COMPOUND	DANGB-4-SL16-SD1 88092781	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
ENZYL CHLORIDE	ND	ND	ND
IS (2-CHLOROETHOXY)METHANE	ND	ND	ND
BIS (2-CHLOROISOPROPYL)ETHER	ND	ND	ND
ROMOBENZENE	ND	ND	ND
ROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOETHANE	ND	ND	ND
ARBON TETRACHLORIDE	ND	ND	ND
HLORACETALDEHYDE	ND	ND	ND
CHLORAL	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
HLOROETHANE	ND	ND	ND
HLOROFORM	16	ND	6.7
1-CHLOROHEXANE	ND	ND	ND
-CHLOROETHYL VINYL ETHER	ND	ND	ND
HLOROMETHANE	ND	ND	ND
CHLOROMETHYL METHYL ETHER	ND	ND	ND
CHLOROTOLUENE	ND	ND	ND
IBROMOCHLOROMETHANE	ND	ND	ND
IBROMOMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
,4-DICHLOROBENZENE	ND	ND	ND
ICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND
,2-DICHLOROETHANE	ND	ND	ND
,1-DICHLOROETHYLENE	ND	ND	ND
RANS-1,2-DICHLOROETHYLENE	ND	ND	ND
DICHLOROMETHANE	50B	1.9B	ND
,2-DICHLOROPROPANE	ND	ND	13B

ND - Not Detected

ANALYSIS REPORT FOR WORK ORDER NUMBER 1057

ST COMPOUND	DANGB-4-SL16-SD1 88092781	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
3-DICHLOROPROPYLENE	ND	ND	ND
1,2,2-TETRACHLOROETHANE	ND	ND	ND
1,1,2-TETRACHLOROETHANE	ND	ND	ND
TRACHLOROETHYLENE	ND	ND	ND
1,1-TRICHLOROETHANE	ND	ND	ND
1,2-TRICHLOROETHANE	ND	ND	ND
ICHLOROETHYLENE	ND	ND	ND
ICHLOROFLUOROMETHANE	ND	ND	ND
ICHLOROPROPANE	ND	ND	ND
NYL CHLORIDE	ND	ND	ND

- Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1057
B NUMBER : ZB0000000440
WORK ORDER DATE : 09/28/88

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

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

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

TEST COMPOUND	DANGB-4-SL16-SD1 88092781	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
NZENE	ND	ND	ND
LOROBENZENE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
4-DICHLOROBENZENE	ND	ND	ND
HYL BENZENE	ND	ND	ND
TOLUENE	ND	ND	ND
LENES	ND	ND	ND

ND - Not Detected

ANALYSIS REPORT

RK ORDER NUMBER: 1057
B NUMBER : ZB0000000440
RK ORDER DATE : 09/28/88

APPROVED BY _____
Lab Supervisor

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

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

OF REPORT COPIES: 1

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

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

ST COMPOUND	DANGB-SGC4-SS1-RESAMPLE 88092782	DANGB-SGC4-SS2-RESAMPLE 88092783
DRIN	ND	ND
PHA-BHC	ND	ND
TA-BHC	ND	ND
LTA-BHC	ND	ND
MMA-BHC	ND	ND
LORDANE	ND	ND
4'-DDD	ND	ND
4'-DDE	ND	ND
4'-DDT	ND	ND
ELDRIN	ND	ND
DOSULFAN I	ND	ND
DOSULFAN II	ND	ND
DOSULFAN SULFATE	ND	ND
DRIN	ND	ND
DRIN ALDEHYDE	NA	NA
PTACHLOR	ND	ND
PTACHLOR EPOXIDE	ND	ND
PONE	NA	NA
THOXYCHLOR	ND	ND
XAPHENE	ND	ND
B-1016	ND	ND
B-1221	ND	ND
B-1232	ND	ND
B-1242	ND	ND
-1248	ND	ND
B-1254	105	205
B-1260	ND	ND

- Not Detected

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

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

Work Order: 1057
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:	88092782	88092783
Sample No.:	DANGB-SGC4-SS1-RESAMPLE	DANGB-SGC4-SS2-RESAMPLE
Date Sampled:	9-27-88	9-27-88
Time Sampled:	16:15	16:15
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	7	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: September 28, 1988 Work Order: 1057
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:	88092782	88092783
Sample No.:	DANGB-SGC4-SS1-RESAMPLE	DANGB-SGC4-SS2-RESAMPLE
Date Sampled:	9-27-88	9-27-88
Time Sampled:	16:15	16:15
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	7	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: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1057
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:	88092782	88092783
Sample No.:	DANGB-SGC4-SS1-RESAMPLE	DANGB-SGC4-SS2-RESAMPLE
Date Sampled:	9-27-88	9-27-88
Time Sampled:	16:15	16:15
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	7	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: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1057
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:	88092782	88092783
Sample No.:	DANGB-SGC4-SS1-RESAMPLE	DANGB-SGC4-SS2-RESAMPLE
Date Sampled:	9-27-88	9-27-88
Time Sampled:	16:15	16:15
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	7	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: September 28, 1988
Date Reported: December 9, 1988

Work Order: 1057
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:	88092782	88092783
Sample No.:	DANGB-SGC4-SS1-RESAMPLE	DANGB-SGC4-SS2-RESAMPLE
Date Sampled:	9-27-88	9-27-88
Time Sampled:	16:15	16:15
Date Extracted:	10-07-88	10-07-88
Date Analyzed:	11-15-88	11-15-88
Percent Moisture:	7	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

1057

CHAIN OF CUSTODY RECORD

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

SAMPLER(S): (Signature) Robert Z. Davis

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	SW3270	EPA 418.1	SW8010, 7060, 7191	SW7131, 7421, 7471			REMARKS
9-27-88	0905	DANGB-4-SL16-SD1	1				X	X	X			382781 Dont analyze for SW7060 or SW7471
9-27-88	0905	DANGB-4-SL16-SD1	1	X								
9-27-88	1615	DANGB-SGCA-SS1 - RESAMPLE	1		X	X	X	X	X			RESAMPLE due to lab refrigerator breakage
9-27-88	1615	DANGB-SGCA-SS2 - RESAMPLE	1		X	X	X	X	X			" "
9-27-88	1615	DANGB-SGCA-SS1- RESAMPLE	1	X								" 382782 "
9-27-88	1615	DANGB-SGCA-SS2-RESAMPLE	1	X								" 382783 "

1652

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Robert Z. Davis	9-27-88 1800	Fed Ex Airbill # 9490309850			

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	Remarks
				SAMPLES RECEIVED COLD AND INTACT

Q... ...TY ...TROL ...SUL... SUMM...
METALS

Job No.: OR001.02

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

QC Report No: AAF-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

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
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	

1953

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.: OR001.02

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: 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

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

1654

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 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

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

1655

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

'b No.: OR001

lient: ES Oak Ridge
:tn: Bill Hayden
ldress: 710 S. Illinois Avenue
Suite F-103
Oak Ridge, Tn. 37830

roject: Duluth ANGB

: Report for Laboratory Sample No(s):
88092781-88092783
88092799-88092805

QC Report No: TPH-S-0080-88
Sample Matrix: Soil
Conc. Unit: mg/KG
Date Received: NA
Date Prepared: 10-18-88
Date Analyzed: 10-25-88
Date Reported: 11-08-88
Dilution Factor: 6
%Moisture: 7.0

Laboratory Supervisor Approval:

aboratory mple No.	Anal Method	Blank	SR	SA	MS	PR	MSD	PR	RPD	Notes
8092782	418.1	<100	100	1100	610	46	430	30	35	*
lank	418.1	<100	<100	1000	86	86	770	77	11	

1657

OTE: If % moisture is reported, results are presented on a dry-weight basis.
* The relative percent difference for the matrix sample exceeds the ES Laboratory limit.
A blank spike analysis shows the laboratory to be in control.

elative 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

ercent 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.: OR0C1

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 1658	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

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	75-118
	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	82-113

1659

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

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 N[illegible]3092739 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: 11-03-88

Laboratory Supervisor Approval:

File ID	Date Analyzed	Fraction	Instrument ID	CAS Number	Compound (HSL, TIC or Unknown)	Conc	CRDL	Inclusive Sample Nos.
86	10-06-88	VGC	Porasil	75-09-2	Dichloromethane	9.5	0.25	88092781-88092783

1661

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

QC Report No.: OCP-S-0037-38B
QC Sample No.: Blank
Level (Low/Med): Low
Date Reported: 11-03-88

Project: Duluth ANGB

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	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: 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.: OCP-S-0[illegible]-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	64.7	85	63	29	31	35-130
Aldrin	49.5	63	NC*	NC*	43	34-132
Dieldrin	131	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. Illinoi Avenue
Suite F-103
Oak Ridge, 30

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

Project: Duluth ANGB

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:

1666

Fraction	Compound	SA	SR	MS	PR	MSD	PR	RPD	EPA QC Limit RPD	EPA QC Limit %Recovery
	1,2,4-Trichlorobenzene	3920	ND	2070	53	2090	53	2	23	38-107
B/N	Acenaphthene	3920	ND	2510	64	2490	64	1	19	31-137
Laboratory	2,4-Dinitrotoluene	3920	ND	2870	73	2940	75	2	47	28-89
Sample #	Pyrene	3920	ND	2290	58	2300	59	4	36	35-142
88092674	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
	Pentachlorophenol	7840	ND	8000	102	7880	101	2	47	17-109
ACID	Phenol	7840	ND	4590	59	4470	57	3	35	26-90
Laboratory	2-Chlorophenol	7840	ND	4550	58	4310	55	5	50	25-102
Sample #	4-Chloro-3-Methylphenol	7840	ND	6200	79	6310	80	2	33	26-103
88092674	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.: 88092783
WORK ORDER NO.: 1057

The first analysis of sample 88092783 showed low area counts for the sixth internal standard. A subsequent re-analysis confirmed this, indicating a matrix effect. Since no target compounds were found, this should not affect the results of this 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.
E6240	11-15-88	BNA	2	-	None Detected	-	-	88092731-88092733 88092782-88092783 88092799-88092805

1668

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: >D3115 DFTPP Injection Date: 11/15/88

Instrument ID: 70 2 DFTPP Injection Time:

m/e	ION ABUNDANCE CRITER	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	56.8
68	Less than 2.0% of mass 69	0.0(0.0)1
69	Mass 69 relative abundance	70.
70	Less than 2.0% of mass 69	.5(.7)1
127	40.0 - 60.0% of mass 198	40.2
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	5.9
275	10.0 - 30.0% of mass 198	19.9
365	Greater than 1.00% of mass 198	1.54
441	Present, but less than mass 443	10.8
442	Greater than 40.0% of mass 198	80.9
443	17.0 - 23.0% of mass 442	15.3(18.9)2

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

5 point
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	60mg/l abn std	>E6234	11/15/88	12:53	
02	88092810 1ML + IS	>E6235	11/15/88	14:02	SS out, IS out
03	88092811 1ML + IS	>E6236	11/15/88	15:00	SS out IS out
04	88092752 1ml + IS	>E6237	11/15/88	16:06	
05	88092753 1ml + IS	>E6238	11/15/88	17:01	IS out
06	88092755 1ml + IS	>E6239	11/15/88	17:56	
07	88092731-33,82,83,99	>E6240	11/15/88	18:51	SS out
08	88092731 1ML + IS	>E6241	11/15/88	19:47	
09	88092782 1ML + IS	>E6242	11/15/88	20:42	
10	88092783 1ML + IS	>E6243	11/15/88	21:37	IS out, RA out
11	88092733 1ML + IS	>E6244	11/15/88	22:32	
12	88092732 1ML + IS	>E6245	11/15/88	23:27	IS out, RA out
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

another project

use

use

use

use

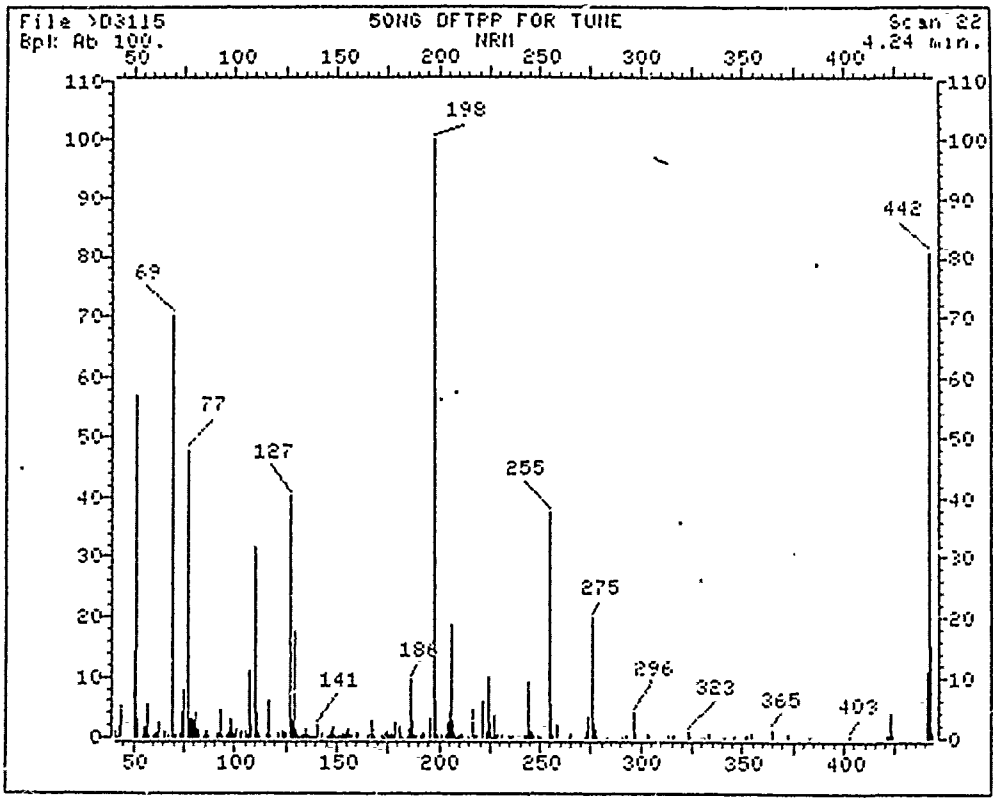
see LA 50066

GC/MS PERFORMANCE STANDARD

Decafluorotriphenylphospine (DFTPP)

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	56.80	56.80	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	70.04	70.04	Ok
70	Less than 2% of mass 69	.46	.65	Ok
127	40-60% of mass 198	40.21	40.21	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	5.91	5.91	Ok
275	10-30% of mass 198	19.92	19.92	Ok
365	Greater than 1% of mass 198	1.54	1.54	Ok
441	0-100% of mass 443	10.81	70.75	Ok
442	Greater than 40% of mass 198	80.93	80.93	Ok
443	17-23% of mass 442	15.28	18.89	Ok

Injection Date: 11/15/88
Injection Time: 12:29
Data File: >D3115
Scan: 22



File:)03115 Scan #: 22 Retn. time: 4.24

m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.	m/z	Int.
41.00	1.089	97.95	3.110	149.00	.518	204.00	2.495	264.95	.641
42.00	.246	98.95	2.723	150.10	.193	205.00	3.979	271.95	.105
43.10	1.616	100.15	.404	151.00	.457	206.00	18.763	272.95	1.195
44.00	5.165	100.95	1.537	152.00	.237	207.00	2.837	274.05	3.338
50.00	14.433	102.95	.659	153.00	.668	207.90	.650	275.05	19.923
51.00	56.799	103.95	1.160	153.85	.545	208.90	.211	276.05	2.301
52.00	3.031	104.95	1.054	154.95	1.072	209.70	.228	277.05	1.467
54.00	.123	105.95	.492	156.05	1.502	210.30	.492	277.95	.228
55.10	1.757	106.95	10.787	156.85	.307	211.00	.720	283.05	.193
56.00	1.915	107.95	1.985	157.85	.387	211.70	.272	291.00	.088
57.00	5.429	109.90	31.571	159.95	.685	214.90	.184	293.00	.351
58.10	.316	111.00	4.190	160.95	.764	216.90	4.445	296.00	4.058
60.00	.281	111.90	.606	164.95	.580	217.90	.553	296.90	.747
61.10	.861	112.90	.141	165.95	.562	218.90	.378	303.00	.597
62.00	.747	116.00	.861	167.05	2.916	221.00	5.815	303.60	.184
63.00	2.416	116.90	6.228	167.95	1.344	222.90	1.080	304.00	.272
65.10	1.195	117.90	.395	169.05	.193	224.00	9.935	314.00	.343
66.95	.343	121.90	.729	171.85	.351	225.60	2.319	315.00	.395
67.15	.325	123.00	1.195	172.95	.334	225.90	.176	316.00	.272
68.95	70.037	124.00	.668	173.95	.615	227.00	3.602	323.10	1.054
70.05	.457	125.00	.826	175.05	1.133	228.00	.545	324.10	.343
71.05	.712	127.00	40.214	175.95	.509	229.00	.897	327.00	.255
73.05	.826	127.90	2.952	176.95	.773	231.00	.430	331.85	.149
73.95	4.120	129.00	17.814	177.95	.264	235.00	.299	333.95	.826
74.95	7.704	129.90	1.423	178.95	2.372	235.80	.202	335.05	.211

78.05	3.268	131.90	.141	180.95	.782	237.00	.299	346.05	.343
78.95	3.689	133.00	.316	182.85	.132	241.95	.387	351.85	.422
79.95	2.929	133.90	.439	184.05	.202	242.95	.439	352.95	.299
80.95	1.129	135.00	1.493	184.95	1.379	243.95	9.267	353.95	.632
81.95	1.414	135.80	.518	186.05	9.505	245.05	.975	364.95	1.537
83.05	1.405	137.00	.527	187.05	2.811	245.95	1.256	372.10	.755
84.05	.483	138.10	.167	187.95	.307	247.05	.290	383.00	.237
85.05	.957	138.80	.141	189.05	.650	248.95	.307	403.10	.360
85.95	.975	139.90	.211	190.95	.378	249.95	.105	420.95	.589
87.05	.518	140.10	.211	191.95	.676	250.95	.088	421.85	.166
88.95	.220	141.00	2.091	192.95	.764	254.95	37.535	423.05	4.058
91.05	.887	142.00	.782	196.05	3.022	255.95	5.596	424.05	.870
91.95	.799	142.80	.422	197.90	100.000	256.95	.413	441.05	10.813
92.95	4.612	145.00	.228	198.90	5.912	257.95	1.968	442.05	80.929
93.95	.360	146.00	.360	199.90	.422	261.05	.167	443.05	15.285
96.05	.413	147.00	.957	201.30	.474	261.35	.167	444.05	1.221
97.15	.632	148.00	1.704	203.00	.395				

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 11/15/88

Contractor: Time: 12:53

Contract No: Laboratory ID:)E6234

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	1.43013	15.29		
2-Fluorophenol	1.41912	1.32367	6.73		
bis(2-Chloroethyl)ether	1.41737	1.53412	8.24		
Phenol	1.78209	1.60221	10.09	*	
Phenol-d5	1.35470	1.49815	10.59		
Aniline	.74553	.52815	29.16		
2-Chlorophenol	1.32089	1.39870	5.89		
1,3-Dichlorobenzene	1.51101	1.47453	2.41		
1,4-Dichlorobenzene	1.51574	1.47131	2.93	*	
Benzyl Chloride	-	-	-		
Benzyl Alcohol	.56944	.77502	36.10		
1,2-Dichlorobenzene	1.45179	1.45164	.01		
2-Methylphenol	1.42392	1.50615	5.77		
3-&-4-Methylphenol	1.58422	1.39348	12.04		
bis(2-chloroisopropyl)Ether	2.35722	3.54191	50.26		
N-Nitroso-Di-n-Propylamine	1.13410	1.50678	32.86		**
Hexachloroethane	.70056	.69501	.79		
Dibromochloropropane	-	-	-		
Nitrobenzene	.56683	.60756	7.19		
Nitrobenzene-d5	.49938	.55360	10.86		
2-Nitrophenol	.22040	.25135	14.04	*	
Isophorone	.87207	1.01572	16.47		
bis(2-Chloroethoxy)methane	.58240	.64898	11.43		
2,4-Dimethylphenol	.40862	.39848	2.48		
Benzoic Acid	.29595	.43159	45.83		
2,4-Dichlorophenol	.53135	.50297	5.34	*	
1,2,4-Trichlorobenzene	.31739	.33635	5.97		
Naphthalene	.98196	1.00445	2.29		
4-Chloroaniline	.33116	.34134	3.07		
Hexachlorobutadiene	.18652	.19112	2.47	*	
4-Chloro-3-Methylphenol	.28631	.26301	8.14	*	
2-Methylnaphthalene	.54168	.60226	10.57		

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: 11/15/88

Contractor: _____ Time: 12:53

Contract No: _____ Laboratory ID: >E6234

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	.31559	5.20		**
2,4,6-Trichlorophenol	.32295	.27517	14.79	*	
2,4,5-Trichlorophenol	.49539	.62395	25.95		
2-Fluorobiphenyl	1.26699	1.20645	4.78		
2-Chloronaphthalene	1.24653	1.12659	9.62		
2-Nitroaniline	.63129	.67864	7.50		
Dimethylphthalate	1.33033	1.34538	1.13		
2,6-Dinitrotoluene	.31816	.37696	18.48		
Acenaphthylene	1.65820	1.56090	5.87		
3-Nitroaniline	.63702	.71912	12.89		
2,4-Dinitrophenol	.05753	.07631	32.66		**
Acenaphthene	1.12644	1.06948	5.06	*	
Dibenzofuran	1.50204	1.52324	1.41		
2,4-Dinitrotoluene	.32099	.39408	22.77		
4-Nitrophenol	.18425	.12030	34.71		**
Fluorene	1.09332	1.16873	6.90		
Diethylphthalate	1.32354	1.28188	3.15		
4-Chlorophenyl-phenylether	.46214	.46860	2.81		
4-Nitroaniline	.27495	.36718	33.55		
2,4,6-Tribromophenol	.14218	.05719	59.78		
1,2-Diphenylhydrazine	-	-	-		
Alpha-BHC	-	-	-		
Beta-BHC	-	-	-		
Gamma-BHC	-	-	-		
Delta-BHC	-	-	-		
Heptachlor	-	-	-		
Aldrin	-	-	-		
N-Nitrosodiphenylamine	.44983	.42744	4.98	*	
4,6-Dinitro-2-Methylphenol	.08606	-	-		
4-Bromophenyl-phenylether	.22979	.24988	8.74		
Hexachlorobenzene	.28768	.33374	16.01		
Pentachlorophenol	.11390	.12488	9.63	*	

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: 11/15/88

Contractor: Time: 12:53

Contract No: Laboratory ID:)E6234

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	.99406	7.92		
Anthracene	1.13334	1.09421	3.45		
Di-n-Butylphthalate	1.71746	1.75903	2.42		
4,4'-Dibromobiphenyl	-	-	-		
Fluoranthene	1.17568	1.17738	.14	*	
Heptachlor Epoxide	-	-	-		
Endosulfan I	-	-	-		
4,4'-DDE	-	-	-		
Dieldrin	-	-	-		
Endrin	-	-	-		
4,4'-DDD	-	-	-		
Endosulfan II	-	-	-		
Endrin Aldehyde	-	-	-		
4,4'-DDT	-	-	-		
Endosulfan Sulfate	-	-	-		
Dibutylchlorendate	-	-	-		
Benzidine	.03775	.00159	95.79		
Pyrene	1.65647	1.47530	10.94		
Terphenyl-d14	1.09647	1.07713	1.76		
Butylbenzylphthalate	1.15097	1.15436	.29		
3,3'-Dichlorobenzidine	.12990	.25720	98.00		
Chrysene	1.01423	1.02138	.71		
Benzo(a)Anthracene	1.09006	1.16383	6.77		
bis(2-Ethylhexyl)Phthalate	1.34247	1.33831	.31		
Di-n-octylphthalate	3.72331	2.91716	21.65	*	
Benzo(a)Pyrene	1.27071	1.26835	.19	*	
Benzo(b)Fluoranthene	1.48902	1.63809	10.01		
Indeno(1,2,3-cd)Pyrene	.82543	.74872	9.29		
Dibenzo(a,h)Anthracene	.78966	1.11333	40.99		
Benzo(k)Fluoranthene	1.51900	1.11057	26.89		
Benzo(g,h,i)Perylene	.74580	1.11733	49.82		

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	74368	7.90	259080	11.40	146405	16.77
UPPER LIMIT	148736		518160		292810	
LOWER LIMIT	37184		129540		73202	
EPA SAMPLE NO.						
01 98092810	34296	7.64	122317 *	11.34	89875	16.72
02 11	35258 *	7.85	165363	11.33	98027	16.73 *
03 2752	60074	7.89	213484	11.34	112372	16.73
04 53	32134 *	7.71	83454 *	11.34	76462	16.73
05 55	37435	7.86	153484	11.34	87286	16.73
06 SET BLK	49407	7.89	183107	11.34	98914	16.73
07 2731	47267	7.90	171761	11.34	91644	16.73
08 83	56140	7.90	184857	11.34	96546	16.73
09 63	53350	7.91	196013	11.36	103164	16.75
10 33	55101	7.91	205858	11.35	108654	16.75
11 32	38786 *	7.85	319000 *	11.34	176250 *	16.72 *
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:_____ 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	219517	21.35	165896	29.74	135375	34.57	
UPPER LIMIT	439034		331792		270750		
LOWER LIMIT	109758		82948		67687		
EPA SAMPLE NO.							
01	88092910	181770	21.31	149860	29 68	118339	34.53
02	"	168707	21.31	128494	2968	69181	3453
03	2752	179424	21.32	148702	2969	109483	34.52
04	53	151766	21.32	122362	2968	95836	34.53
05	55	151000	21.32	109253	2967	71439	3452
06	set Blk	157285	21.33	129097	2968	107909	3453
07	2731	149050	21.33	131222	2968	83259	34.52
08	82	159860	21.33	128547	2969	80203	3451
09	83	166056	21.34	131820	2972	66102*	3459 *
10	33	175240	21.34	130115	2971	78173	34.51
11	32	267824	21.31	18172*	2962	9863	34.54 *
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

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