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A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

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DEC 28 1987
CITY OF ST. LOUIS PARK
US EPA RECORDS CENTER REGION 5
514106

12/24/87
N.

ERT Ref. No. 105-REB-112

environmental and engineering excellence

24 December 1987

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

In the recent telephone conversation between you, Dr. Tsai, Dr. Trainor, and me, we discussed the concentration ranges which ERT routinely uses to calibrate the GC/MS instrumentation for the part per trillion PAH analyses. Specifically, Dr. Tsai felt that the ppt PAH calibration range should be extended to a lower range. ERT would like to present the following points.

The ppt PAH method employs a concentration factor of 8,000 (4 liters of sample reduced to a 0.5 mL extract). It is therefore, very important to relate the concentration of the GC/MS calibration standard to the samples' initial concentration. A table has been included showing the five point GC/MS calibration standard range (20 to 200 ng/mL) and the corresponding absolute sample concentration (2.5 to 25 ng/L or ppt).

As ERT developed the part per trillion PAH methodology, we looked very closely at the published EPA methods for guidance in conducting trace level organics analysis. The review of these methods suggested that for EPA method 625, the calibration standard should be near, but above the MDL, and that for the CLP semi-volatile method, the calibrations should be done at 20 ug/L. With required detection limits of 10 ug/L, the ratio of the lowest calibration standard to the MDL is 2.0. In the CLP volatile method, the calibrations should be done at 20 ug/L. Many of the required detection limits are 5.0 ug/L; therefore, the ratio of the lowest calibration standard to the MDL is 4.0.

The method detection limit for the 30 target compounds for this program vary from 0.42 to 4.3 ppt. The present lower calibration solution falls at a value slightly above the mean of the range of MDL's. The solution is at or below the MDL for 8 of the 30 compounds and within a ratio of 2X the MDL for an additional 9; all are within a factor of 4 except 1. For compounds in which the MDL is equal to or greater than a value of

2.5 ppt, the lowest calibration standard is at a concentration less than the corresponding MDL and would meet the criteria suggested by Dr. Tsai. Of the 30 compounds, 8 have MDL's above 2.5 ppt and therefore meet the criteria.

ERT feels that the EPA guidelines for calibration protocol of the above methods are being closely followed in the ppt PAH method. In an effort to address the concerns of Dr. Tsai, ERT's technical judgement, based upon our experiences with these analyses, is that the addition of a lower level calibration standard to the method might slightly increase the measurement accuracy for only those 9 compounds whose MDL fell below 1.0 ng/L. Our experience indicates that far greater uncertainties are introduced by the inherent difficulties of the extraction of part per trillion contaminants from 4 liters of water.

Should EPA conclude that a more stringent analytical calibration protocol is warranted than found in their published methodologies, ERT would propose that an additional standard at 1.5 ng/L be run for those 9 compounds whose MDL falls below 1.0 ng/L. We believe this would give the added incremental assurance that the levels which are being reported for these compounds are accurate values.

We trust that this answers the concerns of the EPA. Should you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

cc: A. Paradice
T. Trainor
M. Hoyt

Calibration standard concentration comparisons to initial sample concentration at the part per trillion level.

Initial Sample Concentration (ng/L)	Concentration in Sample Extract (ng/mL)	Corresponding Standard Conc. (ng/mL)
2.5	20	20
5.0	40	40
12.5	100	100
20	160	160
25	200	200

A 4-liter sample is concentrated to a 0.5 mL extract for an 8000X concentration factor.

Table 1. Comparison of method detection limit values for part per trillion PAH analysis for the Finnigan 5100 versus the Hewlett-Packard MSD.

Carcinogenic PAH's

Parameter	Finnigan MDL	HP MDL
Quinoline	1.90	2.60
Benz(a)anthracene	4.40	4.30
Chrysene	4.40	2.60
Benzofluoranthenes	9.70	1.40
Benzo(a)pyrene	3.40	2.90
Indeno(1,2,3-cd)pyrene	4.40	0.67
Dibenz(a,h)anthracene	3.40	0.42
Benzo(g,h,i)perylene	5.30	0.67

Other PAH's

Parameter	Finnigan MDL	HP MDL
2,3-benzofuran	1.90	2.00
2,3-dihydroindene	3.40	2.80
Indene	2.90	1.90
Naphthalene	47.00	2.00
Benzo(b)thiophene	2.20	1.20
Indole	1.90	0.92
2-methylnaphthalene	5.00	1.60
1-methylnaphthalene	3.10	1.30
Biphenyl	17.00	1.30
Acenaphthylene	1.70	1.00
Acenaphthene	1.30	1.20
Dibenzofuran	1.20	0.69
Fluorene	0.88	0.64
Dibenzothiophene	6.30	0.55
Phenanthrene	3.10	3.70
Anthracene	3.40	3.10
Acridine	2.50	1.50
Carbazole	2.60	1.80
Fluoranthene	4.40	0.97
Pyrene	4.10	0.74
Benzo(e)pyrene	1.50	4.00
perylene	1.60	1.20

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MAIL

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HE

Ms. Erin Moran
Remedial Project Manager
United States Environmental
Protection Agency
Re ~ S
Chicago, IL 60604

CH2M HILL CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
W63720.FR	Reilly Tar, Minnesota

LABORATORY

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	REMARKS
1	11/13	1:15		X	travel blank	1	
2	11/13	1:07		X	treated	1	
3	11/13	1:10		X	treated duplicate	1	
							Empty bottles : do not analyse

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Linda M Rogalinski / GLO	11/13			
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY: (SIGNATURE)**	**RELINQUISHED BY: (SIGNATURE)**	**DATE/TIME**	**RECEIVED BY LAB: (SIGNATURE)**

REMARKS

SAMPLE SHIPPED VIA ☐ UPS ☐ BUS ☐ FEDERAL EXPRESS

AIR BUS BILL NUMBER

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

11/13/87

11/13/87
N.

Engineers
Planners
Economists
Scientists

November 13, 1987

W63720.FR

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

Dear Mr. Scrivner:

On October 14, 1987, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. It should be noted that the surrogate recovery for the travel blank was less than 1%. Low sample volume prevented re-extraction. Surrogate recovery on all other samples was acceptable. No other difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09946001
Date Received : 10/14/87
Date Extracted: 10/16/87
Date Analyzed : 11/11/87

Client: REILLY TAR, MINNESOTA

Sample Description: 10/13/87 13:15 TRAVEL BLANK

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	BMDL			
Benzo(b)thiophene	1.0	BMDL			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	BMDL			
Biphenyl	1.0	BMDL			
Acenaphthylene	1.0	BMDL			
Acenaphthene	1.3	BMDL			
Dibenzofuran	2.0	BMDL			
Fluorene	1.4	BMDL			
Dibenzothiophene	x	BMDL			
Phenanthrene	1.0	BMDL			
Anthracene	1.0	BMDL			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	BMDL			
Pyrene	1.0	BMDL			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.		1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	xx		2 BMDL = BELOW METHOD DETECTION LIMIT	RA	

Comments: x Detection Limit not determined.
xx Surrogate recovery less than 1%.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09946002
Date Received : 10/14/87
Date Extracted: 10/16/87
Date Analyzed : 11/11/87

Client: REILLY TAR, MINNESOTA

Sample Description: 10/13/87 13:30 GAC EFFLUENT

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	*	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	30	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	1.8	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	2.3			
Benzo(b)thiophene	1.0	1.6			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	*	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	2.3			
Biphenyl	1.0	3.7			
Acenaphthylene	1.0	6.4			
Acenaphthene	1.3	16			
Dibenzofuran	2.0	5.5			
Fluorene	1.4	8.7			
Dibenzothiophene	*	0.9			
Phenanthrene	1.0	4.9			
Anthracene	1.0	1.1			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	2.3			
Pyrene	1.0	1.6			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	*	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	*	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	56		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW RA	

Comments: * Detection Limit not determined.

Engineers
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Scientists

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09946003
Date Received : 10/14/87
Date Extracted: 10/16/87
Date Analyzed : 11/11/87

Client: REILLY TAR, MINNESOTA

Sample Description: 10/13/87 13:30 GAC EFFLUENT

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	35	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	3.7	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	4.5			
Benzo(b)thiophene	1.0	5.4			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	2.6			
Biphenyl	1.0	4.1			
Acenaphthylene	1.0	7.3			
Acenaphthene	1.3	17			
Dibenzofuran	2.0	5.7			
Fluorene	1.4	9.7			
Dibenzothiophene	x	1.0			
Phenanthrene	1.0	5.6			
Anthracene	1.0	1.2			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	2.4			
Pyrene	1.0	1.8			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	62		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				RA	

Comments: x Detection Limit not determined.

11/9/87
N.

CITY OF SAINT LOUIS PARK

RECEIVED
NOV 12 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

November 9, 1987

Ms. Erin Moran
United States Environmental Protection Agency, Region 5
ATTN: Hazardous Waste Enforcement Branch
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Michael Vennewitz
Minnesota Pollution Control Agency
ATTN: Site Response Section
520 Lafayette Road North
St. Paul, Minnesota 55155

Mr. Richard Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. John Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

RE: Interim Analysis - GAC Plant
St. Louis Park, Minnesota

Dear Project Leaders:

Enclosed is the laboratory report for analyses completed on water samples taken from the City's GAC plant in October, 1987 (set 2GACT-6). The results of the analyses indicate a consistent, though low level, presence of PAH's in the effluent. A comparison of the September and October results confirms the same PAH compounds are present.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/cmr
Enclosure

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

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A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-092
ERT Proj. No. E631-057

environmental and engineering excellence

6 November 1987

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set 2GAC-6) received from the GAC plant on 14 October 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to E. Moran, U.S. EPA; R. Clark, Minnesota Department of Health; and M. Vennewicz, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
R. Gen.
P. Pelletier
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 6 November 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set 2GAC-6 (E631-057)

Date Samples Received: 14 October 1987

Number of Samples Received/Matrix: 4 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
6 November 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET 2GAC-6

ERT PROJECT NO. E631-057
6 November 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 2GAC-6) received by the ERT Analytical Chemistry Laboratory on 14 October 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/L (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 - 108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 108%, within the 20% - 150% target range. A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the 95% confidence limits as required in the Plan.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACT-6
2.	ERT SAMPLE NUMBER:	48540
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	10/13/87
5.	DATE RECEIVED:	10/14/87
6.	DATE EXTRACTED:	10/15/87
7.	DATE ANALYZED:	10/20/87
8.	GC/MS FILE #:	>2444
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2434
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 48542
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 48569
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48570
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2435

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-6
2.	ERT SAMPLE NUMBER:	48541
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	10/13/87
5.	DATE RECEIVED:	10/14/87
6.	DATE EXTRACTED:	10/15/87
7.	DATE ANALYZED:	10/20/87
8.	GC/MS FILE #:	>2445
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2434
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 48542
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 48569
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48570
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2435

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACFB-6
2.	ERT SAMPLE NUMBER:	48539
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	10/13/87
5.	DATE RECEIVED:	10/14/87
6.	DATE EXTRACTED:	10/15/87
7.	DATE ANALYZED:	10/20/87
8.	GC/MS FILE #:	>2443
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2434
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 48542
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 48569
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48570
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2435

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACMS-6
2.	ERT SAMPLE NUMBER:	48542
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	10/13/87
5.	DATE RECEIVED:	10/14/87
6.	DATE EXTRACTED:	10/15/87
7.	DATE ANALYZED:	10/20/87
8.	GC/MS FILE #:	>2441
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2434
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 48542
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 48569
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48570
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2435

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	48569; MB870858
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	10/13/87
5.	DATE RECEIVED:	10/14/87
6.	DATE EXTRACTED:	10/15/87
7.	DATE ANALYZED:	10/20/87
8.	GC/MS FILE #:	>2440
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2434
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 48542
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 48569
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48570
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2435

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-6 ERT NO: 48542

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	100	81.1	81	>20%
FLUORENE	20	25.8	129	>20%
CHRYSENE	20	14.2	71	>10%
BENZO(G,H,I)PERYLENE	20	24.5	122	>10%
INDENE	20	15.2	76	>20%
QUINOLINE	20	18.6	93	>20%
BENZO(E)PYRENE	20	43.4	217*	>10%
2-METHYLNAPHTHALENE	20	14.1	71	>20%
AVERAGE % RECOVERY			108	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, per the QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-6 ERT NO: 48540

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	11.0
INDENE	<2.9
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	4.6
ACENAPHTHENE	11.0
DIBENZOFURAN	5.0
FLUORENE	8.7
DIBENZOTHIOPHENE	ND
PHENANTHRENE	12.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	52.0
TOTAL PAH'S	52.0

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-6 ERT NO: 48541

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	26.0
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	8.1
ACENAPHTHENE	18.0
DIBENZOFURAN	7.6
FLUORENE	12.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	14.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	85.7
TOTAL PAH'S	85.7

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-6 ERT NO: 48539

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	3.2
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	1.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	7.4
TOTAL PAH'S	7.4

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-6 ERT NO: 48542

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	19.0
BENZO(A)ANTHRACENE	ND
CHRYSENE	14.0
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	24.0
TOTAL CARCINOGENIC PAH	57.0

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	29.0
INDENE	15.0
NAPHTHALENE	81.0
BENZO(B)THIOPHENE	6.0
INDOLE	ND
2-METHYLNAPHTHALENE	14.0
1-METHYLNAPHTHALENE	<3.1
BIPHENYL	ND
ACENAPHTHYLENE	8.2
ACENAPHTHENE	19.0
DIBENZOFURAN	7.7
FLUORENE	36.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	15.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	43.0
PERYLENE	ND
TOTAL OTHER PAH	274.0
TOTAL PAH'S	331.0

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 48569; MB870858

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.2
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	1.2
TOTAL PAH'S	1.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-6 ERT NO: 48540

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	2.6	26	14-108
FLUORENE-D10	10.0	9.0	90	41-162
CHRYSENE-D12	10.0	8.4	84	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-6 ERT NO: 48541

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	5.3	53	14-108
FLUORENE-D10	10.0	10.9	109	41-162
CHRYSENE-D12	10.0	8.7	87	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-6 ERT NO: 48539

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	3.2	32	14-108
FLUORENE-D10	10.0	8.4	84	41-162
CHRYSENE-D12	10.0	9.0	90	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-6 ERT NO: 48542

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	5.7	57	14-108
FLUORENE-D10	10.0	13.2	132	41-162
CHRYSENE-D12	10.0	9.7	97	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 48569; MB870858

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	1.7	17	14-108
FLUORENE-D10	10.0	15.3	153	41-162
CHRYSENE-D12	10.0	9.4	94	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 13 October 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	**Field Logbook No.**
Sampler: (Signature)	**Chain of Custody Tape No.**
Michael Z. Riggin	22384 to 22386

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL PAH						REMARKS
2GACFD	10-13-87	1314	48539	4X1L Amber	X						
2GACT	10-13-87	1320	48540	4X1L Amber	X						
2GACTD	10-13-87	1325	48541	4X1L Amber	X						
2GACMS	10-13-87	1332	48542	4X1L Amber	X						
											8 Empty bottles

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael Z. Riggin	10-13-87	1420			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
			Dean Gowen	10/14/87	12:45
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR
ROBERT BURKE
ST LOUIS PK WATER DEPT
5005 MTKA Blvd
ST LOUIS PARK MN
55416

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

№ 20312

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: St. Louis Park

COC Record #(s): # 20312

Matrix	Container	ERT #(s)
Water	1L Amber	

1. Were samples shipped or hand-delivered?

   Notes: Airbill # 5437615536

2. Was COC record present upon receipt of samples? Yes ☒ No ☐

   Notes: Whiteout was used to void the 5 sample entry on all copies prior to receipt

3. Was COC tape present/unbroken on outer package? Yes ☒ No ☐

   Notes: #22384 #22386

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☒

   Notes:

6. Were samples properly preserved? Yes ☒ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☒

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☒

   Notes:

9. Were samples received within holding times? Yes ☒ No ☐

   Notes:

Additional Comments:

Stored in R7

Samples inspected and logged in by Dean Gouvein Date: 10/14/87

CH2M HILL **CHAIN OF CUSTODY RECORD**

PROJECT NUMBER	PROJECT NAME
GL063720.	FR REILLY TAR, MN

LABORATORY: CH2M HILL [illegible]

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	TRACE PAH	REMARKS
	10/[illegible]	15		X	TRAVEL BLANK	1	X	
	10/31	30		X	PILOT COLUMN NO. 1	1	X	
	10/31	1:30		X	PILOT COLUMN NO. 1 DUPLICATE		X	HOLD THIS SAMPLE UNTIL NOTIFIED TO DO ANALYSIS
					5 EMPTY BOTTLES			DO NOT ANALYSE

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[illegible]	10/31	[illegible]		
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY: (SIGNATURE)**	**RELINQUISHED BY: (SIGNATURE)**	**DATE/TIME**	**RECEIVED BY LAB: (SIGNATURE)**

REMARKS: [illegible]

SAMPLE SHIPPED VIA: ☐ UPS ☐ BUS ☒ FEDERAL EXPRESS

AIR BUS BILL NUMBER

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

10/31/01

10/26/87
N.

CH2M HILL
Engineers
Planners
Economists
Scientists

October 26, 1987

W63720.FR

Mr. Allen Scrivner
CH2M Hill, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data for Laboratory No. 9729

Dear Mr. Scrivner:

On September 03, 1987, the CH2M HILL Montgomery Laboratory received two samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

Engineers
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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09729001
Date Received : 09/03/87
Date Extracted: 09/10/87
Date Analyzed : 09/21/87

Client: REILLY TAR, MN

Sample Description: 9/2/87 1:07 EFFLUENT

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	*	6.2	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	5.2	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1	2.2	Benzo(g,h,i)perylene	1	BMDL
Naphthalene	1.9	6.2			
Benzo(b)thiophene	1	BMDL			
Quinoline	1	BMDL	OTHER COMPOUNDS:		
Isoquinoline	*	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2	3			
1-Methylnaphthalene	1	2			
Biphenyl	1	BMDL			
Acenaphthylene	1	BMDL			
Acenaphthene	1.3	3.2			
Dibenzofuran	2	BMDL			
Fluorene	1.4	BMDL			
Dibenzothiophene	*	BMDL			
Phenanthrene	1	1.5			
Anthracene	1	BMDL			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1	BMDL			
Pyrene	1	BMDL			
Benzo(a)anthracene	1	BMDL			
Chrysene/Triphenylene	1	BMDL			
Benzo(b & k)fluoranthene	1	BMDL			
7,12-Dimethyl benzo(a)anthracene	*	BMDL			
Benzo(e)pyrene	1	BMDL			
Benzo(a)pyrene	1	BMDL			
Perylene	1	BMDL			
3-Methyl cholanthrene	*	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	57		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: * Detection Limit not determined.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09729002
Date Received : 09/03/87
Date Extracted: 09/10/87
Date Analyzed : 09/21/87

Client: REILLY TAR, MN

Sample Description: 9/2/87 1:13 EFFLUENT

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	*	5.7	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	5.2	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1	2	Benzo(g,h,i)perylene	1	BMDL
Naphthalene	1.9	6.1			
Benzo(b)thiophene	1	BMDL			
Quinoline	1	BMDL	OTHER COMPOUNDS:		
Isoquinoline	*	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2	2.2			
1-Methylnaphthalene	1	1.7			
Biphenyl	1	BMDL			
Acenaphthylene	1	BMDL			
Acenaphthene	1.3	BMDL			
Dibenzofuran	2	BMDL			
Fluorene	1.4	BMDL			
Dibenzothiophene	*	BMDL			
Phenanthrene	1	1.4			
Anthracene	1	BMDL			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1	BMDL			
Pyrene	1	BMDL			
Benzo(a)anthracene	1	BMDL			
Chrysene/Triphenylene	1	BMDL			
Benzo(b & k)fluoranthene	1	BMDL			
7,12-Dimethyl benzo(a)anthracene	*	BMDL			
Benzo(e)pyrene	1	BMDL			
Benzo(a)pyrene	1	BMDL			
Perylene	1	BMDL			
3-Methyl cholanthrene	*	BMDL			
SURROGATE RECOVERIES	% REC.		1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	55		2 BMDL = BELOW METHOD DETECTION LIMIT	HK	

Comments: * Detection Limit not determined.

10/15/87
IN.

CH2M HILL
Engineers
Planners
Economists
Scientists

October 15, 1987

W63720.FR

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

Dear Mr. Scrivner:

This is to acknowledge that we received three samples on October 14, 1987, which have been assigned our laboratory number 9946. Your samples arrived in good order, however, if you need to call regarding your samples, please reference the laboratory number. A copy of the chain of custody is attached which provides further detail of the samples description.

For prompt assistance please direct any inquiries to the following individuals:

Project Status Organic Analyses - Ward Dickens
Project Status Inorganic Analyses - Craig Vinson
Sample Supplies - Lisa Hardiman

Thank you for allowing CH2M HILL to provide you with analytical services.

Sincerely,

L. Hardiman

Lisa Hardiman
Sample Custodian

ACK/001

CH2M HILL CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
W63720.FR	REILLY TAR, MINNESOTA

CLIENT NAME

REPORT TO: ALAN SCRIVNER/GLO

COPY TO:

REQUESTED COMPLETION DATE

LABORATORY: MONTGOMERY

ANALYSES REQUESTED

FOR LAB USE ONLY

LAB # 9946

PROJ # W63720.FR

ACK AC 10/15/87 VERIFIED CR

DATE INVOICED

NO. OF SAMPLES 3 pg 1 of 1

DISPOSITION: D R DATE

STA NO	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION	NUMBER OF CONTAINERS	PAH	REMARKS
1	10/13	13:15			Travel Blank	1	X	
2	10/13	13:30			GAC Effluent	1	X	
3	10/13	13:30			GAC Effluent	1	X	
								H_2O
					Empty Bottles	2		Do not analyze

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	DATE/TIME
Sandra L Shaare Engr	10/13 1330	Sandra L Shaare	10/13 1415	3	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LAB: (SIGNATURE)	DATE/TIME
4		5		6		[illegible]	10/14/87 9:00

REMARKS

SAMPLING PROGRAM: SDWA ☐ NPDES ☐ RCRA ☐ OTHER (SPECIFY)

SAMPLE SHIPPED VIA: ☐ UPS ☐ BUS ☒ FED-EX ☐ HAND OTHER

AIR BUS BILL NUMBER: 4969015030

DISTRIBUTION: W ORIGINAL ACCOMPANIES SHIPMENT PINK — COPY TO COORDINATOR FIELD FILES YELL CLIENT

REV. 6/87 FORM 340

CH2M HILL CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
[illegible]	[illegible] TAR, MINNE[illegible]

CLIENT NAME

REPORT TO:	COPY TO:
ALAN [illegible]	

REQUESTED COMPLETION DATE	LABORATORY
	MONTGOMERY

ANALYSES REQUESTED

FOR LAB USE ONLY

LAB # _____

PROJ # _____

ACK _____ VERIFIED _____

DATE INVOICED _____

NO. OF SAMPLES _____ pg _____ of _____

DISPOSITION: D R _____ DATE

STA NO	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION	NUMBER OF CONTAINERS		HVJ										REMARKS
1	10/13	[illegible]			Travel Blank	1		X										
2	[illegible]	[illegible]			[illegible] Effluent	1		X										
[illegible]	[illegible]	[illegible]			[illegible] Effluent	1		X										
					Empty Bottle	2												1 [illegible] on [illegible]

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	DATE/TIME
1 [illegible]	[illegible]	2 [illegible]		3	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LAB: (SIGNATURE)	DATE/TIME
4		5		6		7	

REMARKS _____

SAMPLING PROGRAM: SDWA ☐ NPDES ☐ RCRA ☐ OTHER _____ (SPECIFY)

SAMPLE SHIPPED VIA: ☐ UPS ☐ BUS ☒ FED-EX ☐ HAND OTHER _____

AIR BUS BILL NUMBER: 4[illegible]

10/13/87

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT PINK — COPY TO COORDINATOR FIELD FILES YELLOW — CLIENT

REV. 6/87 FORM 340

10/11/87
N.

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET 2GAC-5

ERT PROJECT NO. E631-055
11 October 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 2GAC-5) received by the ERT Analytical Chemistry Laboratory on 16 September 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/L (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 - 108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 60%, within the 20% - 150% target range. A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the 95% confidence limits as required in the Plan.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACT-5
2.	ERT SAMPLE NUMBER:	47692
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2258
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-5
2.	ERT SAMPLE NUMBER:	47693
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2259
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACF-5
2.	ERT SAMPLE NUMBER:	47694
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2260/61
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACFB-5
2.	ERT SAMPLE NUMBER:	47691
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2257
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACMS-5
2.	ERT SAMPLE NUMBER:	47695
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2256
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	47999; MB870800
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	09/15/87
5.	DATE RECEIVED:	09/16/87
6.	DATE EXTRACTED:	09/22/87
7.	DATE ANALYZED:	09/24/87
8.	GC/MS FILE #:	>2253
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2251
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 47695
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47999
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 48000
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2252

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-5 ERT NO: 47695

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	73.3	64	>20%
FLUORENE	26.9	19.9	74	>20%
CHRYSENE	21.4	2.3	11	>10%
BENZO(G,H,I)PERYLENE	19.4	TR	<10*	>10%
INDENE	20.0	16.1	81	>20%
QUINOLINE	22.5	20.1	89	>20%
BENZO(E)PYRENE	16.7	4.3	26	>10%
2-METHYLNAPHTHALENE	28.9	21.6	75	>20%
AVERAGE % RECOVERY			60	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, per the QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-5 ERT NO: 47692

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	9.6
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	2.4
ACENAPHTHENE	4.7
DIBENZOFURAN	2.4
FLUORENE	3.7
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	30.0
TOTAL PAH'S	30.0

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-5 ERT NO: 47693

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	2.2
ACENAPHTHENE	4.3
DIBENZOFURAN	2.3
FLUORENE	3.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.1
ANTHRACENE	<3.4
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	<1.5
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	19.3
TOTAL PAH'S	19.3

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACF-5 ERT NO: 47694

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	<4.4
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	1200
INDENE	48.6
NAPHTHALENE	ND
BENZO(B)THIOPHENE	360
INDOLE	ND
2-METHYLNAPHTHALENE	5.2
1-METHYLNAPHTHALENE	100
BIPHENYL	390
ACENAPHTHYLENE	520
ACENAPHTHENE	1000
DIBENZOFURAN	730
FLUORENE	1000
DIBENZOTHIOPHENE	150
PHENANTHRENE	1200
ANTHRACENE	ND
ACRIDINE	28
CARBAZOLE	29
FLUORANTHENE	220
PYRENE	170
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	7151
TOTAL PAH'S	7151

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-5 ERT NO: 47691

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	<0.88
DIBENZOTHIOPHENE	ND
PHENANTHRENE	6.1
ANTHRACENE	<3.4
ACRIDINE	ND
CARBAZOLE	<2.6
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	6.1
TOTAL PAH'S	6.1

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-5 ERT NO: 47695

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	20
BENZO(A)ANTHRACENE	ND
CHRYSENE	2.3
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	22.3

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	10
INDENE	16
NAPHTHALENE	73
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	21
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	2.2
ACENAPHTHENE	4.8
DIBENZOFURAN	2.7
FLUORENE	24
DIBENZOTHIOPHENE	ND
PHENANTHRENE	9.4
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	4.3
PERYLENE	ND
TOTAL OTHER PAH	167.4
TOTAL PAH'S	189.7

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 47999; MB870800

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	5.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	5.2
TOTAL PAH'S	5.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-5 ERT NO: 47692

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	8.6	69	14-108
FLUORENE-D10	12.0	13.7	114	41-162
CHRYSENE	9.9	7.1	72	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-5 ERT NO: 47693

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	8.2	66	14-108
FLUORENE-D10	12.0	13.6	113	41-162
CHRYSENE	9.9	5.6	56	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACF-5 ERT NO: 47694

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	5.5	44	14-108
FLUORENE-D10	12.0	14.0	117	41-162
CHRYSENE	9.9	5.7	58	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-5 ERT NO: 47691

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	6.9	55	14-108
FLUORENE-D10	12.0	14.9	124	41-162
CHRYSENE	9.9	11.6	117	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-5 ERT NO: 47695

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	8.6	69	14-108
FLUORENE-D10	12.0	14.2	118	41-162
CHRYSENE	9.9	4.2	42	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 47999; MB870800

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	9.3	74	14-108
FLUORENE-D10	12.0	17.9	149	41-162
CHRYSENE	9.9	9.9	100	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL
QUINOLINE	1.90
BENZO (A) ANTHRACENE	4.40
CHRYSENE	4.40
BENZOFLUORANTHENES	9.70
BENZO (A) PYRENE	3.40
INDENO (1,2,3-CD) PYRENE	4.40
DIBENZO (A,H) ANTHRACENE	3.40
DIBENZO (G,H,I) PERYLENE	5.30

OTHER PAH'S

PARAMETERS	MD
2,3-BENZOFURAN	1.90
2,3-DIHYDROINDENE	3.40
INDENE	2.90
NAPHTHALENE	47.00
BENZO (B) THIOPHENE	2.20
INDOLE	1.90
2-METHYLNAPHTHALENE	5.00
1-METHYLNAPHTHALENE	3.10
BIPHENYL	17.00
ACENAPHTHYLENE	1.70
ACENAPHTHENE	1.30
DIBENZOFURAN	1.20
FLOURENE	0.88
DIBENZOTHIOPHENE	6.30
PHENANTHRENE	3.10
ANTHRACENE	3.40
ACRIDINE	2.50
CARBAZOLE	2.60
FLUORANTHENE	4.40
PYRENE	4.10
BENZO (E) PYRENE	1.50
PERYLENE	1.60

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 15 September 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael Z. Kiggins	Chain of Custody Tape No. 22397 + 22398

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT	PAH					REMARKS
2GACFB-5	9-15-87	1258	47691	4X1L AMBER	X						
2GACT-5	9-15-87	1305	47692	4X1L AMBER	X						
2GACTD-5	9-15-87	1310	47693	4X1L AMBER	X						
2GACF-5	9-15-87	1316	47694	4X1L AMBER	X						
2GACMS-5	9-15-87	1324	47695	4X1L AMBER	X						
											4X1L Empty Bottles

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael Z. Kiggins	9-15-87	1430			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael [illegible]	9/16/87	10:00
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK WATER DEPT
5005 MINNETONKA BLVD
ST LOUIS PARK MN
55416

ERT

№ 9928

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP 2-GAC-5

COC Record #(s): 9928

Matrix	Container	ERT #(s)
Water MS011	4X 1L Amber	47691-47695

1. Were samples shipped or hand-delivered?
   Notes: Airbill# 4709377
2. Was COC record present upon receipt of samples? Yes ☑ No ☐
   Notes:
3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐
   Notes: 22397, 22398 Rec'd intact
4. Were samples received ambient or chilled?
   Notes:
5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑
   Notes:
6. Were samples properly preserved? Yes ☑ No ☐
   Notes:
7. Were COC types present/unbroken on samples? Yes ☐ No ☑
   Notes:
8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑
   Notes:
9. Were samples received within holding times? Yes ☑ No ☐
   Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael [illegible] Date: 9/16/87

2013/2-86

9/15/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-070
ERT Proj. No. E631-051

environmental and engineering excellence

September 15, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set 2GAC-2) received from the GAC plant on 20 August 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to E. Moran, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
R. Gen.
P. Pelletier
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET 2GAC-2

ERT PROJECT NO. E631-051
15 SEPTEMBER 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 2GAC-2) received by the ERT Analytical Chemistry Laboratory on 20 August 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 -108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 49%, within the 20% - 150% target range. It should be noted that the sample was inadvertently spiked with ca. 10x the normal level.

A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACT-2
2.	ERT SAMPLE NUMBER:	46459
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2189
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-2
2.	ERT SAMPLE NUMBER:	46461
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2191
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-2A
2.	ERT SAMPLE NUMBER:	46460
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2190
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACFB-2
2.	ERT SAMPLE NUMBER:	46458
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2188
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACMS-2
2.	ERT SAMPLE NUMBER:	46462
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2187
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	47320; MB870687
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/19/87
5.	DATE RECEIVED:	08/20/87
6.	DATE EXTRACTED:	08/26/87
7.	DATE ANALYZED:	09/02/87
8.	GC/MS FILE #:	>2186
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2182
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 46462
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 47320
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 47321
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2184

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-2 ERT NO: 46462

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	1143	597	52	>20%
FLUORENE	269	206	76	>20%
CHRYSENE	214	37.7	18	>10%
BENZO(G,H,I)PERYLENE	194	10.4	5.4*	>10%
INDENE	200	102	51	>20%
QUINOLINE	225	262	116	>20%
BENZO(E)PYRENE	167	17.1	10	>10%
2-METHYLNAPHTHALENE	289	175	61	>20%
AVERAGE % RECOVERY			49	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-2 ERT NO: 46459

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	1.2
DIBENZOTHIOPHENE	ND
PHENANTHRENE	5.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	6.2
TOTAL PAH'S	6.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-2 ERT NO: 46461

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	1.3
FLUORENE	1.6
DIBENZOTHIOPHENE	ND
PHENANTHRENE	8.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	10.9
TOTAL PAH'S	10.9

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-2A ERT NO: 46460

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	<1.3
DIBENZOFURAN	1.4
FLUORENE	1.8
DIBENZOTHIOPHENE	ND
PHENANTHRENE	8.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	11.2
TOTAL PAH'S	11.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-2 ERT NO: 46458

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	5.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	5.7
TOTAL PAH'S	5.7

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-2 ERT NO: 46462

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	262
BENZO(A)ANTHRACENE	ND
CHRYSENE	12.1
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	2.9
TOTAL CARCINOGENIC PAH	277

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	<3.4
INDENE	102
NAPHTHALENE	597
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	175
1-METHYLNAPHTHALENE	6.5
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	2.0
FLUORENE	206
DIBENZOTHIOPHENE	ND
PHENANTHRENE	9.8
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	3.5
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	17.1
PERYLENE	ND
TOTAL OTHER PAH	1119
TOTAL PAH'S	1396

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 47320; MB870687

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	4.6
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	4.6
TOTAL PAH'S	4.6

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-2 ERT NO: 46459

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	5.4	43	14-108
FLUORENE-D10	12.0	11.7	98	41-162
CHRYSENE	9.9	2.4	24	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-2 ERT NO: 46461

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	9.1	73	14-108
FLUORENE-D10	12.0	19.4	161	41-162
CHRYSENE	9.9	4.4	45	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-2A ERT NO: 46460

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	9.4	75	14-108
FLUORENE-D10	12.0	18.7	156	41-162
CHRYSENE	9.9	2.7	27	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-2 ERT NO: 46458

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	6.9	55	14-108
FLUORENE-D10	12.0	14.8	123	41-162
CHRYSENE	9.9	7.2	73	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-2 ERT NO: 46462

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	6.7	54	14-108
FLUORENE-D10	12.0	16.4	137	41-162
CHRYSENE	9.9	2.0	20	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 47320; MB870687

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	8.0	64	14-108
FLUORENE-D10	12.0	19.3	161	41-162
CHRYSENE	9.9	9.4	95	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 19 August 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN.
Project No.	**Field Logbook No.**
Sampler: (*Signature*)	**Chain of Custody Tape No.**
Michael J. Riggin	26803 & 26806

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL PAH						REMARKS
2 FB-2	8-19-87	1310	46458	4XIL AMBER	X						
2-GACT-2	8-19-87	1317	46459	4XIL AMBER	X						
2-GACTD-2	8-19-87	1322	46460	4XIL AMBER	X						
2-GACTO-2	8-19-87	1329	46461	4XIL AMBER	X						
2GACMS-2	8-19-87	1336	46462	4XIL AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Riggin	8-19-87	1420			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*)	Date	Time
			Jim Rucci	8/20/87	
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PARK WATER DEPT
ST LOUIS PARK MN
55416

ERT

№ 10413

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP 2-GACR EC31-001

COC Record #(s):

Matrix	Container	ERT #(s)
WATER	4x1L AMBER	46458 - 46462

1. Were samples shipped or hand-delivered?

   Notes: # 4709377293

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: # 26803, 26806

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

IN R7

Samples inspected and logged in by Jim Tucci Date: 8/20/17

2013/2-86

9/10/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

environmental and engineering excellence

ERT Ref. No. 105-REB-068
ERT Proj. No. E631-048

September 10, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set GAC-9) received from the GAC plant on 4 August 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
R. Gen.
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 10 September 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set GAC-9 (E631-048)

Date Samples Received: 4 August 1987

Number of Samples Received/Matrix: 4 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
10 September 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET GAC-9

ERT PROJECT NO. E631-048
10 SEPTEMBER 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-9) received by the ERT Analytical Chemistry Laboratory on 4 August 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20)

samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 -108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 38%, within the 20% - 150% target range.

A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 QAPP.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-9
2.	ERT SAMPLE NUMBER:	45841
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/01/87
5.	DATE RECEIVED:	08/04/87
6.	DATE EXTRACTED:	08/04/87
7.	DATE ANALYZED:	08/28/87
8.	GC/MS FILE #:	>2163
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2156
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45843
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45861
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45862
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2165

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-9
2.	ERT SAMPLE NUMBER:	45842
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/01/87
5.	DATE RECEIVED:	08/04/87
6.	DATE EXTRACTED:	08/04/87
7.	DATE ANALYZED:	08/28/87
8.	GC/MS FILE #:	>2163
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2156
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45843
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45861
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45862
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2165
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-9
2.	ERT SAMPLE NUMBER:	45840
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/01/87
5.	DATE RECEIVED:	08/04/87
6.	DATE EXTRACTED:	08/04/87
7.	DATE ANALYZED:	08/28/87
8.	GC/MS FILE #:	>2162
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2156
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45843
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45861
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45862
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2165

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GAMS-9
2.	ERT SAMPLE NUMBER:	45843
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/01/87
5.	DATE RECEIVED:	08/04/87
6.	DATE EXTRACTED:	08/04/87
7.	DATE ANALYZED:	08/28/87
8.	GC/MS FILE #:	>2162
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2156
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45843
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45861
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45862
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2165

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	45861; MB870547
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	08/04/87
5.	DATE RECEIVED:	08/04/87
6.	DATE EXTRACTED:	08/04/87
7.	DATE ANALYZED:	08/28/87
8.	GC/MS FILE #:	>2163
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2156
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45843
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45861
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45862
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2165
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-9 ERT NO: 45843

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	29	25	>20%
FLUORENE	27	30	110	>20%
CHRYSENE	21	3.1	14	>10%
BENZO(G,H,I)PERYLENE	19	0.27	<10*	>10%
INDENE	20	7.3	36	>20%
QUINOLINE	23	13.8	61	>20%
BENZO(E)PYRENE	17	4.8	28	>10%
2-METHYLNAPHTHALENE	29	8.1	28	>20%
AVERAGE % RECOVERY			38	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-9 ERT NO: 45841

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	49.2
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	6.0
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	<3.1
BIPHENYL	ND
ACENAPHTHYLENE	10.6
ACENAPHTHENE	23.5
DIBENZOFURAN	8.8
FLUORENE	16.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	20.6
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	5.4
PYRENE	4.4
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	144.5
TOTAL PAH'S	144.5

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-9 ERT NO: 45842

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	97.2
INDENE	<2.9
NAPHTHALENE	ND
BENZO(B)THIOPHENE	11.4
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	3.7
BIPHENYL	ND
ACENAPHTHYLENE	16.0
ACENAPHTHENE	35.5
DIBENZOFURAN	12.5
FLUORENE	21.9
DIBENZOTHIOPHENE	ND
PHENANTHRENE	24.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	5.7
PYRENE	4.6
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	232.6
TOTAL PAH'S	232.6

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-9 ERT NO: 45840

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-9 ERT NO: 45843

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	13.8
BENZO(A)ANTHRACENE	ND
CHRYSENE	<4.4
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	13.8

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	49.8
INDENE	7.3
NAPHTHALENE	28.7
BENZO(B)THIOPHENE	6.1
INDOLE	ND
2-METHYLNAPHTHALENE	8.1
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	10.6
ACENAPHTHENE	24.2
DIBENZOFURAN	9.6
FLUORENE	29.7
DIBENZOTHIOPHENE	ND
PHENANTHRENE	27.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	6.7
PYRENE	5.3
BENZO(E)PYRENE	4.8
PERYLENE	ND
TOTAL OTHER PAH	217.9
TOTAL PAH'S	231.7

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 45861
MB870547

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-9 ERT NO: 45841

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	3.1	25	14-108
FLUORENE-D10	12.0	9.9	82	41-162
CHRYSENE	9.9	4.7	48	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-9 ERT NO: 45842

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	6.0	48	14-108
FLUORENE-D10	12.0	15.8	132	41-162
CHRYSENE	9.9	5.2	52	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-9 ERT NO: 45840

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	3.0	24	14-108
FLUORENE-D10	12.0	14.6	122	41-162
CHRYSENE	9.9	8.7	88	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-9 ERT NO: 45843

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	3.0	24	14-108
FLUORENE-D10	12.0	30.8	256*	41-162
CHRYSENE	9.9	5.8	58	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 45861
MB870547

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	5.7	45	14-108
FLUORENE-D10	12.0	8.0	66	41-162
CHRYSENE	9.9	8.4	85	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 1 August 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City St. Louis Park	St. Louis Park, MN
Project No.	Field Logbook No.
Sampler: (*Signature*) Scott Anderson	Chain of Custody Tape No. 200096 + 200097 ~~200098 + 200099~~

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT PAH						REMARKS
GACFB-9	8-1-87	1050	45840	4x 1L Amber	X						
GACT-9	〃	1058	45841	〃 〃	X						
GACTD-9		1104	45842		X						
GACMS-9	8-1-87	1111	45843	4x 1L Amber	X						
Empty Bottles (2)											

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Scott Anderson	8-3-87	1330			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*)	Date	Time
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robert Burke
City St. Louis Pk Water Dept.
5005 MTKA, Blvd.
St. Louis Park, MN 55416

ERT

№ 9848

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP, GAC-9 E631-048

COC Record #(s): 9848

Matrix	Container	ERT #(s)
Water MS011	4x1L. Amber	45840 - 45843

1. Were samples shipped or hand-delivered?

   Notes: Airbill # 4709377282

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: 200096, 200097 Rec'd intact

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael J. [illegible] Date: 8/4/87

2013/2-86

9/9/87
N.

Engineers
Planners
Economists
Scientists

September 09, 1987

W63720.FR

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

Dear Mr. Scrivner:

This is to acknowledge that we received two samples on September 03, 1987, which have been assigned our laboratory number 9729. Your samples arrived in good order, however, if you need to call regarding your samples, please reference the laboratory number. A copy of the chain of custody is attached which provides further detail of the samples description.

For prompt assistance please direct any inquiries to the following individuals:

Project Status Organic Analyses - Ward Dickens
Project Status Inorganic Analyses - Bill Rhodes
Sample Supplies - Lisa Hardiman

Thank you for allowing CH2M HILL to provide you with analytical services.

Sincerely,

L. Hardiman

Lisa Hardiman
Sample Custodian

ACK/001

CH2M HILL **CHAIN OF CUSTODY RECORD**

PROJECT NUMBER	PROJECT NAME
W63720.FR	REILLY TAR, MN

LABORATORY: CH2M HILL / MONTGOMERY AL

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	PAH	REMARKS
1	9/2	1:07			EFFLUENT	1	X	
2	9/2	1:13			EFFLUENT	1	X	
					EMPTY BOTTLES	3	DO NOT ANALYZE	

FOR LAB USE ONLY
LAB # 9729
PROJ # W63720-FR
ACK LC 9/8/87 VERIFIED CR
DATE INVOICED
NO. OF SAMPLES 2 pg 1 of 1
DISPOSITION: D R DATE

H2O

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Sandra L Graese	9/2 1 PM	Sandra L Graese	9/2	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LAB: (SIGNATURE)
					S Hardiman 9/3/87 9:00

REMARKS

SAMPLE SHIPPED VIA: ☐ UPS ☐ BUS ☒ FEDERAL EXPRESS

AIR BUS BILL NUMBER

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

9/9/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-066
ERT Proj. No. E631-046

environmental and engineering excellence

September 9, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set GAC-7) received from the GAC plant on 31 July 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
letter only
A. Paradice
P. Rose
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 9 September 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set GAC-7 (E631-046)

Date Sample Received: 31 July 1987

Number of Samples Received/Matrix: 4 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
9 September 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-7) received by the ERT Analytical Chemistry Laboratory on 31 July 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20)

samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following criteria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 -108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 31%, within the 20% - 150% target range. Due to apparent degradation of the matrix spike superstock, the recoveries were corrected to represent true recovery.

A review of the surrogate recoveries indicated that nearly all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan. Two samples exhibited naphthalene surrogate recoveries slightly below the acceptance criterion established in the January 1987 revised QAPP.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 QAPP.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-7
2.	ERT SAMPLE NUMBER:	45746
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/30/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2116
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45781
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45782
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-7
2.	ERT SAMPLE NUMBER:	45745
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/29/87
5.	DATE RECEIVED:	07/30/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2115
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45781
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45782
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-7
2.	ERT SAMPLE NUMBER:	45747
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/30/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2117
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45781
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45782
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACMS-7
2.	ERT SAMPLE NUMBER:	45744
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/30/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2117
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45781
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45782
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870532
2.	ERT SAMPLE NUMBER:	45781
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/30/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2117
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45781
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45782
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-7 ERT NO: 45744

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY (see note)	TARGET
NAPHTHALENE	114	24	21	>20%
FLUORENE	27	26	98	>20%
CHRYSENE	21	4.1	19	>10%
BENZO(G,H,I)PERYLENE	19	TR	TR*	>10%
INDENE	20	4.3	21	>20%
QUINOLINE	23	6.7	30	>20%
BENZO(E)PYRENE	17	0.68	4*	>10%
2-METHYLNAPHTHALENE	29	6.1	21	>20%
AVERAGE % RECOVERY			31	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

* = OUTSIDE CONTROL LIMITS

Note: percent recoveries are corrected based upon the % recoveries observed for the standard.

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-7 ERT NO: 45746

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	47.3
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	5.6
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	11.1
ACENAPHTHENE	24.1
DIBENZOFURAN	8.9
FLUORENE	15.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	14.6
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	127
TOTAL PAH'S	127

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-7 ERT NO: 45745

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	32.9
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	3.6
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	6.7
ACENAPHTHENE	14.7
DIBENZOFURAN	5.0
FLUORENE	10.2
DIBENZOTHIOPHENE	1.3
PHENANTHRENE	8.4
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	82.8
TOTAL PAH'S	82.8

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-7 ERT NO: 45747

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-7 ERT NO: 45744

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	4.35
BENZO(A)ANTHRACENE	ND
CHRYSENE	1.49
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	5.84

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	18.86
INDENE	3.05
NAPHTHALENE	12.77
BENZO(B)THIOPHENE	2.25
INDOLE	ND
2-METHYLNAPHTHALENE	3.90
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	12.02
DIBENZOFURAN	5.42
FLUORENE	17.68
DIBENZOTHIOPHENE	ND
PHENANTHRENE	14.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	90.15
TOTAL PAH'S	95.99

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 45781
MB870532

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	3.0
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	6.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	3.3
TOTAL OTHER PAH	12.4
TOTAL PAH'S	12.4

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-7 ERT NO: 45746

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	3.3	26	14-108
FLUORENE-D10	12.0	9.6	80	41-162
CHRYSENE	9.9	2.0	20	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-7 ERT NO: 45745

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	2.1	17	14-108
FLUORENE-D10	12.0	5.9	49	41-162
CHRYSENE	9.9	1.7	17	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-7 ERT NO: 45747

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.6	13*	14-108
FLUORENE-D10	12.0	9.7	81	41-162
CHRYSENE	9.9	17.3	175*	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-7 ERT NO: 45744

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.4	11*	14-108
FLUORENE-D10	12.0	6.3	52	41-162
CHRYSENE	9.9	2.1	21	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 45781
MB870532

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	2.8	23	14-108
FLUORENE-D10	12.0	15.5	129	41-162
CHRYSENE	9.9	11.9	120*	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
BENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
METHYLNAPHTHALENE	3.10	2.00
PHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 30 July 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City St. Louis Park	St. Louis Park, MN
Project No.	Field Logbook No.
Sampler: (Signature) Scott Lindsen	Chain of Custody Tape No. 24875 + 24874 24876 + 27877

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL-PAH						REMARKS
GACTD-6A	7-29-87	1402	45742	4x1L Amber	X						
GACFB-6A	7-30-87	1320	45743		X						Cooler 24874 24875
GACMS-7		1330	45744		X						
GACTD-7		1336	45745		X						
GACT-7		1345	45746		X						Cooler
GACFB-7	7-30-87	1352	45747	4x1L Amber	X						24876 24877

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Scott Lindsen	7-30-87	1415			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Sam Rucci	Date 7/31/87	Time
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robt. Burke Water Dept
City St. Louis Park
5005 Mtka Blvd,
St. Louis Pk, MN 55416

ERT

№ 10325

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP EC31-046

COC Record #(s): 10325

Matrix	Container	ERT #(s)	
water MSO	4 X 1L Amber (Replacement set)	45742, 45743	Cooler #1
water ↓	4 X 1L Amber	45744 - 45747	Cooler #2

1. Were samples shipped or hand-delivered?

   Notes: # 4709377260

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes: cooler #1, 24874, 24875
   #2, 24876, 24877

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes:

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes: none present

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

in R7

ERT # 45742, 45743 are the replacement samples for the ones received on 7/30/87

Samples inspected and logged in by Jim Ross **Date:** 7/31/87

2013/2-86

CH2M HILL CHA... OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
LABORATORY	

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS										REMARKS
1	[illegible]	[illegible]		X	Travel [illegible]	1										
2	[illegible]	[illegible]		X	Treated	1										
3	[illegible]	[illegible]		X	Treated [illegible]	1										
4	[illegible]	[illegible]		X	Field [illegible]	1										

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	/ /			
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LAB: (SIGNATURE)

REMARKS

SAMPLE SHIPPED VIA
☐ UPS ☐ BUS
☐ FEDERAL EXPRESS

AIR BUS BILL NUMBER

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

9/18/82

9/8/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-065
ERT Proj. No. E631-044

environmental and engineering excellence

September 8, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set GAC-5) received from the GAC plant on 29 July 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 8 September 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set GAC-5 (E631-044)

Date Samples Received: 29 July 1987

Number of Samples Received/Matrix: 3 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
8 September 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET GAC-5

ERT PROJECT NO. E631-044
8 SEPTEMBER 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-5) received by the ERT Analytical Chemistry Laboratory on 29 July 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed all samples to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 -108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 46%, within the 20% - 150% target range. A review of the surrogate recoveries revealed all to be within the 95% confidence limits as required in the Plan. Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 QAPP.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-5
2.	ERT SAMPLE NUMBER:	45699
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/28/87
5.	DATE RECEIVED:	7/29/87
6.	DATE EXTRACTED:	7/30/87
7.	DATE ANALYZED:	8/20/87
8.	GC/MS FILE #:	>2096
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45763
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45762
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45761
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2087

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-5
2.	ERT SAMPLE NUMBER:	45700
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/28/87
5.	DATE RECEIVED:	7/29/87
6.	DATE EXTRACTED:	7/30/87
7.	DATE ANALYZED:	8/20/87
8.	GC/MS FILE #:	>2097
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45763
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45762
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45761
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2087

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-5
2.	ERT SAMPLE NUMBER:	45701
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/28/87
5.	DATE RECEIVED:	7/29/87
6.	DATE EXTRACTED:	7/30/87
7.	DATE ANALYZED:	8/20/87
8.	GC/MS FILE #:	>2098
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45763
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45762
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45761
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2087
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870527
2.	ERT SAMPLE NUMBER:	45762
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/28/87
5.	DATE RECEIVED:	7/29/87
6.	DATE EXTRACTED:	7/30/87
7.	DATE ANALYZED:	8/20/87
8.	GC/MS FILE #:	>2093
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45763
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45762
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45761
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2087

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1	FIELD IDENTIFICATION:	LF870792
2.	ERT SAMPLE NUMBER:	45763
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	7/28/87
5.	DATE RECEIVED:	7/29/87
6.	DATE EXTRACTED:	7/30/87
7.	DATE ANALYZED:	8/20/87
8.	GC/MS FILE #:	>2094
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45763
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45762
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45761
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2087

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-5 ERT NO.: 45699

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-5 ERT NO.: 45700

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	40
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	4.4
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	<3.1
BIPHENYL	ND
ACENAPHTHYLENE	9.0
ACENAPHTHENE	22
DIBENZOFURAN	7.0
FLUORENE	12
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	101
TOTAL PAH'S	101

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-5 ERT NO.: 45701

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	28
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	3.2
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	7.2
ACENAPHTHENE	17
DIBENZOFURAN	5.6
FLUORENE	9.8
DIBENZOTHIOPHENE	ND
PHENANTHRENE	6.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	7.5
TOTAL OTHER PAH	84
TOTAL PAH'S	84

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870527 ERT NO.: 45762

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	<1.2
FLUORENE	<0.88
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3 1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870792 ERT NO.: 45763

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	9.0
BENZO (A) ANTHRACENE	ND
CHRYSENE	6.0
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	3.0
TOTAL CARCINOGENIC PAH	18

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	7.1
NAPHTHALENE	<47
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	11
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	11
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	23
PERYLENE	ND
TOTAL OTHER PAH	52
TOTAL PAH'S	70

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870792 ERT NO.: 45763

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	37	32	>20%
FLUORENE	27	11	41	>20%
CHRYSENE	21	6.0	29	>10%
BENZO(G,H,I)PERYLENE	19	3.0	16	>10%
INDENE	20	7.1	36	>20%
QUINOLINE	23	9.0	39	>20%
BENZO(E)PYRENE	17	23	135	>10%
2-METHYLNAPHTHALENE	29	11	38	>20%
AVERAGE % RECOVERY			46	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-5 ERT NO: 45699

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	3.1	25	14-108
FLUORENE-D10	12.0	7.0	58	41-162
CHRYSENE-D12	9.9	11.6	117	10-118

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-5 ERT NO: 45700

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	4.8	38	14-108
FLUORENE-D10	12.0	12.0	100	41-162
CHRYSENE-D12	9.9	3.9	39	10-118

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-5 ERT NO: 45701

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	3.5	28	14-108
FLUORENE-D10	12.0	9.5	79	41-162
CHRYSENE-D12	9.9	2.7	27	10-118

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870527 ERT NO: 45762

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	5.5	44	14-108
FLUORENE-D10	12.0	15	125	41-162
CHRYSENE-D12	9.9	12.4	125	10-118 *

*= OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870792 ERT NO: 45763

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	3.9	31	14-108
FLUORENE-D10	12.0	7.5	62	41-162
CHRYSENE-D12	9.9	9.2	93	10-118

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 28 July 1987

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City St. Louis Park Water Dept	St. Louis Park, MN
Project No.	**Field Logbook No.**
Sampler: (*Signature*)	**Chain of Custody Tape No.**
Scott Anderson	24870 - 24871

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPt PAH						REMARKS
GACFB-5	7-28-87	1505	45699	4x1L Amber	X						
GACT-5	7-28-87	1512	45700	4x1L Amber	X						
GACTD-5	7-28-87	1521	45701	4x1L Amber	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Scott Anderson	7-28-87	1600			
Relinquished by: (*Signature*)	**Date**	**Time**	**Received by: (*Signature*)**	**Date**	**Time**
Relinquished by: (*Signature*)	**Date**	**Time**	**Received for Laboratory: (*Signature*)**	**Date**	**Time**
			Michael [illegible]	7/29/87	11:00
Sample Disposal Method:	**Disposed of by: (*Signature*)**			**Date**	**Time**

SAMPLE COLLECTOR ⟷ ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

Robert Burke
City St. Louis Park H_2O Dept
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

ERT

Nº 10323

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP-GAC-5 E631-044

COC Record #(s): 10323

Matrix	Container	ERT #(s)
Water MS011	4x1l. Amber	

Were samples shipped or hand-delivered?

Notes: Airbill # 4709377245

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

Notes: 24870, 24871 Rec'd intact

4. Were samples received ambient or chilled?

Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

Notes:

6. Were samples properly preserved? Yes ☑ No ☐

Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

Notes:

9. Were samples received within holding times? Yes ☑ No ☐

Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael [illegible] Date: 7/29/87

2013/2-86

9/8/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-064
ERT Proj. No. E631-045

environmental and engineering excellence

September 8, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set GAC-6) received from the GAC plant on 30 July 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 8 September 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set GAC-6 (E631-045)

Date Samples Received: 30 July 1987

Number of Samples Received/Matrix: 5 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
8 September 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET GAC-6

ERT PROJECT NO. E631-045
8 SEPTEMBER 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-6) received by the ERT Analytical Chemistry Laboratory on 30 and 31 July 1987. The samples were to be analyzed for selected 'polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed all except GACF-6 to be packaged properly and received in good condition. Due to the breakage of 3 of the 4 L bottles from this sample, new sets identified as GACTD-6A (which had been taken as a reserve sample on 29 July) and GACFB-6A (which was inserted as a field blank on 30 July), were sent to ERT for analysis. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 -108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 52%, within the 20% - 150% target range. Due to apparent degradation of the matrix spike superstock, the recoveries were corrected to represent true recovery.

A review of the surrogate recoveries indicated that three naphthalene and two fluorene surrogate recoveries were slightly below the lower 95% confidence limit as required in the Plan.

Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 QAPP.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-6
2.	ERT SAMPLE NUMBER:	45705
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/29/87
5.	DATE RECEIVED:	07/30/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2108
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45779
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45780
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-6
2.	ERT SAMPLE NUMBER:	45706
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/29/87
5.	DATE RECEIVED:	07/30/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2110
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45779
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45780
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-6
2.	ERT SAMPLE NUMBER:	45707
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/29/87
5.	DATE RECEIVED:	07/30/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/21/87
8.	GC/MS FILE #:	>2111
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2106
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45779
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45780
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2107
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-6A
2.	ERT SAMPLE NUMBER:	45742
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/29/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/20/87
8.	GC/MS FILE #:	>2102
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45779
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45780
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2089, 2087, 2088, 2090, 2091

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-6A
2.	ERT SAMPLE NUMBER:	45743
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/30/87
5.	DATE RECEIVED:	07/31/87
6.	DATE EXTRACTED:	07/31/87
7.	DATE ANALYZED:	08/20/87
8.	GC/MS FILE #:	>2103
9.	GC/MS TAPE #:	RTE034
10.	CORRESPONDING DFTPP FILE #:	>2086
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 45744
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 45779
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 45780
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2089, 2087, 2088, 2090, 2091

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: NA

ERT NO: MS870225

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY (see note)	TARGET
NAPHTHALENE	114	69	16*	>20%
FLUORENE	27	19	23	>20%
CHRYSENE	21	7.0	89	>10%
BENZO(G,H,I)PERYLENE	19	5.3	97	>10%
INDENE	20	15	14*	>20%
QUINOLINE	23	16	20	>20%
BENZO(E)PYRENE	17	29	137	>10%
2-METHYLNAPHTHALENE	29	18	22	>20%
AVERAGE % RECOVERY			52	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

* = OUTSIDE CONTROL LIMITS

Note: percent recoveries are corrected based upon the % recoveries observed for the standard.

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-6 ERT NO: 45705

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	17
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	<2.2
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	2.5
ACENAPHTHENE	8.0
DIBENZOFURAN	2.8
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	37
TOTAL PAH'S	37

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-6 ERT NO: 45706

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	6.6
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	6.6

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	16
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	<2.2
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	6.5
ACENAPHTHENE	14.0
DIBENZOFURAN	5.1
FLUORENE	10.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	10.4
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	62
TOTAL PAH'S	69

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-6 ERT NO: 45707

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-6A ERT NO: 45742

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	24
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	2.8
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	5.6
ACENAPHTHENE	13.0
DIBENZOFURAN	4.4
FLUORENE	8.2
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.3
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	57
TOTAL PAH'S	57

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-6A ERT NO: 45743

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 45779
MB870530

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-6 ERT NO: 45705

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.3	10*	14-108
FLUORENE-D10	12	5.4	45	41-162
CHRYSENE	9.9	2.0	20	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-6 ERT NO: 45706

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.5	12*	14-108
FLUORENE-D10	12	7.6	64	41-162
CHRYSENE	9.9	5.4	55	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-6 ERT NO: 45707

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.3	11*	14-108
FLUORENE-D10	12	4.6	39*	41-162
CHRYSENE	9.9	9.3	94	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-6A ERT NO: 45742

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	2.0	16	14-108
FLUORENE-D10	12	6.2	52	41-162
CHRYSENE	9.9	3.6	36	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-6A ERT NO: 45743

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.9	15	14-108
FLUORENE-D10	12	5.3	44	41-162
CHRYSENE	9.9	12.8	129*	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 45779

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95 % CONF. LIMITS (%)
NAPHTHALENE-D8	12.5	1.9	16	14-108
FLUORENE-D10	12	4.6	38*	41-162
CHRYSENE	9.9	5.4	55	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 29 July 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of St. Louis Park, Water Dept	St. Louis Park, MN E631-045
Project No.	Field Logbook No.
Sampler: (Signature) Scott Erickson	Chain of Custody Tape No. 24872 & 24873

ANALYSES: PPL - PAH

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL - PAH						REMARKS
GACT-6	7-29-87	1341	45705	4x1L Amber	X						
GACTD-6		1350	45706	4x1L Amber	X						
GACFB-6		1333	45707	4x1L Amber	X						
GACF-6	7-29-87	1359	—	4x1L Amber	X						Rec'd 32 Bottles

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Scott Erickson	7-29-87	1415			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
			Michael [illegible]	7/30/87	09:50

Sample Disposal Method:	Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robert Burke
St. Louis Park Water Dept.
5005 MTKA, Blvd.
St. Louis Pk, MN 55426

ERT

№ 10322

9743-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: CITY OF St. Louis Park E631-045

COC Record #(s): 10322

Matrix	Container	ERT #(s)
Water	4x1L Amber	45705-45707

1. Were samples shipped or hand-delivered?

   Notes: # 4709377256

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: # 24872, 24873

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☑ No ☐

   Notes: Sample GACF-6 3 of The 4 Bottles were Broken

   Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes: none present

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

in RT

a Replacement set of GACF-6 will be shipped.

Samples inspected and logged in by Jim Rucci **Date:** 7/30/87

2013/2-86

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City St. Louis Park	St. Louis Park, MN
Project No.	Field Logbook No.
Sampler: (Signature) Scott Anderson	Chain of Custody Tape No. 24875 + 24874 24876 + 27877

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL-PAH						REMARKS
GACTD-6A	7-29-87	1402	45742	4x1L Amber	X						
GACFB-6A	7-30-87	1320	45743		X						Cooler 24879 24875
GACMS-7		1330	45744		X						
GACTD-7		1336	45745		X						
GACT-7		1345	45746		X						Cooler
GACFB-7	7-30-87	1352	45747	4x1L Amber	X						24876 24877

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Scott Anderson	7-30-87	1415			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Jim Rucci	Date 7/31/87	Time
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robt. Burke Water Dept
City St. Louis Park
5005 Mtka Blvd.
St. Louis Pk, MN 55416

ERT

№ 10325

1074-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP EC31-046

COC Record #(s): 10375

Matrix	Container	ERT #(s)	
water MSO	4 x 1L Amber (Replacement set)	45742, 45743	Cooler #1
water ↓	4 x 1L Amber	45744 - 45747	Cooler #2

1. Were samples shipped or hand-delivered?

   Notes: # 4709377260

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes: cooler #1, 24874, 24875
   #2, 24876, 24877

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes:

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes: none present

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

in R7

ERT # 45742, 45743 are the replacement samples for the ones received on 7/30/87

Samples inspected and logged in by Jim Thor **Date:** 7/31/87

2013/2-86

CH2M HILL CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME

LABORATORY

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS										REMARKS

Lab did not include travel blank. ∴ no blank sample taken
SG

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY LAB: (SIGNATURE)

REMARKS

SAMPLE SHIPPED VIA
☐ UPS ☐ BUS
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FORM 340

9/24/86

CH2M HILL CHA... OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
LABORATORY	

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS											REMARKS

SAMPLED BY AND TITLE *(SIGNATURE)*	DATE/TIME	RELINQUISHED BY: *(SIGNATURE)*	DATE/TIME	RECEIVED BY: *(SIGNATURE)*
RELINQUISHED BY: *(SIGNATURE)*	DATE/TIME	RECEIVED BY: *(SIGNATURE)*	RELINQUISHED BY: *(SIGNATURE)*	DATE/TIME	RECEIVED BY LAB: *(SIGNATURE)*

REMARKS

SAMPLE SHIPPED VIA
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DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

8/26/87

7/20/87
N.

ERT
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-052
ERT Proj. No. E631-032

environmental and engineering excellence

July 20, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set for Well 4A) received from the GAC plant on 11 June, 1987.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
memo only
A. Paradice
P. Rose
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 658-6399

From: LABORATORY MANAGER

Date of Issuance: July 20, 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set for Well 4A (E631-032)

Date Sample Received: 11 June 1987

Number of Samples Received/Matrix: 3 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal. Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET FOR WELL 4A

ERT PROJECT NO. E631-032
JULY 20, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set for well 4A) received by the ERT Analytical Chemistry Laboratory on 11 June 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene-d_{12}, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 40%, within the 20% - 150% target range.

A review of the surrogate recoveries indicated that, with the exception of sample #44092 (Field ID B-06), all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan. Sample #44092 yielded a lower naphthalene surrogate recovery, which is typical of what has been observed in the past. Due to technician error, the method blank sample was inadvertently overspiked with a PAH fortification solution. As a result, analytical results for sample concentration were not corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-06
2.	ERT SAMPLE NUMBER:	44092
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/10/87
5.	DATE RECEIVED:	6/11/87
6.	DATE EXTRACTED:	6/17/87
7.	DATE ANALYZED:	7/08/87
8.	GC/MS FILE #:	>78002
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	>78D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44323
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44321
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	44322
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>78001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	W4-06
2.	ERT SAMPLE NUMBER:	44093
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/10/87
5.	DATE RECEIVED:	6/11/87
6.	DATE EXTRACTED:	6/17/87
7.	DATE ANALYZED:	7/07/87
8.	GC/MS FILE #:	>77004
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	>77D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44323
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44321
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	44322
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>77002

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	W4-06A
2.	ERT SAMPLE NUMBER:	44094
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/10/87
5.	DATE RECEIVED:	6/11/87
6.	DATE EXTRACTED:	6/17/87
7.	DATE ANALYZED:	7/07/87
8.	GC/MS FILE #:	>77005
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	>77D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44323
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44321
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	44322
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>77002

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870363
2.	ERT SAMPLE NUMBER:	44321
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	NA
5.	DATE RECEIVED:	NA
6.	DATE EXTRACTED:	6/17/87
7.	DATE ANALYZED:	7/08/87
8.	GC/MS FILE #:	>78003
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	>78D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44323
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44321
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	44322
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>78001

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	LF870543
2.	ERT SAMPLE NUMBER:	44323
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/10/87
5.	DATE RECEIVED:	6/11/87
6.	DATE EXTRACTED:	6/17/87
7.	DATE ANALYZED:	7/07/87
8.	GC/MS FILE #:	>77003
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	>77D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44323
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44321
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	44322
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>77002
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-06 ERT NO.: 44092

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	10
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	5.1
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	15
TOTAL PAH'S	15

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: W4-06 ERT NO.: 44093

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	5.0
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	5.0
TOTAL PAH'S	5.0

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: W4-06A ERT NO.: 44094

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	50
INDENE	7.5
NAPHTHALENE	ND
BENZO (B) THIOPHENE	12
INDOLE	10
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	8.5
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	37
DIBENZOFURAN	1.7
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	3.5
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	6.9
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	137
TOTAL PAH'S	137

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870363 ERT NO.: 44321

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	20
CHRYSENE	21
BENZOFLUORANTHENES	40
BENZO (A) PYRENE	20
INDENO (1,2,3-CD) PYRENE	13
DIBENZ (A,H) ANTHRACENE	14
BENZO (G,H,I) PERYLENE	13
TOTAL CARCINOGENIC PAH	141

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	13
ACENAPHTHENE	11
DIBENZOFURAN	ND
FLUORENE	13
DIBENZOTHIOPHENE	ND
PHENANTHRENE	17
ANTHRACENE	20
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	16
PYRENE	15
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	105
TOTAL PAH'S	246

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870543 ERT NO.: 44323

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	12
BENZO (A) ANTHRACENE	ND
CHRYSENE	5.8
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	3.1
TOTAL CARCINOGENIC PAH	21

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	8.2
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	13
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	7.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	14
PERYLENE	ND
TOTAL OTHER PAH	43
TOTAL PAH'S	64

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870543 ERT NO.: 44323

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	31	27	>20%
FLUORENE	27	7.4	28	>20%
CHRYSENE	21	5.8	27	>10%
BENZO(G,H,I)PERYLENE	19	3.1	16	>10%
INDENE	20	8.2	41	>20%
QUINOLINE	23	12	51	>20%
BENZO(E)PYRENE	17	14	84	>10%
2-METHYLNAPHTHALENE	29	13	46	>20%
AVERAGE % RECOVERY			40	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-06 ERT NO: 44092

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	0.66	5.3	42-102 *
FLUORENE-D10	12.0	11.4	95	60-128
CHRYSENE-D12	9.9	1.1	11	10-54

*= OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: W4-06 ERT NO: 44093

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	6.9	55	42-102
FLUORENE-D10	12.0	11.7	97	60-128
CHRYSENE-D12	9.9	10.2	103	10-54 *

*= OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: W4-06A ERT NO: 44094

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	6.5	52	42-102
FLUORENE-D10	12.0	10	84	60-128
CHRYSENE-D12	9.9	1.8	18	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870363 ERT NO: 44321

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	6.5	52	42-102
FLUORENE-D10	12.0	10.9	91	60-128
CHRYSENE-D12	9.9	11.2	113	10-54 *

*= OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870543 ERT NO: 44323

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	RECOVERY (%)	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	5.7	45	42-102
FLUORENE-D10	12.0	7.5	62	60-128
CHRYSENE-D9.4	9.9	9.4	95	10-54 *

*= OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
BENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled June 10, 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	**Field Logbook No.**
Sampler: (*Signature*)	**Chain of Custody Tape No.**
Michael J Higgins	200600 + 200601

ANALYSES: PPT, PAH

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT	PAH					REMARKS
B-06	6-10-87	1125	44092	4XIL AMBER	X						
W4-06	6-10-87	1138	44093	4XIL AMBER	X						
W4-06A	6-10-87	1142	44094	4XIL AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgins	6-10-87	1410			
Relinquished by: (*Signature*)	**Date**	**Time**	**Received by: (*Signature*)**	**Date**	**Time**
Relinquished by: (*Signature*)	**Date**	**Time**	**Received for Laboratory: (*Signature*)**	**Date**	**Time**
			Michael J Ry	6/11/87	11:00
Sample Disposal Method:	**Disposed of by: (*Signature*)**			**Date**	**Time**

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PARK WATER DEPT
5005 MINNETONKA BLVD
ST LOUIS PARK MN
55416

ERT

№ 9625

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SJP E631-032

COC Record #(s): 9625

Matrix	Container	ERT #(s)
Water, ~~NSOIL~~	4/1l. Ambers	44092 - 44094

1. Were samples shipped or hand-delivered?

   Notes: Airbill # 820789572

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: 200600, 200601 Paid intact

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

RT

Samples inspected and logged in by [signature] Date: 5/11/87

2013/2-88

7/17/87
N.

ERT
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

environmental and engineering excellence

ERT Ref. No. 105-REB-051
ERT Proj. No. E631-037

July 17, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the ~~set of water~~ samples (set GAC-4) received from the GAC plant on 7 July 1987. This report is submitted in accordance with ~~the requirements~~ of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
memo only
P. Rose
A. Paradice
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
J. Craun
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 658-6399

From: LABORATORY MANAGER

Date of Issuance: July 17, 1987

Subject: SAMPLE RETENTION TERMS

Client: St. Louis Park (E631-037)

Date Sample Received: July 7, 1987

Number of Samples Received/Matrix: 5 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal. Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET FOR WELL GAC-4

ERT PROJECT NO. E631-037
JULY 17, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-4) received by the ERT Analytical Chemistry Laboratory on 7 July 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene-d_{12}, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 26%, within the 20% - 150% target range.

A review of the surrogate recoveries indicated that nearly all of the surrogate recoveries for the samples were lower than 95% confidence limit as required in the Plan. A review of the instrumental response for all samples indicated that the GC/MS met the required operating conditions for DFTPP and for the daily check standard. However, a generally lower recovery was noted throughout the samples run for this set. During sample preparation, the treated and treated duplicate samples were noted to have a yellow color which was not typical of the samples associated with the GAC-1,2 or 3 sets. It is believed, based upon overall response noted, that there was a matrix interference associated with these samples. Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 Quality Assurance Project Plan.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-4
2.	ERT SAMPLE NUMBER:	44844
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/02/87
5.	DATE RECEIVED:	07/06/87
6.	DATE EXTRACTED:	07/07/87
7.	DATE ANALYZED:	07/16/87
8.	GC/MS FILE #:	>71608
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>7/15B
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44848
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44939
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44940
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71604

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-4
2.	ERT SAMPLE NUMBER:	44845
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/02/87
5.	DATE RECEIVED:	07/06/87
6.	DATE EXTRACTED:	07/07/87
7.	DATE ANALYZED:	07/16/87
8.	GC/MS FILE #:	>71609
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>7/15B
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44848
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44939
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44940
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71604

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-4
2.	ERT SAMPLE NUMBER:	44846
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/02/87
5.	DATE RECEIVED:	07/06/87
6.	DATE EXTRACTED:	07/07/87
7.	DATE ANALYZED:	07/16/87
8.	GC/MS FILE #:	>71610
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>7/15B
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44848
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44939
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44940
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71604

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACMS-4
2.	ERT SAMPLE NUMBER:	44848
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/02/87
5.	DATE RECEIVED:	07/06/87
6.	DATE EXTRACTED:	07/07/87
7.	DATE ANALYZED:	07/15/87
8.	GC/MS FILE #:	>71504
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>7/15B
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44848
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44939
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44940
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71503

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870439
2.	ERT SAMPLE NUMBER:	44939
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/07/87
5.	DATE RECEIVED:	NA
6.	DATE EXTRACTED:	07/07/87
7.	DATE ANALYZED:	07/15/87
8.	GC/MS FILE #:	>71505
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>7/15B
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44848
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44939
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44940
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71503

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-4 ERT NO: 44844

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-4 ERT NO: 44845

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	4.3
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.9
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	6.2
TOTAL PAH'S	6.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-4 ERT NO: 44846

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	3.2
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	3.2

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	16
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	<2.2
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	2.2
ACENAPHTHENE	6.5
DIBENZOFURAN	1.6
FLUORENE	1.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	4.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	4.4
PYRENE	5.7
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	42
TOTAL PAH'S	45

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-4 ERT NO: 44848

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	7.7
BENZO(A)ANTHRACENE	ND
CHRYSENE	3.7
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	11

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	25
INDENE	7.1
NAPHTHALENE	ND
BENZO(B)THIOPHENE	2.7
INDOLE	ND
2-METHYLNAPHTHALENE	9.9
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	4.9
ACENAPHTHENE	11
DIBENZOFURAN	3.8
FLUORENE	13
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	2.3
PERYLENE	<1.6
TOTAL OTHER PAH	80
TOTAL PAH'S	91

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870439 ERT NO: 44939

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-4 ERT NO: 44848

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	29	25	>20%
FLUORENE	27	13	48	>20%
CHRYSENE	21	3.7	18	>10%
BENZO(G,H,I)PERYLENE	19	TR	<10*	>10%
INDENE	20	7.1	36	>20%
QUINOLINE	23	7.7	33	>20%
BENZO(E)PYRENE	17	2.3	14	>10%
2-METHYLNAPHTHALENE	29	9.9	34	>20%
AVERAGE % RECOVERY			26	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-4 ERT NO: 44844

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	3.1	24	42-102
FLUORENE-D10	12	5.7	48	60-128
CHRYSENE	9.9	6.2	62	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-4 ERT NO: 44845

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	0.67	5.4	42-102
FLUORENE-D10	12	0.96	8.0	60-128
CHRYSENE	9.9	0.51	5.2	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-4 ERT NO: 44846

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	1.8	14	42-102
FLUORENE-D10	12	11	95	60-128
CHRYSENE	9.9	1.4	14	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-4 ERT NO: 44848

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	4.1	33	42-102
FLUORENE-D10	12	5.6	47	60-128
CHRYSENE	9.9	3.4	34	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870439 ERT NO: 44939

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	4.3	34	42-102
FLUORENE-D10	12	5.3	44	60-128
CHRYSENE	9.9	5.9	60	10-54

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled July 6, 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
E631-037 CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	**Field Logbook No.**
Sampler: (Signature)	**Chain of Custody Tape No.**
Michael J. Wiggin	200590 200592 200591 + 200593

ANALYSES: PPC PAH

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPC	PAH					REMARKS
GACFB-4A	7-6-87	1254	44844	4 X 1L AMBER	X						
GACT-4A	7-6-87	1258	44845	4 X 1L AMBER	X						
GACTF-4A	7-6-87	1303	44846	4 X 1L AMBER	X						
GACTD-4A	7-6-87	1308	44847	4 X 1L AMBER	X						
GACMS-4A	7-6-87	1313	44848	4 X 1L AMBER	X						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael J. Wiggin	7-6-87	1415			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
			Jim Lucas	7/7/87	
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK. WATER DEPT
5005 MTKA. BLVD.
ST LOUIS PARK MN
55416

ERT

№ 10104

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: St Louis Park E631-037 ~~[illegible]~~

COC Record #(s): 10104

Matrix	Container	ERT #(s)
Water	4x1L Amber	44244 - 44248

Were samples shipped or hand-delivered?

Notes: # 4224928024

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

Notes: cooler #1 200590 & 200591
#2 200592-200593

4. Were samples received ambient or chilled?

Notes: The ice packs were not frozen when shipped

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

Notes:

6. Were samples properly preserved? Yes ☑ No ☐

Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

Notes: none present

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

Notes:

9. Were samples received within holding times? Yes ☑ No ☐

Notes:

Additional Comments:

These are the second batch to replace the samples that were received warm. Stored in R 7

Samples inspected and logged in by Jim Lucas Date: 7/7/87

2013/2-86

7/16/87
N.

CH2M HILL TRANSMITTAL

From: Alan Scrivner
CH2M Hill

To: U.S. EPA Region V
230 South Dearborn
Chicago, IL 60604

Date: July 22, 1987

Our Project No. W63720.FR
WA # 41-5L06.2

Attn: Erin Moran

Re: Reilly Tar, MN

IF MATERIAL RECEIVED IS NOT AS LISTED, PLEASE NOTIFY US AT ONCE

WE ARE SENDING YOU

☒ ATTACHED ☐ UNDER SEPARATE COVER VIA

☐ SHOP DRAWINGS ☐ TRACINGS

☐ PRINTS ☐ CATALOGS

☐ DOCUMENTS ☐ COPY OF LETTER

☐ SPECIFICATIONS ☐ _____

COPIES	DATE	ITEM
1		Lab Report for July 1, 1987
		samples
		Blank
		Treated Water
		Treated Water Dup

RECEIVED
JUL 23 1987
U.S. EPA REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BR.

REMARKS _____

COPY TO _____

FORM 6
REV 6/81

CH2M HILL
Engineers
Planners
Economists
Scientists

July 16, 1987

W63720.FR

JUL 21 1987

Mr. Allen Scrivner
CH2M Hill, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data for Laboratory No. 9433

Dear Mr. Scrivner:

On July 02, 1987, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433001
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/09/87

Client: REILLY TAR

Sample Description: 7/1/87 12:58 GRAB TRAVEL BLANK

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	3.6	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	20			
Benzo(b)thiophene	1.0	BMDL			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	29			
1-Methylnaphthalene	1.0	23			
Biphenyl	1.0	49			
Acenaphthylene	1.0	BMDL			
Acenaphthene	1.3	BMDL			
Dibenzofuran	2.0	11			
Fluorene	1.4	40			
Dibenzothiophene	x	BMDL			
Phenanthrene	1.0	51			
Anthracene	1.0	BMDL			
Acridine	1.8	11			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	BMDL			
Pyrene	1.0	BMDL			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	62		2 BMDL = BELOW METHOD DETECTION LIMIT		
				MSC	

Comments: x Detection Limit not determined.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433003
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/09/87

Client: REILLY TAR

Sample Description: 7/1/87 1:05 GRAB TREATED WATER

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	33	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	4.1	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	4.5			
Benzo(b)thiophene	1.0	15			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	1.9			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	5.1			
Biphenyl	1.0	10			
Acenaphthylene	1.0	2.4			
Acenaphthene	1.3	55			
Dibenzofuran	2.0	18			
Fluorene	1.4	24			
Dibenzothiophene	x	2.1			
Phenanthrene	1.0	11			
Anthracene	1.0	2.2			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	5.8			
Pyrene	1.0	4.6			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	35		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				MSC	

Comments: x Detection Limit not determined.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433002
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/08/87

Client: REILLY TAR

Sample Description: 7/1/87 1:00 GRAB TREATED WATER

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	110	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	4.1	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	4.1			
Benzo(b)thiophene	1.0	15			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	5.1			
Biphenyl	1.0	9.9			
Acenaphthylene	1.0	24			
Acenaphthene	1.3	56			
Dibenzofuran	2.0	17			
Fluorene	1.4	25			
Dibenzothiophene	x	2.0			
Phenanthrene	1.0	12			
Anthracene	1.0	2.9			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	6.7			
Pyrene	1.0	4.9			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	62		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				MSC	

Total = 228.7

Comments: x Detection Limit not determined.

7/16/87
N.

Engineers
Planners
Economists
Scientists

July 16, 1987

W63720.FR

JUL 21 1987

Mr. Allen Scrivner
CH2M Hill, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data for Laboratory No. 9433

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If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

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- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433001
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/09/87

Client: REILLY TAR

Sample Description: 7/1/87 12:58 GRAB TRAVEL BLANK

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	3.6	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	20			
Benzo(b)thiophene	1.0	BMDL			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	29			
1-Methylnaphthalene	1.0	23			
Biphenyl	1.0	49			
Acenaphthylene	1.0	BMDL			
Acenaphthene	1.3	BMDL			
Dibenzofuran	2.0	11			
Fluorene	1.4	40			
Dibenzothiophene	x	BMDL			
Phenanthrene	1.0	51			
Anthracene	1.0	BMDL			
Acridine	1.8	11			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	BMDL			
Pyrene	1.0	BMDL			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	62		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW MSC	

Comments: x Detection Limit not determined.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433003
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/09/87

Client: REILLY TAR

Sample Description: 7/1/87 1:05 GRAB TREATED WATER

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	33	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	4.1	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	4.5			
Benzo(b)thiophene	1.0	15			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	1.9			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	5.1			
Biphenyl	1.0	10			
Acenaphthylene	1.0	2.4			
Acenaphthene	1.3	55			
Dibenzofuran	2.0	18			
Fluorene	1.4	24			
Dibenzothiophene	x	2.1			
Phenanthrene	1.0	11			
Anthracene	1.0	2.2			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	5.8			
Pyrene	1.0	4.6			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	35		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW MSC	

Total: 196.3

Comments: x Detection Limit not determined.

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 09433002
Date Received : 07/02/87
Date Extracted: 07/07/87
Date Analyzed : 07/08/87

Client: REILLY TAR

Sample Description: 7/1/87 1:00 GRAB TREATED WATER

Matrix: WATER

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	110	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	4.1	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	4.1			
Benzo(b)thiophene	1.0	15			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	5.1			
Biphenyl	1.0	9.9			
Acenaphthylene	1.0	24			
Acenaphthene	1.3	56			
Dibenzofuran	2.0	17			
Fluorene	1.4	25			
Dibenzothiophene	x	2.0			
Phenanthrene	1.0	12			
Anthracene	1.0	2.9			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	6.7			
Pyrene	1.0	4.9			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	62		2 BMDL = BELOW METHOD DETECTION LIMIT		
				MSC	

Total = 298.7

Comments: x Detection Limit not determined.

7/31

ERIN - THANKS. ITS OBVIOUS THAT Samples collected on July 7 are not representative to samples results from June 30, July 1, July 2!

= Paul

Do you have their calculations for the statistic?

7-29

Paul,

Here are the results of the attempted 4 day sampling by Reilly, per our talk. I need these back when you finished.

Erin

7/16/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-049
ERT Proj. No. E631-036

environmental and engineering excellence

July 16, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set GAC-3) received from the GAC plant of 2 July 1987. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
memo only
P. Rose
A. Paradice
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
J. Craun
W. Gregg
Chemistry File

RECEIVED
JUL 20 1987
U.S. EPA REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 658-6399

From: LABORATORY MANAGER

Date of Issuance: July 16, 1987

Subject: SAMPLE RETENTION TERMS

Client: St. Louis Park (E631-036)

Date Sample Received: July 2, 1987

Number of Samples Received/Matrix: 5 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal. Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET FOR WELL GAC-3

ERT PROJECT NO. E631-036
JULY 16, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set GAC-3) received by the ERT Analytical Chemistry Laboratory on 2 July 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene-d_{12}, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 51%, within the 20% - 150% target range.

A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan. Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Since the levels found in the water for set 15A were in excess of the drinking water criterion, these analyses were conducted in accordance with the Remedial Action Plan and the July, 1986 Quality Assurance Project Plan.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACFB-3
2.	ERT SAMPLE NUMBER:	44805
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/01/87
5.	DATE RECEIVED:	07/02/87
6.	DATE EXTRACTED:	07/02/87
7.	DATE ANALYZED:	07/14/87
8.	GC/MS FILE #:	>71415
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>714D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44809
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44854
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44855
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71403

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACT-3
2.	ERT SAMPLE NUMBER:	44806
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/01/87
5.	DATE RECEIVED:	07/02/87
6.	DATE EXTRACTED:	07/02/87
7.	DATE ANALYZED:	07/14/87
8.	GC/MS FILE #:	>71416
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>714D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44809
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44854
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44855
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71403

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACTD-3
2.	ERT SAMPLE NUMBER:	44807
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/01/87
5.	DATE RECEIVED:	07/02/87
6.	DATE EXTRACTED:	07/02/87
7.	DATE ANALYZED:	07/14/87
8.	GC/MS FILE #:	>71417
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>714D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44809
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44854
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44855
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71403

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	GACMS-3
2.	ERT SAMPLE NUMBER:	44809
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/01/87
5.	DATE RECEIVED:	07/02/87
6.	DATE EXTRACTED:	07/02/87
7.	DATE ANALYZED:	07/14/87
8.	GC/MS FILE #:	>71412
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>714D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44809
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44854
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44855
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71403

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870422
2.	ERT SAMPLE NUMBER:	44854
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	07/01/87
5.	DATE RECEIVED:	07/02/87
6.	DATE EXTRACTED:	07/02/87
7.	DATE ANALYZED:	07/14/87
8.	GC/MS FILE #:	>71414
9.	GC/MS TAPE #:	RTE023
10.	CORRESPONDING DFTPP FILE #:	DFTPP>714D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44809
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44854
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44855
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>71403

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-3 ERT NO: 44805

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	8.6
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	1.9
ACENAPHTHENE	4.1
DIBENZOFURAN	2.2
FLUORENE	2.6
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.1
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	19
TOTAL PAH'S	19

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-3 ERT NO: 44806

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	86
INDENE	<2.9
NAPHTHALENE	ND
BENZO(B)THIOPHENE	11
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	4.7
BIPHENYL	ND
ACENAPHTHYLENE	19
ACENAPHTHENE	40
DIBENZOFURAN	15
FLUORENE	22
DIBENZOTHIOPHENE	ND
PHENANTHRENE	9.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	4.8
PYRENE	4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	216
TOTAL PAH'S	216

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-3 ERT NO: 44807

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	110
INDENE	3.4
NAPHTHALENE	ND
BENZO(B)THIOPHENE	14
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	5.8
BIPHENYL	<17
ACENAPHTHYLENE	24
ACENAPHTHENE	49
DIBENZOFURAN	20
FLUORENE	25
DIBENZOTHIOPHENE	ND
PHENANTHRENE	11
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	5.4
PYRENE	4.3
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	272
TOTAL PAH'S	272

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-3 ERT NO: 44809

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	16
BENZO(A)ANTHRACENE	ND
CHRYSENE	3.4
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	19

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	85
INDENE	14
NAPHTHALENE	50
BENZO(B)THIOPHENE	12
INDOLE	ND
2-METHYLNAPHTHALENE	17
1-METHYLNAPHTHALENE	5.5
BIPHENYL	ND
ACENAPHTHYLENE	19
ACENAPHTHENE	40
DIBENZOFURAN	17
FLUORENE	37
DIBENZOTHIOPHENE	ND
PHENANTHRENE	10
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	5.4
PYRENE	4.5
BENZO(E)PYRENE	2.0
PERYLENE	ND
TOTAL OTHER PAH	318
TOTAL PAH'S	337

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870422 ERT NO: 44854

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-3 ERT NO: 44809

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	50	44	>20%
FLUORENE	27	37	137	>20%
CHRYSENE	21	3.4	16	>10%
BENZO(G,H,I)PERYLENE	19	TR	<10*	>10%
INDENE	20	14	70	>20%
QUINOLINE	23	16	70	>20%
BENZO(E)PYRENE	17	2.0	12	>10%
2-METHYLNAPHTHALENE	29	17	59	>20%
AVERAGE % RECOVERY			51	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%
1) Only one parameter may fall below its target recovery, as per QAPP.
* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACFB-3 ERT NO: 44805

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	10.7	82	42-102
FLUORENE-D10	12	13.9	116	60-128
CHRYSENE	9.9	6.7	68	10-54 *

*= OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACT-3 ERT NO: 44806

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	7.3	58	42-102
FLUORENE-D10	12	10.9	91	60-128
CHRYSENE	9.9	4.2	42	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACTD-3 ERT NO: 44807

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	8.4	67	42-102
FLUORENE-D10	12	11.4	95	60-128
CHRYSENE	9.9	3.7	37	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: GACMS-3 ERT NO: 44809

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	6.7	54	42-102
FLUORENE-D10	12	9.7	81	60-128
CHRYSENE	9.9	4.1	41	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870422 ERT NO: 44854

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	9.4	75	42-102
FLUORENE-D10	12	11.8	98	60-128
CHRYSENE	9.9	9.6	97	10-54 *

*= OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled July 1, 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
E631-036 CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael I. Higgins	Chain of Custody Tape No. 200896 200602 200895 + 200603

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL PAH						REMARKS
GACFB-3	7-1-87	1300	44805	4XIL AMBER	X						
GACT-3	7-1-87	1303	44806	4XIL AMBER	X						
GACTD-3	7-1-87	1308	44807	4XIL AMBER	X						
GACTF-3	7-1-87	1313	44808	4XIL AMBER	X						
GACMS-3	7-1-87	1318	44809	4XIL AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael I. Higgins	7-1-87	14:30			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Jim Tuck	Date 7/2/87	Time
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robert Burke
ST LOUIS PARK WATER DEPT
5005 MINNETONKA BLVD
ST LOUIS PARK MN 55416

ERT

№ 10133

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: St. Louis Park 0005-367

COC Record #(s): 10133

Matrix	Container	ERT #(s)
water	4XLL amber	44705-448069

1. Were samples shipped or hand-delivered?

   Notes: Airbill # 4224926105

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: cooler #1 200896, 200895
   cooler #2 200602, 200603

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes: none present

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

stored in R7

mples inspected and logged in by [signature] Date: 7/2/07

7/9/87
N.

CITY OF SAINT LOUIS PARK

RECEIVED
JUL 13 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

July 10, 1987

Ms. Erin Moran
Remedial Project Leader
United States Environmental
Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. Michael K. Vennewitz
Remedial Project Leader
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Mr. John C. Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

RE: Interim Sampling - GAC Plant
St. Louis Park, Minnesota

Dear Project Leaders:

Enclosed are the reports of the June 16, 1987 sampling (event No. 16) of the St. Louis Park GAC plant. The results of the treated water analysis appear to corroborate the results of sampling event No. 15A.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-045
ERT Proj. No. E631-031

environmental and engineering excellence

July 9, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set no. 16) submitted from the GAC plant on 16 June, 1987. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
memo only
A. Paradice
P. Rose
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 658-6399

From: LABORATORY MANAGER

Date of Issuance: July 9, 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set 16 (E631-031)

Date Sample Received: 16 June 1987

Number of Samples Received/Matrix: 6 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal. Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET NO. 16

ERT PROJECT NO. E631-031
JULY 9, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 16) received by the ERT Analytical Chemistry Laboratory on 17 June 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted smaples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) sample submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene-d_{12}, at a sample concentration level of approximately 10 ng/l (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 80%, within the 20% - 150% target range.

A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the Plan. Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Total other PAH's in all of the 3 treated samples were found to be in excess of the drikning water criterion. In accordance with the requirements of the June 1986 QAPP, the City of St. Louis Park was notified on 24 June 1987 for set 15A. This set - #16 - was sampled after set 15A, and provides corroboration of the set 15A results.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-16
2.	ERT SAMPLE NUMBER:	44246
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6.	DATE EXTRACTED:	6/27/87
7.	DATE ANALYZED:	6/30/87
8.	GC/MS FILE #:	>63002
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>630D3
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>63001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	T-16
2.	ERT SAMPLE NUMBER:	44247
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6.	DATE EXTRACTED:	6/23/87
7.	DATE ANALYZED:	6/25/87
8.	GC/MS FILE #:	>62503
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>625D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62502
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-16
2.	ERT SAMPLE NUMBER:	44248
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6.	DATE EXTRACTED:	6/23/87
7.	DATE ANALYZED:	6/25/87
8.	GC/MS FILE #:	>62504
9	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>625D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62502
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-16A
2.	ERT SAMPLE NUMBER	44249
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6.	DATE EXTRACTED	6/23/87
7.	DATE ANALYZED:	6/25/87
8.	GC/MS FILE #:	>62506
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>625D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44423
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62502
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1	FIELD IDENTIFICATION:	MS-16
2.	ERT SAMPLE NUMBER:	44250
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6	DATE EXTRACTED:	6/23/87
7.	DATE ANALYZED:	6/25/87
8.	GC/MS FILE #:	>62507
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>625D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62502

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1	FIELD IDENTIFICATION:	F-16
2	ERT SAMPLE NUMBER:	44251
3	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	6/16/87
5.	DATE RECEIVED:	6/17/87
6.	DATE EXTRACTED:	6/23/87
7	DATE ANALYZED:	6/30/87
8.	GC/MS FILE #:	>63004
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>630D3
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>63001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	LF870580
2.	ERT SAMPLE NUMBER:	44428
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	NA
5.	DATE RECEIVED:	6/23/87
6.	DATE EXTRACTED:	6/23/87
7.	DATE ANALYZED:	6/25/87
8.	GC/MS FILE #:	>62505
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>625D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62502
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870380
2.	ERT SAMPLE NUMBER:	44429
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	NA
5.	DATE RECEIVED:	NA
6.	DATE EXTRACTED:	6/23/87
7.	DATE ANALYZED:	6/30/87
8.	GC/MS FILE #:	>63003
9.	GC/MS TAPE #:	RTE020
10.	CORRESPONDING DFTPP FILE #:	>630D3
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 44428
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 44429
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 44430
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>63001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID B-16 ERT NO.: 44246

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-16 ERT NO.: 44247

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	<1.9
2,3-DIHYDROINDENE	220
INDENE	10
NAPHTHALENE	ND
BENZO (B) THIOPHENE	56
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	18
BIPHENYL	29
ACENAPHTHYLENE	56
ACENAPHTHENE	91
DIBENZOFURAN	47
FLUORENE	83
DIBENZOTHIOPHENE	3.7
PHENANTHRENE	43
ANTHRACENE	9.2
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	17
PYRENE	12
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	700
TOTAL PAH'S	700

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-16 ERT NO.: 44248

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	130
INDENE	6.0
NAPHTHALENE	ND
BENZO (B) THIOPHENE	35
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	11
BIPHENYL	19
ACENAPHTHYLENE	35
ACENAPHTHENE	57
DIBENZOFURAN	30
FLUORENE	54
DIBENZOTHIOPHENE	6.9
PHENANTHRENE	35
ANTHRACENE	7.0
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	16
PYRENE	12
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	454
TOTAL PAH'S	454

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-16A ERT NO.: 44249

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	81
INDENE	3.9
NAPHTHALENE	ND
BENZO (B) THIOPHENE	23
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	7.7
BIPHENYL	12
ACENAPHTHYLENE	23
ACENAPHTHENE	39
DIBENZOFURAN	21
FLUORENE	37
DIBENZOTHIOPHENE	<6.3
PHENANTHRENE	29
ANTHRACENE	6.0
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	14
PYRENE	10
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	307
TOTAL PAH'S	307

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-16 ERT NO.: 44250

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	67
INDENE	3.2
NAPHTHALENE	ND
BENZO (B) THIOPHENE	22
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	7.0
BIPHENYL	<17
ACENAPHTHYLENE	23
ACENAPHTHENE	39
DIBENZOFURAN	20
FLUORENE	42
DIBENZOTHIOPHENE	<6.3
PHENANTHRENE	28
ANTHRACENE	5.9
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	14
PYRENE	11
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	282
TOTAL PAH'S	282

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: F-16 ERT NO.: 44251

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	5.5
CHRYSENE	<4.4
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	5.5

OTHER PAH'S

2,3-BENZOFURAN	2.9
2,3-DIHYDROINDENE	350
INDENE	21
NAPHTHALENE	ND
BENZO (B) THIOPHENE	120
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	51
BIPHENYL	180
ACENAPHTHYLENE	300
ACENAPHTHENE	430
DIBENZOFURAN	320
FLUORENE	540
DIBENZOTHIOPHENE	80
PHENANTHRENE	540
ANTHRACENE	110
ACRIDINE	18
CARBAZOLE	8.0
FLUORANTHENE	250
PYRENE	180
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	3501
TOTAL PAH'S	3506

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870380 ERT NO.: 44429

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (C) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870580 ERT NO.: 44428

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	81.6	71	>20%
FLUORENE	26.9	20.4	76	>20%
CHRYSENE	21.4	8.4	39	>10%
BENZO(G,H,I)PERYLENE	19.4	2.3	12	>10%
INDENE	20	19.9	99	>20%
QUINOLINE	22.5	30.0	133	>20%
BENZO(E)PYRENE	16.7	16.1	96	>10%
2-METHYLNAPHTHALENE	28.9	33.6	116	>20%
AVERAGE % RECOVERY			80	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-16 ERT NO: 44246

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	5.5	44	42-102
FLOURENE D10	12.0	8.4	70	60-128
CHRYSENE D12	9.9	8.9	90	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-16 ERT NO: 44247

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	10.3	82	42-102
FLOURENE D10	12.0	27.0	225	60-128 *
CHRYSENE D12	9.9	8.1	82	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-16 ERT NO: 44248

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	7.0	56	42-102
FLOURENE D10	12.0	10.3	86	60-128
CHRYSENE D12	9.9	8.3	84	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-16A ERT NO: 44249

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	5.6	45	42-102
FLOURENE D10	12.0	13.2	110	60-128
CHRYSENE D12	9.9	9.0	91	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-16 ERT NO: 44250

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	5.3	42	42-102
FLOURENE D10	12.0	15.3	127	60-128
CHRYSENE D12	9.9	8.3	84	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: F-16 ERT NO: 44251

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	5.8	46	42-102
FLOURENE D10	12.0	9.6	80	60-128
CHRYSENE D12	9.9	6.0	61	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: LF870580 ERT NO: 44428

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	12.4	99	42-102
FLOURENE D10	12.0	19.0	158	60-128 *
CHRYSENE D12	9.9	11.6	117	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID. MB870380 ERT NO: 44429

SURROGATE	SPIKE LEVEL NG/L	OBSERVED LEVEL NG/L	% RECOVERY	95% CONFIDENCE LIMIT (%)
NAPHTHALENE D8	12.5	6.2	50	42-102
FLOURENE D10	12.0	12.4	103	60-128
CHRYSENE D12	9.9	8.9	90	10-54 *

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

AIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled May 26, 1987

MDL	0.64 MDL
1.90	1.20
4.40	2.80
4.40	2.80
9.70	6.20
3.40	2.20
4.[illegible]	2.80
3.	2.20
5.30	3.40

MDL	0.64 MDL
1.90	1.20
3.40	2.20
2.90	1.80
47.00	30.00
2.20	1.40
1.90	1.20
5.	3.20
3.	2.00
17.00	11.00
1.70	1.10
1.30	0.83
1.20	0.77
0.88	0.56
6.30	4.00
3.10	2.00
3.40	2.20
2.50	1.60
2.60	1.70
4.40	2.80
4.10	2.60
1.50	0.96
1.60	1.00

NCE INTERVAL OF MDL

CHAIN OF CUSTODY RECORD

Client Project Name	Project Location
CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (Signature) [illegible] Riggin	Chain of Custody Tape No. 200688 200689 & [illegible] 20091

ANALYSES: PPL PAH MS011

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL	PAH	MS011				REMARKS
B-16	6-16-87	1020	44246	4 XIL AMBER	X						
T-16	6-16-87	1026	44247	4 XIL AMBER	X						
TD-16	6-16-87	1030	44248	4 XIL AMBER	X						
TD-16A	6-16-87	1040	44249	4 XIL AMBER	X						
MS-16	6-16-87	1048	44250	4 XIL AMBER	X						
F-16	6-16-87	1054	44251	4 XIL AMBER	X						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael J. Riggin	6-16-87	1130			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Michael J. Riggin	Date 6/17/87	Time 10:15
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

CONTACT:

Environmental Research and Technology, Inc.
[illegible] Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY
Robert Burke
City of St Louis Pk Water Dept
[illegible] Minnetonka Blvd
St Louis Park MN 55416

ERT

№ 9847

1974 [illegible]

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP E631-031 set 16

COC Record #(s):

Matrix	Container	ERT #(s)
Water MS020	4x1L Amber	44246-44251

1. Were samples shipped or hand-delivered?

   Notes: Airbill # 820789583

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: 200688, 200689; 200690, 200691

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

   Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael J Sigman Date: 6/17/87

2013/2-86

7/6/87
N.

Engineers
Planners
Economists
Scientists

July 06, 1987

W63720.FR

Mr. Allen Scrimner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

Dear Mr. Scrimner:

This is to acknowledge that we received three samples on July 02, 1987, which have been assigned our laboratory number 9433. Your samples arrived in good order, however, if you need to call regarding your samples, please reference the laboratory number. A copy of the chain of custody is attached which provides further detail of the samples' description.

For prompt assistance please direct any inquiries to the following individuals:

Project Status Organic Analyses - Ward Dickens
Project Status Inorganic Analyses - Bill Rhodes
Sample Supplies - Lisa Hardiman

Thank you for allowing CH2M HILL to provide you with analytical services.

Sincerely,

L. Hardiman

Lisa Hardiman
Sample Custodian

ACK/001

CH2M HILL **CHAIN OF CUSTODY RECORD**

PROJECT NUMBER	PROJECT NAME
W63720.FR	REILLY TAR SITE ST. LOUIS PARK, MINNESOTA

LABORATORY: MGM

STA. NO.	DATE	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	Trace PNA	REMARKS
#1	07/01	12:58 pm		X	TRAVEL BLANK	1	X	Rush
#2	07/01/87	1:00 pm		X	TREATED WATER	1	X	
#3	07/01/87	1:05 pm		X	TREATED WATER	1	X	
					Extra bottles; do not analyze	2		

1433

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Linda M Rogalinski	07/01/87 1:05 pm	Linda M Rogalinski	07/01/87	
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY: (SIGNATURE)**	**RELINQUISHED BY: (SIGNATURE)**	**DATE/TIME**

RECEIVED BY LAB: (SIGNATURE) Stadman 7/2/87

REMARKS

SAMPLE SHIPPED VIA ☐ UPS ☐ BUS ☐ FEDERAL EXPRESS

AIR BUS BILL NUMBER

DISTRIBUTION: WHITE — ORIGINAL ACCOMPANIES SHIPMENT, PINK — COPY TO COORDINATOR FIELD FILES, YELLOW — CLIENT

FORM 340

6/23/87
N.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-038
ERT Proj. E631-027

environmental and engineering excellence

June 26, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set no. 15A) submitted from the GAC plant on May 27, 1987. This written notification is in accordance with the procedures as outlined in the June 1986 QAPP that the City be notified in writing within 48 hours of the original telephone notification. Please note that we have not sent copies of this report to D. Bicknell, U.S. EPA; R. Clark, Minnesota Department of Health; and D. Robohm, Minnesota PCA.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

33 Industrial Way
Wilmington, MA 01887

(617) 657-4290

REB/pjp

cc:
memo only
E. Lang
A. Paradice
P. Rose
T. Trainor
+ disposition
M. Lynn
+ report
Chemistry File
W. Gregg

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET NO. 15A

ERT PROJECT NO. E631-027
JUNE 23, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 15A) received by the ERT Analytical Chemistry Laboratory on 27 May 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted smaples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) sample submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d_8, fluorene-d_{10}, and chrysene-d_{12}, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d_8	42	72	15	42-102
Fluorene-d_{10}	60	94	17	60-128
Chrysene-d_{12}	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

It should be noted that one of the eight (8) selected compounds, benzo(g,h,i)perylene, was found to be outside the method spike criteria for data validity. However, the average recovery for the target compounds was 47%, within the 20% - 150% target range.

With the exception of the naphthalene surrogate for one sample (T-15A) a review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the lower 95% confidence limit as required in the plan. Analtyical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986. Total other PAH's in 2 of 3 treated samples were found to be in excess of the advisory levels. One of these samples was also found to exceed the drinking water criterion. In accordance with the requirements of the June 1986 QAPP, the City of St. Louis Park was notified on 24 June 1987.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-15A
2.	ERT SAMPLE NUMBER:	43682
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62313
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	T-15A
2.	ERT SAMPLE NUMBER:	43683
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62312
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-15A
2.	ERT SAMPLE NUMBER:	43684
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62311
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-15AA
2.	ERT SAMPLE NUMBER:	43685
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62310
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MS-15A
2.	ERT SAMPLE NUMBER:	43686
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62308
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MB870302
2.	ERT SAMPLE NUMBER:	43809
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	05/26/87
5.	DATE RECEIVED:	05/27/87
6.	DATE EXTRACTED:	06/02/87
7.	DATE ANALYZED:	06/23/87
8.	GC/MS FILE #:	>62309
9.	GC/MS TAPE #:	RTE019
10.	CORRESPONDING DFTPP FILE #:	>623D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43686
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43809
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>62302

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-15A ERT NO: 43682

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-15A ERT NO: 43683

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	120
INDENE	4.5
NAPHTHALENE	ND
BENZO(B)THIOPHENE	16
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	4.9
BIPHENYL	<17
ACENAPHTHYLENE	23
ACENAPHTHENE	43
DIBENZOFURAN	12
FLUORENE	23
DIBENZOTHIOPHENE	ND
PHENANTHRENE	8.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	4.6
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	260
TOTAL PAH'S	260

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15A ERT NO: 43684

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	110
INDENE	4.3
NAPHTHALENE	ND
BENZO(B)THIOPHENE	16
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	5.3
BIPHENYL	<17
ACENAPHTHYLENE	37
ACENAPHTHENE	47
DIBENZOFURAN	14
FLUORENE	37
DIBENZOTHIOPHENE	ND
PHENANTHRENE	9.2
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	4.9
PYRENE	<4.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	280
TOTAL PAH'S	280

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15AA ERT NO: 43685

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	60
INDENE	4.4
NAPHTHALENE	ND
BENZO(B)THIOPHENE	8.4
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	<3.1
BIPHENYL	ND
ACENAPHTHYLENE	15
ACENAPHTHENE	28
DIBENZOFURAN	8.2
FLUORENE	22
DIBENZOTHIOPHENE	ND
PHENANTHRENE	7.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	4.4
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	160
TOTAL PAH'S	160

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15A ERT NO: 43686

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	16
BENZO(A)ANTHRACENE	ND
CHRYSENE	2.3
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	18

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	81
INDENE	14
NAPHTHALENE	<47
BENZO(B)THIOPHENE	13
INDOLE	ND
2-METHYLNAPHTHALENE	16
1-METHYLNAPHTHALENE	4.4
BIPHENYL	ND
ACENAPHTHYLENE	19
ACENAPHTHENE	36
DIBENZOFURAN	12
FLUORENE	32
DIBENZOTHIOPHENE	ND
PHENANTHRENE	6.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	<4.4
PYRENE	<4.1
BENZO(E)PYRENE	2.0
PERYLENE	ND
TOTAL OTHER PAH	236
TOTAL PAH'S	254

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870302 ERT NO: 43809

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15A ERT NO: 43686

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	42	37	>20%
FLUORENE	27	32	119	>20%
CHRYSENE	21	2.3	11	>10%
BENZO(G,H,I)PERYLENE	19	TR	<10*	>10%
INDENE	20	14	70	>20%
QUINOLINE	23	16	70	>20%
BENZO(E)PYRENE	17	2.0	12	>10%
2-METHYLNAPHTHALENE	29	16	55	>20%
AVERAGE % RECOVERY			47	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%
1) Only one parameter may fall below its target recovery, as per QAPP.
* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-15A ERT NO: 43682

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	8.2	63	42-102
FLUORENE-D10	12	15	125	60-128
CHRYSENE	9.9	10	101	10-54*

* = OUT OF CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-15A ERT NO: 43683

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	5.1	39	42-102*
FLUORENE-D10	12	8.3	69	60-128
CHRYSENE	9.9	3.2	32	10-54

* = OUT OF CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15A ERT NO: 43684

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	8.0	62	42-102
FLUORENE-D10	12	13.7	114	60-128
CHRYSENE	9.9	3.9	39	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15AA ERT NO: 43685

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	5.4	42	42-102
FLUORENE-D10	12	13	I08	60-128
CHRYSENE	9.9	3.5	35	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15A ERT NO: 43686

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	7.6	58	42-102
FLUORENE-D10	12	13.3	108	60-128
CHRYSENE	9.9	3.3	33	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MB870302 ERT NO: 43809

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	13	6.6	51	42-102
FLUORENE-D10	12	15	125	60-128
CHRYSENE	9.9	9.8	99	10-54*

* = OUT OF CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
IBENZO (A,H) ANTHRACENE	3.40	2.20
IBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK -

Sampled May 26, 1987

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PARK WATER DEPT	ST LOUIS PARK MN
Project No.	**Field Logbook No.**
Sampler: (*Signature*)	**Chain of Custody Tape No.**
Michael J. Kuzyn	200893 + 200891 200894 + 200892

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL	PAH					REMARKS
B-15A	5-26-87	1310	43682	4X1L AMBER	X						
T-15A	5-26-87	1315	43683	5X1L AMBER	X						
TD-15A	5-26-87	1321	43684	5X1L AMBER	X						
TD-15AA	5-26-87	1327	43685	5X1L AMBER	X						
MS-15A	5-26-87	1335	43686	5X1L AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Kuzyn	5-26-87	1430			
Relinquished by: (*Signature*)	**Date**	**Time**	**Received by: (*Signature*)**	**Date**	**Time**
Relinquished by: (*Signature*)	**Date**	**Time**	**Received for Laboratory: (*Signature*)**	**Date**	**Time**
			Michael J. Kuzyn	5/27/87	10:15
Sample Disposal Method:	**Disposed of by: (*Signature*)**			**Date**	**Time**

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK WATER DEPT
5005 MINNETONKA BLVD
ST LOUIS PARK MN
55416

ERT

№ 9630

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP - SET 15A E631-027

COC Record #(s): 9630

Matrix	Container	ERT #(s)
Water MS011	5X1l. Amber	43682 (4x1l.) 43683-43686

1. Were samples shipped or hand-delivered?
   Notes: Airbill # 820789550
2. Was COC record present upon receipt of samples? Yes ☑ No ☐
   Notes:
3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐
   Notes: 200843, 200894 200891, 200892
4. Were samples received ambient or chilled?
   Notes: Ice Packs Were not Cold when Rec'd
5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑
   Notes:
6. Were samples properly preserved? Yes ☑ No ☑
   Notes: Should have been Cool
7. Were COC types present/unbroken on samples? Yes ☐ No ☑
   Notes:
8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑
   Notes:
9. Were samples received within holding times? Yes ☑ No ☐
   Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael J Ly Date: 5/27/87

6/23/87
N.

CH2M HILL
Engineers
Planners
Economists
Scientists

June 23, 1987

MG157.35

Rec'd
6/24/87
AES

Mr. Allan Scrivner
Project Manager
310 W. Wisconsin Ave, Suite 700
Milwaukee, Wisconsin 53203

RE: Analytical Data for Laboratory No. 9165

Dear Mr. Scrivner:

On May 13, 1987, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-49

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Client: REILLY TAR
Sample Identification: Water - BLANK

Lab No: 9165-1
Date Sampled : 5/12/87
Date Received 5/13/87
Date Extracted : 5/19/87
Date Analyzed : 6/12/87

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	10.0	BMDL
2,3-Dihydro-1H-Indene	14.0	BMDL	Acridine	18.0	BMDL
1H-Indene	10.0	BMDL	Phenanthridine	14.0	BMDL
Naphthalene	19.0	1000	Carbazole	11.0	BMDL
Benzo(b)thiophene	10.0	BMDL	Fluoranthene	10.0	BMDL
Quinoline	10.0	BMDL	Pyrene	10.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	10.0	BMDL
Indole	29.0	BMDL	Chrysene/Triphenylene	10.0	BMDL
2-Methylnaphthalene	20.0	80	Benzo(b & k)fluoranthene	10.0	BMDL
1-Methylnaphthalene	12.0	95	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	10.0	1800	Benzo(e)pyrene	10.0	BMDL
Acenaphthylene	10.0	BMDL	Benzo(a)pyrene	10.0	BMDL
Acenaphthene	13.0	BMDL	Perylene	10.0	BMDL
Dibenzofuran	20.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	14.0	100	Indeno(1,2,3-cd)Pyrene	17.0	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	14.0	BMDL
Phenanthrene	10.0	70	Benzo(g,h,i)perylene	10.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =33

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Client: REILLY TAR
Sample Identification: Water - EFFLUENT

Lab No: 9165-2
Date Sampled : 5/12/87
Date Extracted : 5/19/87
Date Received 5/13/87
Date Analyzed : 6/12/87

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	61	Acridine	1.8	BMDL
1H-Indene	1.0	5.2	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	11	Fluoranthene	1.0	3.8
Quinoline	1.0	BMDL	Pyrene	1.0	3.2
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	2.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	5.3	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	14	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	35	Perylene	1.0	BMDL
Dibenzofuran	2.0	10	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	9.7	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	1.0	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	3.3	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =62

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Client: REILLY TAR
Sample Identification: Water - EFFLUENT DUPLICATE

Lab No: 9165-3
Date Sampled : 5/12/87
Date Extracted : 5/19/87
Date Received 5/13/87
Date Analyzed : 6/12/87

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	1.0
2,3-Dihydro-1H-Indene	1.4	76	Acridine	1.8	BMDL
1H-Indene	1.0	3.8	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.3	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	12	Fluoranthene	1.0	2.6
Quinoline	1.0	BMDL	Pyrene	1.0	2.2
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	6.5	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	14	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	37	Perylene	1.0	BMDL
Dibenzofuran	2.0	9.4	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	16	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	1.0	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	3.5	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =73

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

6/15/87
N.

CITY OF SAINT LOUIS PARK

RECEIVED
JUN 22 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

June 17, 1987

Ms. Erin Moran
Remedial Project Leader
United States Environmental
Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. Michael K. Vennewitz
Remedial Project Leader
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Mr. John C. Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

RE: Interim Sampling of the GAC Plant
St. Louis Park, Minnesota

Gentlemen and Ms. Moran:

Enclosed herewith is a copy of the laboratory analysis completed on water samples collected at the GAC plant on May 12, 1987 (Set No. 15). It was learned in late May that the samples which comprise Set No. 15 would not meet established quality control criteria and replacement Set No. 15A was taken on May 26, 1987. The information provided herein will be superseded by information contained in Set No. 15A; however, it is presented at this time as "information of interest".

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure
cc: Elizabeth Thompson (w/o enclosure)

INFO

May will DIS SWD but breakthrough

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 929-3000

ERT
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MASSACHUSETTS 01742, (617) 369-8910

ERT Ref. No. 105-REB-032
ERT Proj. No. E631-020

environmental and engineering excellence

June 15, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set no. 15) submitted from the GAC plant on 12 May 1987. As we discussed in our telephone conversation of 22 May 1987 we acknowledge that these results will not be acceptable to the Agencies, but are submitting them to you for informational purposes.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB/pjp

cc:
memo only
E. Lang
A. Paradice
P. Rose
T. Trainor
+ disposition letter
M. Lynn
+ report
Chemsitry File
W. Gregg

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET NO. 15

ERT PROJECT NO. E631-020
JUNE 15, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 15) received by the ERT Analytical Chemistry Laboratory on 13 May 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted smaples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) sample submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-15
2.	ERT SAMPLE NUMBER:	43222
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	5/12/87
5.	DATE RECEIVED:	5/13/87
6.	DATE EXTRACTED:	5/18/87
7.	DATE ANALYZED:	5/22/87
8.	GC/MS FILE #:	ERT>52203
9.	GC/MS TAPE #	RTE014
10.	CORRESPONDING DFTPP FILE #:	DFTPP>522D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43226
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43394
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD >52201
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	T-15
2.	ERT SAMPLE NUMBER:	43223
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	5/12/87
5.	DATE RECEIVED:	5/13/87
6.	DATE EXTRACTED:	5/18/87
7.	DATE ANALYZED:	5/21/87
8.	GC/MS FILE #:	ERT>52004
9.	GC/MS TAPE #:	RTE014
10.	CORRESPONDING DFTPP FILE #:	DFTPP>520D2
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43226
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43394
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD >52002

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-15A
2.	ERT SAMPLE NUMBER:	43225
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	5/12/87
5.	DATE RECEIVED:	5/13/87
6.	DATE EXTRACTED:	5/18/87
7.	DATE ANALYZED:	5/21/87
8.	GC/MS FILE #:	ERT>52005
9.	GC/MS TAPE #:	RTE014
10.	CORRESPONDING DFTPP FILE #:	DFTPP>520D2
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43226
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43394
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD >52002
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MS-15
2.	ERT SAMPLE NUMBER:	43226
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	5/12/87
5.	DATE RECEIVED:	5/13/87
6.	DATE EXTRACTED:	5/18/87
7.	DATE ANALYZED:	5/21/87
8.	GC/MS FILE #:	ERT>52003
9.	GC/MS TAPE #:	RTE014
10.	CORRESPONDING DFTPP FILE #:	DFTPP>520D2
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 43226
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 43394
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 43395
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	STD >52002
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-15 ERT NO.: 43222

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-15 ERT NO.: 43223

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	12.25
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	4.58
ACENAPHTHENE	10.34
DIBENZOFURAN	1.74
FLUORENE	7.14
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	3.00
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	39.05
TOTAL PAH'S	39.05

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15A ERT NO.: 43225

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	14.14
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	1.57
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	3.50
ACENAPHTHENE	10.29
DIBENZOFURAN	1.74
FLUORENE	6.34
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	37.58
TOTAL PAH'S	37.58

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15 ERT NO.: 43226

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	2.68
BENZO (A) ANTHRACENE	ND
CHRYSENE	4.35
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	7.03

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	8.75
INDENE	ND
NAPHTHALENE	5.27
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	2.05
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	3.33
ACENAPHTHENE	8.90
DIBENZOFURAN	1.90
FLUORENE	11.07
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	9.39
PERYLENE	ND
TOTAL OTHER PAH	50.66
TOTAL PAH'S	57.69

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15 ERT NO.: 43226

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	6.21	5.4	>20%
FLUORENE	27	11.31	42	>20%
CHRYSENE	21	4.51	21	>10%
BENZO(G,H,I)PERYLENE	19	1.71	8.8	>10%
INDENE	20	1.48	7.4	>20%
QUINOLINE	23	2.68	12	>20%
BENZO(E)PYRENE	17	9.49	57	>10%
2-METHYLNAPHTHALENE	29	2.05	7.1	>20%
AVERAGE % RECOVERY			20	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-15 ERT NO: 43222

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	1.05	8.4	42-102
FLUORENE-D10	12.0	9.06	76	60-128
CHRYSENE-D12	9.9	10.52	106	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-15 ERT NO: 43223

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	1.17	9.4	42-102
FLUORENE-D10	12.0	7.31	61	60-128
CHRYSENE-D12	9.9	7.66	77	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-15A ERT NO: 43225

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	1.20	9.6	42-102
FLUORENE-D10	12.0	7.43	62	60-128
CHRYSENE-D12	9.9	6.20	63	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-15 ERT NO: 43226

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE-D8	12.5	.88	7.0	42-102
FLUORENE-D10	12.0	5.27	44	60-128
CHRYSENE-D12	9.9	4.85	49	10-54

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ZR ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
DIBENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled May 12, 1987

E631-026

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK (WATER)	ST LOUIS PK MN.
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Higgins	Chain of Custody Tape No. 200071 200073 200070 200072

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPC PAH						REMARKS
B-15	5-12-87	1310	43222	4X1L Amber	X						
T-15	5-12-87	1315	43223	5X1L Amber	X						
TD-15	5-12-87	1320	43224	5X1L Amber	X						
TD-15A	5-12-87	1325	43225	5X1L Amber	X						
MS-15	5-12-87	1330	43226	5X1L Amber	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgins	5-12-87	1420			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael J. Higgins	Date 5/13/87	Time 10:30
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE (WATER DEPT)
5005 MTKA Blvd
ST LOUIS PARK MN
55416

ERT

№ 8443

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP E631-020

COC Record #(s): 8443

Matrix	Container	ERT #(s)
Water PAHgpt	5X1l, Amber	43222 4x1l. - 43223, - 43226 5x1l.

Were samples shipped or hand-delivered?

Notes: Airbill # 820789546

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

Notes: 200071, 200073 200070, 200072 Rec'd intact

4. Were samples received ambient or chilled?

Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

Notes:

Were samples properly preserved? Yes ☑ No ☐

Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

Notes: Samples Rec'd sealed w/white Plastic tape.

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

Notes:

9. Were samples received within holding times? Yes ☑ No ☐

Notes:

Additional Comments:

R

Samples inspected and logged in by Michael J Ry Date: 5/13/87

2013/2-86

6/4/87
N.

Minnesota Pollution Control Agency

June 4, 1987

RECEIVED
JUN 8 - 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

Ms. Erin Moran
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Moran:

Re: Variations in Permeability Within the St. Peter Formation

This letter is in response to your office's letter of March 26, 1987 requesting the Minnesota Pollution Control Agency (MPCA) to supply additional information substanciating our position on the design of monitoring wells in the St. Peter Formation. In particular, the statement was made that the MPCA had represented the permeability of the St. Peter to vary by an order of magnitude.

A point of clarification, it is not true that 1) I ever made this blanket type of statement and 2) that the proposed monitoring well designs will automatically fail to work, if indeed the formation has an order of magnitude variation in permeability. In any case, I do not intend to dwell on past misunderstandings, but will address the issue of variability in the St. Peter as best I can at this time within the context of monitoring well design.

All published literature and unpublished reports dealing with the St. Peter have been examined for direct estimates of transmissivity or permeability and any other applicable information that might allow qualitative estimates to be made. This literature search has brought no new information to light directly relating to permeability variations. However, previously unknown publications have been found dealing with the environment of deposition of the St. Peter and specifically with detailed analysis of sand grain shape. (Mazzullo and Ehrlich, 1980, 1983, and 1987) I contacted Dr. James Mazzullo of Texas A & M University to inquire about the availability of data on samples taken in the Twin Cities area. Grain size analysis data for the Battle Creek section, figure 1, of the St. Peter was obtained and estimates of hydraulic conductivity made by standard methods (Walton, 1975). This data and analysis is shown on the enclosed table and figures.

Phone:_____
520 Lafayette Road, St. Paul, Minnesota 55155
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Further explanation of the limitations and assumptions involved in the analysis is required for a meaningful discussion of the results. The primary data limitation is the fact that each sample consisted of approximately 100 grains of sand rather than the many thousand in a standard sieve analysis sample. Also the samples were taken only over the upper 45 feet of the formation rather than the full section. Samples were prepared by washing out particles finer than 38 microns and boiling the sample in an acid bath to remove the trace amounts of feldspar, iron oxide, and dolomite adhering to the grains. The amount of silt and clay sized particles in the upper St. Peter is miniscule. Therefore, the estimates would not be skewed because of the sample preparation but possibly from sample size and location.

Another problem is whether data from the Battle Creek section is applicable to the St. Louis Park area, approximately 16.5 miles away, Figure 1. Even though it is known that the St. Peter is very uniform, particular fine structures in the Battle Creek outcrop are not traceable for any distance. As a result, these results should be taken in a general sense and in conjunction with results from other sources rather than being definitive of the St. Peter as a whole.

The hydraulic conductivity estimates were made from the mean grain size and the standard deviation by the formulas of Krumbein & Monk (1941) and Hazen (1893). There are more accurate methods of estimation that require a more detailed knowledge of the grain size distribution. However, because we are interested in the relative differences in conductivity and not the actual value, it was felt that these estimates would be sufficient.

Average values of hydraulic conductivity produced by the different formulas are 87 and 117 ft./day. It is known from several pumping tests that the St. Peter has a conductivity of 20 ft./day. (Mogg, 1962 and Liesch, 1962) This is also the value used by the USGS in their most recent computer modeling of the St. Peter. (personal communication, J. Stark USGS) Because of overestimation of the average hydraulic conductivity by grain size methods, the Hazen estimates were normalized to an average 20 ft./day to more clearly show the variation in estimated conductivity. The normalized estimates range from no less than 3 to no more than 47 ft./day when the average is set at 20 ft./day.

The graphs included here demonstrate a relationship between grain size and roundness, figure 2 and 3. The correlation is most evident on figure 2 because the graph sizes are about the same; however, it still may be seen on figure 3. In general, the more rounded the grains the larger the mean grain size and higher the hydraulic conductivity. This has been interpreted to be the result of different means of transport of the sand grains. The more angular and smaller grains being transported by rivers and the larger and more rounded grains by wind. (Mazzullo and Ehrlich, 1987)

From the discussion above, there is evidence to suggest that an order of magnitude variation exists in the hydraulic conductivity of the St. Peter Formation as the result of variations in grain size. It is interpreted here that this variation exists because of the differences in grain size between eolian and fluvial sand deposited in the near-shore environment. The proportion of these two types can be found by the relative percent of well rounded to angular grains. Therefore, sections of the St. Peter which show consistent amounts of either type will probably have much lower variability in hydraulic conductivity. The three other sections analyzed for grain roundness, figure 4, generally show a trend of increasing roundness towards the top of the formation and presumably increasing permeability. They also show fewer sharp breaks toward more angular sand than is seen in the Battle Creek section. This demonstrates two things: 1) in general, the top of the formation is the best place to situate the screen of a monitoring well in the St. Peter when more detailed petrographic or hydrogeologic information is not available and 2) that the sudden increases in angular sand in parts of the Battle Creek section is the exception rather than the rule and therefore the formation is more uniform than at Battle Creek.

In conclusion, evidence has been presented that supports the existence of up to an order of magnitude variability in the hydraulic conductivity in the St. Peter Aquifer. This evidence is qualified by its distance from the Site, small size of the samples, and empirical nature of the conversion from grain size to conductivity. Because of these qualifications and the observations of several field workers that the St. Peter coarsens at the top of the formation, it is felt that the proposal to situate the monitoring well screens at the top of the formation is the best that currently can be done.

I hope that this analysis provides the data you are looking for to answer concerns about St. Peter well design. If you have any questions in this regard, please don't hesitate to call me at 612/296-7744.

Sincerely,

Justin L. Blum

Justin L. Blum, Hydrogeologist
Superfund Unit
Site Response Section
Solid and Hazardous Waste Division

JLB:sg

Enclosure

REFERENCES

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VARIABILITY OF ESTIMATED HYDRAULIC CONDUCTIVITY OF THE ST. PETER FORMATION
FROM GRAIN SIZE ANALYSIS OF THE BATTLE CREEK SECTION

(DATA FROM J. MAZZULLO, TEXAS A&M UNIVERSITY)

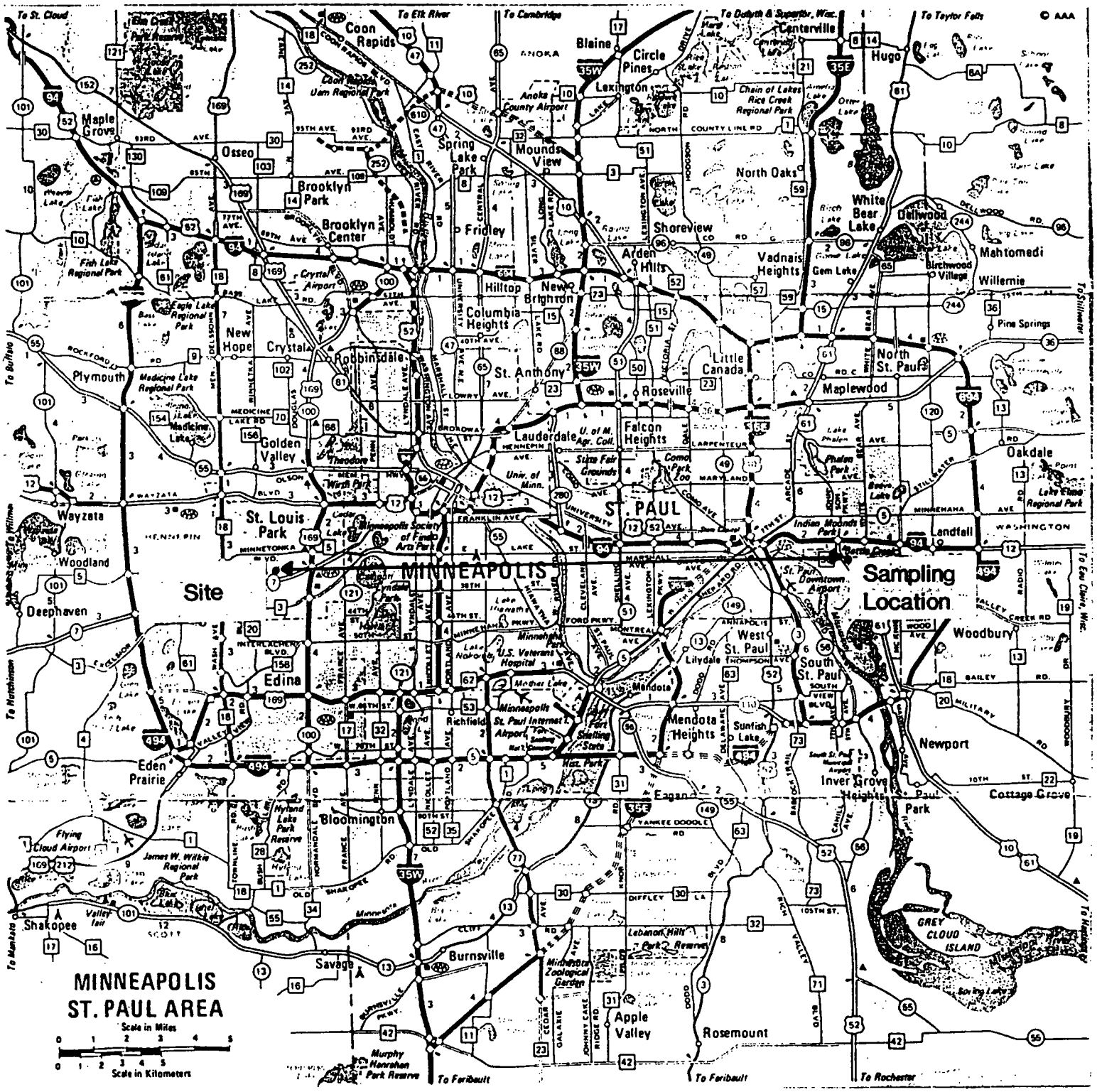
SAMPLE NO.	DEPTH FROM TOP OF FORMATION (METERS)	PERCENT OF ROUNDED GRAINS	MEAN DIAMETER OF GRAINS (MICRONS)	STANDARD DEVIATION	KRUMBEIN & MONK EST. CONDUCTIVITY (FT./DAY)	HAZEN APPROX. ESTIMATED CONDUCTIVITY (FT./DAY)	HAZEN COND. NORMALIZED TO AVERAGE* (FT./DAY)
111	0.00	54	206.11	69.980	72	96	16.4
109	0.25	47	214.09	78.279	78	102	17.4
107	0.50	50	189.44	71.699	61	79	13.5
105	0.75	53	225.44	72.231	86	116	19.9
103	1.00	60	177.46	81.348	54	65	11.2
101	1.25	65	178.41	71.087	54	69	11.8
99	1.50	55	153.19	72.970	40	48	8.2
97	1.75	66	171.75	62.390	50	66	11.2
95	2.00	57	124.95	48.841	27	34	5.8
93	2.25	47	192.58	84.106	63	78	13.4
91	2.50	65	164.67	64.811	46	59	10.1
89	2.75	49	151.79	68.402	39	48	8.2
87	3.00	34	290.13	65.530	143	206	35.2
85	3.25	64	205.46	71.870	72	95	16.2
83	3.50	75	186.58	88.755	59	71	12.2
81	3.75	42	260.12	71.856	115	160	27.3
79	4.00	22	170.56	72.296	49	62	10.6
77	4.25	4	146.55	57.855	37	47	8.0
75	4.50	8	191.11	63.236	62	83	14.2
73	4.75	22	166.05	71.339	47	58	10.0
71	5.00	16	233.96	66.430	93	129	22.0
69	5.25	10	193.38	54.363	64	88	15.0
67	5.50	6	226.88	87.009	88	113	19.3
65	5.75	27	216.41	67.096	80	108	18.5
63	6.00	63	247.71	67.241	104	145	24.9
61	6.25	61	293.68	54.140	147	217	37.1
59	6.50	71	270.22	44.798	124	186	31.8
57	6.75	61	265.62	51.728	120	176	30.1
55	7.00	67	251.72	68.476	108	150	25.7
53	7.25	62	284.53	85.746	138	188	32.1
51	7.50	81	159.17	72.850	43	53	9.0
49	7.75	60	255.03	66.190	111	155	26.6
47	8.00	59	224.62	59.529	86	120	20.5
45	8.25	60	238.03	66.142	96	134	22.8
43	8.50	66	273.48	69.943	127	179	30.6
41	8.75	88	284.96	71.838	138	195	33.3
39	9.00	68	321.63	64.769	176	257	44.0
37	9.25	67	335.33	72.043	191	277	47.3
35	9.50	23	136.56	39.343	32	44	7.5
33	9.75	55	106.91	45.354	19	24	4.2
31	10.00	38	125.35	44.139	27	35	6.0
30	10.12	0	140.59	48.017	34	45	7.6
29	10.25	63	122.01	44.208	25	33	5.7
28	10.38	0	184.23	71.766	58	74	12.6
27	10.50	79	233.9	88.398	93	120	20.6
26	10.63	0	251.56	44.490	108	160	27.3
25	10.75	100	267.63	38.902	122	185	31.6
23	11.00	76	261.3	42.148	116	174	29.8

VARIABILITY OF ESTIMATED HYDRAULIC CONDUCTIVITY OF THE ST. PETER FORMATION
FROM GRAIN SIZE ANALYSIS OF THE BATTLE CREEK SECTION

(DATA FROM J. MAZZULLO, TEXAS A&M UNIVERSITY)

SAMPLE NO.	DEPTH FROM TOP OF FORMATION (METERS)	PERCENT OF ROUNDED GRAINS	MEAN DIAMETER OF GRAINS (MICRONS)	STANDARD DEVIATION	KRUMBEIN & MONK EST. CONDUCTIVITY (FT./DAY)	HAZEN APPROX. ESTIMATED CONDUCTIVITY (FT./DAY)	HAZEN COND. NORMALIZED TO AVERAGE* (FT./DAY)
21	11.25	89	265.73	37.442	120	183	31.2
19	11.50	79	258.43	43.563	114	170	29.0
17	11.75	88	282.59	58.922	136	198	33.8
15	12.00	81	259.42	51.648	114	168	28.6
13	12.25	74	246.66	40.920	103	155	26.5
11	12.50	83	250.58	48.332	107	157	26.8
9	12.75	82	256.28	50.103	112	164	28.0
7	13.00	83	252.24	50.558	108	158	27.0
5	13.25	54	124.18	57.357	26	32	5.5
3	13.50	75	91.9	29.305	14	19	3.3
TOTAL NO. OF SAMPLES: 58		AVERAGE VALUE:	214.84		84.0	117.4	20.1
		MAXIMUM VALUE:	335.33		191.2	276.9	47.3
		MINIMUM VALUE:	91.90		14.4	19.4	3.3
		STANDARD DEVIATION:	57.164		41.094	62.640	10.708

* NOTE THAT AVERAGE CONDUCTIVITY FROM PUMPING TESTS IS 20 FT./DAY



Location Map

Figure 1

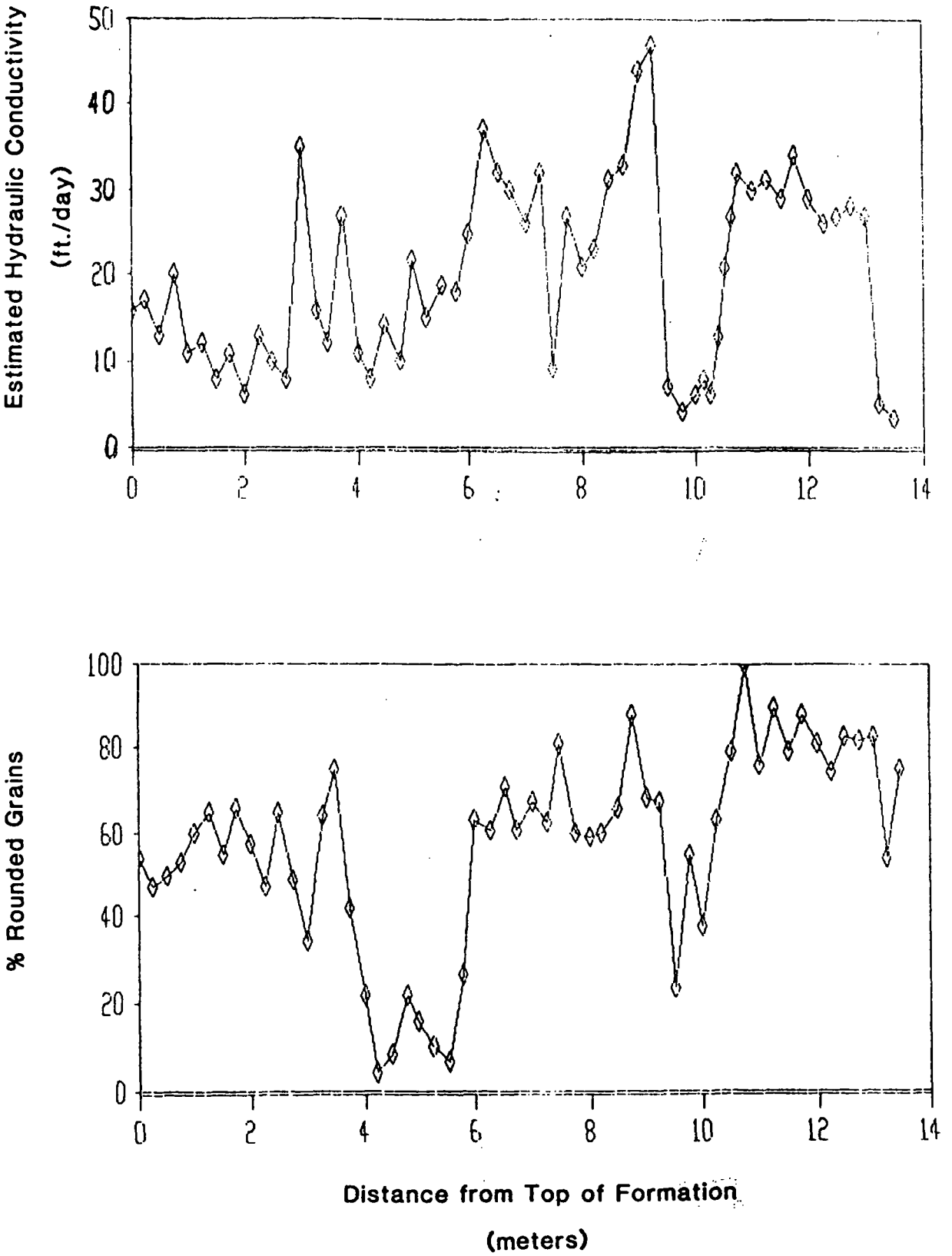
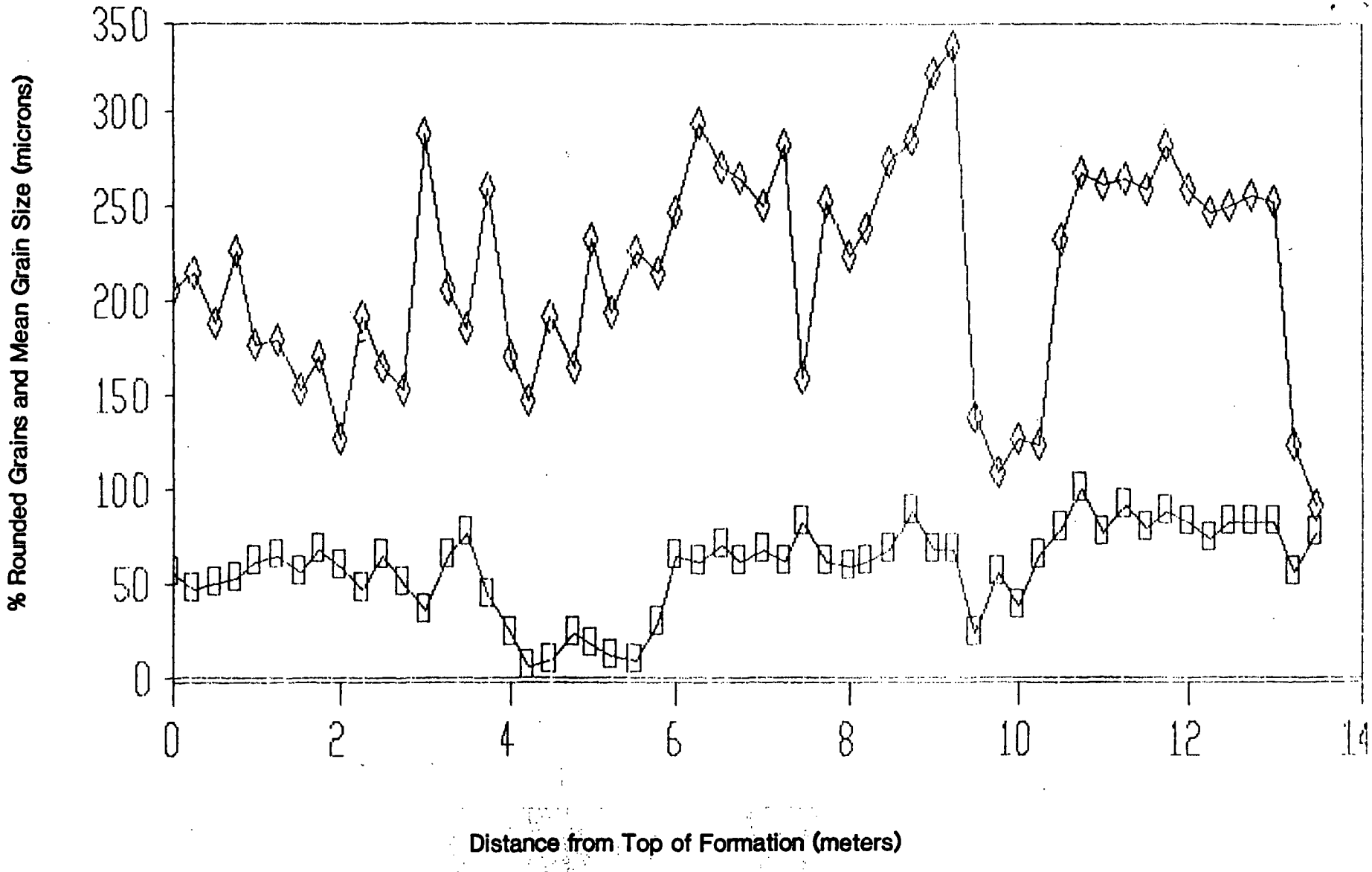
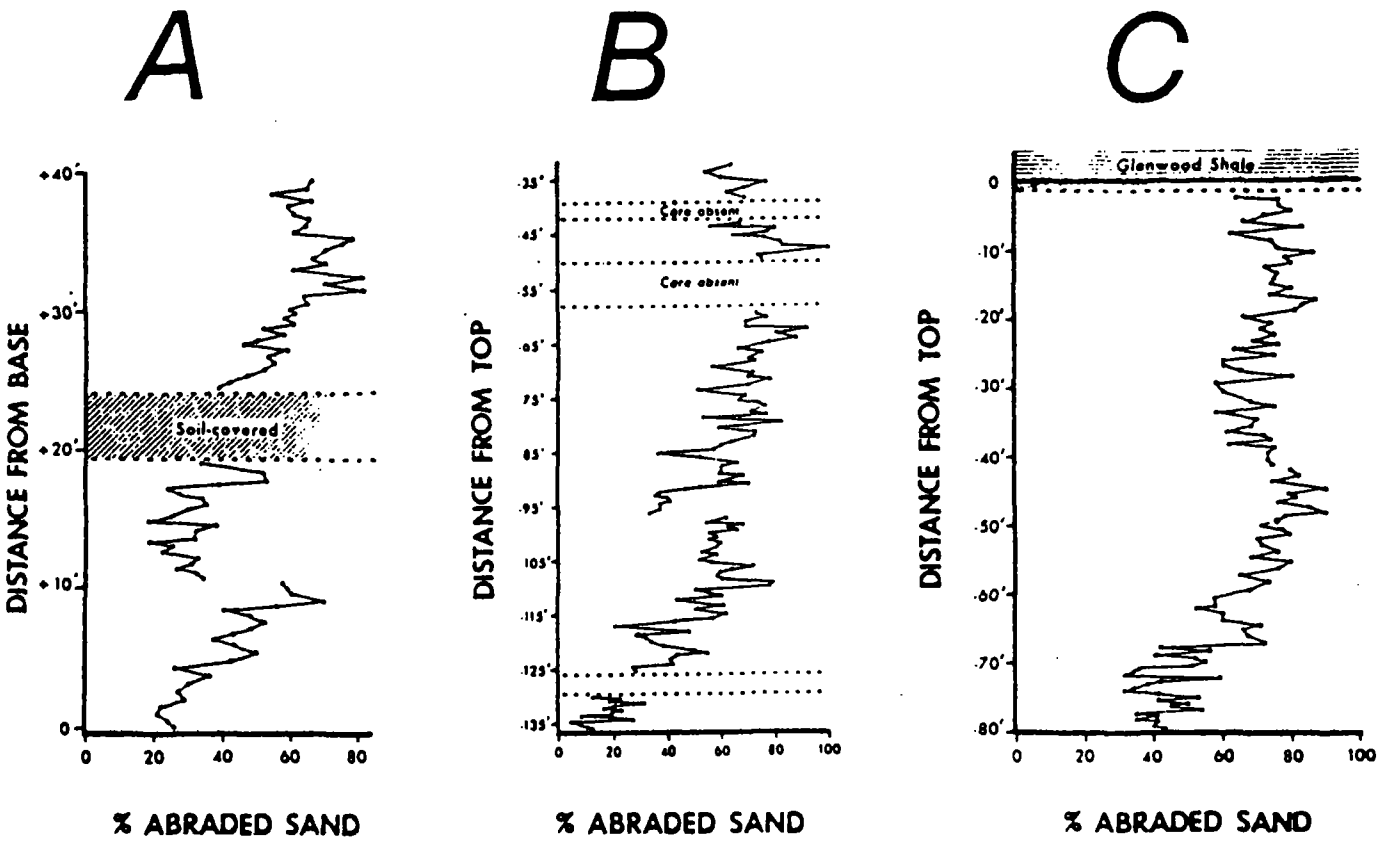

Estimated Hydraulic Conductivity
(ft./day)
50
40
30
20
10
0
0
2
4
6
8
10
12
14
% Rounded Grains
100
80
60
40
20
0
0
2
4
6
8
10
12
14
Distance from Top of Formation
(meters)

Figure 2



◊— MEAN DIA —□— ROUNDED %

Figure 3



Plot of the proportions of end member 2 (highly abraded eolian sand) grains in samples from the Cannon Falls (A), MnDot 97 (B), and Mounds Park (C) sections. Missing or diagenetically altered zones are indicated by shading. The scale on the vertical axis records the distance from either the top of the formation (in the case of MnDot 97 and Mounds Park) or the base (in the case of Cannon Falls). Cycles are well defined as upward increases in the proportion of abraded sand in successive samples. No correlation between sections is implied.

From: Mazzullo and Ehrlich, 1983

Figure 4

5/29/87
N.

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A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-026
ERT Proj. No. E631-016

environmental and engineering excellence

May 29, 1987

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water sample (set no. 14) submitted fromthe GAC plant on 14 April 1987. As we discussed in our telephone conversation of 8 May and in my subsequent letter of 11 May 1987, we acknowledge that these results will not be acceptable to the Agencies, but are submitting them to you for informational purposes.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

EB/pjp

c:
memo only
E. Lang
A. Paradice
P. Rose
T. Trainor
+ disposition letter
M. Lynn
+ report
Chemistry File
W. Gregg

Jus + Info.

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET NO. 14

ERT PROJECT NO. E631-016
MAY 29, 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Health
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 14) received by the ERT Analytical Chemistry Laboratory on 15 April 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted smaples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) sample submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/1 (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	Minimum Mean (%)	Mean (%)	Standard Deviation (%)	95% Confidence Limits
Naphthalene-d8	42	72	15	42-102
Fluorene-d10	60	94	17	60-128
Chrysene-d12	20	30	12	10-54

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be below the 95% confidence limit.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

A review of the data generated during analysis suggested problems with the recoveries for all of the naphthalene-d08 and fluorene-d010 surrogates. Further problems were evident in the recoveries for the matrix spike compounds, with 5 of the 8 matrix spike compounds not meeting the criteria as established in the June 1986 QAPP. Reanalysis of the matrix spike sample (results included as run #1 and run #2) yeilded nearly identical results. A review of the procedures followed in the laboratory suggest that there was a problem during the sample preparation phase of the workup. Although it is acknowledged that the Agencies will not accept the data from this sampling, the results are provided for informational purposes.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	B-14
2.	ERT SAMPLE NUMBER:	42468
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43004
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	T-14
2.	ERT SAMPLE NUMBER:	42469
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43005
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-14
2.	ERT SAMPLE NUMBER:	42470
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43006
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	TD-14A
2.	ERT SAMPLE NUMBER:	42471
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43007
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MS-14
2.	ERT SAMPLE NUMBER:	42472
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43003
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001
15.	COMMENTS: NA = Not Available	

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	MS-14
2.	ERT SAMPLE NUMBER:	42472
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	04/14/87
5.	DATE RECEIVED:	04/15/87
6.	DATE EXTRACTED:	04/20/87
7.	DATE ANALYZED:	04/30/87
8.	GC/MS FILE #:	>43002
9.	GC/MS TAPE #:	RTE010
10.	CORRESPONDING DFTPP FILE #:	>430D1
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 42472
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 42541
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 42546
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>43001

15. COMMENTS: NA = Not Available

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: B-14 ERT NO.: 42468

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	ND
TOTAL PAH'S	ND

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: T-14 ERT NO.: 42469

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.03
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	1.0
TOTAL PAH'S	1.0

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-14 ERT NO.: 42470

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	2.43
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.61
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	4.0
TOTAL PAH'S	4.0

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-14A ERT NO.: 42471

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO (A) ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	3.98
INDENE	ND
NAPHTHALENE	ND
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.96
DIBENZOFURAN	ND
FLUORENE	ND
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	5.9
TOTAL PAH'S	5.9

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472 (RUN#1)

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	3.73
BENZO (A) ANTHRACENE	ND
CHRYSENE	2.68
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	6.4

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	2.24
INDENE	1.78
NAPHTHALENE	7.27
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	<3.20
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	2.27
DIBENZOFURAN	ND
FLUORENE	6.74
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	2.86
PERYLENE	ND
TOTAL OTHER PAH	23.2
TOTAL PAH'S	29.6

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472 (RUN#2)

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	3.41
BENZO (A) ANTHRACENE	ND
CHRYSENE	2.51
BENZOFLUORANTHENES	ND
BENZO (A) PYRENE	ND
INDENO (1,2,3-CD) PYRENE	ND
DIBENZ (A,H) ANTHRACENE	ND
BENZO (G,H,I) PERYLENE	ND
TOTAL CARCINOGENIC PAH	5.9

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	2.04
INDENE	1.63
NAPHTHALENE	6.94
BENZO (B) THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	<3.20
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	1.67
DIBENZOFURAN	ND
FLUORENE	6.41
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO (E) PYRENE	2.45
PERYLENE	ND
TOTAL OTHER PAH	21.1
TOTAL PAH'S	27.0

ND = Concentration < 95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: B-14 ERT NO.: 42468

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	0.35	3.5	42-102
FLUORENE - D10	10	3.61	36	60-128
CHRYSENE - D12	9.9	5.56	56	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: T-14 ERT NO.: 42469

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	0.52	5.3	42-102
FLUORENE - D10	10	3.35	34	60-128
CHRYSENE - D12	9.9	4.05	41	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-14 ERT NO.: 42470

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	1.18	12	42-102
FLUORENE - D10	10	4.66	47	60-128
CHRYSENE - D12	9.9	4.46	45	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: TD-14A

ERT NO.: 42471

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	1.09	11	42-102
FLUORENE - D10	10	4.50	45	60-128
CHRYSENE - D12	9.9	4.97	50	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472 (RUN#1)

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	0.93	9.4	42-102
FLUORENE - D10	10	3.65	37	60-128
CHRYSENE - D12	9.9	3.18	32	10-54

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472 (RUN#2)

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONFIDENCE LIMITS (%)
NAPHTHALENE - D8	9.8	0.78	7.9	42-102
FLUORENE - D10	10	3.34	33	60-128
CHRYSENE - D12	9.9	2.94	30	10-54

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	7.58	6.7	>20%
FLUORENE	27	6.99	26	>20%
CHRYSENE	21	2.90	14	>10%
BENZO(G,H,I)PERYLENE	19	.29	2	>10%
INDENE	20	1.86	10	>20%
QUINOLINE	23	3.73	16	>20%
BENZO(E)PYRENE	17	3.18	19	>10%
2-METHYLNAPHTHALENE	29	3.05	11	>20%
AVERAGE % RECOVERY			10	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, as per QAPP.

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-14 ERT NO.: 42472

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	114	7.25	6.3	>20%
FLUORENE	27	6.66	25	>20%
CHRYSENE	21	2.73	13	>10%
BENZO(G,H,I)PERYLENE	19	.14	0.73	>10%
INDENE	20	1.71	8.5	>20%
QUINOLINE	23	3.41	15	>20%
BENZO(E)PYRENE	17	2.77	16	>10%
2-METHYLNAPHTHALENE	29	2.93	10	>20%
AVERAGE % RECOVERY			10	20-150%

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

i) Only one parameter may fall below its target recovery, as per QAPP.

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
PPT ANALYSIS OF PAH in WATER
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	1.90	1.20
BENZO (A) ANTHRACENE	4.40	2.80
CHRYSENE	4.40	2.80
BENZOFLUORANTHENES	9.70	6.20
BENZO (A) PYRENE	3.40	2.20
INDENO (1,2,3-CD) PYRENE	4.40	2.80
DIBENZO (A,H) ANTHRACENE	3.40	2.20
BENZO (G,H,I) PERYLENE	5.30	3.40

OTHER PAH'S

PARAMETERS	MDL	0.64 MDL
2,3-BENZOFURAN	1.90	1.20
2,3-DIHYDROINDENE	3.40	2.20
INDENE	2.90	1.80
NAPHTHALENE	47.00	30.00
BENZO (B) THIOPHENE	2.20	1.40
INDOLE	1.90	1.20
2-METHYLNAPHTHALENE	5.00	3.20
1-METHYLNAPHTHALENE	3.10	2.00
BIPHENYL	17.00	11.00
ACENAPHTHYLENE	1.70	1.10
ACENAPHTHENE	1.30	0.83
DIBENZOFURAN	1.20	0.77
FLOURENE	0.88	0.56
DIBENZOTHIOPHENE	6.30	4.00
PHENANTHRENE	3.10	2.00
ANTHRACENE	3.40	2.20
ACRIDINE	2.50	1.60
CARBAZOLE	2.60	1.70
FLUORANTHENE	4.40	2.80
PYRENE	4.10	2.60
BENZO (E) PYRENE	1.50	0.96
PERYLENE	1.60	1.00

0.64 MDL = LOWER CONTROL LIMIT OF 95% CONFIDENCE INTERVAL OF MDL

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK (WATER DEPT)	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (Signature) Scott Anderson	Chain of Custody Tape No. 102617 & 102618 10435 & 10436

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL PAH						REMARKS
B-14	4/14/87	1246	42468	4X1L AMBER	X						
T-14	4/14/87	1254	42469	5X1L AMBER	X						
TD-14	4/14/87	1300	42470	5X1L AMBER	X						
TD-14A	4/14/87	1307	42471	5X1L AMBER	X						
MS-14	4/14/87	1313	42472	5X1L AMBER	X						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Scott Anderson	4-14-87	1345			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Michael J Ly	4/15/87	11:00
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK
5005 MINNETONKA BLVD
ST LOUIS PARK MN 55416

ERT

№ 8465

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: SLP E631-016 Set 14

COC Record #(s): 8465

Matrix	Container	ERT #(s)
PAH ppt water	4X1l Ambers	
	5X1l Ambers	

Were samples shipped or hand-delivered? Shipped

Notes: Airbill # 820789524

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

Notes: COC Tapes Rec'd intact: 102617, 102618 - Cooler Red Cell 80
10435, 10436 - Cooler #51

4. Were samples received ambient or chilled?

Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

Notes:

Were samples properly preserved? Yes ☑ No ☐

Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

Notes:

9. Were samples received within holding times? Yes ☑ No ☐

Notes:

Additional Comments:

R7

Samples inspected and logged in by Michael Shy Date: 4/15/87

5/5/87
N.

Lower Drift is silty - want in mid Drift

REILLY TAR & CHEMICAL CORPORATION

TELEPHONE: 317/638-7531
CABLE: RETAR INDIANAPOLIS
TELEX: 27-404

1510 MARKET SQUARE CENTER
151 NORTH DELAWARE STREET
INDIANAPOLIS, INDIANA 46204

Defer to MPCA

RECEIVED
MAY 11 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

May 8, 1987

Ms. Erin Moran
Remedial Project Manager
United States Environmental
Protection Agency
Region 5
Chicago, Illinois 60604

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. Michael K. Vennewitz
Remedial Project Manager
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Boulevard
St. Louis Park, Minnesota 55416-2290

Gentlemen and Ms. Moran:

Enclosed is a copy of information provided by Bill Gregg of ERT concerning the recommended screening intervals for the source and gradient control wells to be installed in the Drift aquifer. Since submitting our modified plans for these wells on January 29, Reilly has completed a test boring at the gradient control well location and received grain-size analysis results and screen design recommedations from Johnson Division. Based on these results, as decribed in Bill's letter, Reilly would like to 1) modify the Drift source control well screen design presented in the January 29 plan and 2) incorporate screen design details into the Drift gradient control well plan of January 29.

Please let me know how you would like us to handle these changes in the context of your on-going process of final plan review and approval.

Very truly yours,

REILLY TAR & CHEMICAL CORPORATION

John C. Craun

Is this a problem? what

John C. Craun
Senior Engineer,
Corporate Environmental Affairs

JCC:lt

cc: B. A. Comstock (w/ enclosure)
W. M. Gregg (w/o enclosure)
R. Polack (w/o enclosure)

Enclosure

Are the Logistics?

ERT®
A RESOURCE ENGINEERING COMPANY
5871 CEDAR LAKE RD., SUITE 21, ST. LOUIS PARK, MINNESOTA 55416, (612) 541-1642

environmental and engineering excellence

May 5, 1987
D722-291

Mr. John Craun
Reilly Tar & Chemical Corporation
1500 South Tibbs Avenue
Indianapolis, Indiana 46241

Dear John,

The purpose of this letter is to summarize the recent changes in the recommended design for the Drift Aquifer Source Control well and to present the recommended design for the Gradient Control Well based on considerations of grain size analyses of site soil samples. Discussions with local water well contractors and well design specialists have led to a change in specifications for the Drift Aquifer Source Control Well design given in the January 29, 1987 Work Plan. Instead of screening the aquifer's full thickness, the design change specifies screening only the lower portion of the Drift Aquifer (Figure 1). This change is based on sand size analyses by Johnson Division (Figure 2), and on a decision to increase the available drawdown which will increase in the operational life of the well. By screening only the lower portion of the well, the available drawdown will be greater, thus assuring that the pump will be set above the screen. This will avoid distorted flow patterns in the vicinity of the screen and the resulting increased velocities that cause higher incrustation rates, corrosion, and/or sand pumping. This will also avoid mixing of air and water from dewatering the screen, causing incrustation. Also, the well will be less susceptable to potential future problems of lower pumping water levels caused by a general lowering of the water table, increased pumping rates or reduced specific capacity.

The well design shown in Figure 1 includes a five foot section of blank casing at a depth of 57 to 62 feet. This is based on grain size analyses of two samples (S23 and S24) that indicate a three-foot thick lense of fine-grained sediments at a depth of 57 to 62 feet. Although visual descriptions of these two samples did not indicate the presence of significant amounts of fine-grained sediment (Figure 3), the five-foot section of casing across this interval is a conservative design that will prevent the possibility of

fine-grained sediments migrating through the coarse sand pack and entering the well, possibly plugging the screen.

A soil boring log at the Drift Aquifer Gradient Control Well site (Figure 4) and subsequent sand size analyses by Johnson Division (Figure 5) are now available. These data indicate that the gradient control well should be screened with 25 feet of 40 slot screen set at 53 - 78 feet, with #30 sand pack (Figure 6). This design takes advantage of a zone of larger grain size in this zone, and allows for a large available drawdown.

If you have any questions about these matters, please call me at (612) 541-1642.

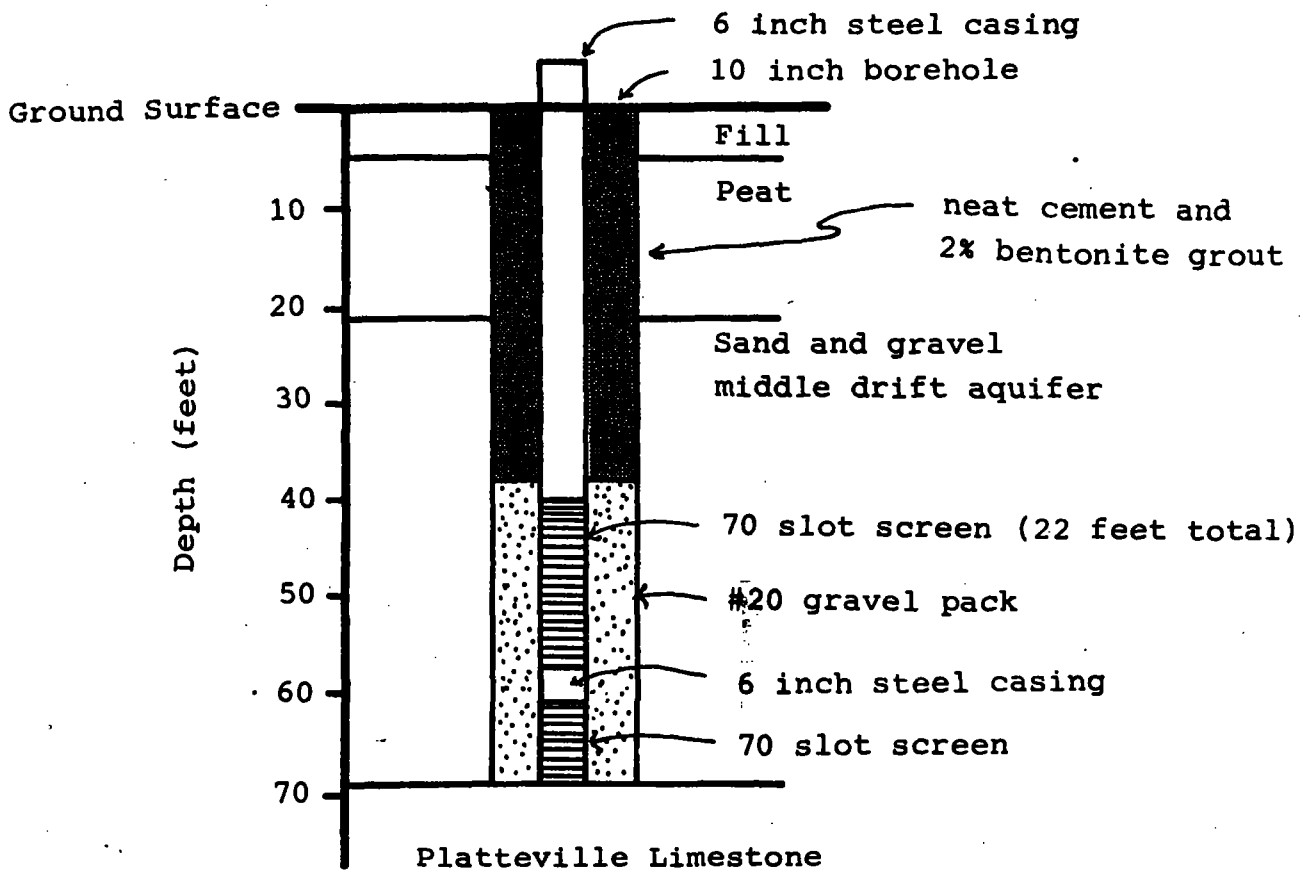
Sincerely,

William M. Gregg

William M. Gregg
Hydrogeologist

WMG/pb

ERT



Total Depth of Well = 66.8 feet

Figure 1. Recommended Design For Drift Aquifer Source Control Well

Figure 2. Sand Size Analysis Results, Drift Aquifer Source Control Well

SAND ANALYSIS REPORT

Johnson Division
P.O. Box 64118 St. Paul, Minn. 55164
Tel. 612-636-3900
800-328-9110
Telex 297451

PAGE _____ OF _____

DRILLER: STS CONSULTANTS, LTD.

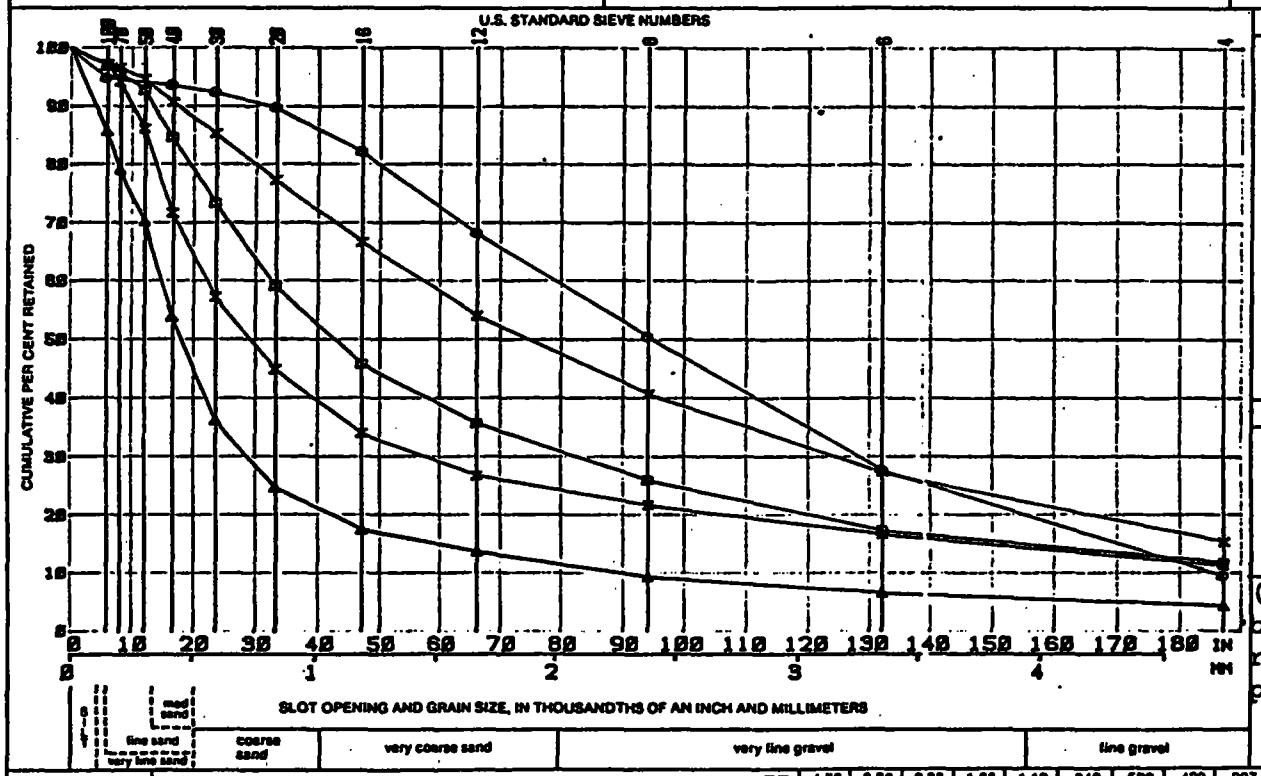
ENGINEER: ERT
ST. LOUIS PARK, MINNESOTA 55416

ANALYSIS BY: ALBERT J. SMITH
DATE: 13 NOVEMBER, 1986

JOB NAME

LOCATION

JOHNSON I.D. NUMBER: 86321E1
SAMPLE SENT IN BY: ERT



TEST HOLE DATA

DIAMETER

DEPTH 67.5 FEET

DRILLING METHOD

DRILLING FLUID

GEOPHYSICAL LOGS

STATIC WATER LEVEL 10'

COMMENTS

Centering guides would be required to center the 6" pipe size screen within the 10" diam. borehole.

(57-62 ft) should be cased off if the recommended gravel pack is utilized.

WELL DATA

CASING DIAMETER

DESIRED YIELD

WELL APPLICATION: Gradient Control

DESIGN RECOMMENDATIONS

Utilize a gravel pack material similar in gradation to the #20 gravel from American Materials Corp, Eau Claire, Wisc, in conjunction with a #70 slot screen

SCREEN RECOMMENDATIONS

DIAMETER 6 P.S.

COMBINED SAMPLE DEPTHS	PHYSICAL SAMPLE DESCRIPTION	mm	4.76	3.36	2.38	1.68	1.19	.840	.590	.420	.297	.210	.149	.074	.053	TOTAL WT.	SLOT	LENGTH	SETTING
		Inches	.187	.123	.094	.066	.047	.033	.023	.016	.012	.008	.006	.003	.002				
		U.S. Sieve #	4	6	8	12	16	20	30	40	50	70	100	200	270				
28 / 24.5 FT.	O SAMPLES #S-2 & #S-3	CUMULATIVE % RETAINED	9.5	27.8	58.6	68.4	82.3	89.9	92.4	93.7			94.9			158.8			
25 / 34 FT.	□ SAMPLES #S-4, S-5, S-6 & S-8		11.7	17.3	26.8	35.7	45.9	58.2	73.5	84.7	92.9	95.9	98.9			196.8			
34 / 42 FT.	Δ SAMPLES #S-9 & S-10		4.4	6.6	9.3	13.7	17.6	24.7	36.3	53.8	78.3	79.1	85.7			182.8	.070	17	40-57
38 / 41 FT.	⧗ SAMPLES #S-11 & S-12		11.2	16.7	21.7	26.8	34.1	44.9	57.2	71.7	88.2	94.2	97.1			278.8	.070	5	62-67
41.5-47.5 FT.	X SAMPLES #S-13, S-14, S-15 & S-16		15.3	27.3	48.7	54.8	68.7	77.3	85.3	98.7	94.7	98.7	97.3			388.8			

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

SAND ANALYSIS REPORT

DRILLER

ENGINEER

ANALYSIS BY

DATE 13 NOVEMBER, 1988

JOB NAME

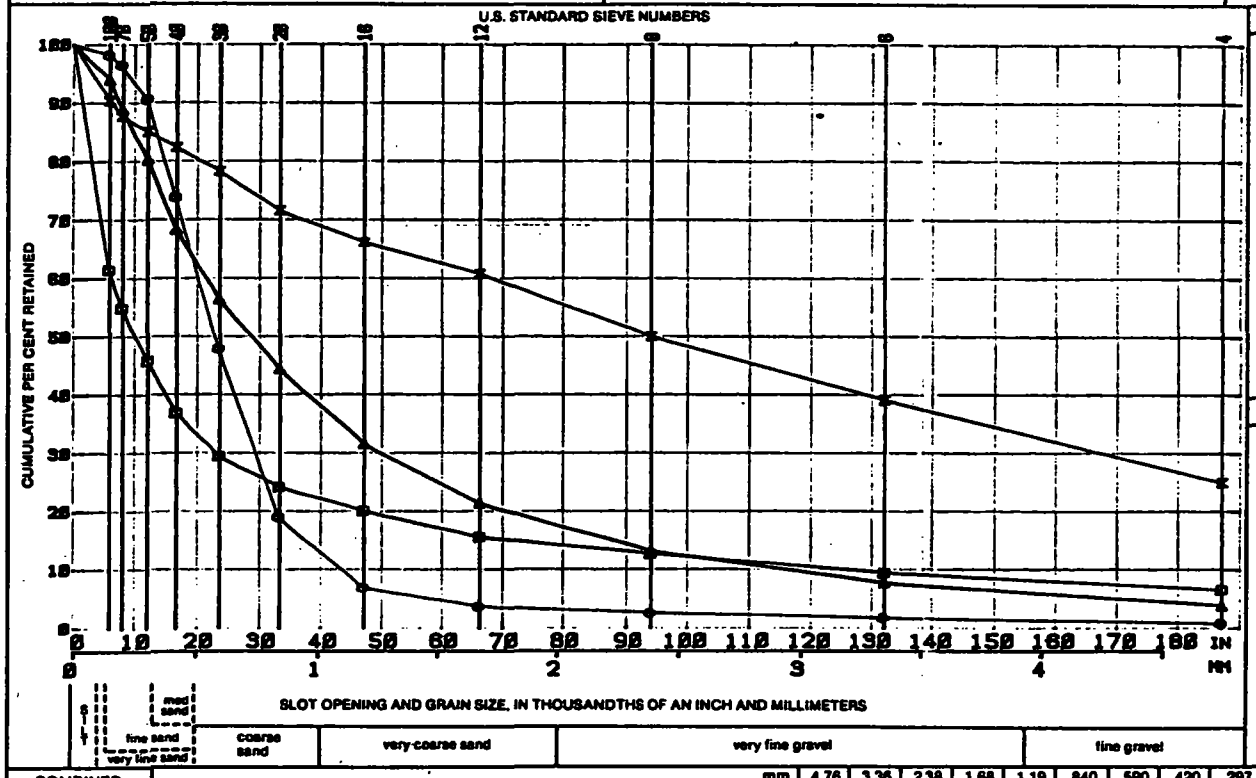
LOCATION

JOHNSON I.D. NUMBER 86321E2

SAMPLE SENT IN BY ERT

Johnson Division
P.O. Box 64118 St. Paul, Minn. 55164
Tel. 612-636-3900
800-328-9110
Telex 297451

PAGE _____ OF _____



TEST HOLE DATA	
DIAMETER	
DEPTH	
DRILLING METHOD	
DRILLING FLUID	
GEOPHYSICAL LOGS	
STATIC WATER LEVEL	

WELL DATA	
CASING DIAMETER	
DESIRED YIELD	
WELL APPLICATION	

DESIGN RECOMMENDATIONS

COMMENTS

SCREEN RECOMMENDATIONS

DIAMETER

SLOT	LENGTH	SETTING

COMBINED SAMPLE DEPTHS	PHYSICAL SAMPLE DESCRIPTION	mm	4.76	3.36	2.38	1.68	1.19	.840	.590	.420	.297	.210	.149	.074	.053	TOTAL WT.
		Inches	.187	.123	.094	.066	.047	.033	.023	.016	.012	.008	.006	.003	.002	
		U.S. Sieve #	4	6	8	12	16	20	30	40	50	70	100	200	270	
47 - 57 FT.	O SAMPLES #S-18,S-17,S-19,S-20,S-21,S-22	CUMULATIVE % RETAINED	0.9	1.7	2.6	3.8	6.9	19.1	48.0	74.0	90.0	96.5	98.3			346.0
57 - 68 FT.	□ SAMPLES #S-23 & S-24		0.6	9.4	12.7	15.6	20.1	24.2	29.5	36.9	45.9	54.9	61.5			244.0
68 - 86 FT.	Δ SAMPLES #S-25, S-26, S-27 & S-28		3.0	7.7	13.2	21.4	31.6	44.4	58.4	68.4	80.3	88.9	94.0			294.0
86 - 87.5 FT.	X SAMPLES #S-29		25.0	39.2	50.0	60.0	66.2	71.6	78.4	82.4	85.1	87.8	90.5			140.0

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF JOHNSON WELL SCREENS.

Figure 2, cont'd.

Figure 3. Soil Boring Log, Drift Aquifer Source Control Well

STS Consultants Ltd.

PROJECT NAME	ARCHITECT—ENGINEER
Proposed Well House	ERT

SITE LOCATION: St. Louis Park, Minnesota

SURFACE ELEVATION +100 feet

Depth	Elevation	Sample No.	Sample Type	Sample Distance	Recovery	Description of Material	Unit Dry Wt. Lbs./Ft³	Standard Penetration Blows/Ft.
						Hollow stem augered to 17.5 feet - see log of boring #2 for soil conditions above 17.5 feet		
	99.3	1	SS			Organic silty clay, little sand - dark brown - firm - (OH)		9; 7/12"
		2	SS			Clayey silt - gray - soft - (ML - CL)		10
		2A	SS					
		3	SS			Silty sand - gray - saturated - medium dense - (SM)		5/6"
	95.3							8
		4	SS			Fine to coarse sand, little gravel, trace silt - gray - saturated - loose - (SW - SP)		10
		5	SS					6
	90.3					Note: 31.0 feet driller notes hole caving due to gravel		
		6	SS					11
		7	SS			Fine to medium sand, trace coarse sand, trace gravel, trace silt - brown - saturated - medium dense - (SP)		16
		8	SS					30
	85.3	9	SS			Silty sand, trace gravel - brown - saturated - medium dense - (SM)		27
		10	SS					14/6"
		10A	SS			Sandy gravel, trace silt - gray - saturated - medium dense - (GP)		8/6"
	80.3	11	SS					18
		12	SS			Fine to coarse sand, trace gravel, trace silt - gray - saturated - medium dense - (SP) - (SW)		8
		13	SS					10
		14	SS					27
	75.3							
		15	SS					29
		16	SS					15
		17	SS					19
	70.3	18	SS					23
		19	SS					22
		20	SS					19
	65.3	21	SS					14
		22	SS					8/6"
		23	SS			Fine to medium sand, little silt, trace gravel - brown - medium dense - (SM)		17; 22/6"
	60.3	24	SS			Sandy gravel, trace silt - gray - saturated - medium dense - (GP)		24
		25	SS					21
		26	SS			Fine to coarse sand, trace to little gravel, trace silt - gray - saturated - medium dense - (SW) - (SP)		19
		27	SS					10
	55.3	28	SS			Sandy gravel, trace silt - gray - saturated - medium dense - limestone gravel - (GP) - (clay seams)		20; 55/6"
		29	SS					
	50.3	29A	SS			Platteville limestone		100/3"

End of boring at 66.8 ft.
Hollow stem augered to 17.5 ft. Drilled with 2 15/16" rockbit and bentonite drilling fluid 17.5 ft. to 32.5 ft. Caving gravel 31 feet. Set hollow stem to 32.5 ft. Drilled with 2 15/16" rockbit and bentonite drilling fluid from 32.5-66.0 ft. Grouted hole with neat cement grout.

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL	WS OR WD	BORING STARTED	10/24/86	STS OFFICE	Minnesota
WL	BCR ACR	BORING COMPLETED	10/24/86	DRAWN BY AN	SHEET NO. 1 OF 1
WL		RIG CME-75 FOREMAN	GD	APP'D BY DCJ	STS JOB NO. 94026

BL-S-0184

Figure 4. Soil Boring Log, Drift Aquifer Gradient Control Well

STS Consultants Ltd.

PROJECT NAME	ARCHITECT-ENGINEER
Proposed Well House	ERT

SITE LOCATION: St. Louis Park, Minnesota

DEPTH in feet / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL / SURFACE ELEVATION	UNIT DRY WT. LBS./FT.³	UNCONFINED COMPRESSIVE STRENGTH TONS·FT² (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/FT (10 20 30 40 50)
	1	SS			Fine to medium sand, little silt, trace gravel - brown - moist - medium dense - (SM)		50/1"
	2	SS					35
5.0	3	SS			Fine to medium sand, trace coarse sand and gravel, trace silt - brown - dense to medium dense -(SP)		20
	4	SS			Fine sand, trace silt and medium sand - brown - moist - medium dense - (SP)		15
10.0 / 11.0	5	SS					14
					End of boring at 11.0 ft. Power augered to full depth.		

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL Dry WS OR WD	BORING STARTED 9/29/86	STS OFFICE Minnesota	
WL BCR ACR	BORING COMPLETED 9/29/86	DRAWN BY KC	SHEET NO. 1 OF 1
WL Dry AB	RIG CME-45 FOREMAN GD	APP'D BY WBT	STS JOB NO. 94026

BL: 1-983

Figure 4, cont'd.

STS Consultants Ltd.

PROJECT NAME	ARCHITECT—ENGINEER
Proposed Well House	ERT, Inc.

SITE LOCATION: St. Louis Park, Minnesota

DEPTH	ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)	PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50)	STANDARD PENETRATION BLOWS/FT. (10 20 30 40 50)
						SURFACE ELEVATION				
5.0						Hollow stem augered to 14.0 feet - see log of boring #1 for soil conditions above 14.0 feet				
10.0										
15.0		1	SS			Fine to medium sand, trace coarse sand and silt - brown - moist - medium dense - (SP)				22
		2	SS			Clayey sand, some silt, trace gravel - brown - moist - medium dense - (SC)				24
20.0		3	SS			Fine sand, trace silt - brown - moist - medium dense (estimated) cobble at 19.75 feet - (SP)				129
		4	SS			Clayey silt, trace interbedded sand seams - grayish brown - wet to saturated - medium dense (ML - CL)				56
25.0		5	SS			Silty fine to medium sand, trace gravel and coarse sand - brown - saturated - medium dense to very dense - (SM)				52
		6	SS							17
30.0		7	SS							50
		8	SS							8
35.0		9	SS							47
		10	SS							101
40.0		11	SS							70
		12	SS							88
45.0		13	SS							79
		14	SS							51
50.0		15	SS							69
		16	SS							76
55.0						Continued on next page				

*THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

STS. JOB NO. 94026-B | SHEET NO. 1 OF 2

BL 1 088

Figure 4, cont'd.

STS Consultants Ltd.

PROJECT NAME	ARCHITECT—ENGINEER
Proposed Well House	ERT, Inc.

SITE LOCATION: St. Louis Park, Minnesota

DEPTH / ELEVATION	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL / SURFACE ELEVATION	UNIT DRY WT. LBS./FT³	UNCONFINED COMPRESSIVE STRENGTH TONS/FT² (1 2 3 4 5)	PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50)	STANDARD PENETRATION BLOWS/FT. (10 20 30 40 50)	
					Continued from page 1					
55.0										
	17	SS								100/4"
	18	SS			Medium to coarse sand, trace silt, trace gravel - brownish gray - saturated - extremely dense - (SP - SM)					128/6"
60.0										
	19	SS								239
	20	SS			Faint chemical odor in sample #20					200/6"
65.0										
	21	SS			Fine to medium sand, trace silt - gray - saturated - extremely dense - (SP - SM)					134/6"
	22	SS								157/6"
70.0										
	23	SS								138/6"
	24	SS			Fine sand, trace medium sand and silt - gray - saturated - extremely dense - (SP - SM)					161/6"
75.0										
	25	SS								162/6"
	26	SS			Silty sand, trace gravel - brown - wet - extremely dense - (SM)					200/5"
80.0					Platteville limestone - inferred					
					End of boring at 80.0 ft. Hollow stem augered to 26.5 ft. Drilled with 2 15/16" rockbit and bentonite drilling fluid from 26.5 - 80.0 ft. Grouted hole with 50 gallons of neat cement grout.					

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN SITU, THE TRANSITION MAY BE GRADUAL.

WL 25.5 ft. WS	WS OR WD	BORING STARTED 3/25/87	STS OFFICE Minnesota		
WL BCR	ACR	BORING COMPLETED 3/26/87	DRAWN BY KC	SHEET NO. 2 OF 2	
WL		RIG CME-75 FOREMAN GD	APP'D BY WBT	STS JOB NO. 94026-B	

BL-5-01/84

JOHNSON SCREENS
P.O. Box 64118 • St. Paul, MN 55164
TEL. 612-636-3900 or 1-800-328-9891
TELEX 29-7451
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

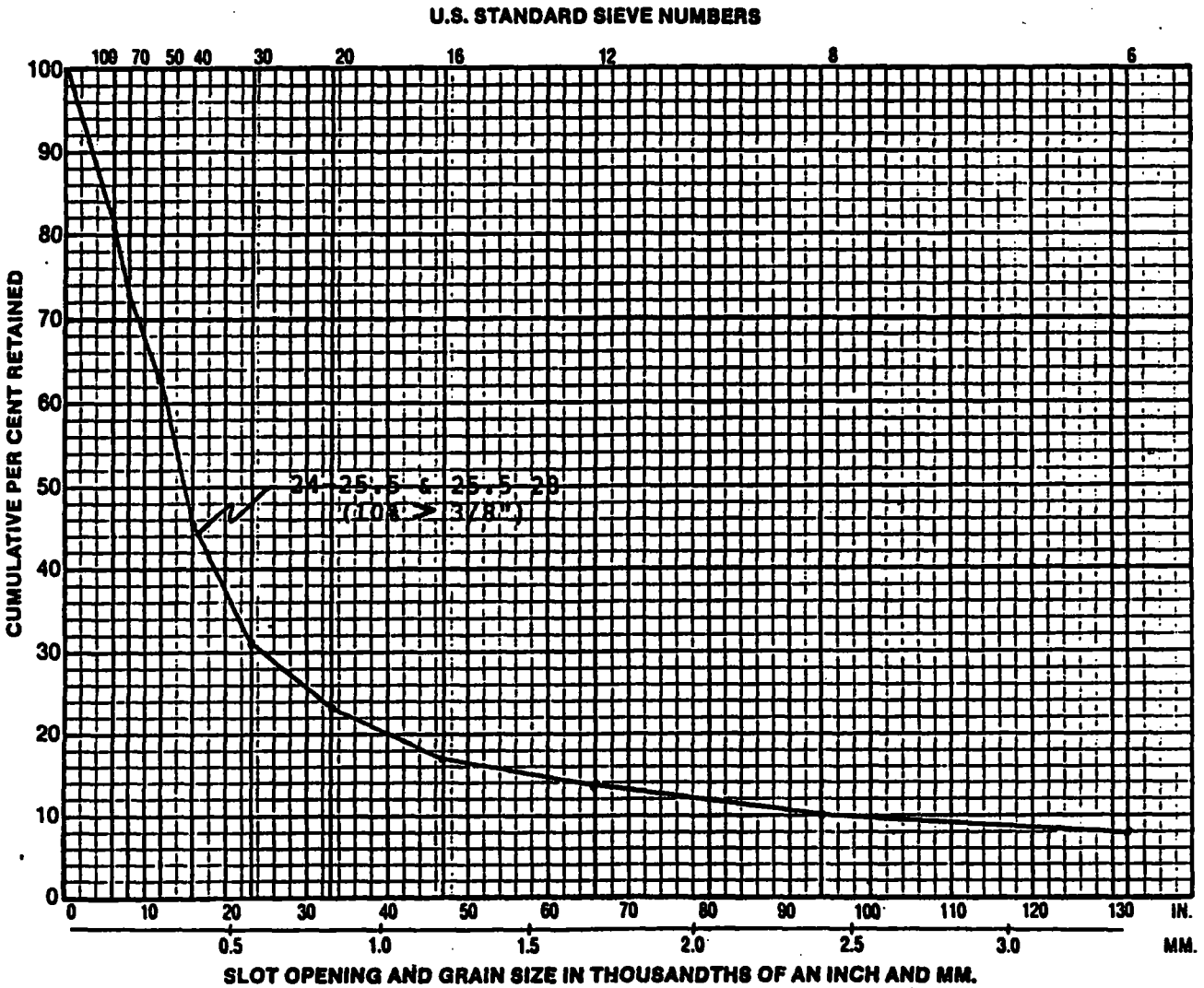
Job Name: Reilly Tar & Chemical Corporation Date: 31 March, 1987

City: St. Louis Park State: Minn Zip:

Driller: STS Consultants, Ltd. Phone:

Engineer: ERT, St. Louis Park, MN SWL=20 ft. Phone:

Remarks: Did not test 21.5-23, sandy clay (Gradient control well)



U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 24/26			
6	.132	3.36	8			
8	.094	2.38	10			
12	.066	1.68	14			
16	.047	1.19	17			
20	.033	0.84	23			
30	.023	0.60	31			
40	.016	0.42	45			
50	.012	0.30	63			
70	.008	0.21	73			
100	.006	0.15	81			

Comments: Utilize a gravel pack material similar in gradation to the #30 gravel from American Materials Corp., Eau Claire, Wisc., in conjunction w/a #40 slot screen.

SCREEN RECOMMENDATIONS: DIAM.

SLOT	SETTING	LENGTH
.040	53-78 ft.	25 ft.

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Figure 5. Sand Size Analysis Results, Drift Aquifer Gradient Control Well

JOHNSON SCREENS
P.O. Box 64118 • St. Paul, MN 55164
TEL. 612-636-3900 or 1-800-328-9891
TELEX 29-7451
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name _____ Date 31 March, 1987

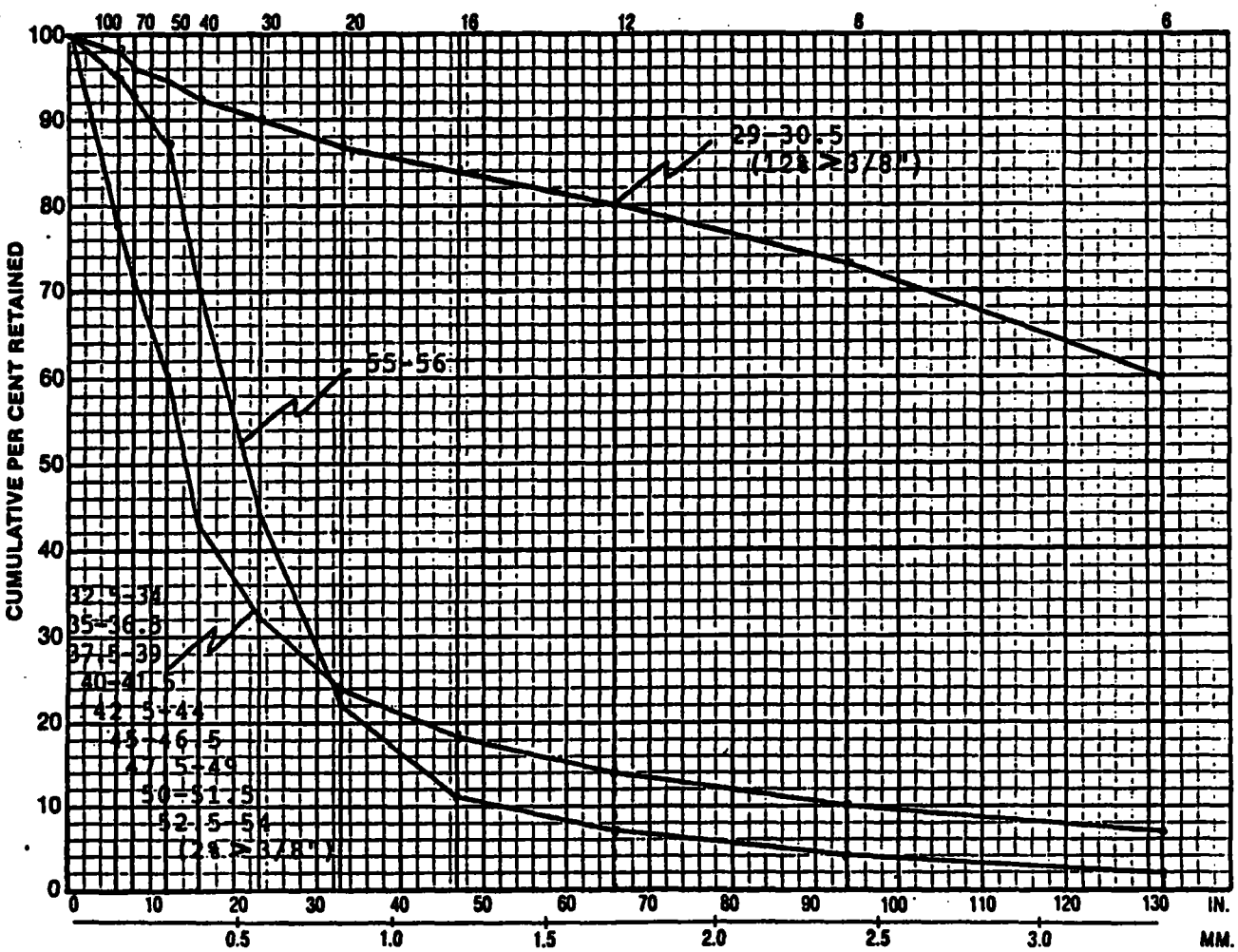
City _____ State _____ Zip _____

Driller _____ Phone _____

Engineer _____ Phone _____

Remarks _____

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 29-30.5	32.5/54	55-56	
6	.132	3.36	60	7	2	
8	.094	2.38	73	10	4	
12	.066	1.68	80	14	7	
16	.047	1.19	84	18	11	
20	.033	0.84	87	24	22	
30	.023	0.60	90	32	44	
40	.016	0.42	92	43	70	
50	.012	0.30	95	60	87	
70	.008	0.21	96	71	93	
100	.006	0.15	98	78	95	

Comments _____

SCREEN RECOMMENDATIONS: DIAM. _____

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Figure 5, cont'd.

P.O. Box 64118 • St. Paul, MN 55164
TEL. 612-636-3900 or 1-800-328-9891
TELEX 29-7451
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name _____ Date 31 March, 1987

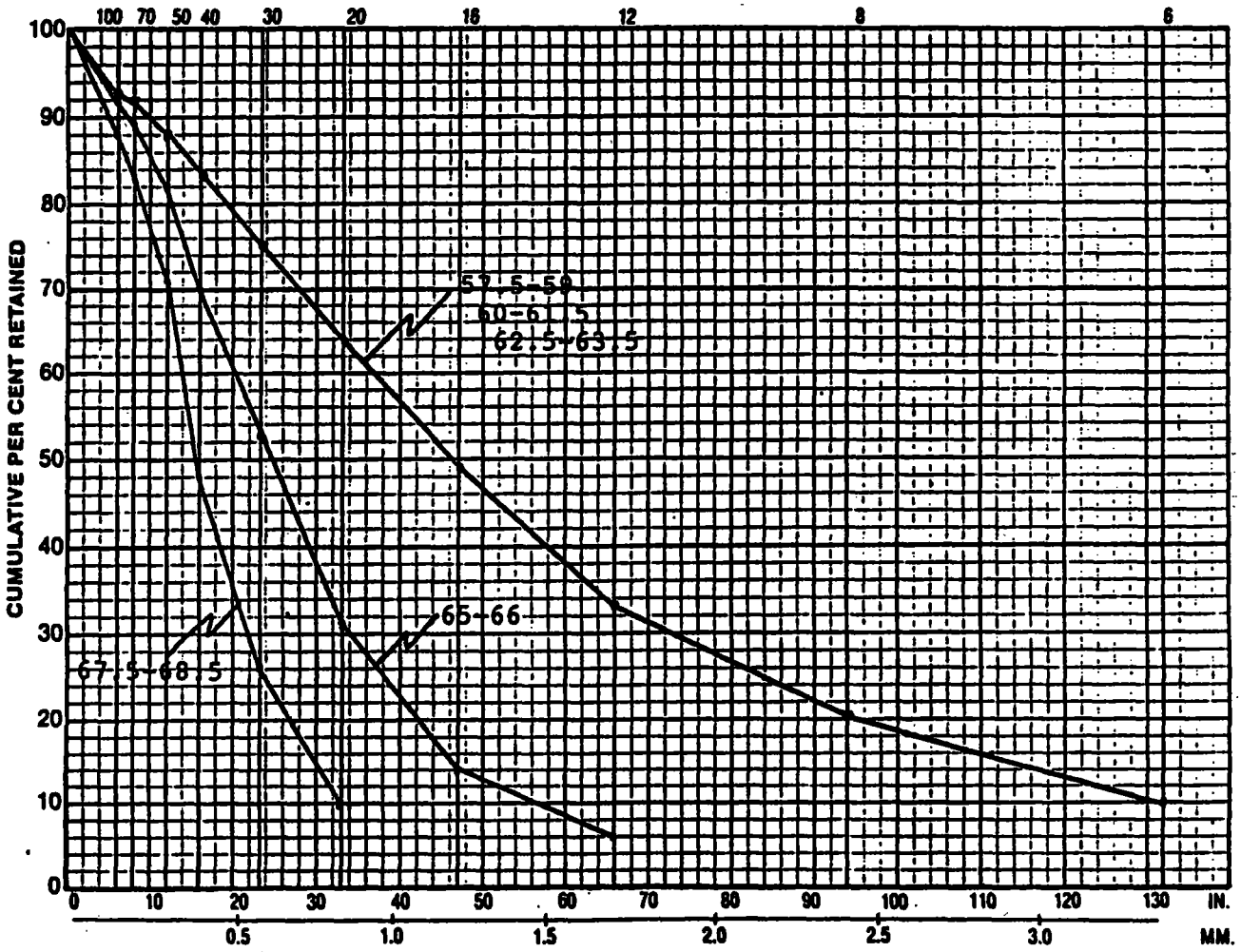
City _____ State _____ Zip _____

Driller _____ Phone _____

Engineer _____ Phone _____

Remarks _____

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 57.5/62.5	65-66	67.5-68.5	
6	.132	3.36	10			
8	.094	2.38	20			
12	.066	1.68	33	6		
16	.047	1.19	49	14		
20	.033	0.84	64	31	10	
30	.023	0.60	75	53	26	
40	.016	0.42	83	70	48	
50	.012	0.30	88	82	71	
70	.008	0.21	92	89	83	
100	.006	0.15	93	92	88	

Comments _____

SCREEN RECOMMENDATIONS: DIAM. _____

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Figure 5, cont'd.

P.O. Box 64118 • St. Paul, MN 55164
TEL. 612-636-3900 or 1-800-328-9891
TELEX 29-7451
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name _____ Date 31 March, 1987

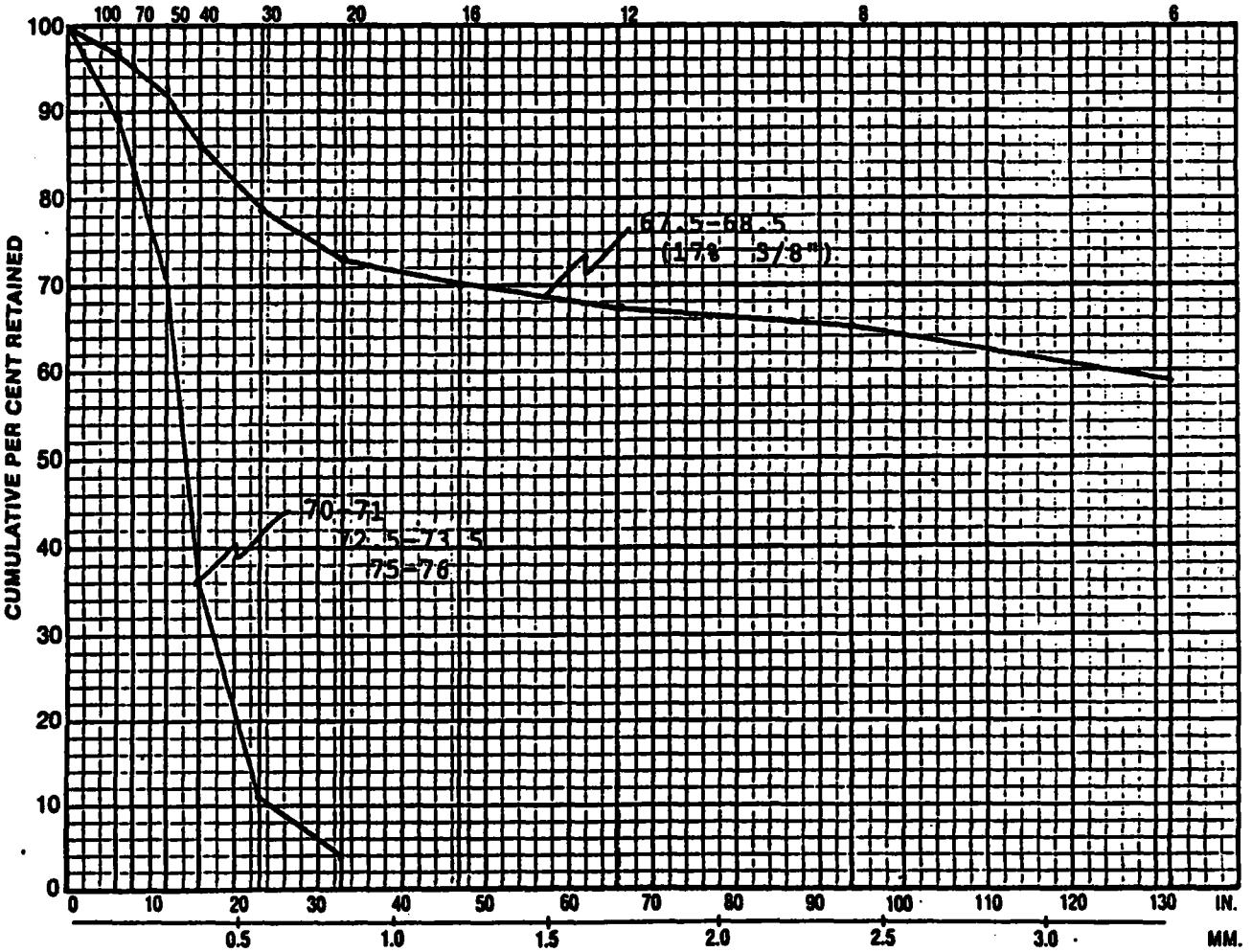
City _____ State _____ Zip _____

Driller _____ Phone _____

Engineer _____ Phone _____

Remarks _____

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 67.5-68.5	70/76		
6	.132	3.36	59			
8	.094	2.38	65			
12	.066	1.68	67			
16	.047	1.19	70			
20	.033	0.84	73	4		
30	.023	0.60	79	11		
40	.016	0.42	86	36		
50	.012	0.30	92	71		
70	.008	0.21	95	83		
100	.006	0.15	97	89		

Comments _____

SCREEN RECOMMENDATIONS: DIAM. _____

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Figure 5, cont'd.

P.O. Box 64118 • St. Paul, MN 55164
TEL. 612-636-3900 or 1-800-328-9891
TELEX 29-7451
SEND SAMPLES TO: 1950 OLD HWY 8, NEW BRIGHTON, MN 55112

SAND ANALYSIS

BY:

Job Name _____ Date 31 March, 1987

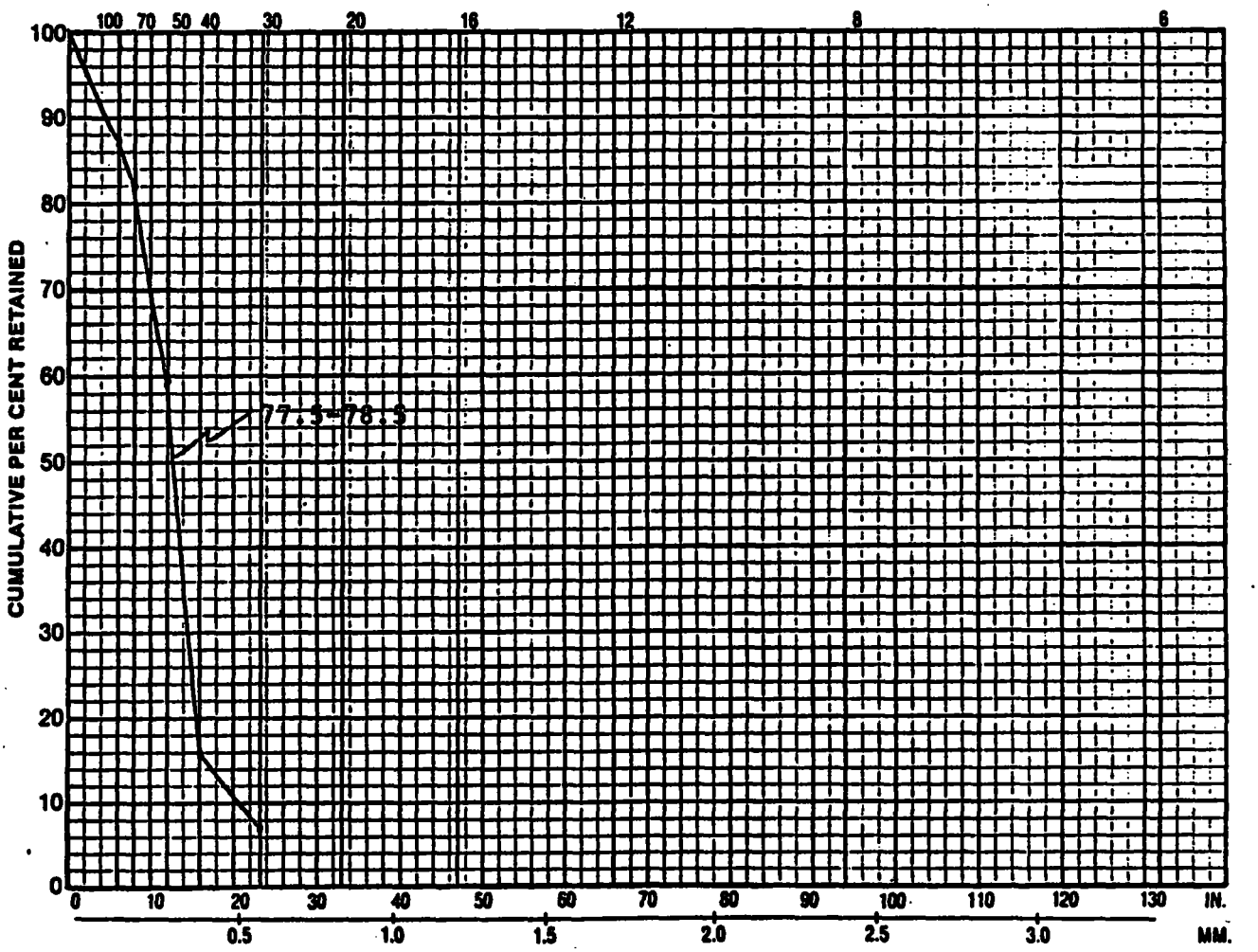
City _____ State _____ Zip _____

Driller _____ Phone _____

Engineer _____ Phone _____

Remarks _____

U.S. STANDARD SIEVE NUMBERS



SLOT OPENING AND GRAIN SIZE IN THOUSANDTHS OF AN INCH AND MM.

U.S. SIEVE NO.	SLOT OPENING IN.	SLOT OPENING MM	SAMPLE DEPTHS 77.5-85			
6	.132	3.36				
8	.094	2.38				
12	.066	1.68				
16	.047	1.19				
20	.033	0.84				
30	.023	0.60	7			
40	.016	0.42	16			
50	.012	0.30	59			
70	.008	0.21	82			
100	.006	0.15	87			

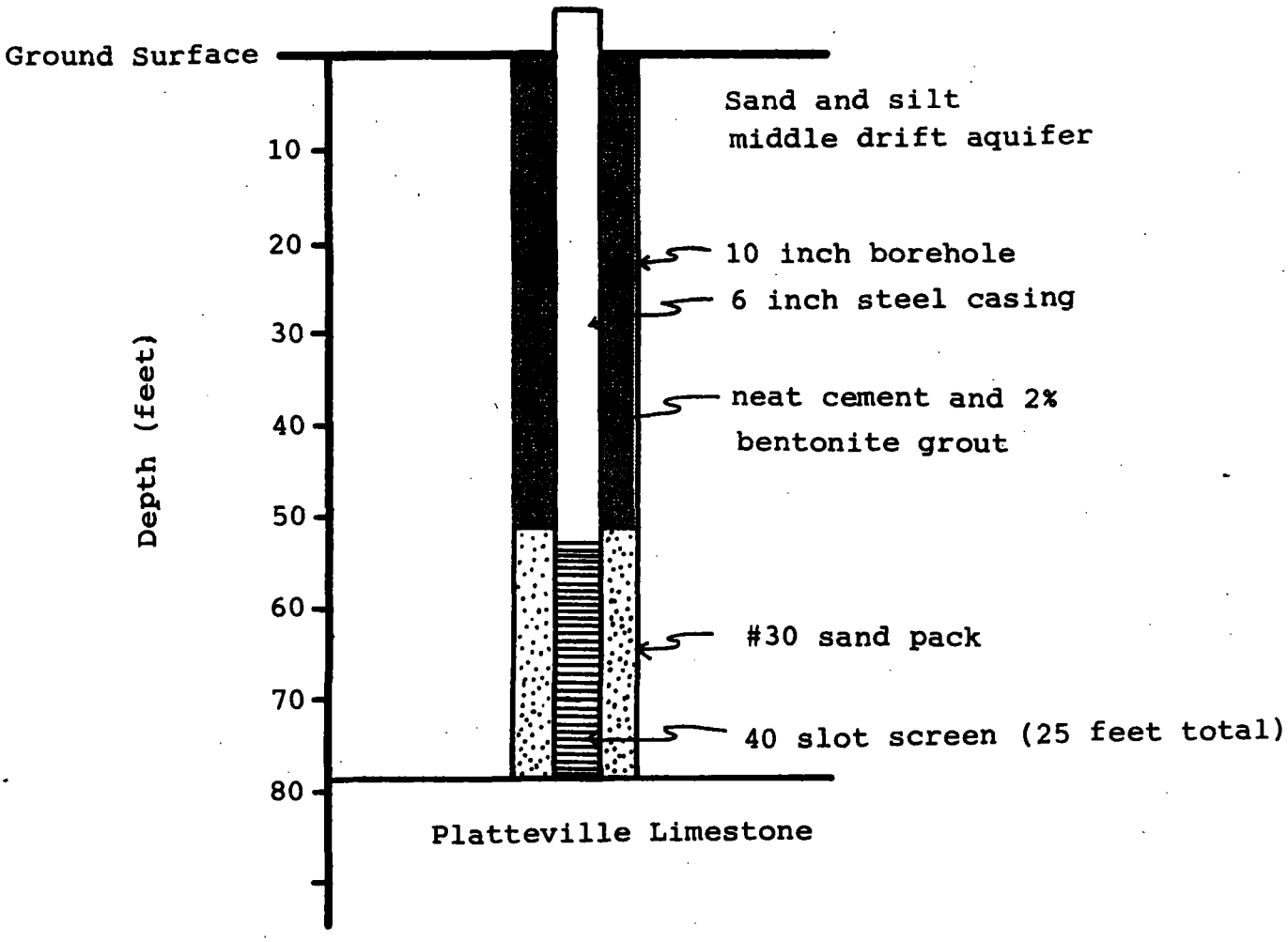
Comments _____

SCREEN RECOMMENDATIONS: DIAM. _____

SLOT	SETTING	LENGTH

SO MANY CONSIDERATIONS ENTER INTO THE MAKING OF A GOOD WELL THAT, WHILE WE BELIEVE SLOT SIZES FURNISHED OR RECOMMENDED FROM SAND SAMPLES ARE CORRECT WE ASSUME NO RESPONSIBILITY FOR THE SUCCESSFUL OPERATION OF ANY WELL.

Figure 5, cont'd.



Total Depth of Well = 78.8 feet

Figure 6. Recommended Design For Drift Aquifer Gradient Control Well

1/27/88
N.

CITY OF SAINT LOUIS PARK

February 8, 1988

Ms. Erin Moran
Remedial Project Leader
United States Environmental
Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Michael K. Vennewitz
Remedial Project Leader
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. John C. Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

RE: Interim Analyses - GAC Plant
St. Louis Park, Minnesota

Dear Project Leaders:

Enclosed is a laboratory analysis report summarizing the results of analyses completed on water taken from the City's GAC plant on January 11, 1988. The laboratory analyses were completed by ERT, Inc., at the direction of the City, pursuant to receipt of the results of analyses completed on samples taken in November, 1987. This information is submitted for information only, as information generated by CH_2M Hill is now being used for purposes of meeting the requirements of the Remedial Action Plan.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

ERT
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-119
ERT Proj. No. E631-066

environmental and engineering excellence

27 January 1988

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set 2GAC-8) received from the GAC plant on 12 January 1988. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
R. Gen.
P. Pelletier
M. Sparlin
+ disposition letter
S. Gerade
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 27 January 1988

Subject: SAMPLE RETENTION TERMS

Client: SLP Set 2GAC-8 (E631-066)

Date Samples Received: 12 January 1988

Number of Samples Received/Matrix: 5 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
27 January 1988

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET 2GAC-8

ERT PROJECT NO. E631-066
27 January 1988

PREPARED FOR

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Prepared by
Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 2GAC-8) received by the ERT Analytical Chemistry Laboratory on 12 January 1988. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/L (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 - 108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 94.5%, within the 20% - 150% target range. A review of the surrogate recoveries indicated that two naphthalene surrogate recoveries were slightly below the 95% confidence limits as required in the Plan. These were for the field blank and the method blank. All of the other samples, and in particular, the treated samples, were within the acceptable ranges. It is our opinion that the data as presented is an accurate representation. Analytical results for sample concentration were corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACT-8
2.	ERT SAMPLE NUMBER:	51342
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2873
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-8
2.	ERT SAMPLE NUMBER:	51343
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2885
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACFB-8
2.	ERT SAMPLE NUMBER:	51344
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2886
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACMS-8
2.	ERT SAMPLE NUMBER:	51345
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2884
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACF-8
2.	ERT SAMPLE NUMBER:	51346
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2895
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	51385; MB880034
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	1/11/88
5.	DATE RECEIVED:	1/12/88
6.	DATE EXTRACTED:	1/13/88
7.	DATE ANALYZED:	1/25/88
8.	GC/MS FILE #:	>2883
9.	GC/MS TAPE #:	NA
10.	CORRESPONDING DFTPP FILE #:	>2889
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 51345
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 51385
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 51386
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2890
15.	COMMENTS: NA = NOT AVAILABLE	

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-8 ERT NO: 51342

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	1.8
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	1.8

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	32.2
INDENE	<1.9
NAPHTHALENE	3.0
BENZO(B)THIOPHENE	2.1
INDOLE	ND
2-METHYLNAPHTHALENE	<1.6
1-METHYLNAPHTHALENE	<1.3
BIPHENYL	3.1
ACENAPHTHYLENE	8.8
ACENAPHTHENE	14.2
DIBENZOFURAN	3.5
FLUORENE	6.8
DIBENZOTHIOPHENE	0.77
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	<1.5
CARBAZOLE	<1.8
FLUORANTHENE	2.5
PYRENE	3.8
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	80.8
TOTAL PAH'S	82.6

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-8 ERT NO: 51343

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	5.2
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	<1.3
ACENAPHTHYLENE	2.4
ACENAPHTHENE	5.0
DIBENZOFURAN	1.7
FLUORENE	4.1
DIBENZOTHIOPHENE	0.62
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	2.4
PYRENE	3.4
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	24.8
TOTAL PAH'S	24.8

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-8 ERT NO: 51344

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	<2.0
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	<0.64
DIBENZOTHIOPHENE	<0.55
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	1.9
FLUORANTHENE	1.6
PYRENE	3.4
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	6.9
TOTAL PAH'S	6.9

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-8 ERT NO: 51345

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	18.3
BENZO(A)ANTHRACENE	ND
CHRYSENE	8.8
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	27.9
TOTAL CARCINOGENIC PAH	55.0

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	14.7
INDENE	23.1
NAPHTHALENE	104
BENZO(B)THIOPHENE	2.9
INDOLE	ND
2-METHYLNAPHTHALENE	20.5
1-METHYLNAPHTHALENE	ND
BIPHENYL	<1.3
ACENAPHTHYLENE	3.8
ACENAPHTHENE	4.6
DIBENZOFURAN	ND
FLUORENE	14.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	ND
BENZO(E)PYRENE	17.2
PERYLENE	ND
TOTAL OTHER PAH	205.2
TOTAL PAH'S	260.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 51385; MB880034

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	ND
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	ND
1-METHYLNAPHTHALENE	ND
BIPHENYL	ND
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	<0.64
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	1.3
PYRENE	2.1
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	3.4
TOTAL PAH'S	3.4

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACF-8 ERT NO: 51346

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	<2.6
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	954
INDENE	22.0
NAPHTHALENE	5.9
BENZO(B)THIOPHENE	63.6
INDOLE	1.0
2-METHYLNAPHTHALENE	1.9
1-METHYLNAPHTHALENE	6.5
BIPHENYL	11.3
ACENAPHTHYLENE	378
ACENAPHTHENE	705
DIBENZOFURAN	149
FLUORENE	430
DIBENZOTHIOPHENE	40.4
PHENANTHRENE	14.6
ANTHRACENE	13.0
ACRIDINE	9.8
CARBAZOLE	8.0
FLUORANTHENE	45.6
PYRENE	89.6
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	2949.2
TOTAL PAH'S	2949.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-8 ERT NO: 51345

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	100	104.0	104	>20%
FLUORENE	20	14.3	72	>20%
CHRYSENE	20	8.80	44	>10%
BENZO(G,H,I)PERYLENE	20	27.9	140	>10%
INDENE	20	23.1	116	>20%
QUINOLINE	20	18.3	92	>20%
BENZO(E)PYRENE	20	17.2	86	>10%
2-METHYLNAPHTHALENE	20	20.5	102	>20%
AVERAGE % RECOVERY			94.5	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%
1) Only one parameter may fall below its target recovery, per the QAPP.
* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-8 ERT NO: 51342

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	8.3	83	14-108
FLUORENE-D10	10.0	9.4	94	41-162
CHRYSENE-D12	10.0	8.6	86	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-8 ERT NO: 51343

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	2.0	20	14-108
FLUORENE-D10	10.0	9.2	92	41-162
CHRYSENE-D12	10.0	7.6	76	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-8 ERT NO: 51344

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	1.2	12*	14-108
FLUORENE-D10	10.0	9.3	93	41-162
CHRYSENE-D12	10.0	7.6	76	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-8 ERT NO: 51345

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	8.4	84	14-108
FLUORENE-D10	10.0	5.2	52	41-162
CHRYSENE-D12	10.0	5.5	55	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 51385; MB880034

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	1.0	10*	14-108
FLUORENE-D10	10.0	6.7	67	41-162
CHRYSENE-D12	10.0	7.8	78	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACF-8 ERT NO: 51346

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	6.5	65	14-108
FLUORENE-D10	10.0	9.8	98	41-162
CHRYSENE-D12	10.0	8.0	80	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
POLYAROMATIC HYDROCARBONS
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	2.60	1.70
BENZO(A)ANTHRACENE	4.30	2.80
CHRYSENE	2.60	1.70
BENZOFLUORANTHENES	1.40	0.90
BENZO(A)PYRENE	2.90	1.90
INDENO(1,2,3-CD)PYRENE	0.67	0.43
DIBENZ(A,H)ANTHRACENE	0.42	0.27
BENZO(G,H,I)PERYLENE	0.67	0.43

OTHER PAH'S

2,3-BENZOFURAN	2.00	1.30
2,3-DIHYDROINDENE	2.80	1.80
INDENE	1.90	1.20
NAPHTHALENE	2.00	1.30
BENZO(B)THIOPHENE	1.20	0.77
INDOLE	0.92	0.59
2-METHYLNAPHTHALENE	1.60	1.00
1-METHYLNAPHTHALENE	1.30	0.83
BIPHENYL	1.30	0.83
ACENAPHTHYLENE	1.00	0.64
ACENAPHTHENE	1.20	0.77
DIBENZOFURAN	0.69	0.44
FLUORENE	0.64	0.41
DIBENZOTHIOPHENE	0.55	0.35
PHENANTHRENE	3.70	2.40
ANTHRACENE	3.10	2.00
ACRIDINE	1.50	0.96
CARBAZOLE	1.80	1.20
FLUORANTHENE	0.97	0.62
PYRENE	0.74	0.47
BENZO(E)PYRENE	4.00	2.40
PERYLENE	1.20	0.77

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK -

Sampled 11 January 1988

E631-066

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City St. Louis Park Water Dept	City St. Louis Park
Project No.	Field Logbook No.
Sampler: (Signature) [signature]	Chain of Custody Tape No. 26815 26876

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPt PAH						REMARKS
2GAC T 011188	1-11-88	1350		4x 1L Amber	X						ERT# 51342
2GAC TD 011188		1355			X						51343
2GAC FB 011188		1300			X						51344
2GAC MS 011188		1320			X						51345
2GAC F 011188	1-11-88	1325			X						51346
											(4 Empty 4x1L Amber)

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	1-11-88	1350			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) [signature]	Date 1-12-88	Time 1020
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

Robert [illegible]
St. Louis Park Water Dept.
5005 Minn Blvd
St. Louis Park, MN 55416

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

№ 20888

1974-3-84

E631-066

SAMPLE RECEIPT CHECK LIST

Client: CITY OF ST LOUIS PARK

COC Record #(s): 20688

Matrix	Container	ERT #(s)
WATER	1 L AMBER	51342-46

1. Were samples shipped or hand-delivered?

   Notes: FED EX 4709377396

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: 26875, 26876

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

   Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☑ No ☐

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments: Stored in R7

Samples inspected and logged in by Scott Gerads Date 1-12-88

1/20/88
N.

Engineers
Planners
Economists
Scientists

RECEIVED
FEB 23 1988
CITY OF ST. LOUIS PARK

February 17, 1988

LM80053.XX

Mr. Jim Grube
City of St. Louis Park
Water Department
5005 Minnetoka Blvd.
St. Louis, Minnesota 55416

RE: Analytical Data for Laboratory Number 10452

Dear Mr. Grube:

On January 20, 1988, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

Engineers
Planners
Economists
Scientists

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10452001
Date Received : 01/21/88
Date Extracted: 01/25/88
Date Analyzed : 02/10/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 1/20/88 1320 GRAB 2GAC9-FB
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	BMDL	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	2.5	BMDL
Naphthalene	4.8	BMDL			
Benzo(b)thiophene	2.5	BMDL			
Quinoline	2.5	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5	BMDL			
1-Methylnaphthalene	2.5	BMDL			
Biphenyl	2.5	BMDL			
Acenaphthylene	2.5	BMDL			
Acenaphthene	3.3	BMDL			
Dibenzofuran	5	BMDL			
Fluorene	3.5	BMDL			
Dibenzothiophene	x	BMDL			
Phenanthrene	2.5	BMDL			
Anthracene	2.5	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.8	BMDL			
Fluoranthene	2.5	BMDL			
Pyrene	2.5	BMDL			
Benzo(a)anthracene	2.5	BMDL			
Chrysene/Triphenylene	2.5	BMDL			
Benzo(b & k)fluoranthene	2.5	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	2.5	BMDL			
Benzo(a)pyrene	2.5	BMDL			
Perylene	2.5	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.		1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	47		2 BMDL = BELOW METHOD DETECTION LIMIT		
				MTP	

Comments: x Detection Limit not determined.

Engineers
Planners
Economists
Scientists

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10452002
Date Received : 01/21/88
Date Extracted: 01/25/88
Date Analyzed : 02/10/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 1/20/88 1325 2GAC9-T
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	27	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	2.5	BMDL
Naphthalene	4.8	BMDL			
Benzo(b)thiophene	2.5	BMDL			
Quinoline	2.5	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5	BMDL			
1-Methylnaphthalene	2.5	BMDL			
Biphenyl	2.5	2.8			
Acenaphthylene	2.5	7.9			
Acenaphthene	3.3	18			
Dibenzofuran	5	BMDL			
Fluorene	3.5	7.4			
Dibenzothiophene	x	BMDL			
Phenanthrene	2.5	3.1			
Anthracene	2.5	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.8	BMDL			
Fluoranthene	2.5	2.5			
Pyrene	2.5	2.5			
Benzo(a)anthracene	2.5	BMDL			
Chrysene/Triphenylene	2.5	BMDL			
Benzo(b & k)fluoranthene	2.5	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	2.5	BMDL			
Benzo(a)pyrene	2.5	BMDL			
Perylene	2.5	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.		1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	81		2 BMDL = BELOW METHOD DETECTION LIMIT		
				MTP	

Comments: x Detection Limit not determined.

Engineers
Planners
Economists
Scientists

ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10452003
Date Received : 01/21/88
Date Extracted: 01/25/88
Date Analyzed : 02/10/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 1/20/88 1330 2GAC9-TD
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3 B	MDL
2,3-Dihydro-1H-Indene	3.5	24	Dibenzo(a,h)anthracene	3.5 B	MDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	2.5 B	MDL
Naphthalene	4.8	BMDL			
Benzo(b)thiophene	2.5	BMDL			
Quinoline	2.5	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5	BMDL			
1-Methylnaphthalene	2.5	BMDL			
Biphenyl	2.5	3.3			
Acenaphthylene	2.5	9.3			
Acenaphthene	3.3	19			
Dibenzofuran	5	BMDL			
Fluorene	3.5	7.7			
Dibenzothiophene	x	1			
Phenanthrene	2.5	2.6			
Anthracene	2.5	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.8	BMDL			
Fluoranthene	2.5	2.6			
Pyrene	2.5	2.6			
Benzo(a)anthracene	2.5	BMDL			
Chrysene/Triphenylene	2.5	BMDL			
Benzo(b & k)fluoranthene	2.5	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	2.5	BMDL			
Benzo(a)pyrene	2.5	BMDL			
Perylene	2.5	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	77		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				MTP	

Comments: x Detection Limit not determined.

1/14/88
N.

REILLY TAR & CHEMICAL CORPORATION

TELEPHONE: 317/638-7531
CABLE: RETAR INDIANAPOLIS
TELEX: 27-404

1510 MARKET SQUARE CENTER
151 NORTH DELAWARE STREET
INDIANAPOLIS, INDIANA 46204

February 4, 1988

RECEIVED
FEB 09 1988
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
OFFICE OF THE DIRECTOR

Ms. Erin Moran
Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, IL 60604

Mr. Michael K. Vennewitz
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Dear Erin and Mike:

Enclosed is a copy of ERT's report on the analysis of start-up water samples from W105 and W23. These samples were not required by the RAP, but were proposed in the approved construction plans for these wells. Both wells were started on November 5, with the reported samples collected on November 11, 1987. Cumulative pumpage at the time of sampling was 152,000 gallons for W105 and 280,000 for W23. Note that similar start-up samples were collected last month for the Drift-Platteville source and gradient control wells. I will send you ERT's results for these samples once I receive them.

Please let me know if you have any questions or suggestions on these items.

Very truly yours,

REILLY TAR & CHEMICAL CORPORATION

John Craun

John C. Craun
Senior Engineer,
Corporate Environmental Affairs

JCC:lt

cc: w/o enclosure

B. A. Comstock
W. M. Gregg
J. N. Grube
R. Polack

ANALYSIS OF WATER SAMPLES
FROM
REILLY TAR AND CHEMICAL

ERT PROJECT NO.0005-453
January 14, 1988

PREPARED FOR

B. Gregg
ERT, St. Louis Park, MN

Prepared by
Analytical Chemistry Laboratory
ERT, A Resource Engineering Company
33 Industrial Way, Wilmington, Massachusetts 01887

ANALYSIS OF SAMPLES
FROM
REILLY TAR AND CHEMICAL

INTRODUCTION

This report represents the results of analysis conducted on various water samples received by the ERT Analytical Chemistry Laboratory on November 12, 1987. The samples were to be selectively analyzed for PAH (ppb).

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition.

Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in:

a. Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, 40 CFR Part 136.
b. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised, March, 1983.
c. Standard Methods for the Examination of Water and Wastewater, 16th Edition, APHA, 1985.

QUALITY CONTROL PROCEDURES

Standard quality control procedures were implemented for all analyses. Laboratory reagent (method) blanks, laboratory duplicated samples, and laboratory fortified control samples were analyzed concurrently with each case of submitted samples. The laboratory normally prepares and analyzes one (1) blank, one (1) fortified sample, and one (1) duplicate sample for each case of samples received or for each twenty (20) samples, whichever is more frequent. A case consists of a finite, usually predetermined number of samples collected over a given time period from one particular site. Duplicate sample analyses are performed only when sufficient sample volume is received. The results of the analyses are reviewed by the laboratory quality control coordinator to insure compliance with established analytical control limits.

Laboratory prepared method blank samples and fortified samples are identified in the analytical result tables under the Field Identification number using a unique numbering system and also assigning one ERT sample number to each sample. The Prefix "MB" refers to Method Blank, and "LF" refers to Laboratory Fortification (i.e., a quality control recovery sample).

In most cases, the analytical results will have been corrected using mean method blank results.

RESULTS OF ANALYSIS

Analytical results for the submitted samples are presented in the appended tables. Summary tables for the results of duplicate, blank, and fortified control samples have also been provided in the Appendix.

DISCUSSION

Review of the results of the quality control/quality assurance samples analyzed concurrently with the submitted samples indicated that the analyses were within the acceptance criteria as established by the U.S. EPA. It should be noted that both samples are reported in duplicate. Also, the Naphthlene concentration in sample W-23 was above the linear range of the instrument. Insufficient sample extract volume precluded reanalysis.

DATA AND REPORT APPROVAL FORM

SUBMITTED BY:

Analytical Chemistry Laboratory
ERT A Resource Engineering Company
33 Industrial Way
Wilmington, MA 01887
January 14, 1988

DATA AUDITED BY:

M. S. Sparlin

Quality Control Coordinator

REPORT APPROVED BY:

A. P. Paradice

Laboratory Manager

PAH (ppb) ANALYSES IN WATER

Summary of Analytical Results

Method Blank Results

Quality Control Check Sample Results

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49843
FLD ID : W-105
DATE ANALYZED : 12/04/87

CLIENT : REILLY TAR CHEMICAL CORP.
SAMPLING SITE : ST. LOUIS PARK,MN
DATE SAMPLED : 11/11/87
DATE EXTRACTED : 11/18/87

PARAMETER	RESULT (UG/L)
2,3-BENZOFURAN	<2.1
2,3-DIHYDROINDENE	2.9
INDENE	2.5
NAPHTHALENE	42.0
BENZO(B)THIOPHENE	2.0
QUINOLINE	<2.8
INDOLE	<2.7
2-METHYLNAPHTHALENE	20.1
1-METHYLNAPHTHALENE	14.7
BIPHENYL	4.2
ACENAPHTHYLENE	4.5
ACENAPHTHENE	8.6
DIBENZOFURAN	8.0
FLUORENE	8.8
DIBENZOTHIOPHENE	<3.1
PHENANTHRENE	11.3
ANTHRACENE	<2.3
ACRIDINE	<3.4
CARBAZOLE	<2.7
FLUORANTHENE	<2.2
PYRENE	<2.2
BENZ(A)ANTHRACENE	<3.1
CHRYSENE	<3.1
BENZOFLUORANTHENES	<10.0
BENZ(E)PYRENE	<2.5
BENZ(A)PYRENE	<2.0
PERYLENE	<2.6
INDENO(123,CD)PYRENE	<2.4
DIBENZ(A,H)ANTHRACENE	<2.0
BENZO(G,H,I)PERYLENE	<2.0
	129.6

SURROGATES, % RECOVERY

NAPHTHALENE, D8	58
FLUORENE, D10	59
CHRYSENE, D12	-5

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49844
FLD ID : W-105
DATE ANALYZED : 12/04/87

CLIENT : REILLY TAR CHEMICAL CORP.
SAMPLING SITE : ST. LOUIS PARK,MN
DATE SAMPLED : 11/11/87
DATE EXTRACTED : 11/18/87

PARAMETER	RESULT (UG/L)
2,3-BENZOFURAN	<2.1
2,3-DIHYDROINDENE	<2.6
INDENE	<2.5
NAPHTHALENE	25.1
BENZO(B)THIOPHENE	<1.9
QUINOLINE	<2.8
INDOLE	<2.7
2-METHYLNAPHTHALENE	12.0
1-METHYLNAPHTHALENE	8.4
BIPHENYL	<2.8
ACENAPHTHYLENE	2.6
ACENAPHTHENE	5.4
DIBENZOFURAN	5.3
FLUORENE	5.0
DIBENZOTHIOPHENE	<3.1
PHENANTHRENE	7.8
ANTHRACENE	<2.3
ACRIDINE	<3.4
CARBAZOLE	<2.7
FLUORANTHENE	<2.2
PYRENE	<2.2
BENZ(A)ANTHRACENE	<3.1
CHRYSENE	<3.1
BENZOFLUORANTHENES	<10.0
BENZ(E)PYRENE	<2.5
BENZ(A)PYRENE	<2.0
PERYLENE	<2.6
INDENO(123,CD)PYRENE	<2.4
DIBENZ(A,H)ANTHRACENE	<2.0
BENZO(G,H,I)PERYLENE	<2.0
	71.6

SURROGATES, % RECOVERY	
NAPHTHALENE, D8	39
FLUORENE, D10	41
CHRYSENE, D12	46

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49845
FLD ID : W-23
DATE ANALYZED : 12/04/87

CLIENT : REILLY TAR CHEMICAL CORP.
SAMPLING SITE : ST. LOUIS PARK,MN
DATE SAMPLED : 11/11/87
DATE EXTRACTED : 11/18/87

PARAMETER	RESULT (UG/L)
2,3-BENZOFURAN	10.9
2,3-DIHYDROINDENE	50.2
INDENE	61.1
NAPHTHALENE	>135.0
BENZO(B)THIOPHENE	31.7
QUINOLINE	<2.8
INDOLE	<2.7
2-METHYLNAPHTHALENE	50.4
1-METHYLNAPHTHALENE	53.5
BIPHENYL	14.4
ACENAPHTHYLENE	7.4
ACENAPHTHENE	39.6
DIBENZOFURAN	24.2
FLUORENE	26.8
DIBENZOTHIOPHENE	<3.1
PHENANTHRENE	33.5
ANTHRACENE	4.0
ACRIDINE	<3.4
CARBAZOLE	<2.7
FLUORANTHENE	8.2
PYRENE	6.2
BENZ(A)ANTHRACENE	<3.1
CHRYSENE	<3.1
BENZOFLUORANTHENES	<10.0
BENZ(E)PYRENE	<2.5
BENZ(A)PYRENE	<2.0
PERYLENE	<2.6
INDENO(123,CD)PYRENE	<2.4
DIBENZ(A,H)ANTHRACENE	<2.0
BENZO(G,H,I)PERYLENE	<2.0
	422.1 plus >135

SURROGATES, % RECOVERY

NAPHTHALENE, D8	84
FLUORENE, D10	100
CHRYSENE, D12	80

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49846
FLD ID : W-23
DATE ANALYZED : 12/04/87

CLIENT : REILLY TAR CHEMICAL CORP.
SAMPLING SITE : ST. LOUIS PARK,MN
DATE SAMPLED : 11/11/87
DATE EXTRACTED : 11/18/87

PARAMETER	RESULT (UG/L)
2,3-BENZOFURAN	10.9
2,3-DIHYDROINDENE	49.9
INDENE	62.5
NAPHTHALENE	>130.0
BENZO(B)THIOPHENE	31.5
QUINOLINE	<2.8
INDOLE	<2.7
2-METHYLNAPHTHALENE	51.4
1-METHYLNAPHTHALENE	56.3
BIPHENYL	15.4
ACENAPHTHYLENE	3.1
ACENAPHTHENE	40.6
DIBENZOFURAN	25.8
FLUORENE	26.1
DIBENZOTHIOPHENE	<3.1
PHENANTHRENE	32.0
ANTHRACENE	4.1
ACRIDINE	<3.4
CARBAZOLE	<2.7
FLUORANTHENE	8.3
PYRENE	6.4
BENZ(A)ANTHRACENE	<3.1
CHRYSENE	<3.1
BENZOFLUORANTHENES	<10.0
BENZ(E)PYRENE	<2.5
BENZ(A)PYRENE	<2.0
PERYLENE	<2.6
INDENO(123,CD)PYRENE	<2.4
DIBENZ(A,H)ANTHRACENE	<2.0
BENZO(G,H,I)PERYLENE	<2.0
	429.3 + >130

SURROGATES, % RECOVERY

NAPHTHALENE, D8	85
FLUORENE, D10	90
CHRYSENE, D12	85

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49938 CLIENT : REILLY TAR CHEMICAL CORP.

LAB ERT NO : LF871285 PROJECT NO : 0005-453

EXTRACTION DATE : 11/18/87 ANALYSIS DATE : 12/04/87

NO.	COMPOUND	SPIKED CONC. (UG/L)	SAMPLE CONC. (UG/L)	% RECOVERY
4	INDENE	53.6	39.5	74
6	NAPHTHALENE	53.7	39.4	73
8	QUINOLINE	52.2	41.8	80
10	2-METHYLNAPHTHALENE	50.6	35.7	70
12	FLUORENE	51.6	45.4	88
20	CHRYSENE	55.8	47.7	85
31	BENZ(E)PYRENE	53.5	53.4	100
36	BENZO(G,H,I)PERYLENE	53.8	42.9	80

	SURROGATES	EXP. CONC.	OBS. CONC.	% RECOVERY
5	NAPHTHALENE, D8	20.0	17.7	89
9	FLUORENE, D10	20.0	19.9	100
19	CHRYSENE, D12	20.0	19.4	97

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS IN WATER

PROJECT NO: 0005-453

ERT NO : 49979
FILE ID : MS870954
DATE ANALYZED : 12/04/87

CLIENT : REILLY TAR CHEMICAL CORP.
SAMPLING SITE : ERT,WILMINGTON,MA
DATE SAMPLED : 11/18/87
DATE EXTRACTED : 11/16/87

PARAMETER	RESULT (UG/L)
2,3-BENZOFURAN	<2.1
2,3-DIHYDROINDENE	<2.6
INDENE	<2.5
NAPHTHALENE	<2.2
BENZO(B)THIOPHENE	<1.9
QUINOLINE	<2.8
INDOLE	<2.7
2-METHYLNAPHTHALENE	<2.8
1-METHYLNAPHTHALENE	<2.9
BIPHENYL	<2.8
ACENAPHTHYLENE	<2.5
ACENAPHTHENE	<2.2
DIBENZOFURAN	<2.0
FLUORENE	<3.0
DIBENZOTHIOPHENE	<3.1
PHENANTHRENE	<2.6
ANTHRACENE	<2.3
ACRIDINE	<3.4
CARBAZOLE	<2.7
FLUORANTHENE	<2.2
PYRENE	<2.2
BENZO(A)ANTHRACENE	<3.1
CHRYSENE	<3.1
BENZOFLUORANTHENES	<10.0
BENZO(E)PYRENE	<2.5
BENZO(A)PYRENE	<2.0
PERYLENE	<2.6
INDENO(123,CD)PYRENE	<2.4
DIBENZ(A,H)ANTHRACENE	<2.0
BENZO(G,H,I)PERYLENE	<2.0

SURROGATES, % RECOVERY	
NAPHTHALENE, D8	94
FLUORENE, D10	99
CHRYSENE, D12	83

CHAIN-OF-CUSTODY RECORD

REILLY TAR AND CHEMICAL

ST. LOUIS PARK, MN

SAMPLE RECEIPT CHECK LIST

Client: Reilly Tar + Chemical

COC Record #(s): 7787

Matrix	Container	ERT #(s)
Ground Water	1 liter Amb	49843 - 49846

1. Were samples shipped or hand-delivered?

   Notes: FED. EX. - 4901307563

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☐ No ☑

   Notes:

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes:

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

Stored in R6

Samples inspected and logged in by Scott Gerade Date 11-13-87

3013 2 86

CHAIN OF CUSTODY RECORD

Client/Project Name: REILLY TAR & Chemical Corp	Project Location: ST. LOUIS PARK
Project No.: D7 22-290	Field Logbook No.: NONE See WMG book 2 ETCC
Sampler: (Signature) William M Gregg	Chain of Custody Tape No.

ANALYSES: PAH, TPH, PCB

Sample No./ Identification	Date	Time	Lab Sample Number (EAT #5)	Type of Sample	PAH	TPH	PCB				REMARKS
W105	11/11/87	15:45	49843	groundwater	X						collected one extra
W105	11/11/87	15:45	49844	groundwater	X						liter, just for kicks
W23	11/11/87	15:55	49845	groundwater	X						collected one extra
W23	11/11/87	15:55	49846	groundwater	X						liter

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
William M. Gregg	11/11/87				
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Scott Gerade	Date 11-13-87	Time 3:30 PM
Sample Disposal Method:			Disposed of by: (Signature)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ERT

Nº 7787

1974 3 84

1/14/88
N.

CITY OF SAINT LOUIS PARK

January 14, 1988

Ms. Erin Moran
Remedial Project Leader
United States Environmental
Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Michael K. Vennewitz
Remedial Project Leader
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. John C. Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

RE: Interim Sampling - GAC Plant
Sampling of SLP-6
St. Louis Park, Minnesota

Dear Project Leaders:

Enclosed are copies of the results of analyses completed on water samples taken from the City's GAC plant November 24, and December 21, 1987. The analyses were completed by CH^2M Hill pursuant to letters of confirmation issued by the City to Project Leaders Moran, Vennewitz, and Craun on December 1 and December 23, 1987.

Also enclosed is a copy of an analytic report issued by ERT, Inc. pursuant to receipt of GAC water and SLP-6 water samples taken November 24, 1987. The City chose to have ERT, Inc. analyze a split sample with CH^2M Hill to provide a comparison between laboratories. The SLP-6 sample was taken by the City "for information only" and is submitted for your files.

Finally, I have enclosed a spread sheet summary of the water sample analyses of the GAC treated effluent for your review. I believe this summary will be beneficial to you as you review the results of the November and December sampling events.

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

Please contact this office if you have any comments in regard to the submittal.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/cmr
Enclosure

cc: Dick Koppy (w/o enclosure)
Elizabeth Thompson (w/o enclosure)

Engineers
Planners
Economists
Scientists

January 11, 1988

MG12721.XX

Mr. Jim Grube
City of St. Louis Park
Water Department
5005 Minnetonka Blvd.
St. Louis, Minnesota 55416

RE: Analytical Data for Laboratory Number 10196

Dear Mr. Grube:

On November 25, 1987, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

CH2M HILL Montgomery Office 2567 Fairlane Drive, P.O. Box 230548, Montgomery, Alabama 36116 205.271.1444

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10196001
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:00 GRAB 2 GAE 7-FB

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	5.8	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	23			
Benzo(b)thiophene	6.3	BMDL			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	22			
1-Methylnaphthalene	6.3	12			
Biphenyl	6.3	BMDL			
Acenaphthylene	6.3	BMDL			
Acenaphthene	3.3	BMDL			
Dibenzofuran	5.0	BMDL			
Fluorene	3.5	BMDL			
Dibenzothiophene	x	BMDL			
Phenanthrene	6.3	BMDL			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	BMDL			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	35		2 BMDL = BELOW METHOD DETECTION LIMIT		
				HK	

Comments: x Detection Limit not determined.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10196002
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:18 GRAB 2 GAE 7-T

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	84	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	4.5	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	22			
Benzo(b)thiophene	6.3	15			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	BMDL			
1-Methylnaphthalene	6.3	6.9			
Biphenyl	6.3	12			
Acenaphthylene	6.3	23			
Acenaphthene	3.3	55			
Dibenzofuran	5.0	23			
Fluorene	3.5	38			
Dibenzothiophene	x	2.8			
Phenanthrene	6.3	16			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	8.0			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT	REVIEW	
1-Fluoronaphthalene	34		2 BMDL = BELOW METHOD DETECTION LIMIT		
				HK	

Comments: x Detection Limit not determined.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10196003
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:24 GRAB 2 GAE 7-TD

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	39	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	20			
Benzo(b)thiophene	6.3	BMDL			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	BMDL			
1-Methylnaphthalene	6.3	BMDL			
Biphenyl	6.3	BMDL			
Acenaphthylene	6.3	7.9			
Acenaphthene	3.3	23			
Dibenzofuran	5.0	7.6			
Fluorene	3.5	14			
Dibenzothiophene	x	BMDL			
Phenanthrene	6.3	BMDL			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	BMDL			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	32		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: x Detection Limit not determined.

Engineers
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January 11, 1988

MG01801.XX

Mr. Jim Grube
City of St. Louis Park
Water Department
5005 Minnetonka Blvd.
St. Louis, Minnesota 55416

RE: Analytical Data for Laboratory Number 10318

Dear Mr. Grube:

On December 22, 1987, the CH2M HILL Montgomery Laboratory received four samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

CH2M HILL Montgomery Office 2567 Fairlane Drive, P.O. Box 230548, Montgomery, Alabama 36116 205.271.1444

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10318001
Date Received : 12/22/87
Date Extracted: 12/23/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 12/21/87 10:48 2GAC8-FD

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	*	BMDL	Indeno(1,2,3-cd)pyrene	1.7	BMDL
2,3-Dihydro-1H-Indene	1.4	1.5	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL
Naphthalene	1.9	3.7			
Benzo(b)thiophene	1.0	BMDL			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	*	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	2.0			
1-Methylnaphthalene	1.0	1.2			
Biphenyl	1.0	BMDL			
Acenaphthylene	1.0	BMDL			
Acenaphthene	1.3	BMDL			
Dibenzofuran	2.0	BMDL			
Fluorene	1.4	BMDL			
Dibenzothiophene	*	BMDL			
Phenanthrene	1.0	5.8			
Anthracene	1.0	BMDL			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	5.0			
Pyrene	1.0	4.2			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	*	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	*	BMDL			
SURROGATE RECOVERIES	% REC.		1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	135		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				HK	

Comments: * Detection Limit not determined.

Engineers
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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10318002
Date Received : 12/22/87
Date Extracted: 12/23/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 12/21/87 10:52 2GAC8-F

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	43	BMDL
2,3-Dihydro-1H-Indene	35	1600	Dibenzo(a,h)anthracene	35	BMDL
1H-Indene	25	89	Benzo(g,h,i)perylene	25	BMDL
Naphthalene	48	25			
Benzo(b)thiophene	25	590			
Quinoline	25	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	73	BMDL			
2-Methylnaphthalene	50	BMDL			
1-Methylnaphthalene	25	240			
Biphenyl	25	540			
Acenaphthylene	25	920			
Acenaphthene	33	1800			
Dibenzofuran	50	1100			
Fluorene	35	1900			
Dibenzothiophene	x	170			
Phenanthrene	25	850			
Anthracene	25	160			
Acridine	45	BMDL			
Phenanthridine	35	BMDL			
Carbazole	28	36			
Fluoranthene	25	350			
Pyrene	25	290			
Benzo(a)anthracene	25	BMDL			
Chrysene/Triphenylene	25	BMDL			
Benzo(b & k)fluoranthene	25	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	25	BMDL			
Benzo(a)pyrene	25	BMDL			
Perylene	25	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	106		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: x Detection Limit not determined.

Engineers
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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10318003
Date Received : 12/22/87
Date Extracted: 12/23/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 12/21/87 10:57 2GAC8-T

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	2.5
2,3-Dihydro-1H-Indene	1.4	57	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	26	Benzo(g,h,i)perylene	1.0	1.6
Naphthalene	1.9	3.3			
Benzo(b)thiophene	1.0	8.3			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	4.7			
Biphenyl	1.0	7.7			
Acenaphthylene	1.0	14			
Acenaphthene	1.3	33			
Dibenzofuran	2.0	13			
Fluorene	1.4	21			
Dibenzothiophene	x	1.8			
Phenanthrene	1.0	9.2			
Anthracene	1.0	1.6			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	4.6			
Pyrene	1.0	3.6			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	93		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: x Detection Limit not determined.

Engineers
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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10318004
Date Received : 12/22/87
Date Extracted: 12/23/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS PARK

Sample Description: 12/21/87 11:01 2GAC8-TD

Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	1.7	2.7
2,3-Dihydro-1H-Indene	1.4	60	Dibenzo(a,h)anthracene	1.4	BMDL
1H-Indene	1.0	3.0	Benzo(g,h,i)perylene	1.0	2.4
Naphthalene	1.9	3.0			
Benzo(b)thiophene	1.0	9.7			
Quinoline	1.0	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	2.9	BMDL			
2-Methylnaphthalene	2.0	BMDL			
1-Methylnaphthalene	1.0	5.4			
Biphenyl	1.0	9.0			
Acenaphthylene	1.0	16			
Acenaphthene	1.3	38			
Dibenzofuran	2.0	15			
Fluorene	1.4	27			
Dibenzothiophene	x	2.2			
Phenanthrene	1.0	12			
Anthracene	1.0	2.6			
Acridine	1.8	BMDL			
Phenanthridine	1.4	BMDL			
Carbazole	1.1	BMDL			
Fluoranthene	1.0	4.9			
Pyrene	1.0	3.6			
Benzo(a)anthracene	1.0	BMDL			
Chrysene/Triphenylene	1.0	BMDL			
Benzo(b & k)fluoranthene	1.0	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	1.0	BMDL			
Benzo(a)pyrene	1.0	BMDL			
Perylene	1.0	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	77		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: x Detection Limit not determined.

ERT®
A RESOURCE ENGINEERING COMPANY
696 VIRGINIA ROAD, CONCORD, MA 01742, (617) 369-8910

ERT Ref. No. 105-REB-111
ERT Proj. No. E631-062

environmental and engineering excellence

23 December 1987

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube:

Enclosed please find seven (7) copies of the report of analysis for the set of water samples (set 2GAC-7) received from the GAC plant on 25 November 1987. Results of these analyses are contained in the attached report. This report is submitted in accordance with the requirements of the Remedial Action Plan and the Quality Assurance Project Plan.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Robert E. Bentley
Quality Control Manager
National Laboratory Services

REB

cc:
letter only
A. Paradice
R. Gen.
P. Pelletier
M. Sparlin
T. Trainor
+ disposition letter
M. Lynn
+ report
W. Gregg
Chemistry File

ERT
33 Industrial Way
Wilmington, MA 01887
(617) 657-4290

From: LABORATORY MANAGER

Date of Issuance: 23 December 1987

Subject: SAMPLE RETENTION TERMS

Client: SLP Set 2GAC-7 (E631-062)

Date Samples Received: 25 November 1987

Number of Samples Received/Matrix: 6 water

It is the policy of ERT to dispose of unanalyzed portions of samples thirty (30) days following submittal of the pertinent final analytical results report. This letter serves as notification that the above samples will be due for disposal.

Sample extracts for organic analyses will be archived for one (1) year. Separate notification will be sent to you prior to disposal of sample extracts.

A. ERT will return to you all unused samples at your expense (Federal Express), or

B. ERT will maintain custody of the samples at a cost of fifteen dollars ($15.00) per sample per quarter for refrigerated storage, and three dollars ($3.00) per sample per quarter for ambient storage. You will be billed in advance each quarter based upon the number of samples in storage at the beginning of the quarter. The minimum storage fee per project will be fifty dollars ($50.00) per quarter to cover administrative costs.

YOU MUST RETURN THIS LETTER TO THE LABORATORY MANAGER WITH PROPER AUTHORIZATION (i.e., Purchase Order Number, Federal Express Number, etc), SAMPLE OPTION, SIGNATURE AND DATE WITHIN THIRTY (30) DAYS OF ISSUANCE OR THE SAMPLES INDICATED ABOVE WILL BE DISPOSED.

OPTION: _____

AUTHORIZATION NO.: _____(Federal Express)

_____(Purchase Order)

SIGNATURE: _____

DATE: _____

DATA AND REPORT APPROVAL FORM

SUBMITTED BY: Analytical Chemistry Laboratory
ERT, Inc.
33 Industrial Way
Wilmington, MA 01887
23 December 1987

DATA SUBMITTED BY: Robert E. Bentley

Quality Control Manager/
Program Manager

DATA AUDITED BY: Marti Sparlin

Quality Control Coordinator

ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT SAMPLE SET 2GAC-7

ERT PROJECT NO. E631-062
23 December 1987

PREPARED FOR

Mr. James N. Grube
Director of Public Works
City of St. Louis Park
5005 Minnetonka Blvd.
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ANALYSIS OF TRACE PAH IN WATER SAMPLES FROM THE CITY OF ST. LOUIS PARK, MN GAC TREATMENT PLANT

INTRODUCTION

This report represents the results of analysis conducted on various water samples (set 2GAC-7) received by the ERT Analytical Chemistry Laboratory on 25 December 1987. The samples were to be analyzed for selected polyaromatic hydrocarbons (PAH) and heterocycles.

SAMPLE RECEIPT AND CHAIN OF CUSTODY

Routine inspection of the samples revealed them to be packaged properly and received in good condition. Upon receipt, information from the submitted samples was recorded in the Master Log Book (and the LIMS computer system) and assigned ERT Control Numbers. These unique sample labels were affixed to respective sample containers and subsequently utilized throughout the laboratory analysis procedures for positive traceability.

ANALYTICAL PROCEDURES

The water samples were analyzed according to procedures as outlined in ERT Standard Analytical Method (SAM) #020-6 "Analytical Method for Low-level PAH and Heterocycles in Water", as provided in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986.

QUALITY CONTROL PROCEDURES

Quality control procedures as described in the Quality Assurance Project Plan for Sampling and Analysis - GAC Plant Testing, June - August, 1986, ERT Document No. P-D209-129-1, July, 1986 (with revisions to the quality control procedures as revised by the City of St. Louis Park letter dated 21 August 1987) were implemented for all analyses. Laboratory method (reagent) blanks, laboratory solvent blanks, laboratory duplicated samples, and laboratory method spike (fortified control) samples were analyzed concurrently with the submitted samples based on the following frequency:

a) Laboratory method blank, 5% - one for every (20) samples submitted.

b) Laboratory solvent blank, 10% - one for every (10) samples submitted.

c) Laboratory method spikes, 5% - one for every (20) samples submitted.

All samples and quality control samples were fortified prior to extraction with selected deuterated PAH surrogate compounds, i.e., naphthalene-d8, fluorene-d10, and chrysene-d12, at a sample concentration level of approximately 10 ng/L (ppt). The following critieria, based on percent recovery, was to be utilized for the determination of data validity for each sample:

Surrogate	95% confidence limits
Naphthalene-d8	14 - 108
Fluorene-d10	41 - 162
Chrysene-d12	10 - 118

Various corrective action steps, as described in the QA plan, were to be initiated whenever the recovery of any one surrogate is found to be outside the 95% confidence limits.

RESULTS OF ANALYSIS

The sampling report, analytical results report, the method spike recovery report, and the surrogate recovery report, are presented in the attached tables.

DISCUSSION

The average recovery for the target compounds for the method spike sample was 103%, within the 20% - 150% target range. A review of the surrogate recoveries indicated that all of the surrogate recoveries for the samples were within the 95% confidence limits as required in the Plan. Review of the method blank sample indicated that the sample was inadvertently spiked with the matrix spiking solution. However, a review of the results obtained for both field blanks in this sample set suggested that there were few quantifiable PAH's present in the samples. Due to this situation, analytical results for sample concentration were not corrected for batch method blank results according to procedures as stated on page 17 of the QAPP, QAD209-129, July, 1986.

ERT ANALYTICAL LABORATORY

SAMPLING REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACT-7
2.	ERT SAMPLE NUMBER:	50226
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2786
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACTD-7
2.	ERT SAMPLE NUMBER:	50227
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2787
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACFB-7
2.	ERT SAMPLE NUMBER:	50225
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2785
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	>2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	2GACMS-7
2.	ERT SAMPLE NUMBER:	50228
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2784
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	SLP6-W
2.	ERT SAMPLE NUMBER:	50230
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2790
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	SLP6-FB
2.	ERT SAMPLE NUMBER:	50229
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2789
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY
SAMPLING REPORT
POLYAROMATIC HYDROCARBONS

1.	FIELD IDENTIFICATION:	Method Blank
2.	ERT SAMPLE NUMBER:	50331; MB870993
3.	FIELD LOGBOOK/PAGE NUMBER:	NA
4.	SAMPLING DATE:	11/24/87
5.	DATE RECEIVED:	11/25/87
6.	DATE EXTRACTED:	12/01/87
7.	DATE ANALYZED:	12/21/87
8.	GC/MS FILE #:	>2788
9.	GC/MS TAPE #:	RTE-053
10.	CORRESPONDING DFTPP FILE #:	>2780
11.	CORRESPONDING MATRIX SPIKE SAMPLE:	ERT # 50228
12.	CORRESPONDING METHOD BLANK SAMPLE:	ERT # 50331
13.	CORRESPONDING SOLVENT BLANK SAMPLE:	ERT # 50474
14.	CORRESPONDING GC/MS CALIBRATION FILE #:	> 2782

15. COMMENTS: NA = NOT AVAILABLE

ERT ANALYTICAL LABORATORY

METHOD SPIKE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANAYLYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
QUALITY CONTROL CHECK SAMPLES
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-7 ERT NO: 50228

PARAMETERS	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	TARGET
NAPHTHALENE	100	112.3	112	>20%
FLUORENE	20	25.3	126	>20%
CHRYSENE	20	9.94	50	>10%
BENZO(G,H,I)PERYLENE	20	12.4	62	>10%
INDENE	20	25.6	128	>20%
QUINOLINE	20	24.8	124	>20%
BENZO(E)PYRENE	20	23.0	115	>10%
2-METHYLNAPHTHALENE	20	20.8	104	>20%
AVERAGE % RECOVERY			103	20-150

AVERAGE % RECOVERY TARGET RANGE = 20%-150%

1) Only one parameter may fall below its target recovery, per the QAPP.

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY

ANALYTICAL RESULTS REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-7 ERT NO: 50226

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	68.0
INDENE	2.6
NAPHTHALENE	3.0
BENZO(B)THIOPHENE	11.0
INDOLE	ND
2-METHYLNAPHTHALENE	<1.6
1-METHYLNAPHTHALENE	5.9
BIPHENYL	9.5
ACENAPHTHYLENE	19.0
ACENAPHTHENE	33.0
DIBENZOFURAN	17.0
FLUORENE	24.0
DIBENZOTHIOPHENE	2.2
PHENANTHRENE	18.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	6.6
PYRENE	4.7
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	224.5
TOTAL PAH'S	224.5

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-7 ERT NO: 50227

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	<1.2
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	44.0
INDENE	2.8
NAPHTHALENE	3.8
BENZO(B)THIOPHENE	8.2
INDOLE	ND
2-METHYLNAPHTHALENE	2.0
1-METHYLNAPHTHALENE	5.1
BIPHENYL	7.4
ACENAPHTHYLENE	18.0
ACENAPHTHENE	29.0
DIBENZOFURAN	16.0
FLUORENE	24.0
DIBENZOTHIOPHENE	2.5
PHENANTHRENE	23.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	7.1
PYRENE	5.4
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	198.3
TOTAL PAH'S	198.3

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-7 ERT NO: 50225

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	3.8
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	1.7
1-METHYLNAPHTHALENE	<1.3
BIPHENYL	<1.3
ACENAPHTHYLENE	1.6
ACENAPHTHENE	<1.2
DIBENZOFURAN	<0.69
FLUORENE	1.1
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	0.97
PYRENE	1.6
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	10.8
TOTAL PAH'S	10.8

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-7 ERT NO: 50228

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	25.0
BENZO(A)ANTHRACENE	ND
CHRYSENE	9.9
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	12.0
TOTAL CARCINOGENIC PAH	46.9

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	73.0
INDENE	28.0
NAPHTHALENE	116
BENZO(B)THIOPHENE	13.0
INDOLE	ND
2-METHYLNAPHTHALENE	23.0
1-METHYLNAPHTHALENE	6.9
BIPHENYL	9.8
ACENAPHTHYLENE	20.0
ACENAPHTHENE	33.0
DIBENZOFURAN	19.0
FLUORENE	49.0
DIBENZOTHIOPHENE	2.8
PHENANTHRENE	19.0
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	6.9
PYRENE	4.8
BENZO(E)PYRENE	23.0
PERYLENE	ND
TOTAL OTHER PAH	447.2
TOTAL PAH'S	494.1

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK

ERT NO: 50331; MB870993

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	21.0
BENZO(A)ANTHRACENE	ND
CHRYSENE	13.0
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	21.0
TOTAL CARCINOGENIC PAH	55.0

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	<2.8
INDENE	24.0
NAPHTHALENE	110
BENZO(B)THIOPHENE	1.3
INDOLE	ND
2-METHYLNAPHTHALENE	21.0
1-METHYLNAPHTHALENE	1.9
BIPHENYL	ND
ACENAPHTHYLENE	ND
ACENAPHTHENE	ND
DIBENZOFURAN	0.75
FLUORENE	25.0
DIBENZOTHIOPHENE	ND
PHENANTHRENE	ND
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	<0.74
BENZO(E)PYRENE	43.0
PERYLENE	ND
TOTAL OTHER PAH	227.0
TOTAL PAH'S	282.0

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: SLP6W ERT NO: 50230

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	30.0
INDENE	3.5
NAPHTHALENE	6.4
BENZO(B)THIOPHENE	4.8
INDOLE	ND
2-METHYLNAPHTHALENE	3.6
1-METHYLNAPHTHALENE	2.3
BIPHENYL	2.2
ACENAPHTHYLENE	3.8
ACENAPHTHENE	7.2
DIBENZOFURAN	0.99
FLUORENE	1.4
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	1.3
PYRENE	1.4
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	68.9
TOTAL PAH'S	68.9

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
POLYAROMATIC HYDROCARBONS

FIELD ID: SLP6FB ERT NO: 50229

CARCINOGENIC PAH'S

PARAMETERS	ANALYTICAL RESULT (NG/L)
QUINOLINE	ND
BENZO(A)ANTHRACENE	ND
CHRYSENE	ND
BENZOFLUORANTHENES	ND
BENZO(A)PYRENE	ND
INDENO(1,2,3-CD)PYRENE	ND
DIBENZ(A,H)ANTHRACENE	ND
BENZO(G,H,I)PERYLENE	ND
TOTAL CARCINOGENIC PAH	ND

OTHER PAH'S

2,3-BENZOFURAN	ND
2,3-DIHYDROINDENE	ND
INDENE	ND
NAPHTHALENE	4.5
BENZO(B)THIOPHENE	ND
INDOLE	ND
2-METHYLNAPHTHALENE	1.9
1-METHYLNAPHTHALENE	<1.3
BIPHENYL	<1.3
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	ND
DIBENZOFURAN	ND
FLUORENE	0.77
DIBENZOTHIOPHENE	ND
PHENANTHRENE	<3.7
ANTHRACENE	ND
ACRIDINE	ND
CARBAZOLE	ND
FLUORANTHENE	ND
PYRENE	<0.97
BENZO(E)PYRENE	ND
PERYLENE	ND
TOTAL OTHER PAH	7.2
TOTAL PAH'S	7.2

ND = Concentration <95% Confidence Interval of MDL

ERT ANALYTICAL LABORATORY

SURROGATE RECOVERY REPORT

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACT-7 ERT NO: 50226

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	8.4	84	14-108
FLUORENE-D10	10.0	9.3	93	41-162
CHRYSENE-D12	10.0	6.2	62	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACTD-7 ERT NO: 50227

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	6.1	61	14-108
FLUORENE-D10	10.0	8.1	81	41-162
CHRYSENE-D12	10.0	6.6	66	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACFB-7 ERT NO: 50225

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	4.2	42	14-108
FLUORENE-D10	10.0	8.4	84	41-162
CHRYSENE-D12	10.0	7.1	71	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: 2GACMS-7 ERT NO: 50228

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	9.1	91	14-108
FLUORENE-D10	10.0	11.2	112	41-162
CHRYSENE-D12	10.0	6.4	64	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: METHOD BLANK ERT NO: 50331; MB870993

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	8.6	86	14-108
FLUORENE-D10	10.0	10.8	108	41-162
CHRYSENE-D12	10.0	7.8	78	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: SLP6W ERT NO: 50230

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	8.1	81	14-108
FLUORENE-D10	10.0	8.5	85	41-162
CHRYSENE-D12	10.0	7.0	70	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: SLP6FB ERT NO: 50229

SURROGATE	SPIKE LEVEL (NG/L)	OBSERVED LEVEL (NG/L)	% RECOVERY	95% CONF. LIMITS (%)
NAPHTHALENE-D8	10.0	7.4	74	14-108
FLUORENE-D10	10.0	7.5	75	41-162
CHRYSENE-D12	10.0	7.3	73	10-118

* = OUTSIDE CONTROL LIMITS

ERT ANAYTICAL LABORATORY

METHOD DETECTION LIMITS

CITY OF ST. LOUIS PARK, MN

PPT PAH ANALYSIS IN WATER

ERT ANALYTICAL LABORATORY
POLYAROMATIC HYDROCARBONS
METHOD DETECTION LIMITS

CARCINOGENIC PAH'S

PARAMETERS	MDL	0.64 MDL
QUINOLINE	2.60	1.70
BENZO(A)ANTHRACENE	4.30	2.80
CHRYSENE	2.60	1.70
BENZOFLUORANTHENES	1.40	0.90
BENZO(A)PYRENE	2.90	1.90
INDENO(1,2,3-CD)PYRENE	0.67	0.43
DIBENZ(A,H)ANTHRACENE	0.42	0.27
BENZO(G,H,I)PERYLENE	0.67	0.43

OTHER PAH'S

2,3-BENZOFURAN	2.00	1.30
2,3-DIHYDROINDENE	2.80	1.80
INDENE	1.90	1.20
NAPHTHALENE	2.00	1.30
BENZO(B)THIOPHENE	1.20	0.77
INDOLE	0.92	0.59
2-METHYLNAPHTHALENE	1.60	1.00
1-METHYLNAPHTHALENE	1.30	0.83
BIPHENYL	1.30	0.83
ACENAPHTHYLENE	1.00	0.64
ACENAPHTHENE	1.20	0.77
DIBENZOFURAN	0.69	0.44
FLUORENE	0.64	0.41
DIBENZOTHIOPHENE	0.55	0.35
PHENANTHRENE	3.70	2.40
ANTHRACENE	3.10	2.00
ACRIDINE	1.50	0.96
CARBAZOLE	1.80	1.20
FLUORANTHENE	0.97	0.62
PYRENE	0.74	0.47
BENZO(E)PYRENE	4.00	2.40
PERYLENE	1.20	0.77

CHAIN - OF - CUSTODY RECORDS

CITY OF ST. LOUIS PARK

Sampled 24 November 1987

E631-062

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK WATER DEPT	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (Signature)	Chain of Custody Tape No.
Michael J. Wiggin	24213 + 24217

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPE PAH						REMARKS
2GAC7-FB	11-24-87	10:00	ERT # 50225	4X1L AMBER	X						
2GAC7-T		11:18	50226	4X1L "	X						
2GAC7-TD		11:24	50227	4X1L "	X						
2GAC7-MS		11:28	50228	4X1L "	X						
SLPG FB		10:41	50229	4X1L "	X						SLPG FB 1 BANK NOT TRANSFERRED
SLPG W		10:45	50230	4X1L "	X						RETURN 1X1L AMBER
											EMPTY CAP WAS OFF

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael J. Wiggin	11-24-87	1:15			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
			Scott Gerade	11-25-87	10:00 A
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR
ROBERT BURKE
ST LOUIS PK WATER DEPT
5005 MINNETONKA BLVD
ST LOUIS PARK MN
55416

ANALYTICAL LABORATORY
Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

№ 20092

1974-3-84

ERT

SAMPLE RECEIPT CHECK LIST

Client: CITY OF ST. LOUIS PK. E631-062

COC Record #(s): 20092

Matrix	Container	ERT #(s)
WATER	1 L. Amber	50225-30

1. Were samples shipped or hand-delivered?

   Notes: FED EX. 4709377363

2. Was COC record present upon receipt of samples? Yes ☑ No ☐

   Notes:

3. Was COC tape present/unbroken on outer package? Yes ☑ No ☐

   Notes: 24213, 24217

4. Were samples received ambient or chilled?

   Notes:

5. Were any samples received broken/leaking (improperly sealed? Yes ☐ No ☑

   Notes:

6. Were samples properly preserved? Yes ☑ No ☐

   Notes:

7. Were COC types present/unbroken on samples? Yes ☐ No ☑

   Notes:

8. Any discrepancies between sample labels and COC records? Yes ☐ No ☑

   Notes: (1) SLP6 FB NOT RETURNED BECAUSE CAP WAS OFF RESULTING IN EMPTY BOTTLE.

9. Were samples received within holding times? Yes ☑ No ☐

   Notes:

Additional Comments:

STORED IN: 67

Samples inspected and logged in by Scott Gerade Date: 11-25-86

2013-2 86

GAC TREATED AND TREATED DUPLICATE SAMPLES

SAMPLE NO.	2GACT-1	2GACTD-1	2GACTD-1A	2GACT-2	2GACTD-2	2GACTD-2A	2GACT-3	2GACTD-3	2GACTD-3A	2GACT-4	2GACTD-4	2GACTD-4A	2GACT-5	2GACTD-5	2GACT-6	2GACTD-6	2GACT-7	2GACTD-7	HILLT-7	HILLTD-7	HILLT-8	HILLTD-8
SAMPLE DATE	08/13/87	08/13/87	08/13/87	08/19/87	08/19/87	08/19/87	08/26/87	08/26/87	08/26/87	09/02/87	09/02/87	09/02/87	09/15/87	09/15/87	10/13/87	10/13/87	11/24/87	11/24/87	11/24/87	11/24/87	12/21/87	12/21/87
CARCINOGENS																						
Quinoline	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benz (A) Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzofluoranthenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (A) Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno (1,2,3-CD) Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<1.2	ND	ND	2.5	2.7
Dibenz (A,H) Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (G,H,I) Peryene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	2.4
CARCINOGENS TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.10	5.10
OTHER PAH																						
2,3-Benzofuran	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,3-Dihydroindene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.60	ND	11.00	26.00	68.00	44.00	84.00	39.00	57.00	60.00
Indene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<2.9	ND	2.60	2.80	4.50	ND	26.00	3.00
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.00	3.80	22.00	20.00	3.30	3.00
Benzo (B) Thiophene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.00	8.20	15.00	ND	8.30	9.70
Indole	ND	ND	ND	ND	ND	ND	2.30	<1.9	2.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<1.6	2.00	ND	ND	ND	ND
1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.90	5.10	6.90	ND	4.70	5.40
Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.50	7.40	12.00	ND	7.70	9.00
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.40	2.20	4.60	8.10	19.00	18.00	23.00	7.90	14.00	16.00
Acenaphthene	ND	ND	ND	ND	ND	<1.3	ND	ND	ND	ND	ND	ND	4.70	4.30	11.00	18.00	33.00	29.00	55.00	23.00	33.00	38.00
Dibenzofuran	ND	ND	ND	<1.2	1.30	1.40	<1.3	<1.2	<1.2	ND	<1.2	ND	2.40	2.30	5.00	7.60	17.00	16.00	23.00	7.60	13.00	15.00
Fluorene	ND	ND	ND	1.20	1.60	1.80	1.20	1.10	1.10	<0.88	<0.88	<0.88	3.70	3.40	8.70	12.00	24.00	24.00	38.00	14.00	21.00	27.00
Dibenzothiophene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.20	2.50	2.80	ND	1.80	2.20
Phenanthrene	<3.1	<3.1	<3.1	5.00	8.00	8.00	<3.1	4.00	3.90	4.70	ND	5.40	7.20	7.10	12.00	14.00	18.00	23.00	16.00	ND	9.20	12.00
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<3.4	ND	ND	<3.4	ND	ND	ND	ND	ND	ND	1.60	2.60
Acridine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbazole	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<4.4	<4.4	6.60	7.10	8.00	ND	4.60	4.90
Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<1.5	ND	<4.1	4.70	5.40	ND	ND	3.60	3.60
Benzo (E) Pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OTHER PAH TOTAL	0.0	0.0	0.0	6.2	10.9	11.2	3.5	5.1	7.0	4.7	0.0	8.2	30.0	19.3	52.3	85.7	224.5	198.3	310.2	111.5	208.8	211.4
TOTAL PAH'S	0.0	0.0	0.0	6.2	10.9	11.2	3.5	5.1	7.0	4.7	0.0	8.2	30.0	19.3	52.3	85.7	224.5	198.3	310.2	111.5	212.9	216.5
RECOVERIES (%)																						
Naphthalene-D8	46	* 0	54	43	73	75	63	66	62	17	18	23	69	66	26	53	84	61	* 0	* 0	* 0	* 0
Fluorene-D10	130	112	* 168	98	161	156	77	76	71	74	74	121	114	113	90	109	93	81	* 0	* 0	* 0	* 0
Chrysene-D12	43	43	57	24	45	27	24	15	16	27	32	24	72	56	84	87	62	66	* 0	* 0	* 0	* 0
1-Fluoronaphthalene																			34	32	93	77

1/29/88
N.

CITY OF SAINT LOUIS PARK

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FEB 01 1988
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
OFFICE OF THE DIRECTOR

January 29, 1988

Ms. Erin Moran
Remedial Project Leader
United States Environmental
Protection Agency, Region 5
230 South Dearborn Street
Chicago, Illinois 60604

Mr. Michael K. Vennewitz
Remedial Project Leader
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155

Mr. Richard D. Clark
Minnesota Department of Health
717 Delaware Street Southeast
P.O. Box 9441
Minneapolis, Minnesota 55440

Mr. John C. Craun
Reilly Tar & Chemical Corporation
1510 Market Square Center
151 North Delaware
Indianapolis, Indiana 46204

Dear Project Leaders:

Enclosed is a revised copy of the analytical results of the laboratory testing of water taken from the City's GAC plant on November 24, 1987. The previously submitted results contained an error in the computation of surrogate recoveries for the treated and treated duplicate samples. This submittal provides for the correction of the calculations.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure
cc: Dick Koppy (w/o enclosure)
Elizabeth Thompson (w/o enclosure)

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

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RECEIVED
JAN 26 1988
CITY OF ST. LOUIS PARK

January 22, 1988

MG12721.XX

Mr. Jim Grube
City of St. Louis Park
Water Department
5005 Minnetonka Blvd.
St. Louis, Minnesota 55416

RE: Analytical Data for Laboratory Number 10196

Dear Mr. Grube:

On November 25, 1987, the CH2M HILL Montgomery Laboratory received three samples with a request for analysis of selected organic parameters.

The analytical results and the associated quality control data are enclosed. Please note that all the sample results are the same. The only change to the report are the improved surrogate recovery values. We apologize for any inconvenience these corrections may have caused.

If you should have any questions concerning the data, please call.

Sincerely,

Ward Dickens

Ward Dickens
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORG/001-54

CH2M HILL Montgomery Office 2567 Fairlane Drive, P.O. Box 230548, Montgomery, Alabama 36116 205.271.1444

ORGANIC ANALYSIS

ANALYTICAL INSTRUMENTATION

- Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 automatic Heated Sample Module.

- Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

- Dohrman DX-20 Total Organic Halide System.

- Water High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

- Priority Pollutants: The water samples are analyzed in accordance with procedures described in methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

- Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol. 38, No. 75, Part II, November 28, 1973.

- Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

- Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

- Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

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ANALYTICAL REPORT

PAH, N and S Heterocyclics

Laboratory No : 10196001
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:00 GRAB 2 GAE 7-FB
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	5.8	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	23			
Benzo(b)thiophene	6.3	BMDL			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	22			
1-Methylnaphthalene	6.3	12			
Biphenyl	6.3	BMDL			
Acenaphthylene	6.3	BMDL			
Acenaphthene	3.3	BMDL			
Dibenzofuran	5.0	BMDL			
Fluorene	3.5	BMDL			
Dibenzothiophene	x	BMDL			
Phenanthrene	6.3	BMDL			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	BMDL			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	55		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				HK	

Comments: x Detection Limit not determined.

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10196002
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:18 GRAB 2 GAE 7-T
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	84	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	4.5	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	22			
Benzo(b)thiophene	6.3	15			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	BMDL			
1-Methylnaphthalene	6.3	6.9			
Biphenyl	6.3	12			
Acenaphthylene	6.3	23			
Acenaphthene	3.3	55			
Dibenzofuran	5.0	23			
Fluorene	3.5	38			
Dibenzothiophene	x	2.8			
Phenanthrene	6.3	16			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	8.0			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
			1 MDL - METHOD DETECTION LIMIT		
1-Fluoronaphthalene	53		2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW	
				HK	

Comments: x Detection Limit not determined.

CH2M HILL Montgomery Office 2567 Fairlane Drive, P.O. Box 230548, Montgomery, Alabama 36116 205.271.1444

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ANALYTICAL REPORT
PAH, N and S Heterocyclics

Laboratory No : 10196003
Date Received : 11/25/87
Date Extracted: 12/07/87
Date Analyzed : 01/07/88

Client: CITY OF SAINT LOUIS

Sample Description: 11/24/87 11:24 GRAB 2 GAE 7-TD
Matrix: WATER

Compounds	MDL1 ng/L	Conc.2 ng/L	Compounds	MDL1 ng/L	Conc.2 ng/L
2,3-Benzofuran	x	BMDL	Indeno(1,2,3-cd)pyrene	4.3	BMDL
2,3-Dihydro-1H-Indene	3.5	39	Dibenzo(a,h)anthracene	3.5	BMDL
1H-Indene	2.5	BMDL	Benzo(g,h,i)perylene	6.3	BMDL
Naphthalene	4.8	20			
Benzo(b)thiophene	6.3	BMDL			
Quinoline	6.3	BMDL	OTHER COMPOUNDS:		
Isoquinoline	x	BMDL			
Indole	7.3	BMDL			
2-Methylnaphthalene	5.0	BMDL			
1-Methylnaphthalene	6.3	BMDL			
Biphenyl	6.3	BMDL			
Acenaphthylene	6.3	7.9			
Acenaphthene	3.3	23			
Dibenzofuran	5.0	7.6			
Fluorene	3.5	14			
Dibenzothiophene	x	BMDL			
Phenanthrene	6.3	BMDL			
Anthracene	6.3	BMDL			
Acridine	4.5	BMDL			
Phenanthridine	3.5	BMDL			
Carbazole	2.3	BMDL			
Fluoranthene	6.3	BMDL			
Pyrene	6.3	BMDL			
Benzo(a)anthracene	6.3	BMDL			
Chrysene/Triphenylene	6.3	BMDL			
Benzo(b & k)fluoranthene	6.3	BMDL			
7,12-Dimethyl benzo(a)anthracene	x	BMDL			
Benzo(e)pyrene	6.3	BMDL			
Benzo(a)pyrene	6.3	BMDL			
Perylene	6.3	BMDL			
3-Methyl cholanthrene	x	BMDL			
SURROGATE RECOVERIES	% REC.				
1-Fluoronaphthalene	50		1 MDL - METHOD DETECTION LIMIT 2 BMDL = BELOW METHOD DETECTION LIMIT	REVIEW HK	

Comments: x Detection Limit not determined.

FROM: CH2M HILL, INC.
310 W Wisconsin Ave
Milwaukee, WI
53201

2/5/87
N.

DATE February 5, 1987
PROJECT NO. W63720.FR
SUBJECT Analytical Lab Results, Reilly Tar Site, MN

Dan Bicknell
Regional Project Manager
U.S. Enviromental Protection Agency
Region V
230 South Dearborn
Chicago, IL 60604

Dear Dan:

Enclosed are the CH2M Hill Montgomery Laboratory analytical results for water samples taken in St. Louis Park, Minnesota on January 13, 1987.

If you have any questions, please call.

Sincerely,

Alan E Scrivner/LMR

RECEIVED
Feb 09 1987
U.S. EPA REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

REV 9/83 FORM 176

this informal letterhead was designed to be a handwritten form of communication that will both increase message speed and reduce costs

Engineers
Planners
Economists
Scientists

January 29, 1987

MG157.35

Rec'd
AES
2/3/87

Mr. Alan Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, WI 53201

RE: Analytical Data For Laboratory No. 8597

Dear Mr. Scrivner:

On January 14,1987, the CH2M Hill Montgomery Laboratory received three water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 8597

Client: Reilly Tar

Address: CH2M Hill, Inc., P.O. Box 2090, Milwaukee, Wisconsin 53201

Date Received: 1/14/87 Date Reported: 1/29/87

SAMPLE MATRICES: Water X Soil ____ Sludge ____ Other ____

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles ____ Base/Neutrals ____ Acids ____ Pesticides ____ PCBs ____
2. SDWA Pesticides ____
3. SDWA Herbicides ____
4. Trihalomethanes ____
5. Ethylene Dibromide ____
6. Total Organic Halogen ____
7. Other: 3-PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

____ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

____ Dohrman DX-20 Total Organic Halide System.

____ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38, No.75, Part II, November 28, 1973.

3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

5. Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-1
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#1, 1:10, BLANK, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	3.3	Acridine	1.8	BMDL
1H-Indene	1.0	1.4	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.2	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 90 %

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-2
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#2, 1:15, TREATED WATER, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	22.0	Acridine	1.8	BMDL
1H-Indene	1.0	1.9	Phenanthridine	1.4	BMDL
aphthalene	1.9	3.7	Carbazole	1.1	BMDL
enzo(b)thiophene	1.0	2.3	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.4	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	1.9	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	5.9	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	1.9	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.2	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 84 %

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-3
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#3, 1:20, TREATED WATER DUPLICATE, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	22.0	Acridine	1.8	BMDL
1H-Indene	1.0	1.8	Phenanthridine	1.4	BMDL
aphthalene	1.9	3.6	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	2.4	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.4	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	1.8	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.4	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.1	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 74 %

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

Comments:

1/29/87
N.

CH2M HILL
Engineers
Planners
Economists
Scientists

January 29, 1987

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2/3/87

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Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

CH2M HILL Montgomery Office 2567 Fairlane Drive, P.O. Box 230548
Montgomery, Alabama 36123-0548 205.271.1444

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 8597

Client: Reilly Tar

Address: CH2M Hill, Inc., P.O. Box 2090, Milwaukee, Wisconsin 53201

Date Received: 1/14/87 Date Reported: 1/29/87

SAMPLE MATRICES: Water X Soil ____ Sludge ____ Other ____

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles ____ Base/Neutrals ____ Acids ____ Pesticides ____ PCBs ____
2. SDWA Pesticides ____
3. SDWA Herbicides ____
4. Trihalomethanes ____
5. Ethylene Dibromide ____
6. Total Organic Halogen ____

7. Other: 3-PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

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5. Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-1
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#1, 1:10, BLANK, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	3.3	Acridine	1.8	BMDL
1H-Indene	1.0	1.4	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.2	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
phenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
enaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 90 %

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

ents:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-2
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#2, 1:15, TREATED WATER, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	22.0	Acridine	1.8	BMDL
1H-Indene	1.0	1.9	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.7	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	2.3	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
'-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)anthracene	*	BMDL
phenyl	1.0	1.4	Benzo(e)pyrene	1.0	BMDL
ncenaphthylene	1.0	1.9	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	5.9	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	1.9	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.2	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 84 %

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*Detection Limit not determined

Clark Brandon
REVIEW

ments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Lab No: 8597-3
Date Sampled: 01/13/87
Date Received: 01/14/87

Client: REILLY TAR, ST. LOUIS PARK
Sample Identification: WATER - STA#3, 1:20, TREATED WATER DUPLICATE, GRAB

Date Extracted: 01/19/87
Date Analyzed: 01/27/87

Compounds	MDL1 ng/l	Conc.2 ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	22.0	Acridine	1.8	BMDL
1H-Indene	1.0	1.8	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.6	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	2.4	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)anthracene	*	BMDL
henyl	1.0	1.4	Benzo(e)pyrene	1.0	BMDL
enaphthylene	1.0	1.8	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.4	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.1	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Recovery of 1-Fluoronaphthalene = 74 %

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

ents:

1/26/87
N.

CITY OF SAINT LOUIS PARK

RECEIVED
JAN 30 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

January 26, 1987

Mr. Daniel J. Bicknell
Remedial Project Manager
United States Environmental Protection Agency
Region 5
230 South Dearborn Street
Chicago, illinois 60604

RE: United States of America, et al. vs. Reilly Tar and Chemical Corporation, et al.
Interim Sampling

Dear Mr. Bicknell:

Thank you for your letter of January 15, 1987, wherein you outlined deficiencies in submittals provided in conjunction with the interim sampling of the City's Granular Activated Carbon (GAC) plant. Insofar as the submittals failed to provide all the data required, every effort will be made to provide the necessary documentation in a timely fashion. Regarding document format, a brief review of the submittals does confirm no table of contents or index has been included; however, further review will indicate the information is organized --- in chronological order. Admittedly, the format does not follow Contract Lab Program (CLP) organization, and for good reason --- this in not a CLP project. Future submittals provided in conjunction with the interim sampling of the GAC plant will be formatted in such a way as to facilitate submittal review.

As a final note, please find Chain of Custody documents not included in previous submittals.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST. LOUIS PARK	ST. LOUIS PARK MN.
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Higgins	Chain of Custody Tape No. 101733 & 101796

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPC PAH						REMARKS
T-02	7/22/86	1316	~~3694~~ 37014	4X1L AMBER	X						
W-02	7/22/86	140	37015	4X1L AMBER	X						
B-02	7/22/86	1310	37016	4X1L AMBER	X						Rec'd 2X1l. Amber
TD-02	7/22/86	1320	37017	4X1L AMBER	X						Rec'd w/ Cap (illegible) (1)
MS-02	7/22/86	1328	37018	4X1L AMBER	X						
ONE BOTTLE HAS CAP FROM BLANK IS MARKED											

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgins	7/22/86	1420			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael J. Higgins	Date 7/23/86	Time 09:30
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST. LOUIS PARK WATER DEPT.
5005 Nelka Blvd
St. Louis Park MN.. 55416

ERT

№ 6427

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PARK (WATER DEPT)	ST. LOUIS PARK MN.
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Higgin	Chain of Custody Tape No. 101712 & 101713

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPL PAH						REMARKS
T-03	7/30/86	1310	37135	4 X 1L AMBER	X						
F-03	7/30/86	1320	37136	4 X 1L AMBER	X						
B-03	7/30/86	1300	37137	4 X 1L AMBER	X						
TD-03	7/30/86	1330	37138	4 X 1L AMBER	X						
W-03	7/30/86	1411	37139	4 X 1L AMBER	X						
MS-03	7/30/86	1344	37140	4 X 1L AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgin	7/30/86	1500			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael J. Higgin	7/31/86	09:30
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST. LOUIS PK. WATER DEPT.
5005 MINNETONKA BLVD
ST. LOUIS PK. MN 55416

ERT

№ 6806

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST LOUIS PK (WATER DEPT)	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Riggin	Chain of Custody Tape No. 101744 & 101743

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT PAH						REMARKS
B-04	8/6/86	1107	37303	4X1L AMBER	X						
T-04	8/6/86	1115	37304	4X1L AMBER	X						
TD-04	8/6/86	1122	37305	4X1L AMBER	X						
MS-04	8/6/86	1130	37306	4X1L AMBER	X						
W-04	8/6/86	1147	37307	4X1L AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Riggin	8/6/86	1305			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael Kp	8/7/86	09:30
Sample Disposal Method:			Disposed of by: (*Signature*)	Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK WATER DEPT
5005 MINNETONKA BLVD.
ST LOUIS PARK MN. 55416

ERT

№ 6449

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF ST. LOUIS PARK WATER DEPT	ST LOUIS PARK MN
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Higgins	Chain of Custody Tape No. 101965 & 101964

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT	PAH					REMARKS
T-05	8/26/86	1309	37853	4X1L AMBER	X						
B-05	8/26/86	1257	37854	4X1L AMBER	X						
TD-05	8/26/86	1317	37855	4X1L AMBER	X						
MS-05	8/26/86	1325	37856	4X1L AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgins	8/26/86	1400			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael J Higgins	8/27/86	09:00
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST LOUIS PK. (WATER DEPT)
5005 MINNETONKA Blvd
ST LOUIS PARK MN 55416

ERT

№ 6429

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of St Louis Park	St Louis Park MN
Project No.	Field Logbook No.
Sampler: (Signature) Donald Fernandez	Chain of Custody Tape No. 10-2651 102649-102650 102652

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT	PAH					ERT# REMARKS
7-08	10-7-86	11:15 AM	~~38938~~	4 X 1L Amber	X						38841
T-08	10-7-86	11:25	~~38939~~	4 X 1L Amber	X						38842
TD-08	10-7-86	11:35	~~38940~~	4 X 1L Amber	X						38843
TD-08A	10-7-86	11:45	~~38941~~	4 X 1L Amber	X						38844
MS-08	10-7-86	11:55	~~38942~~	3 X 1L Amber	X						38845
DI H_2O	10/6/86		~~38943~~	4 X 1L Amber	X						38846

MZZ 10/6/86

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Donald Fernandez	10-7-86	12:50 PM			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature) Michael Fry	Date 10/8/86	Time 09:30
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robert Burke
City of St Louis Park (Water Dept)
5005 Mtka. Blvd.
St Louis Park MN 55416

ERT

№ 5636

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
CITY OF SAINT LOUIS PK. MN.	ST. LOUIS PK. MN.
Project No.	Field Logbook No.
Sampler: (*Signature*) Michael J. Higgins	Chain of Custody Tape No. 101711 & 101710

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPU PAH						REMARKS
T-01	7/15/86	0740	36750	4X1L AMBER	X						
F-01	7/15/86	0748	36751	4X1L AMBER	X						
W-01	7/15/86	0833	36752	4X1L AMBER	X						
B-01	7/15/86	0820	36753	4X1L AMBER	X						
TD-01	7/15/86	0800	36754	4X1L AMBER	X						
MS-01	7/15/86	0813	36755	4X1L AMBER	X						

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Michael J. Higgins	7/15/86	0900			
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*) Michael J. Pry	7/16/86	09:30
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

ROBERT BURKE
CITY OF ST. LOUIS PK. WATER DEPT
5005 MINNETONKA BLVD.
ST. LOUIS PARK MN 55416

ERT

№ 6724

1974-3-84

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
City of St Louis Park	St Louis Park MN.
Project No.	Field Logbook No.
Sampler: (Signature) Michael J. Wiggin	Chain of Custody Tape No. 101926 & 101777

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	PPT PAH					Residential	REMARKS
T-09	11-13-86	1311	40145	4X1L Amber	X					4	
TD-09	11-13-86	1320	40146	4X1L Amber	X					4	
TD-09A	11-13-86	1325	40147	4X1L Amber	X					3	1 BROKEN WHEN RECEIVED
MS-09	11-13-86	1331	40148	4X1L Amber	X					2	
Shipping Blank	11/10/86		40149							3	FIELD BLANKS NOT TRANSFERED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Michael J. Wiggin	11-13-86	1400			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
		Park	Michael J. Hy	11/14/86	09:30
Sample Disposal Method: City	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

ANALYTICAL LABORATORY

Robert Burke
City of St Louis Park Water Dept.
5005 Minnetonka Blvd.
St Louis Park MN. 55416

ERT

№ 7285

1974-3-84

1/13/87
N.

CH2M HILL

SUBJECT _____ BY SLG _____ DATE _____

SHEET NO. _____ of _____

PROJECT NO. _____

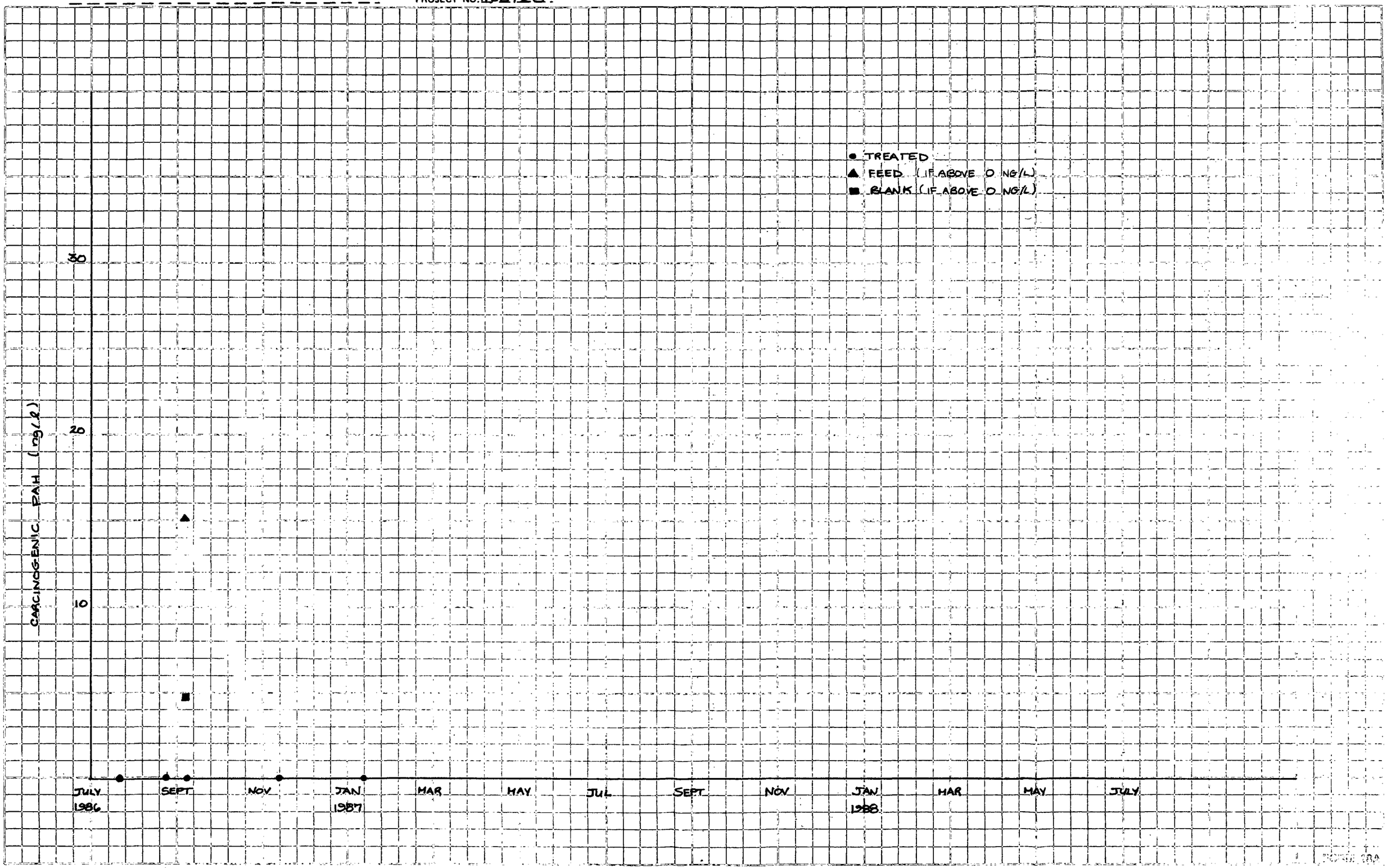
DATE	SAMPLE	BENZO (a) PYRENE & DIBENZO(a,h) ANTHRACENE (ng/L)	CARGINOGENIC PAH (ng/L)	OTHER PAH (ng/L)
7/22/86	BLANK	0	0	0
7/22/86	TREATED	0	0	5.5
8/26/86	BLANK	0	0	123.4
8/26/86	TREATED	0	0	66.9
8/26/86	TREATED	0	0	60.0
8/26/86	FEED	0	0	5181
9/8/86	BLANK	0	4.7	93.5
9/8/86	TREATED	0	0	36.7
9/8/86	TREATED	0	0	32.8
9/8/86	FEED	0	15.2	5517
11/13/86	BLANK	0	0	22.8
11/13/86	TREATED	0	0	65.2
11/13/86	TREATED	0	0	58.9
1/13/87	BLANK	0	0	10.2
1/13/87	TREATED	0	0	43.9

FORM 18C

CH2M HILL

SUBJECT RELLY TAR, MINNESOTA
CARCINOGENIC PAH - CARBON TREATED

BY ___ DATE ___
SHEET NO. ___ OF ___
PROJECT NO. W63720.



CH2M HILL

SUBJECT REILY TAR, MINNESOTA

OTHER PAH - CARBON TREATED

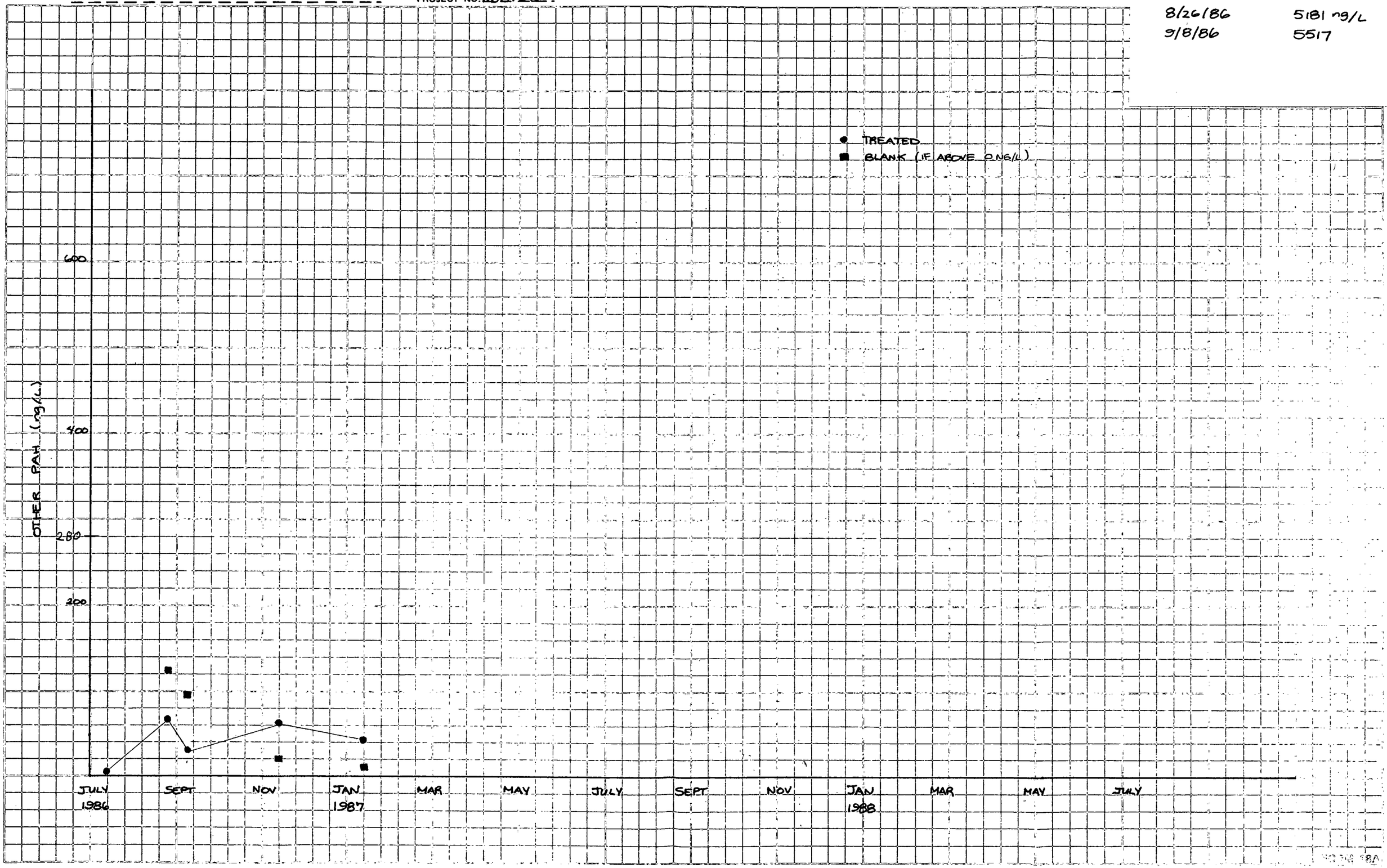
BY ___ DATE ___

SHEET NO. ___ OF ___

PROJECT NO. W63720

FEED

8/26/86	5181 ng/L
9/8/86	5517



1/1/87? N.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
Reilly Tar, St. Louis Park, MN	St Louis Park, MN
Project No.	**Field Logbook No.**
W 63720.FR	
Sampler: (*Signature*)	**Chain of Custody Tape No.**
Alan Scrivner	101734 101735

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample							REMARKS
1	7/22	1 PM		Blank - Travel							
2	7/22	↓		Treated #1 & #2A							
3	7/22			Treated #1 & #2B							
4	7/22			Feed							
H_2O Blank											Transfered to
											Travel Blank
											Do not analyse

Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received by: (*Signature*)	Date	Time
Relinquished by: (*Signature*)	Date	Time	Received for Laboratory: (*Signature*)	Date	Time
Sample Disposal Method:	Disposed of by: (*Signature*)			Date	Time

SAMPLE COLLECTOR

Environmental Research and Technology, Inc.
696 Virginia Road
Concord, MA 01742
617-369-8910

Alan Scrivner
CH2M-Hill

ANALYTICAL LABORATORY

CH2M-Hill
Montgomery, AL
2567 Fairlane, Dr.
Montgomery, AL 36116

ERT

№ 6805

1974-3-84

12/29/86
N.

RECEIVED
DEC 31 1986
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

Minnesota Pollution Control Agency

CERTIFIED MAIL

December 29, 1986

President
Reilly Tar and Chemical Corporation
1510 Market Square Center
151 North Delaware Street
Indianapolis, Indiana 46204

Dear Sir:

Re: United States of America et al. vs. Reilly Tar & Chemical Corporation - File No. Civ. 4-80-469

In response to the request by Dorsey and Whitney dated November 25, 1986 for document production under requirements of Part W of the Consent Decree in the above referenced litigation, we are supplying the information listed below:

1. and 2. The U.S. Environmental Protection Agency, Region V has responded to the request for CH2M Hill and Acurex Data.

3. The ground water data compilation, referenced in "Feasibility of Community-Wide Epidemiologic Studies of Drinking Water in Health: St. Louis Park and New Brighton", December 3, 1985, Minnesota Department of Health is a part of approximately 24,000 to 25,000 records contained in a data base. Reilly already has most of the information contained in the compilation referenced above. We can produce this voluminous information, or smaller discrete amounts, if you will indicate what you are looking for, such as well locations, construction information or data within a specific time frame. Please give us additional information regarding your needs.

4. Enclosed is the Minnesota Pollution Control Agency (MPCA) Soil File Index for the Reilly Tar Site which is also contained in a data base. We need additional information as to the specific files that are needed by Reilly.

Phone:_____
520 Lafayette Road North, St. Paul, Minnesota 55155
Regional Offices • Duluth/Brainerd/Detroit Lakes/Marshall/Rochester
Equal Opportunity Employer

5. We have included a copy of Data on Selected Wells in the St. Louis Park Area, from the United States Geological Survey Water-Supply Paper 2211. Justin Blum, the MPCA Technical Analyst for the Reilly Tar Site, along with Bill Gregg of ERT, Reilly's consultant will be meeting with Marc Hult of the U.S.G.S. to determine if there are any additional revised tables of wells and piezometers since those published in the U.S.G.S. Water-Supply Paper 2211. If additional tables are found, copies will be passed on to Reilly.

Please provide the MPCA with the memoranda of Gary Wilson to John Craun dated June 13, 1985 and July 1, 1985, reporting ERT's results from analyses of W23 and SLP4 samples split with Twin City Testing and Acurex, along with a letter from John Craun to Carl Lesher dated July 10, 1985 explaining the results.

If you have any additional questions please contact Doug Robohm of my staff at (612) 296-7288.

Sincerely,

Richard A. Svanda

Richard A. Svanda
Division Director
Solid and Hazardous Waste Division

Enclosure

cc: Becky Comstock, Dorsey & Whitney
Dan Bicknell, U.S. Environmental Protection Agency, Region V
Dick Clark, Minnesota Department of Health
Steve Shakman, SAAG

SOIL FILE INDEX

Introduction

The Reilly soil data is stored on computer at the Land Management Information System (LMIC). These computer files contain most of the original soil boring log sheets that are in this soil file. This file does contain all the computer coding sheets for the stratigraphy and soil chemical data. The computer files contain information for 317 soil borings in varying degrees of completeness.

Computer Files

The soil data is sorted and stored on the INFO9 system much like the ground water data. The following is a list of the soil files and their contents:

ATTRIBUTE: location, elevation, owner, driller...
UNIQ.STRAT: remarks information
REPEAT.STRAT: soil boring logs
SOIL.ANALYSIS: soil sample data - chemical

Soil File Index

The original soil boring logs are filed by project number in this file. The following pages are an index to the file indicating which unique numbers have been assigned to the borings within a project. Some original logs are missing, so an asterick (*) indicates those borings that seem to have the most complete information. (An older index is also attached for reference.)

Soil Boring Cross Sections

The cross sections generated by a LMIC plotting routine are stored with the Reilly maps. The lists of borings in each cross section follow the soil index. There are two cross sections for each list: 1) borings labeled with primary stratigraphy and 2) borings labeled with project code.

UNIQUE NUMBER DENOMINATION FOR REILLY TAR SOIL BORINGS

LMIC Unique No.	Project No.	Comments
A10001	Braun 60-79	Engineering boring, SW of site
A10002		
A10003		
A10004		
A10005	Braun 71-53 *	Engineering borings for Louisiana Ave. extention, borings surveyed, contamination noted, no samples, South of site.
A10006		
A10007		
A10008		
A10009		
A10010		
A10011		
A10012		
A10013		
A10014		
A10015		
A10016		
A10017		
A10018		
A10019		
A10020		
A10021		
A10022		
A10023		
A10024	Braun 77-211	Engineering borings, SSE of site.
A10025		
A10026		
A10027		
A10028		
A10029	Braun 69-257	Engineering borings,SSE of site
A10030		
A10031		
A10032		
A10033		
A10034		
A10035		
A10036		
A10037		
A10038		
A10039		
A10040		
A10041		
A10042		

Unique No.	Project No.	Comments
A10043 A10044 A10045	Braun 69-257A	Engineering borings, South of site
A10046 A10047 A10048 A10049 A10050 A10051 A10052 A10053 A10054 A10055 A10056 A10057 A10058 A10059 A10060 A10061	Braun 72-233	Engineering borings, surveyed, South of site.
A10062 A10063 A10064 A10065	Subterranean S-7969	Engineering borings, surveyed, South of site.
A10066 A10067 A10068 A10069 A10070 A10071 A10072 A10073 A10074 A10075 A10076 A10077 A10078	Subterranean S-78395 +	Engineering borings, surveyed.
A10079 A10080 A10081	Subterranean S-77242	Engineering borings, surveyed, East of site
A10082 A10083 A10084 A10085	Subterranean S-79293 +	Engineering borings, surveyed.

Unique No.	Project No.	Comments
A10086 A10087 A10088 A10089 A10090 A10091 A10092	Subterranean * S-8285	Engineering borings, surveyed, South of site
A10093 A10094 A10095 A10096 A10097 A10098	Subterranean S-80182 +	Engineering borings, surveyed.
A10099	Braun 71-53 +	Louisiana Av. extention
A10100 A10101 A10102 A10103 A10104	Braun 75-395 *#	Barr Eng. Report borings See Barr Phase I & II reports.
A10105	Soil Ex 22291*#	Barr Eng. Report borings
A10106	Braun 75-395 *#	Barr Eng. Report borings
A10107 A10108 A10109 A10110 A10111 A10112 A10113	Soil Ex. 22291 *#	Barr Eng. Report borings See Barr Phase I & II reports.
A10114 A10115 A10116 A10117 A10118 A10119 A10120 A10121 A10122 A10123 A10124 A10125 A10126 A10127	Soil Ex. 120-2847 *#	Engineering boring, surveyed, contamination noted, at National Lead/Taracorp site.

Unique No.	Project No.	Comments
A10128 A10129 A10130 A10131 A10132	Braun 71-53A	Engineering borings, surveyed, contamination noted, Hwy 7 & Louisiana Av. intersection.
A10133 A10134 A10135 A10136 A10137 A10138 A10139 A10140 A10141 A10142 A10143 A10144 A10145 A10146 A10147 A10148 A10149 A10150 A10151 A10152 A10153 A10154 A10155 A10156 A10157 A10158 A10159 A10160 A10161 A10162 A10163	Braun 75-43	Engineering borings, shallow (5 ft.) borings, SW of site.
A10164 A10165 A10166	Soil Eng. * 71-127	Engineering borings, contamination noted, on-site.
A10167 A10168 A10169 A10170 A10171 A10172	Soil Eng. * 71-53	Engineering borings, contamination noted, South of site.

Unique No.	Project No.	Comments
A10173	Braun 79-687 +	Soil borings for USGS.
A10174		
A10175		
A10176		not on LMIC
A10177		not on LMIC
A10178		not on LMIC
A10179		
A10180		
A10181		
A10182		
A10183		
A10184		
A10185		
A10186		
A10187		
A10188		
A10189		
A10190	Soil Eng. *	Engineering borings, surveyed,
A10191	69-326	on-site borings.
A10192		
A10193		
A10194		
A10195		
A10196		
A10197		
A10198		
A10199		
A10200		
A10201		
A10202		
A10203		
A10204		
A10205		
A10206		
A10207		
A10208		
A10209		
A10210		
A10211	Braun 79-687 +	Soil borings for USGS, not surveyed,
A10212		contamination noted.
A10213		
A10214		
A10215		
A10216		
A10217		
A10218		

Unique No.	Project No.	Comments
A10219 A10220	Braun 67-161	Engineering borings, SSE of site.
A10221	Braun 70-33	Soil boring, on-site.
A10222 A10223 A10224 A10225 A10226	Braun 72-234	Engineering borings, South of site
A10227 A10228 A10229 A10230 A10231	Braun 80-135	Engineering borings, South of site
A10232 A10233 A10234 A10235 A10236 # A10237 A10238 A10239 A10240 A10241 A10242 A10243 A10244 # A10245 A10246 A10247 # A10248	Soil Ex. * 20070	Engineering borings, South of site.
A10249 # A10250 # A10251 # A10252 # A10253 # A10254 # A10255 A10256 A10257 A10258	Soil Ex. * 21160	Engineering borings, south of site.

Unique No.	Project No.	Comments
A10259 A10260 A10261 A10262 A10263 A10264 A10265 A10266 A10267 ~~A10268~~ A10269 A10270 A10271 A10272 A10273 A10274 A10275 A10276 A10277 A10278 A10279 A10280 A10281 A10282 A10283 A10284 A10285 A10286 A10287 A10288 A10289	Nat'l Biocentric	Soil borings for condo project, contamination noted, on-site.
A10290 A10291 A10292 A10293 A10294 A10295 A10296 A10297	GCA *#	Soil borings, surveyed, contamination noted, sampled, on-site.
A10298 A10299 A10300	Soil Ex. 120-8312	Soil borings, contamination noted, at Golden Auto.

Unique No.	Project No.	Comments
A10301	Soil Testing 92430	Soil borings for USGS, contamination noted.
A10302		
A10303		
A10304		
A10305		
A10306		
A10307		
A10308	GCA *#	Same as GCA borings above, unique no. A10290 to A10297.
A10309		
A10310		
A10311		
A10312		
A10313		
A10314		
A10315		
A10316		
A10317		

* Most reliable borings, includes stratigraphy, surface elevation depth of the boring, and original log.
\+ Borings cannot be plotted by LMIC (no latatude and longitude).
\# Chemical analysis of soil samples.

Table 1. Data on selected wells in the St. Lou. ark area, Minnesota

Township and range: First three (or two) digits indicate township north of the baseline; next two digits indicate range north of the principal meridian; last digit(s) indicate(s) section in which well is located. Letters indicate well location in section: first letter denotes the 160-acre tract; second letter denotes the 40-acre tract; third letter denotes the 10-acre tract. Letters are assigned counterclockwise beginning with the northeast quarter. Consecutive numbers beginning with 1 are added as suffixes to distinguish wells within a given 10-acre tract.

Site identification (lat and long): First six digits are latitude of well location in degrees, minutes, and seconds; next seven digits are longitude in degrees, minutes, and seconds; last two digits are arbitrarily assigned to distinguish wells within a given 1-second by 1-second area.

Reported log: Qd, drift, undifferentiated; Opl, Platteville Limestone; Ogl, Glenwood Shale; Osp, St. Peter Sandstone, undifferentiated; Ospl, St. Peter Sandstone, lower siltstone beds; Opc, Prairie du Chien Group; Ꞓj, Jordan Sandstone; Ꞓsl, St. Lawrence Formation; Ꞓf, Franconia Sandstone; Ꞓig, Ironton and Galesville Sandstones; Ꞓe, Eau Claire Sandstone; Ꞓm, Mount Simon Sandstone; pꞒh, Hinckley Sandstone.

Altitude: When MP is given, altitude is for measuring point, not land surface.

Field measurement status: A, well field located and permanently sealed or reconstructed; AH, well field located and permanently sealed by MDH; AR, well reported permanently sealed; BR, well reported filled; D, well field located and contains debris; F, well field located; G, well field located and geophysically logged; M, mass-measurement well (measured 2 to 3 times per year); O, observation well (measured every 2 to 3 weeks); P, well field located and has pump; X, well destroyed.

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 AAB1.	445654093215501	216030	W1	Monitoring well	E. H. Renner	03-76	0-102 Qd 102-107 Opl	922.76 MP	107	4 in. 0-102	Opl	43.67	11-28-78	O
117.21.17 BAC1.	445651093222901	216031	W2	do	do	03-76	0-36 Qd	897.14 MP	36	4 in. 0-32	Qd	10.40	11-28-78	O
117.21.17 BDB1.	445637093222401	216032	W3	do	do	05-76	0-52 Qd	897	52	4 in. 0-49	Qd	7	05-10-76	D,X
117.21.17 CAD2.	445622093221901	216033	W5	do	do	02-76	0-26 Qd	891.72 MP	26	4 in. 0-21	Qd	6.59	11-28-78	O
117.21.17 CAC1.	445620093222601	216034	W6	do	do	02-76	0-26 Qd	892.74 MP	26	4 in. 0-22	Qd	7.39	11-28-78	O
117.21.17 CBD1.	445625093223601	216035	W7	do	do	03-76	0-71 Qd	930	71	4 in. 0-66	Qd	35	03-02-76	D,X
117.21.17 CDD1.	445607093222101	216036	W8	do	do	02-76	0-31 Qd	892.87 MP	31	4 in.	Qd	7.96	11-28-78	O
117.21.17 DCA1.	445614093220301	216037	W9	do	do	02-76	0-25 Qd	891.21 MP	25	4 in. 0-20	Qd	7.13	11-27-78	O
117.21.20 ABD1.	445559093220201	216038	W10	do	do	02-76	0-29 Qd	891.82 MP	29	4 in. 0-25	Qd	7.63	11-27-78	O
117.21.17 DDB2.	445614093215301	216039	W11	do	do	11-76	0-23 Qd	897.20 MP	23	4 in. 0-19	Qd	13.63	11-27-78	O
117.21.17 DDA1.	445613093214001	216040	W12	do	do	12-76	0-47 Qd	919.26 MP	47	4 in. 0-42	Qd	37.02	11-27-78	O
117.21.17 DCB1.	445615093220901	216041	W13	do	do	11-76	0-50 Qd	890.40 MP	50	4 in. 0-45	Qd	6.19	11-28-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 DCA2.	445614093220302	216042	W14	do	do	02-77	0-68 Qd 68-82 Opl 82-85 Ogl 85-95 Osp	891.41 MP	95	8 in. 0-69 4 in. 0-86	Osp	23.75	11-27-78	G,O
117.21.17 CAC2.	445621093222601	216043	W15	do	do	04-77	0-76 Qd	892.47 MP	76	4 in.	Qd	8.30	11-28-78	O
117.21.20 ABD2	445559093220202	216044	W16	do	do	04-77	0-73.5 Qd	892.07 MP	64	4 in. 0-61	Qd	8.56	11-27-78	O
117.21.17 DDB3.	445614093215302	216045	W17	do	do	04-77	0-69 Qd	897.07 MP	69	4 in. 0-66	Qd	14.05	11-27-78	O
117.21.17 DCA3.	445614093220303	216046	W18	do	do	1978	0-68 Qd 68-78 Opl	893.23 MP	78	4 in. 0-68	Opl	9.86	11-27-78	O
117.21.17 CDD2.	445607093222102	216047	W19	do	do	1978	0-72 Qd 71-81 Opl	894.43 MP	81	4 in. 0-81	Opl	11.22	11-28-78	O
117.21.20 AAB1.	445605093215101	216048	W20	do	do	1978	0-69 Qd 69-80 Opl	895.55 MP	80	4 in. 0-70	Opl	14.01	11-27-78	O
117.21.20 ABD3.	445559093220203	216049	W21	do	do	1978	0-87 Qd 87-92 Osp	892.60 MP	92	4 in. 0-92	Osp	24.27	11-27-78	O
117.21.17 CAA1.	445630093222101	200993	W22	Republic Creosote — Washroom Well.	do	12-47	0-65 Qd 65-91 Opl 91-91 Osp	896.16 MP	91	4 in. 0-71	Originally Opl-Osp Now Opl.	11.44	11-28-78	G,O
117.21.17 CAD1.	445625093221601	216050	W23	Republic Creosote — Site "Hinckley" well on site, Cooling well.	McCarthy	12-17 to 05-18.	0-60 Qd 60-95 Opl 95-195 Osp 195-258 Ospl 258-372 Opc 372-457 €j 457-507 €sl 507-835 €f-€e 835-909 €m	894.49 MP	909	12 in. 0-65 10 in. 0-257 7 in. <230-373	Originally €j,€sl,€f, €ig,€e,€m Now Osp, Opc, €j,€sl,€f.	33.15	11-28-78	G,O
117.21.20 ABB1.	445604093220501	160018	W24	Monitoring well	E. H. Renner	1978	0-81 Qd 81-83 Opl 83-86 Ogl 86-90 Osp	892.92 MP	90	8 in. 0-81.5 4 in. 0-86.7	Osp	22.84	11-27-78	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- CDC2.	445610093222602	206448	W25	Lakeland Door ----	do	11-50	0-79 Qd 79-85 Opl	888.79 MP	85	3 in. 0-79	Opl	4.39 9	10-15-78 11-01-50	G,O
117.21.17 --- CDA1.	445619093221801	209344	W26	Mill City Plywood --	do	08-52	0-59 Qd 59-90 Opl	891.45 MP	90	4 in. 0-76	Opl	6.90 3.5	10-13-78 08-05-52	G,O
117.21.17 --- DBC1.	445624093220801	216052	W27	Terry Excavating ---	do	1953	0-80 Qd 80-100 Opl 100-112 Osp	905	112	4 in.	Opl-Osp	30	1953	G,O
117.21.17 --- CDB1.	445619093222501	216053	W28	7401 Walker St. ----	----------	Before 1939	---	895	---	---	---	---	---	X
117.21.20 --- BAA2.	445604093223801	206454	W29	Flame Industries ---	E. H. Renner	-04-63	0-73 Qd 73-90 Opl 90-94 Ogl 94-202 Osp 202-251 Ospl 251-335 Opc	897	335	10 in. 0-77 8 in. 0-257	Opc	68	04-12-63	P
117.21.17 --- CCA2.	445614093223801	216054	W30	3636 Quebec Ave. --	do	About 1940	---	935	200	6 in. 0-100	Opl-Osp	---	---	AH
117.21.20 --- BBB1.	445600093224901	216055	W31	3831 Texas Ave. ----	----------	About 1949	---	905	---	---	---	---	---	---
117.21.07 --- DDD1.	445702093225401	203190	W32	Tonka Shopping Center.	E. H. Renner	-08-51	0-98 Qd 98-112 Opl 112-117 Ogl 117-228 Osp 228-283 Ospl 283-405 Opc 405-466 Cj	925	466	8 in. 0-283.5	Opc-Cj	80	08-00-51	F
117.21.17 --- DDB1.	445614093214901	206449	W33	Strand Mfg., Wayne Register, Midco Register, Robinson Rubber.	Max Renner	--06-53	0-80 Qd 80-100 Opl 100-102 Ogl 102-182 Osp	906.37 MP	182	8 in.	Opl-Osp Osp (from 6-79).	23.62 45.97	11-27-78 07-10-79	P,G
117.21.16 --- CAA1.	445627093213601	216056	W34	Crib Diaper Service, Sterilized Diaper Service.	Bergerson-Caswell	----05-67	0-93 Qd 93-107 Opl 107-113 Ogl 113-212 Osp 212-280 Ospl 280-342 Opc	918	342	6 in. 0-292	Opc	99.1	11-08-78	AH,G

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 DAA1.	445625093210301	216057	W35	Burdick Grain Co.	----------	About 1910	---	912	---	4 in.	Opl(?)-Osp(?)	51.6	10-20-78	P,M
117.21.16 DBD1.	445620093211901	216058	W36	Dayton Rogers Well #1.	----------	Before 1947	---	908	---	3 in.	Qd	31.77	10-25-78	F,O
117.21.16 DBD2.	445619093211801	216059	W37	Dayton Rogers Well #2.	Laurel Hansmann	03-73	---	910	120	6 in.	Opl	36.03	10-25-78	O,G
117.21.16 CDB1.	445618093211801	216060	W38	Milwaukee Railroad Well.	----------	1913	0-107 Qd 107-111 Opl 111-260 Osp 260-405 Opc 405-485 €j 485-515 €sl 515-1002 €f-p€h	914	1002	---	Opl-p€h	---	---	---
117.21.16 DCA3.	445613093212201	216061	W39	3612 Alabama Ave.	----------		---	910	---	---	Osp	---	---	X
117.21.16 CDB2.	445615093211601	206444	W40	Minnesota Rubber	----------	1963	0-125 Qd 125-205 Osp 205-276 Ospl 276-378 Opc	910	378	8 in. 0-205	Osp-Opc	---	---	P
117.21.16 DCC3.	445611093213401	216062	W41	Hartmann #1 3700 Colorado.	E. H. Renner		---	912	160	2 in.	Osp(?)	---	---	D
117.21.16 DCC1.	445611093213401	216063	W42	Hartmann #2 3700 Colorado.	----------		---	912	60	---	---	---	---	---
28.24.7 BBC1.	445559093210301	200541	W44	King's Inn, Lilac Lane Bowling Alley.	Max Renner	12-51	0-111 Qd 111-131 Opl 131-259 Osp	910	259	8 in. 0-111	Opl-Osp	47	1951	P
117.21.16 CDA1.	445618093210001	206445	W45	S-K Products, Inc.	Don Stodola's Well Drilling.	07-63	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	900	312	8 in. 0-? 6 in. 0-244	Ospl-Opc	84	07-25-78	P
117.21.16 CDA2.	445617093210201	216065	W46	do	do	1973	0-92 Qd 92-94 Opl 94-122 Ogl 122-224 Osp 224-265 Ospl 265-312 Opc	905	305	6 in. 0-234	Ospl-Opc	95	02-16-73	P

Table 1. Data on selected wells in the St. Louis . area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28.24.6 AAC1.	445647093195301	216066	W47	Belco; Burdick Grain Co.		Before 1942	---	891	---	8 in.	Opl-Ꞓj	16.39	12-06-78	G,A
117.21.20 ADA2.	445646093214601	216067	W48	Methodist Hospital.	McCarthy		0-85 Qd 85-94 Opl 94-257 Osp 257-377 Opc 377-466 Ꞓj 466-485 Ꞓsl	889.8	485	20 in. 0-255	Ospl(?) Opc-Ꞓsl	68.82	12-06-78	G,P
117.21.17 DDD1.	445607093214101	206540	W49	Strom Block, deep well.	E. H. Renner	-1958	0-72 Qd 72-92 Opl 92-96 Ogl 96-260 Osp 260-381 Opc 381-384 Ꞓj	900	384	8 in. 0-77 6 in. 0-241	Ospl-Ꞓj	65	09-00-58	—
117.21.17 DCD1.	445609093215801	216068	W50	Prestolite		Before 1937	---	890	---	---	---	---	—	G,AH
117.21.20 BAA1.	445605093221601	216069	W51	Androc Chemical Co.			---	892	—	4 in.	Opl	—	—	G,AH
117.21.20 BCA1.	445548093223701	216070	W52	Merit Gage Co.; Suburban Sanitary Drainage.	E. H. Renner	-09-61	0-81 Qd 81-95 Opl 95-97 Ogl 97-110 Osp	920	—	4 in. 0-82	Opl-Osp	30	09-29-61	G,AH
28.24.6 BDB2.	445638093204001	216071	W53	Northland Aluminum.			---	884	—	---	—	84.10	06-22-79	F
117.21.19 AAD1.	445553093225401	216072	W54	Old Galachirche residence.			---	920	—	6 in.	—	—	—	—
117.21.20 BBA1.	445605093223501	216073	W55	7612 Division St.	E. H. Renner	-01-59	0-99 Qd 99-118 Opl	915	118	4 in. 0-102	Opl	36	1959	—
117.21.17 CCB1.	445619093224201	216074	W56	Earlinson residence			---	935	—	4 in.	—	—	—	—
117.21.17 CCA1.	445619093223801	216075	W57	Oak Hill School		Before 1940	---	935	—	—	—	—	—	—
117.21.17 DBB1.	445628093221101	216077	W59	On site east of Louisiana Extension.			---	—	24	6 in. 0-15	Qd	—	—	AH

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 CCA3.	445614093224001	216078	W60	3645 Rhode Island Ave.	E. H. Renner	---	—	935	250	6 in.	Opl-Osp	—	—	AH
117.21.17 DDD3.	445607093214001	216079	W61	William V. Terry	---	---	—	905	—	—	—	—	—	—
117.21.8 CAA1.	445721093221801	206438	W62	McCourtney Plastics.	do	09-66	0-86 Qd 86-103 Opl 103-105 Ogl 105-274 Osp 274-394 Opc	910	394	12 in. 0-90 10 in. 0-246	Ospl-Opc	88	09-08-69	P
117.21.20 CBB1.	445538093224501	216080	W63	National Foods	McCarthy	09-45	—	910	285	10 in. inside 12 in.	—	75	09-00-45	P
117.21.17 DDD4.	445607093214202	206451	W65	Ace Manufacturing - Strom Block.	E. H. Renner	09-58	0-77 Qd 77-93 Opl 93-95 Ogl 95-109 Osp	904	109	4 in. 0-77	Opl-Osp	24.68	12-01-78	F
117.21.19 ABA2.	445559093220502	216081	W66	Black Top Service, - deep well.	do	01-56	0-65 Qd 65-86 Opl 86-87 Ogl 87-251 Osp 251-280 Opc	899	280	6 in.	—	—	—	BR
117.21.19 ABA1.	445559093220501	216082	W67	Black Top Service, - shallow well.	do	12-55	0-78 Qd 78-84 Opl 84-85 Ogl 85-105 Osp	812	105	3 in. 0-84	Opl(?)-Osp	25	12-29-55	—
117.21.20 BAC1.	445604093223001	206447	W68	Bergeson Residence.	Aamot	12-61	0-95 Qd	900	110	2 in. 0-90	Qd	40	12-00-61	P
28.24.6 CAA1.	445614093203601	216083	W69	Hedberg-Friedheim - Block Co.; Wolfe Lake Augmentation Well.	Max Renner	07-47	0-71 Qd 71-78 Opl 78-81 Ogl 81-246 Osp 246-327 Opc	890	327	—	—	65	1947	G
28.24.6 BAA1.	445653093202601	200539	W70	Park Theatre	do	09-39	0-74 Qd 74-104 Opl 104-229 Osp 229-358 Opc 358-398 Cj	905	398	10 in. 0-74 8 in. 0-229	Opc-Cj	46	1939	P

Table 1. Data on selected wells in the St. Louis . ..k area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
28.24.07 ---- CAB1.	445535093203401	200543	W71	Cairns residence ----	----- do -----	03-58	0-70 Qd 70-86 Opl	880	86	4 in. 0-70	Opl	16	03-00-58	---
28.24.07 ---- DBA1.	445533093200701	216085	W72	Harder residence ---	Pederson -----	12-58	0-138 Qd 138-153 Osp	925	153	---	Osp	---	---	---
117.21.19 --- ACA.	---	216086	W73	Jasperion Dairy ----	E. H. Renner -	05-52	0-87 Qd 87-114 Opl 114-120 Ogl 120-144 Osp	915	144	6 in. 0-90.3	Opl-Osp	22	05-22-52	---
117.21.08 --- CAA1.	445721093221801	216087	W74	Landers Gravel ----	McCarthy ----	09-21	0-82 Qd 82-100 Opl 100-265 Osp 265-280 Opc	890	280	---	Opl(?) Osp(?)-Opc	31	09-00-21	AR
28.24.6 ----- BDB1.	445639093203201	216089	W75	Park Pet Hosp. ----	Max Renner --	1951	0-67 Qd 67-130 Opl-Osp	884	130	6 in. 0-67	Opl-Osp	33.51	12-11-78	P
28.24.06 ---- ABC1.	445644093202101	216090	W76	Professional ------ Instruments.	----- do -----	1946	---	882	184	6 in.	Opl(?)-Osp	---	---	P
117.21.19 --- CBD1.	445608093240301	216093	W80	Red Owl ----------	Keys ---------	10-46	0-99 Qd 99-117 Opl 117-279 Osp 279-397 Opc 397-502 Ꞓj	920	502	16 in. 0-279 12 in. 0-304	Opc	70	10-03-46	---
29.24.30 ---- BCC1.	445916093205101	201039	W82	Weldwood Nursing -	Bergeson-Caswell.	----- 10-57	0-56 Qd 56-67 Opl 67-235 Osp 235-348 Opc 348-444 Ꞓj	878	444	12 in. 0-56 6 in. 0-348	(?)-Ꞓj	50	11-07-57	---
29.24.29 ---- CBC1.	445808093103901	201014	W86	Prudential -------- Insurance Co. No. 1.	Layne --------	07-54	0-243 Qd 243-257 Osp 257-383 Opc 383-467 Ꞓj 467-470 Ꞓsl	925	470	16 in. 0-259	Opc-Ꞓsl	78	07-00-54	---
117.21.17 --- BAC2.	445651093222902	149710	W100	Monitoring well ----	E. H. Renner -	12-78	0-73 Qd 73-88 Opl	910	88	4 in. 0-73	Opl	13.03	12-26-78	O
117.21.16 --- CDB2.	445617093211501	149711	W101	Monitoring well ----	----- do -----	12-78	0-100 Qd 100-106 Opl	910	106	4 in. 0-103	Opl	52.41	12-26-78	G,O
----------	---	216102	W104	Rice Gravel & Sand -	----------	1935	---	---	250	12 in.	Opc(?)	---	---	---

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers*	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.17 --- CA1.	---	200979?	W105	Minnesota Sugar Beet Co.	--- Swenson	-----1899	0-73 Qd 73-93 Opl 93-260 Osp 260-385 Opc 385-504 Ꞓj 504-950 Ꞓsl-Ꞓm	892	950	---	Opl-Ꞓm(?)	---	---	---
28.24.6 ----- CAA2.	445614093204102	216103	W106	Hedberg, Friedheim & Co.	----------	----------Before 1936	0-90 Qd 90-100 Opl 100-230 Osp	900	230	---	Opl(?)-Osp	---	---	---
28.24.06 ---- BCD1.	445634093204101	216104	W107	Interior Elevator Co., Salem Ave. and Chicago & Milwaukee Rail Road tracks.	---	----------About 1893	0-75 Qd 75-100 Opl 100-250 Osp 250-390 Opc 390-495 Ꞓj 495-710 Ꞓl-Ꞓf 710-755 Ꞓig	875	755	---	Opl(?)-Ꞓig	---	---	---
117.21.21 --- BAB1.	445605093211201	216029	W108	5800 Goodrich	----- E. H. Renner	-Before 1936	---	---	---	---	---	---	---	---
117.21.09 --- CDC1.	445658093211201	216105	W109	Max Renner's Shop.	------ Max Renner	--Before 1936	0-93 Qd 93-113 Opl 113-118 Osp	925	118	---	Opl(?)-Osp	---	---	---
117.21.16 --- CCD1.	445609093212501	216107	W111	6030 Oxford St.	---- ----- do	-----Before 1936	0-190 Qd 190-240 Osp	919	240	---	Osp	---	---	G
117.21.16 --- CCA1.	445615093212301	206443	W112	Old St. Louis Park Well #1.	------ McCarthy	----05-32	0-109 Qd 109-274 Osp 274-398 Opc 398-486 Ꞓj 486-540 Ꞓsl	917.52	540	16 in. 0-212 12 in. 194-274	in 1932 Opc-Ꞓsl in 1978 Opc	77	12-21-78	G,M
117.21.8 ---- DCB3.	445701093215803	206440	W113	St. Louis Park No. 3.	---- ----- do	-----08-39	0-103 Qd 103-118 Opl 118-286 Osp	922	286	24 in. 0-103	Opl-Osp	60	08-00-39	P
28.24.6 ----- CAA3.	445614093204103	216108	W114	Hedberg, Friedheim & Co.	---------- E. H. Renner	-Before 1936	0-60 Qd 60-80 Opl 80-249 Osp	887	249	---	Opl(?)-Osp	---	---	F
117.21.20 --- ABD1.	445554093220301	216109	W115	Monitoring well	---- Bergerson-Caswell.	----02-79	0-65 Qd 65-78 Opl 78-78 Ogl	892.16 MP	78	4 in. 0-66	Opl	10.85	02-12-79	O

Table 1. Data on selected wells in the St. Louis Park area, Minnesota—Continued

Township and range	Site identification (lat and long)	Minnesota unique well number	USGS project well number	Owner name or other identifiers	Driller	Date drilled	Reported log, in feet	Land surface altitude, in feet	Reported depth of well, in feet	Diameter, in inches, and depth, in feet, of casing	Aquifer(s) open to well bore	Water level, in feet	Date measured	Field measurement status
117.21.16 DCB3.	445634093205903	160030	W116	do	E. H. Renner	04-79	0-67 Qd	909.59	67	0-4 in. 0-63	Qd	35.01	06-05-79	O
117.21.16 CDB3.	445617093211502	160031	W117	do	do	04-79	0-72 Qd	917.73 MP	72	4 in. 0-68	Qd	39.68	06-05-79	O
117.21.20 CDC1.	445516093222501	216088	W118	Minneapolis Park Board-Meadowbrook Golf Course.	do		0-80 Qd 80-89 Opl 89-245 Osp 245-370 Opc 370-485 €j 485-487 €sl	905	487	—	Opc-€sl	—	—	—
117.21.20 DAC1.	445527093215201	216009	W119	do		06-35	0-74 Qd 74-82 Opl 82-90 Ogl 90-252 Osp 252-375 Opc 375-465 €j 465-502 €sl	890	502	16 in. 0-77 12 in. 77-257	Opc-€sl	54.5	06-28-35	—
117.21.16 DCA2.	445014093212802	165516	W120	Monitoring well	E. H. Renner	07-79	0-95.5 Qd 95.8-98 Opl, (weathered) 98-107 Opl 107-108.6 Ogl	919.8 MP	105.7	4 in. 0-98	Opl	38.84	07-12-79	G,O
117.21.21 BBD1.	445558093212001	165577	W121	do	do	07-79	0-110 Qd 110-115 Opl, (weathered) 115-117 Ogl	918	113.25	4 in. 0-109	Opl	53.58	07-18-79	G,O
117.21.21 BAD1.	445557093210901	165578	W122	do	do	08-79	0-120 Qd 120-212 Osp 212-239 Ospl	920	239	4 in. 0-217	—	—	—	G,O
117.21.21 BBC1.	445559093213201	216129	W140	Cambridge Brick			—	—	—	4 in.	Opl?	—	—	D
117.21.17 DDD5.	445607093214203	216051	W143	6425 Oxford St.			0-70 Qd 70-90 Opl	—	—	4 in. 0-70	Opl	—	—	G
28.24.06 BCD2.	445634093204102	216128	W144	Interior Elevator			—	—	—	—	—	—	—	F

Well-Numbering System

Each well or test hole has been assigned four identifying numbers. They are (1) WATSTORE (STORET) site identification, (2) township and range location, (3) Minnesota Unique Well Number, and (4) a project number (table 1). WATSTORE and STORET are water-quality data bases maintained by the USGS and U.S. Environmental Protection Agency, respectively. Most data in WATSTORE can be obtained through STORET. The WATSTORE site identification number is identical to the STORET station number and is needed to enter data into either of these data bases. The first six numerals of the number are the latitude of the well location in degrees, minutes, and seconds. The next seven numbers are the longitude of the location. The last two numbers are arbitrary numbers, which distinguish wells within a given 1-second by 1-second area (approximately 75 by 100 feet).

The township and range method of numbering test holes and wells is based on the U.S. Bureau of Land Management's system of subdivision of public lands. The first segment of a well or test-hole number indicates the township north of the baseline; the second, the range west of the principal meridian; and the third, the section in which the well is situated. The letters A, B, C, and D, following the section number, indicate well location in the section. The first letter denotes the 160-acre tract, the second letter the 40-acre tract, and the third letter the 10-acre tract. The letters are assigned counterclockwise beginning with the northeast quarter. Consecutive numbers beginning with 1 are added as suffixes to distinguish wells within a given 10-acre tract. For example, the number 117.21.17BAC2 identifies the second well or test hole in the southwest quarter of the northeast quarter of the northwest quarter, sec. 17, T. 117 N., R. 21 W.

The Minnesota Unique Well Number is an arbitrary number assigned by the State of Minnesota to new wells when they are drilled and older wells when they are located in the field. This number is needed to identify wells in ground-water data bases maintained by the State.

The project well number is used throughout this report to identify wells and piezometers. Municipal-supply wells are numbered with the initial letters of the name of the municipality and the well number assigned to the well by the municipality. For example, St. Louis Park municipal well 4 is numbered SLP4. Other wells, piezometers, and borings are numbered with the prefix W, P, or B, respectively, and a number. Wells W1-W17 and piezometers P1-P3 are consistent with the numbering system used in Barr Engineering Co. (1976, 1977).

Glossary

The geologic, hydrologic, and chemical terms pertinent to this report are defined as follows:

Aqueous phase—water in the saturated or unsaturated zone, which may contain hydrocarbon compounds. (See "Hydrocarbon fluid phase" and "Hydrocarbon solid phase.")

Aquifer—a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells or springs.

Confined ground water—ground water under pressure significantly greater than atmospheric. Its upper limit is the bottom of a bed of distinctly lower vertical hydraulic conductivity than that of the material in which the confined water occurs. (See "Confining bed.")

Confining bed—a body of material with low vertical permeability stratigraphically adjacent to one or more aquifers. Replaces the terms "aquiclude "aquitard," and "aquifuge."

Constituent, coal-tar—a chemical compound identified as occurring in significant amounts in commercial coal tar. (See "Derivative, coal-tar" and "Degradation product, coal-tar.")

Degradation product, coal-tar—a chemical compound identified as being formed by chemical or biochemical reactions involving coal-tar constituents.

Derivative, coal-tar—a constituent or degradation product of coal tar. (See "Constituent, coal-tar" and "Degradation product, coal-tar.")

Desorption—the removal of contaminants from the solid matrix of the porous medium by fluids in the ground-water system.

Diffusion—molecular movement of chemical constituents of ground water or hydrocarbon fluids response to chemical-concentration gradients.

Dispersion, mechanical—differences in the rate and direction of movement of individual tracer particles owing to variations in path lengths and pore geometry or size.

Dispersion, hydrodynamic—the combined effects of "Diffusion" and "Dispersion, mechanical."

Dissolved—organic or inorganic constituents of ground water that are not removed by filtration through a 0.45-micrometer filter. (See "Suspended" and "Total.")

Drawdown—the vertical distance between the static (nonpumping) water level and the level caused by pumping.

6/10

Ebrum —

These pages are missing from the official copy of the Accuracy report.

One copy is needed for the Accuracy report — the file i one copy should be sent to Ebrum.

S —

Well-Numbering System

Each well or test hole has been assigned four identifying numbers. They are (1) WATSTORE (STORET) site identification, (2) township and range location, (3) Minnesota Unique Well Number, and (4) a project number (table 1). WATSTORE and STORET are water-quality data bases maintained by the USGS and U.S. Environmental Protection Agency, respectively. Most data in WATSTORE can be obtained through STORET. The WATSTORE site identification number is identical to the STORET station number and is needed to enter data into either of these data bases. The first six numerals of the number are the latitude of the well location in degrees, minutes, and seconds. The next seven numbers are the longitude of the location. The last two numbers are arbitrary numbers, which distinguish wells within a given 1-second by 1-second area (approximately 75 by 100 feet).

The township and range method of numbering test holes and wells is based on the U.S. Bureau of Land Management's system of subdivision of public lands. The first segment of a well or test-hole number indicates the township north of the baseline; the second, the range west of the principal meridian; and the third, the section in which the well is situated. The letters A, B, C, and D, following the section number, indicate well location in the section. The first letter denotes the 160-acre tract, the second letter the 40-acre tract, and the third letter the 10-acre tract. The letters are assigned counterclockwise beginning with the northeast quarter. Consecutive numbers beginning with 1 are added as suffixes to distinguish wells within a given 10-acre tract. For example, the number 117.21.17BAC2 identifies the second well or test hole in the southwest quarter of the northeast quarter of the northwest quarter, sec. 17, T. 117 N., R. 21 W.

The Minnesota Unique Well Number is an arbitrary number assigned by the State of Minnesota to new wells when they are drilled and older wells when they are located in the field. This number is needed to identify wells in ground-water data bases maintained by the State.

The project well number is used throughout this report to identify wells and piezometers. Municipal-supply wells are numbered with the initial letters of the name of the municipality and the well number assigned to the well by the municipality. For example, St. Louis Park municipal well 4 is numbered SLP4. Other wells, piezometers, and borings are numbered with the prefix W, P, or B, respectively, and a number. Wells W1-W17 and piezometers P1-P3 are consistent with the numbering system used in Barr Engineering Co. (1976, 1977).

Glossary

The geologic, hydrologic, and chemical terms pertinent to this report are defined as follows:

Aqueous phase—water in the saturated or unsaturated zone, which may contain hydrocarbon compounds. (See "Hydrocarbon fluid phase" and "Hydrocarbon solid phase.")

Aquifer—a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells or springs.

Confined ground water—ground water under pressure significantly greater than atmospheric. Its upper limit is the bottom of a bed of distinctly lower vertical hydraulic conductivity than that of the material in which the confined water occurs. (See "Confining bed.")

Confining bed—a body of material with low vertical permeability stratigraphically adjacent to one or more aquifers. Replaces the terms "aquiclude "aquitard," and "aquifuge."

Constituent, coal-tar—a chemical compound identified as occurring in significant amounts in commercial coal tar. (See "Derivative, coal-tar" and "Degradation product, coal-tar.")

Degradation product, coal-tar—a chemical compound identified as being formed by chemical or biochemical reactions involving coal-tar constituents.

Derivative, coal-tar—a constituent or degradation product of coal tar. (See "Constituent, coal-tar" and "Degradation product, coal-tar.")

Desorption—the removal of contaminants from the solid matrix of the porous medium by fluids in the ground-water system.

Diffusion—molecular movement of chemical constituents of ground water or hydrocarbon fluids response to chemical-concentration gradients.

Dispersion, mechanical—differences in the rate and direction of movement of individual tracer particles owing to variations in path lengths and pore geometry or size.

Dispersion, hydrodynamic—the combined effects of "Diffusion" and "Dispersion, mechanical."

Dissolved—organic or inorganic constituents of ground water that are not removed by filtration through a 0.45-micrometer filter. (See "Suspended" and "Total.")

Drawdown—the vertical distance between the static (nonpumping) water level and the level caused by pumping.

4/17/87
N.

Table 50. Approximate Concentrations of Other Compounds Identified in Well W-133 Control Sample (8412-028-5)

RECEIVED
APR 17 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

Scan Number	Compound Identification	Approximate Concentration (µg/L)
316	$C_6H_{12}O_2$ (Hydroxy-methyl-pentanone)	2.9
382	Methyl cyclopentanol	3.0
387	Methyl cyclopentanol	5.0
487	Cyclohexen-one	0.4
1068	$C_5H_{10}O_2$ or $C_8H_{16}O$ [a]	0.8
1160	$C_5H_{10}O_2$ or $C_8H_{16}O$ [a]	1.4
2385	Alkyne	7.0
2418	Alcohol or alkene	10.5
2683,2692	Alkyne	338.5
2721	Alcohol or alkene	3.5
962	Alkyne or alkyldiene	8.1
3131	Azelate ester	14.9

[a] - see library display of 3 best fits

Table 51. Approximate Concentrations of Other Compounds Identified in Method Blank (8412-017-10)

Scan Number	Compound Identification	Approximate Concentration µg/mL extract
337	$C_7H_{14}O$ or $C_5H_{10}O$	0.55
602,616	$C_4H_{10}O_3$ [a]	2.20
1147	$C_5H_{10}O_2$ or $C_8H_{16}O$ [a]	1.23
400	Alcohol	10.96
2661	Alkyne	271.7
3113	Azelate ester	13.62

Table 51a. Approximate Concentrations of Other Compounds Identified in Method Blank (8412-020-11)

Scan Number	Compound Identification	Approximate Concentration µg/mL extract
308	$C_6H_{10}O$ [a]	14.50
316	Tetrachloroethylene	0.86
354	Alkane	0.60
386,394	$C_6H_{12}O_2$ [a]	58.44
?	Alcohol	0.55
676	$C_4H_{10}O_3$ [a]	3.17
2386,2388	Alkene	12.50
2420	Alcohol	20.76
2690	Alkene or $C_{20}H_{40}O_2$ [a]	288.61
2697	Alkene	90.40
3141	Azelate ester	8.87
3321	Bis(2-ethylhexyl)phthalate	9.89

[a] - see library display for chemical name(s)

[b] - approximate concentration is given in µg/mL extract; final volume of extract: 2 mL; initial volume 350 mL acetone/CH_2Cl_2 (20:80)

Table 52. Results of QC Analyses for Resin Cartridge Samples - Quantitation Done by Isotope Dilution Method

Compound	Percent Recovery				
	8412-010 -8	8412-017 -11	8412-018 -8	8412-020 -12	8412-027 -14
Acenaphthene	113	108	108	106	112
Fluoranthene	107	110	112	106	109
Naphthalene	110	114	96	108	117
Phenol	120	106	115	111	122
Benzo(a)pyrene	107	109	76	101	111
Chrysene	110	103	90	114	115
Dibenzo(a,h)anthracene	103	103	107	107	125
Pyrene	106	104	101	96	107
9H-Carbazole	129	121	107	126	123
Acridine	112	112	114	114	116
Quinoline	103	107	106	106	127
1-Naphthol	99	97	110	86	128

Table 52a. Results of QC Analyses for Continuous Liquid-Liquid Extraction Method Quantitation Done by Isotope Dilution Method

Compound	Percent Recovery 8412-016 -3
Acenaphthene	112
Fluoranthene	120
Naphthalene	114
Phenol	*
Benzo(a)pyrene	86
Chrysene	130
Dibenzo(a,h)anthracene	102
Pyrene	108
9H-Carbazole	117
Acridine	120
Quinoline	110
1-Naphthol	100

* Not able to quantitate phenol due to chromatography problems.

11/24/86
N.

CH2M HILL
Engineers
Planners
Economists
Scientists

November 24, 1986

W63720.FR

Ms. Linda Rogalinski
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data For Laboratory No. 8352

Dear Ms. Rogalinski:

On ~~May~~ Nov 14, 1986 the CH2M HILL Montgomery Laboratory received three water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORGANIC ANALYSIS

SAMPLE INFORMATION

Client: Reilly Tar

Address: CH2M HILL Inc., P.O. Box 2090, Milwaukee, Misconsin 53201 Attention: Linda Rogalinski

Lab No: B352

Date Received: November 14, 1986 Date Reported: November 24, 1986

SAMPLE MATRICES: Water 3 Soil ___ Sludge ___ Other ___

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles ___
   Base/Neutrals ___
   Acids ___
   Pesticides ___
   PCBs ___
2. SDWA Pesticides ___
3. SDWA Herbicides ___
4. Trihalomethanes ___
5. Ethylene Dibromide ___
6. Total Organic Halogen ___
7. Other: Three PAH

ANALYTICAL INSTRUMENTATION

1 Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

___ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

___ Dohrman DX-20 Total Organic Halide System.

___ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.
2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38, No.75, Part II, November 28, 1973.
3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.
4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TRAVEL BLANK, GRAB, 1:15

Lab No. :8352-1

Date Sampled :11/13/86

Date Extracted :11/20/86

Date Received :11/14//86

Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	9.0	Acridine	1.8	BMDL
1H-Indene	1.0	2.5	Phenanthridine	1.4	BMDL
Naphthalene	1.9	5.7	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	3.0	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.6	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.0	Benzo(e)pyrene	1.0	BMDL
enaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
enaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =76

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED DUPLICATE, GRAB, 1:10
Lab No. :8352-3
Date Sampled :11/13/86
Date Extracted :11/20/86
Date Received :11/14//86
Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	32	Acridine	1.8	BMDL
1H-Indene	1.0	4.0	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.8	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	1.6	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.8	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	2.1	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.8	Benzo(e)pyrene	1.0	BMDL
[illegible]-enaphthylene	1.0	3.9	Benzo(a)pyrene	1.0	BMDL
[illegible]naphthene	1.3	6.0	Perylene	1.0	BMDL
[illegible]benzofuran	2.0	1.6	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	3.5	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =71

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED, GRAB, 1:07

Lab No. :8352-2

Date Sampled :11/13/86

Date Extracted :11/20/86

Date Received :11/14//86

Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	28	Acridine	1.8	BMDL
1H-Indene	1.0	3.5	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.6	Carbazole	1.1	BMDL
Benzo(b)thiophene	1.0	1.6	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.8	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	2.1	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	2.2	Benzo(e)pyrene	1.0	BMDL
enaphthylene	1.0	2.5	Benzo(a)pyrene	1.0	BMDL
naphthene	1.3	6.6	Perylene	1.0	BMDL
ibenzofuran	2.0	1.9	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.0	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =80

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

11/13/86
N.

CITY OF SAINT LOUIS PARK

March 9, 1987

Mr. Daniel J. Bicknell
Remedial Project Manager
United States Environmental Protection Agency
Region 5
230 South Dearborn Street
Chicago, illinois 60604

RE: Interim Sampling - GAC Plant
United States of America, et al. vs. Reilly Tar & Chemical Corporation, et al.
File No. Civ. 4-80-469

Dear Mr. Bicknell:

Pursuant to receipt of your letters of request dated January 5 and 22, 1987, the City's laboratory consultant received authorization to discuss the various issues raised in the correspondence with Mr. K. Bolger, United States Environmental Protection Agency - CMS (Region V). On January 30, 1987, Mr. W. G. Wilson, Director of Natural Laboratory Services for ERT (the City's consultant) contacted Mr. Bolger and discussed three areas of concern:
(1) overall organization of data packages submitted; (2) CLP reporting deficiencies; and, (3) CLP rules prohibiting method blank correction of samples.

Pursuant to the conversation it is believed Mr. Bolger takes a somewhat less critical stance on the "data package issue" as that imparted in your correspondence. Specifically, Mr. Bolger acknowledges the Quality Assurance Project Plan (QAPP) approved for the project does not contemplate a reporting format contained in CLP guidance documents, and as a result, certain changes must be made in the agency review process to accommodate those differences.

In addition, Mr. Bolger acknowledges the approved QAPP does allow method blank correction, a condition not permitted under CLP rules. In this case, Mr. Bolger has advised we follow the format of the approved QAPP.

Regarding data package organization and perceived CLP reporting deficiencies, the City's consultant has provided the following information (please find enclosed herein):

1. Initial calibration curves identified as to which sample sets they were used for.

2. Table showing percent recoveries for each matrix spike calculated as he requested.

5005 minnetonka boulevard • st. louis park, minnesota 55416-2290 • phone (612) 924-2500

3. Specific review of each matrix spike calculation and the effect of blank correction.

4. Table showing comparison percentages of each daily check standard relative to the appropriate initial calibration curve.

The City is confident the information provided, together with recently submitted data packages, will provide information necessary for the agencies to confirm that the GAC plant is indeed operating as anticipated and that treatment plant effluent meets the criteria of Section 2.2 of the RAP.

Please contact this office if you have any questions in regard to this matter.

Sincerely,

James N. Grube

James N. Grube
Director of Public Works

JNG/ja
Enclosure
cc: Elizabeth Thompson (w/o enclosure)
John Craun (w/o enclosure)
Dick Koppy (w/o enclosure)

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A RESOURCE ENGINEERING COMPANY
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ERT Ref. No. 104-TMT-019
ERT Proj. No. E631-005

environmental and engineering excellence

March 3, 1987

Mr. James N. Grube
Director of Public Health
City of St. Loius Park
5005 Minnetonka Blvd.
St. Louis Park, MN 55416

Dear Mr. Grube,

In reference to additional documentation requested by the U.S. EPA, Region V concerning analyses conducted by ERT on the GAC plant, we wish to provide the attached documentation. Briefly, the information supplied here represents that agreed upon by W.G. Wilson, ERT, and K. Bolger, U.S. EPA-ESD (Region V), based on a telephone conversation between these individuals on January 30, 1987, which was summarized in a letter sent to you by W.G. Wilson on February 9, 1987. Further, it is our intention that the documentation contained here serve to alleviate any deficiencies in the raw data packages that had been expressed by the U.S. EPA through letters to you from D. Bicknell, dated January 15 and January 22, 1987. The following is included:

1) Three different five point calibration curves were utilized for all analyses to date and are provided here. All raw data packages provided forthwith will include this data.

2) Tables for all matrix spike (MS) recovery analyses are included, utilizing the format requested by K. Bolger. Furthermore, the values for the observed concentrations are not corrected for values present in either the corresponding blank or treated samples, as requested by K. Bolger.

3) We reviewed the effect of blank correction on the matrix spike recovery calculation. A potential problem here has come to light - due primarily to the low concentration (20 ppt) of the matrix spike. Namely, for occassions when the observed concentration of an individual matrix spike compound approaches the level in the blank, or alternatively, approaches the MDL of that compound, blank correcting that value invariably leads to matrix spike recovery values less than the target recovery range (20%, or approximately 4.0 ppt for seven of the eight MS compounds, and 10% or 2.0 ppt for benzo(ghi)perylene).

4) Tables showing the results of the continuing calibration check performed on the GC/MS prior to analysis of all sample batches reported to date. The table includes for each target compound the observed response factor (RF), the average response factor calculated from the appropriate calibration curve ($\overline{RF}$), and the calculated per cent difference (%D) between these two values. This information, while contained in all the data packages to date, will be more clearly presented in all new

packages. Please note that for the instances where the per cent difference (%D) for these parameters is greater than the ±35% range specified in the QAPP, an asterik (*) has been placed alongside the value. As you will note in the review of the %D values for these calibration checks, for each set of samples at least one compound was outside the ±35% range. However, in sets 1, 3, 4, 5, and 8, either no PAH's were detected in the samples, or non-carcinogenic PAH's were detected and quantitated. Therefore, it was not felt that recalibration and reanalysis was warranted.

In sample set 2, chrysene was detected in sample MS-02, the matrix spike, at 14 ng/l. The %D for the chrysene calibration standard was 36.1%. In sample set number 9, quinoline was detected in sample MS-09, the matrix spike, at 11 ng/l and sample TD-09, the treatment duplicate, at 2.4 ng/l. The %D for the quinoline calibration standard was 35.6%. In both cases the %D was so close to the ±35% range that recalibration and reanalysis was not felt to be warranted. Further, in this set no quinoline was detected in the treatment sample.

We hope the enclosed documentation meets your requirements. In general, ERT has tried to follow the guidelines as set forth in the QAPP and feels the supporting documentation provided to be thorough and complete. We find it difficult if not impossible, however, to meet the requirememts and/or expectations of regulatory reviewers who feel this program must meet additional criteria (eg. EPA-CLP).

Please feel free to contact Joseph Mastone, Laboratory Manager, Robert Bentley, Division QC Manager, or myself concerning this information.

Sincerely,

Thomas M. Trainor
Program Manager
Organic Chemistry

Robert E. Bentley
Quality Control Manager
National Laboratory Services

cc: R. Bradway
J. Mastone
A. Paradice
L. Pounds
M. Sparlin

ERT

APPENDIX A

Initial Five Point Calibration Curves

Curve #1: August 5, 1986

Utilized for the following sampling dates:

Set #1: July 15, 1986
Set #2: July 22, 1986
Set #3: July 23, 1986
Set #4: August 7, 1986
Set #5: August 27, 1986

Curve #2: September 5, 1986

Utilized for the following sampling dates:

Set #8: October 7, 1986

Curve #3: November 18, 1986

Set #9: November 13, 1986

CAL CURVE :

STD. CONC. : 20 ng/ml 40 ng/ml 100 ng/ml 160ng/ml 200ng/ml 40 ng/ml

GC/MS File # : STD02 STD01 STD04 STD05 STD03 STD06

Cal Curve #1

08/05/86

cc080586

Internal Std.	Area	Area	Area	Area	Area	Area	AVG	SD	% RSD
Acenaphthene-d10	534245	506420	529964	521454	614701	575822	547101	36892	6.743
Phenanthrene-d10	1635788	1424011	1440108	1471483	1600781	1590584	1527126	84222	5.515
Benz(a)pyrene-d12	944023	1025374	829436	1121300	939414	885377	957487	94471	9.867
Group I	RF	RF	RF	RF	RF	RF	AVG	SD	% RSD
benzofuran	1.708	1.702	1.708	1.481	1.426	1.566	1.598	0.115	7.184
dihydroinden	1.073	0.966	0.965	0.832	0.815	0.894	0.924	0.088	9.574
indene	1.235	1.207	1.186	1.043	1.387	1.133	1.198	0.104	8.716
Naphthalene-d8 (Surr.)	2.552	2.507	2.677	2.269	2.221	2.423	2.442	0.158	6.491
Naphthalene	5.016	3.572	3.218	2.994	2.498	3.789	3.515	0.788	22.418
Benz(b)thio	2.154	1.946	2.234	1.939	1.861	2.029	2.027	0.129	6.387
Quinoline	1.144	0.877	1.047	1.012	0.856	0.922	0.976	0.101	10.383
Indole	1.300	1.092	1.218	1.045	1.024	1.130	1.135	0.097	8.539
ethyl	2.282	1.767	1.862	1.619	1.551	1.912	1.832	0.238	12.970
thyl	2.406	1.757	1.839	1.655	1.489	1.803	1.825	0.284	15.582
nenyl		16.566	15.500	5.224	7.955	20.293	18.290	5.622	42.888
Acenaphthylene	1.568	1.802	1.561	1.483	1.435	1.620	1.578	0.117	7.402
Acenaphthene	1.502	1.381	1.475	1.373	1.262	1.511	1.417	0.088	6.225
Dibenzofuran	2.589	2.364	2.400	2.360	2.186	2.370	2.378	0.117	4.926
Group II									
Flourene-d10 (Surr.)	0.610	0.556	0.507	0.470	0.473	0.485	0.517	0.051	9.832
Fluorene	0.969	0.749	0.743	0.688	0.710	0.723	0.764	0.094	12.296
Dibenzothiophene	1.232	1.233	0.956	0.932	0.930	1.246	1.088	0.149	13.710
Phenanthrene		2.022	1.325	1.292	1.525	1.817	1.596	0.283	17.736
Anthracene	1.309	0.885	0.809	0.842	0.820	0.912	0.929	0.173	18.667
Acridine	0.596	0.406	0.433	0.488	0.426	0.400	0.458	0.068	14.837
Carbazole	0.782	0.701	0.707	0.779	0.692	0.694	0.726	0.039	5.367
Fluoranthene	1.413	1.111	1.060	1.318	1.073	1.105	1.180	0.135	11.465
ene-d10 (Surr.)	0.774	0.798	0.766	0.962	0.745	0.763	0.801	0.074	9.183
ene	1.436	1.142	1.125	1.679	1.134	1.124	1.273	0.213	16.725
Group III									
Benz(a)anthracene	1.223	1.498	1.188	1.325	1.134	1.208	1.263	0.120	9.471
Chrysene-d12 (Surr.)	0.500	0.531	0.454	0.469	0.432	0.450	0.473	0.033	7.030
Chrysene	1.407	1.651	1.455	1.490	1.466	1.441	1.485	0.079	5.290
Benzofluoranthenes	1.891	1.752	1.627	1.584	1.481	1.595	1.655	0.132	7.985
Benz(e)pyrene	2.011	1.806	1.807	1.637	1.688	1.830	1.796	0.119	6.598
Benz(a)pyrene	1.328	1.173	1.216	1.131	1.104	1.245	1.200	0.075	6.215
Perylene-d12 (Surr.)	0.788	0.679	0.728	0.727	0.681	0.658	0.710	0.043	6.093
Perylene	1.437	1.102	1.216	1.407	1.159	1.211	1.255	0.124	9.899
Indeno(123,cd)pyrene	1.410	2.074	1.498	1.018	1.633	1.241	1.479	0.330	22.285
Dibenz(ah)anthracene	0.994		1.086	0.742	1.150	0.857	0.966	0.149	15.408
Dibenzo(ghi)perylene	1.728	1.568	1.534	1.039	1.481	1.334	1.447	0.217	14.971

RF = Response Factor

CAL CURVE	:									Cal Curve #1
STD. CONC.	:	20 ng/ml	40 ng/ml	100 ng/ml	160ng/ml	200ng/ml	40 ng/ml			08/05/86
GC/MS File #	:	STD02	STD01	STD04	STD05	STD03	STD06			cc080586
Internal Std.		**RT**	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
Acenaphthene-d10		18.026	18.024	18.029	18.030	18.028	18.034	18.029	0.003	0.017
Phenanthrene-d10		21.580	21.847	21.852	21.855	21.850	21.859	21.807	0.102	0.466
Benz(a)pyrene-d12		32.532	32.524	32.531	32.531	32.533	32.540	32.532	0.005	0.014
Group I		**RT**	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
benzofuran		10.156	10.160	10.166	10.160	10.162	10.171	10.163	0.005	0.047
dihydroinden		10.885	10.886	10.897	10.894	10.890	10.900	10.892	0.006	0.051
indene		11.039	11.040	11.053	11.043	11.042	11.056	11.046	0.007	0.059
Naphthalene-d8 (Surr.)		13.476	13.476	13.481	13.481	13.480	13.486	13.480	0.003	0.025
Naphthalene		13.516	13.516	13.521	13.521	13.520	13.527	13.520	0.004	0.027
Benz(b)thio		13.671	13.671	13.675	13.676	13.674	13.680	13.675	0.003	0.023
Quinoline		14.380	14.379	14.383	14.384	14.382	14.390	14.383	0.004	0.025
Indole		15.156	15.157	15.167	15.167	15.165	15.172	15.164	0.006	0.038
2-methyl		15.285	15.284	15.287	15.289	15.286	15.292	15.287	0.003	0.017
thyl		15.559	15.557	15.572	15.573	15.571	15.578	15.568	0.008	0.049
enyl		16.523	16.521	16.525	16.527	16.524	16.530	16.525	0.003	0.017
Acenaphthylene		17.618	17.616	17.621	17.619	17.619	17.626	17.620	0.003	0.018
Acenaphthene		18.107	18.105	18.108	18.111	18.108	18.114	18.109	0.003	0.016
Dibenzofuran		18.521	18.520	18.523	18.524	18.522	18.528	18.523	0.003	0.014
Group II										
Flourene-d10 (Surr.)		19.343	19.341	19.346	19.348	19.345	19.351	19.346	0.003	0.017
Fluorene		19.419	19.416	19.421	19.425	19.420	19.428	19.422	0.004	0.020
Dibenzothiophene		21.581	21.578	21.585	21.582	21.587	21.586	21.583	0.003	0.015
Phenanthrene		21.857	21.893	21.900	21.900	21.899	21.904	21.892	0.016	0.073
Anthracene		22.015	22.014	22.019	22.019	22.018	22.023	22.018	0.003	0.013
Acridine		22.135	22.126	22.134	22.135	22.134	22.138	22.134	0.004	0.017
Carbazole		22.441	22.439	22.442	22.444	22.442	22.448	22.443	0.003	0.013
Fluoranthene		25.018	25.013	25.021	25.017	25.021	25.021	25.019	0.003	0.012
ene-d10 (Surr.)		25.559	25.557	25.560	25.562	25.560	25.566	25.561	0.003	0.011
ene		25.598	25.596	25.600	25.601	25.600	25.606	25.600	0.003	0.012
Group III										
Benz(a)anthracene		28.711	28.708	28.712	28.715	28.712	28.722	28.713	0.004	0.015
Chrysene-d12 (Surr.)		28.765	28.761	28.763	28.759	28.765	28.764	28.763	0.002	0.008
Chrysene		28.821	28.818	28.822	28.817	28.284	28.823	28.731	0.200	0.696
Benzofluoranthenes		31.601	31.626	31.730	31.629	31.632	31.639	31.643	0.041	0.129
Benz(e)pyrene		32.444	32.439	32.445	32.448	32.446	32.456	32.446	0.005	0.016
Benz(a)pyrene		32.603	32.599	32.604	32.606	32.607	32.613	32.605	0.004	0.013
Perylene-d12 (Surr.)		32.796	32.790	32.797	32.800	32.797	32.808	32.798	0.005	0.016
Perylene		32.873	32.865	32.873	32.865	32.875	32.884	32.873	0.006	0.020
Indeno(123,cd)pyrene		34.566	36.949	36.954	36.958	36.961	36.967	36.559	0.891	2.438
Dibenz(ah)anthracene		34.629	37.009	37.028	37.028	37.028	37.038	36.627	0.893	2.439
Dibenzo(ghi)perylene		35.524	38.169	38.180	38.186	38.185	38.186	37.738	0.990	2.624

RT = Retention Time

CAL CURVE :							Cal Curve #1
STD. CONC. :	20 ng/ml	40 ng/ml	100 ng/ml	160ng/ml	200ng/ml	40 ng/ml	08/05/86
GC/MS File # :	STD02	STD01	STD04	STD05	STD03	STD06	cc080586

Internal Std.

Acenaphthene-d10
Phenanthrene-d10
Benz(a)pyrene-d12

Group I	RRT	RRT	RRT	RRT	RRT	RRT	AVG	SD	% RSD
benzofuran	0.563	0.564	0.564	0.564	0.564	0.564	0.564	0.000	0.035
dihydroinden	0.604	0.604	0.604	0.604	0.604	0.604	0.604	0.000	0.035
indene	0.612	0.613	0.613	0.612	0.612	0.613	0.613	0.000	0.046
Naphthalene-d8 (Surr.)	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.000	0.009
Naphthalene	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.000	0.011
Benz(b)thio	0.758	0.758	0.759	0.759	0.758	0.759	0.758	0.000	0.006
Quinoline	0.798	0.798	0.798	0.798	0.798	0.798	0.798	0.000	0.008
Indole	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.000	0.022
2-methyl	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.000	0.003
[illegible]thyl	0.863	0.863	0.864	0.864	0.864	0.864	0.864	0.000	0.033
Biphenyl	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.000	0.002
Acenaphthylene	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.000	0.006
Acenaphthene	1.004	1.004	1.004	1.004	1.004	1.004	1.004	0.000	0.004
Dibenzofuran	1.027	1.028	1.027	1.027	1.027	1.027	1.027	0.000	0.005
Group II									
Flourene-d10 (Surr.)	0.896	0.885	0.885	0.885	0.885	0.885	0.887	0.004	0.464
Fluorene	0.900	0.889	0.889	0.889	0.889	0.889	0.891	0.004	0.464
Dibenzothiophene	1.000	0.988	0.988	0.988	0.988	0.988	0.990	0.005	0.466
Phenanthrene	1.013	1.002	1.002	1.002	1.002	1.002	1.004	0.004	0.397
Anthracene	1.020	1.008	1.008	1.008	1.008	1.008	1.010	0.005	0.464
Acridine	1.026	1.013	1.013	1.013	1.013	1.013	1.015	0.005	0.473
Carbazole	1.040	1.027	1.027	1.027	1.027	1.027	1.029	0.005	0.466
Fluoranthene	1.159	1.145	1.145	1.145	1.145	1.145	1.147	0.005	0.469
[illegible]e-d10 (Surr.)	1.184	1.170	1.170	1.170	1.170	1.170	1.172	0.005	0.467
[illegible]ne	1.186	1.172	1.172	1.171	1.172	1.171	1.174	0.005	0.466
Group III									
Benz(a)anthracene	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.000	0.007
Chrysene-d12 (Surr.)	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.000	0.013
Chrysene	0.886	0.886	0.886	0.886	0.869	0.886	0.883	0.006	0.697
Benzofluoranthenes	0.971	0.972	0.975	0.972	0.972	0.972	0.973	0.001	0.129
Benz(e)pyrene	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.000	0.005
Benz(a)pyrene	1.002	1.002	1.002	1.002	1.002	1.002	1.002	0.000	0.004
Perylene-d12 (Surr.)	1.008	1.008	1.008	1.008	1.008	1.008	1.008	0.000	0.006
Perylene	1.010	1.010	1.011	1.010	1.011	1.011	1.010	0.000	0.010
Indeno(123,cd)pyrene	1.063	1.136	1.136	1.136	1.136	1.136	1.124	0.027	2.438
Dibenz(ah)anthracene	1.064	1.138	1.138	1.138	1.138	1.138	1.126	0.027	2.439
Dibenzo(ghi)perylene	1.092	1.174	1.174	1.174	1.174	1.174	1.160	0.030	2.624

RRT = Relative Retention Time

CAL CURVE :						Cal Curve #2		
STD. CONC. :	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml	09/05/86		
GC/MS File # :	STD29	STD28	STD27	STD26	STD25	CC860905		
Internal Std.	Area	Area	Area	Area	Area	AVG	SD	% RSD
Acenaphthene-d10	580034	563333	595325	684890	956557	676028	146426	21.660
Phenanthrene-d10	1752879	1772532	1899920	2208802	2579334	2042693	313987	15.371
Benz(a)pyrene-d12	727186	1257251	1202798	1281361	1214990	1136717	206717	18.185
Group I	RF	RF	RF	RF	RF	AVG	SD	% RSD
benzofuran	1.150	1.022	1.026	0.939	0.984	1.024	0.070	6.869
dihydroinden	0.719	0.641	0.628	0.585	0.620	0.639	0.044	6.966
indene	1.193	1.060	1.014	0.956	1.031	1.051	0.079	7.510
Naphthalene-d8 (Surr.)	1.716	1.690	1.677	1.637	1.716	1.687	0.029	1.743
Naphthalene	3.678	2.829	2.579	2.283	2.259	2.726	0.520	19.082
Benz(b)thio	1.488	1.435	1.514	1.460	1.569	1.493	0.046	3.092
Quinoline	0.704	0.959	0.764	0.861	0.839	0.826	0.087	10.545
Indole	1.285	1.023	0.924	0.922	1.046	1.040	0.133	12.738
2-methyl	1.875	1.242	1.373	1.302	1.265	1.412	0.236	16.726
methyl	1.752	1.513	1.527	1.464	1.496	1.551	0.103	6.634
phenyl	15.920	14.893	5.568	3.879	3.009	8.654	5.584	64.526
Acenaphthylene	1.549	1.542	1.641	1.675	1.746	1.631	0.077	4.751
Acenaphthene	1.543	1.453	1.577	1.555	1.581	1.542	0.047	3.016
Dibenzofuran	2.550	2.107	2.147	2.088	2.065	2.192	0.181	8.273
Group II								
Flourene-d10 (Surr.)	0.647	0.544	0.543	0.538	0.586	0.571	0.042	7.275
Fluorene	0.872	0.651	0.697	0.690	0.796	0.741	0.081	10.925
Dibenzothiophene	1.190	0.943	0.951	0.884	0.921	0.978	0.109	11.122
Phenanthrene	(4.707)	1.442	1.562	1.512	1.298	2.104 (1.45)	1.304	61.990 (6.84)
Anthracene	1.371	0.966	0.975	0.974	0.995	1.056	0.158	14.925
Acridine	0.662	0.628	0.599	0.583	0.568	0.608	0.034	5.511
Carbazole	0.708	0.789	0.682	0.737	0.773	0.738	0.040	5.375
Fluoranthene	1.235	1.324	1.358	1.355	1.299	1.314	0.045	3.435
rene-d10 (Surr.)	0.691	0.956	0.901	0.874	0.831	0.851	0.090	10.517
rene	1.241	1.448	1.505	1.483	1.418	1.419	0.094	6.604
Group III								
Benz(a)anthracene	1.496	1.413	1.442	1.404	1.585	1.468	0.067	4.545
Chrysene-d12 (Surr.)	0.602	0.519	0.527	0.486	0.549	0.537	0.038	7.164
Chrysene	1.824	1.649	1.760	1.688	1.859	1.756	0.079	4.516
Benzofluoranthenes	1.937	1.883	1.939	1.750	1.835	1.869	0.071	3.779
Benz(e)pyrene	1.766	1.630	1.642	1.472	1.539	1.610	0.100	6.194
Benz(a)pyrene	1.469	1.428	1.458	1.352	1.364	1.414	0.048	3.366
Perylene-d12 (Surr.)	1.297	1.816	0.750	1.021	1.038	1.184	0.360	30.416
Perylene	1.303	1.194	1.508	1.178	1.231	1.283	0.121	9.410
Indeno(123,cd)pyrene	0.935	1.123	1.364	1.214	1.197	1.166	0.140	11.979
Dibenz(ah)anthracene	0.673	0.744	0.886	0.795	0.764	0.772	0.069	8.993
Dibenzo(ghi)perylene	1.069	1.257	1.500	1.301	1.306	1.287	0.137	10.666

RF = Response Factor

CAL CURVE :						Cal Curve #2		
STD. CONC. :	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml	09/05/86		
GC/MS File # :	STD29	STD28	STD27	STD26	STD25	CC860905		
Internal Std.	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
Acenaphthene-d10	17.775	17.772	17.793	17.792	17.795	17.785	0.010	0.055
Phenanthrene-d10	21.590	21.583	21.612	21.614	21.614	21.603	0.013	0.062
Benz(a)pyrene-d12	32.156	32.147	32.190	32.187	32.184	32.173	0.018	0.055
Group I	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
benzofuran	9.934	9.929	9.945	9.954	9.957	9.944	0.011	0.110
dihydroinden	10.659	10.664	10.682	10.681	10.683	10.674	0.010	0.095
indene	10.820	10.814	10.383	10.837	10.838	10.738	0.178	1.657
Naphthalene-d8 (Surr.)	13.244	13.238	13.262	13.266	13.263	13.255	0.011	0.086
Naphthalene	13.285	13.278	13.302	13.307	13.303	13.295	0.011	0.085
Benz(b)thio	13.434	13.433	13.457	13.453	13.458	13.447	0.011	0.083
Quinoline	14.151	14.145	14.167	14.172	14.166	14.160	0.010	0.073
Indole	14.934	14.931	14.953	14.957	14.951	14.945	0.011	0.071
2-methyl	15.041	15.044	15.067	15.067	15.066	15.057	0.012	0.079
thyl	15.323	15.318	15.343	15.345	15.342	15.334	0.011	0.074
enyl	16.279	16.279	16.308	16.298	16.302	16.293	0.012	0.074
Acenaphthylene	17.374	17.366	17.390	17.391	17.393	17.383	0.011	0.062
Acenaphthene	17.857	17.848	17.875	17.874	17.877	17.866	0.012	0.065
Dibenzofuran	18.276	18.270	18.291	18.290	18.293	18.284	0.009	0.050
Group II								
Flourene-d10 (Surr.)	19.092	19.089	19.123	19.121	19.111	19.107	0.014	0.075
Fluorene	19.164	19.164	19.190	19.188	19.189	19.179	0.012	0.064
Dibenzothiophene	21.318	21.325	21.345	21.348	21.349	21.337	0.013	0.061
Phenanthrene	21.631	21.640	21.665	21.660	21.660	21.651	0.013	0.061
Anthracene	21.748	21.750	21.780	21.782	21.779	21.768	0.015	0.071
Acridine	21.875	21.872	21.898	21.896	21.900	21.888	0.012	0.055
Carbazole	22.194	22.187	22.220	22.212	22.213	22.205	0.013	0.056
Fluoranthene	24.741	24.746	24.779	24.770	24.776	24.762	0.016	0.064
ene-d10 (Surr.)	25.285	25.288	25.316	25.316	25.313	25.304	0.014	0.055
ene	25.325	25.329	25.356	25.357	25.352	25.344	0.014	0.055
Group III								
Benz(a)anthracene	28.438	28.437	28.470	28.468	28.466	28.456	0.015	0.053
Chrysene-d12 (Surr.)	28.489	28.493	28.518	28.515	28.517	28.506	0.013	0.044
Chrysene	28.549	28.543	28.575	28.574	28.575	28.563	0.014	0.050
Benzofluoranthenes	31.290	31.289	31.322	31.317	31.318	31.307	0.015	0.046
Benz(e)pyrene	32.062	32.060	32.097	32.099	32.096	32.083	0.018	0.056
Benz(a)pyrene	32.222	32.214	32.253	32.254	32.251	32.239	0.017	0.053
Perylene-d12 (Surr.)	32.405	32.392	32.435	32.438	32.433	32.421	0.019	0.057
Perylene	32.474	32.470	32.509	32.507	32.506	32.493	0.017	0.053
Indeno(123,cd)pyrene	36.353	36.337	36.393	36.395	36.389	36.373	0.024	0.065
Dibenz(ah)anthracene	36.411	36.406	36.470	36.470	36.468	36.445	0.030	0.082
Dibenzo(ghi)perylene	37.503	37.484	37.547	37.548	37.541	37.525	0.026	0.070

RT = Retention Time

CAL CURVE	:						Cal Curve #2
STD. CONC.	:	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml	09/05/86
GC/MS File #	:	STD29	STD28	STD27	STD26	STD25	CC860905

Internal Std.

Acenaphthene-d10
Phenanthrene-d10
Benz(a)pyrene-d12

Group I	RRT	RRT	RRT	RRT	RRT	AVG	SD	% RSD
benzofuran	0.559	0.559	0.559	0.559	0.560	0.559	0.000	0.061
dihydroinden	0.600	0.600	0.600	0.600	0.600	0.600	0.000	0.044
indene	0.609	0.608	0.584	0.609	0.609	0.604	0.010	1.676
Naphthalene-d8 (Surr.)	0.745	0.745	0.745	0.746	0.745	0.745	0.000	0.033
Naphthalene	0.747	0.747	0.748	0.748	0.748	0.748	0.000	0.035
Benz(b)thio	0.756	0.756	0.756	0.756	0.756	0.756	0.000	0.029
Quinoline	0.796	0.796	0.796	0.797	0.796	0.796	0.000	0.026
Indole	0.840	0.840	0.840	0.841	0.840	0.840	0.000	0.023
2-methyl	0.846	0.847	0.847	0.847	0.847	0.847	0.000	0.028
[illegible]yl	0.862	0.862	0.862	0.862	0.862	0.862	0.000	0.022
[illegible]nyl	0.916	0.916	0.917	0.916	0.916	0.916	0.000	0.026
Acenaphthylene	0.977	0.977	0.977	0.977	0.977	0.977	0.000	0.011
Acenaphthene	1.005	1.004	1.005	1.005	1.005	1.005	0.000	0.013
Dibenzofuran	1.028	1.028	1.028	1.028	1.028	1.028	0.000	0.007
Group II								
Flourene-d10 (Surr.)	0.884	0.884	0.885	0.885	0.884	0.884	0.000	0.026
Fluorene	0.888	0.888	0.888	0.888	0.888	0.888	0.000	0.012
Dibenzothiophene	0.987	0.988	0.988	0.988	0.988	0.988	0.000	0.021
Phenanthrene	1.002	1.003	1.002	1.002	1.002	1.002	0.000	0.026
Anthracene	1.007	1.008	1.008	1.008	1.008	1.008	0.000	0.017
Acridine	1.013	1.013	1.013	1.013	1.013	1.013	0.000	0.011
Carbazole	1.028	1.028	1.028	1.028	1.028	1.028	0.000	0.017
Fluoranthene	1.146	1.147	1.147	1.146	1.146	1.146	0.000	0.022
[illegible]e-d10 (Surr.)	1.171	1.172	1.171	1.171	1.171	1.171	0.000	0.017
[illegible]e	1.173	1.174	1.173	1.173	1.173	1.173	0.000	0.019
Group III								
Benz(a)anthracene	0.884	0.885	0.884	0.884	0.884	0.884	0.000	0.008
Chrysene-d12 (Surr.)	0.886	0.886	0.886	0.886	0.886	0.886	0.000	0.018
Chrysene	0.888	0.888	0.888	0.888	0.888	0.888	0.000	0.008
Benzofluoranthenes	0.973	0.973	0.973	0.973	0.973	0.973	0.000	0.012
Benz(e)pyrene	0.997	0.997	0.997	0.997	0.997	0.997	0.000	0.009
Benz(a)pyrene	1.002	1.002	1.002	1.002	1.002	1.002	0.000	0.005
Perylene-d12 (Surr.)	1.008	1.008	1.008	1.008	1.008	1.008	0.000	0.007
Perylene	1.010	1.010	1.010	1.010	1.010	1.010	0.000	0.006
Indeno(123,cd)pyrene	1.131	1.130	1.131	1.131	1.131	1.131	0.000	0.012
Dibenz(ah)anthracene	1.132	1.132	1.133	1.133	1.133	1.133	0.000	0.028
Dibenzo(ghi)perylene	1.166	1.166	1.166	1.167	1.166	1.166	0.000	0.016

RRT = Relative Retention Time

CAL CURVE :							Cal Curve #3	
STD. CONC. :	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml		11/18/86	
GC/MS File # :	STD46	STD45	STD44	STD43	STD42		cc861118	
Internal Std.	**Area**	**Area**	**Area**	**Area**	**Area**	**AVG**	**SD**	**% RSD**
Acenaphthene-d10	803643	795752	747233	755921	568928	734295	85519	11.646
Phenanthrene-d10	1281848	1334632	1321820	1061742	922719	1184552	163995	13.844
Benz(a)pyrene-d12	713011	903372	909016	761073	722236	801742	86816	10.828
Group I	**RF**	**RF**	**RF**	**RF**	**RF**	**AVG**	**SD**	**% RSD**
benzofuran	1.324	1.226	1.272	1.115	1.577	1.303	0.153	11.764
dihydroinden	0.833	0.737	0.778	0.674	0.895	0.783	0.076	9.750
indene	1.312	1.257	1.297	1.139	1.546	1.310	0.133	10.129
Naphthalene-d8 (Surr.)	2.404	2.091	1.931	1.641	2.025	2.018	0.247	12.216
Naphthalene	3.460	2.817	2.669	2.123	2.690	2.752	0.427	15.521
Benz(b)thio	2.011	1.927	1.603	1.430	1.723	1.739	0.212	12.170
Quinoline	1.002	0.937	1.061	0.871	1.076	0.989	0.077	7.744
Indole	1.417	1.398	1.458	1.530	1.623	1.485	0.082	5.550
2-methyl	1.073	1.161	1.123	0.742	0.998	1.019	0.149	14.596
[illegible]ethyl	1.469	1.514	1.532	1.237	1.543	1.459	0.114	7.813
Biphenyl	6.628	3.891	2.439	1.920	2.095	3.395	1.760	51.830
Acenaphthylene	1.597	1.456	1.623	1.570	1.453	1.540	0.072	4.653
Acenaphthene	1.333	1.290	1.309	1.105	1.304	1.268	0.083	6.531
Dibenzofuran	1.914	1.616	1.610	1.343	1.612	1.619	0.181	11.152
Group II								
Flourene-d10 (Surr.)	0.814	0.749	0.760	0.758	0.770	0.770	0.023	2.974
Fluorene	1.081	1.021	1.005	1.025	1.038	1.034	0.026	2.509
Dibenzothiophene	1.312	1.272	1.111	1.095	1.077	1.173	0.098	8.388
Phenanthrene	3.021	2.588	1.803	1.791	1.568	2.154	0.555	25.753
Anthracene	1.270	1.258	1.200	1.178	1.200	1.221	0.036	2.954
Acridine	0.897	0.826	0.761	0.713	0.681	0.776	0.078	10.046
Carbazole	1.005	1.010	1.007	1.046	1.060	1.026	0.023	2.238
Fluoranthene	1.496	1.476	1.422	1.440	1.405	1.448	0.034	2.333
[illegible]rene-d10 (Surr.)	0.892	0.898	0.936	0.936	0.939	0.920	0.021	2.258
[illegible]ene	1.505	1.555	1.510	1.513	1.540	1.525	0.020	1.283
Group III								
Benz(a)anthracene	1.709	1.455	1.465	1.487	1.348	1.493	0.118	7.910
Chrysene-d12 (Surr.)	0.559	0.446	0.432	0.434	0.386	0.451	0.057	12.721
Chrysene	1.758	1.457	1.509	1.485	1.356	1.513	0.133	8.799
Benzofluoranthenes	3.967	2.438	2.057	1.776	1.704	2.388	0.830	34.758
Benz(e)pyrene	2.750	2.067	1.576	1.452	1.362	1.841	0.516	27.999
Benz(a)pyrene	1.976	1.529	1.340	1.224	1.188	1.451	0.288	19.849
Perylene-d12 (Surr.)	1.214	1.254	(5.686)	0.950	0.879	1.997 (1.074)	1.850	92.678 (15.128)
Perylene	1.505	1.450	1.348	1.131	1.147	1.316	0.153	11.640
Indeno(123,cd)pyrene	1.397	1.264	1.243	1.431	1.226	1.312	0.085	6.457
Dibenz(ah)anthracene	0.883	0.905	0.859	1.004	0.862	0.903	0.054	5.937
Dibenzo(ghi)perylene	1.444	1.309	1.252	1.424	1.254	1.336	0.082	6.145

RF = Response Factor

CAL CURVE :						Cal Curve #3		
STD. CONC. :	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml	11/18/86		
GC/MS File # :	STD46	STD45	STD44	STD43	STD42	cc861118		
Internal Std.	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
Acenaphthene-d10	17.155	17.158	17.154	17.154	17.154	17.155	0.002	0.009
Phenanthrene-d10	20.932	20.929	20.934	20.934	20.926	20.931	0.003	0.015
Benz(a)pyrene-d12	31.164	31.162	31.161	31.163	31.162	31.162	0.001	0.003
Group I	**RT**	**RT**	**RT**	**RT**	**RT**	**AVG**	**SD**	**% RSD**
benzofuran	9.416	9.413	9.408	9.415	9.423	9.415	0.005	0.052
dihydroinden	10.105	10.101	10.103	10.103	10.112	10.105	0.004	0.038
indene	10.267	10.266	10.265	10.264	10.275	10.267	0.004	0.038
Naphthalene-d8 (Surr.)	12.678	12.671	12.671	12.674	12.669	12.673	0.003	0.025
Naphthalene	12.711	12.711	12.710	12.701	12.714	12.709	0.004	0.035
Benz(b)thio	12.872	12.868	12.862	12.864	12.872	12.868	0.004	0.032
Quinoline	13.587	13.585	13.580	13.583	13.588	13.585	0.003	0.021
Indole	14.433	14.442	14.432	14.433	14.439	14.436	0.004	0.028
2-methyl	14.453	14.458	14.451	14.451	14.456	14.454	0.003	0.019
[illegible]ethyl	14.729	14.731	14.725	14.725	14.728	14.728	0.002	0.016
Biphenyl	15.693	15.691	15.692	15.690	15.693	15.692	0.001	0.007
Acenaphthylene	16.730	16.782	16.756	16.748	16.730	16.749	0.019	0.115
Acenaphthene	17.240	17.230	17.230	17.232	17.232	17.233	0.004	0.022
Dibenzofuran	17.653	17.652	17.646	17.655	17.654	17.652	0.003	0.018
Group II								
Flourene-d10 (Surr.)	18.466	18.460	18.462	18.466	18.464	18.464	0.002	0.013
Fluorene	18.531	18.535	18.527	18.531	18.528	18.530	0.003	0.015
Dibenzothiophene	20.664	20.668	20.662	20.663	20.668	20.665	0.003	0.012
Phenanthrene	20.983	20.985	20.979	20.978	20.983	20.982	0.003	0.013
Anthracene	21.091	21.093	21.098	21.096	21.090	21.094	0.003	0.014
Acridine	21.221	21.221	21.220	21.220	21.223	21.221	0.001	0.005
Carbazole	21.571	21.570	21.571	21.569	21.572	21.571	0.001	0.005
Fluoranthene	24.053	24.060	24.055	24.057	24.056	24.056	0.002	0.010
ene-d10 (Surr.)	24.594	24.588	24.586	24.589	24.588	24.589	0.003	0.011
ene	24.633	24.628	24.625	24.627	24.627	24.628	0.003	0.011
Group III								
Benz(a)anthracene	27.716	27.709	27.711	27.712	27.715	27.713	0.003	0.009
Chrysene-d12 (Surr.)	27.765	27.768	27.768	27.765	27.761	27.765	0.003	0.009
Chrysene	27.822	27.822	27.815	27.823	27.818	27.820	0.003	0.011
Benzofluoranthenes	30.402	30.366	30.367	30.370	30.371	30.375	0.014	0.045
Benz(e)pyrene	31.086	31.085	31.083	31.086	31.087	31.085	0.001	0.004
Benz(a)pyrene	31.223	31.219	31.218	31.222	31.215	31.219	0.003	0.009
Perylene-d12 (Surr.)	31.387	31.385	31.383	31.384	31.387	31.385	0.002	0.005
Perylene	31.453	31.447	31.444	31.446	31.447	31.447	0.003	0.010
Indeno(123,cd)pyrene	34.762	34.752	34.750	34.752	34.753	34.754	0.004	0.012
Dibenz(ah)anthracene	34.821	34.810	34.807	34.810	34.810	34.812	0.005	0.014
Dibenzo(ghi)perylene	35.744	35.737	35.730	35.737	35.735	35.737	0.004	0.013

RT = Retention Time

CAL CURVE	:						Cal Curve #3
STD. CONC.	:	20ng/ml	40ng/ml	100ng/ml	160ng/ml	200ng/ml	11/18/86
GC/MS File #	:	STD46	STD45	STD44	STD43	STD42	cc861118

Internal Std.

Acenaphthene-d10
Phenanthrene-d10
Benz(a)pyrene-d12

Group I	RRT	RRT	RRT	RRT	RRT	AVG	SD	% RSD
benzofuran	0.549	0.549	0.548	0.549	0.549	0.549	0.000	0.054
dihydroinden	0.589	0.589	0.589	0.589	0.589	0.589	0.000	0.043
indene	0.598	0.598	0.598	0.598	0.599	0.599	0.000	0.041
Naphthalene-d8 (Surr.)	0.739	0.738	0.739	0.739	0.739	0.739	0.000	0.027
Naphthalene	0.741	0.741	0.741	0.740	0.741	0.741	0.000	0.034
Benz(b)thio	0.750	0.750	0.750	0.750	0.750	0.750	0.000	0.031
Quinoline	0.792	0.792	0.792	0.792	0.792	0.792	0.000	0.021
Indole	0.841	0.842	0.841	0.841	0.842	0.841	0.000	0.022
hyl	0.842	0.843	0.842	0.842	0.843	0.843	0.000	0.014
yl	0.859	0.859	0.858	0.858	0.859	0.859	0.000	0.010
nenyl	0.915	0.915	0.915	0.915	0.915	0.915	0.000	0.013
Acenaphthylene	0.975	0.978	0.977	0.976	0.975	0.976	0.001	0.109
Acenaphthene	1.005	1.004	1.004	1.005	1.005	1.005	0.000	0.024
Dibenzofuran	1.029	1.029	1.029	1.029	1.029	1.029	0.000	0.020
Group II								
Flourene-d10 (Surr.)	0.882	0.882	0.882	0.882	0.882	0.882	0.000	0.017
Fluorene	0.885	0.886	0.885	0.885	0.885	0.885	0.000	0.022
Dibenzothiophene	0.987	0.988	0.987	0.987	0.988	0.987	0.000	0.027
Phenanthrene	1.002	1.003	1.002	1.002	1.003	1.002	0.000	0.026
Anthracene	1.008	1.008	1.008	1.008	1.008	1.008	0.000	0.009
Acridine	1.014	1.014	1.014	1.014	1.014	1.014	0.000	0.020
Carbazole	1.031	1.031	1.030	1.030	1.031	1.031	0.000	0.018
Fluoranthene	1.149	1.150	1.149	1.149	1.150	1.149	0.000	0.020
ne-d10 (Surr.)	1.175	1.175	1.174	1.175	1.175	1.175	0.000	0.018
ne	1.177	1.177	1.176	1.176	1.177	1.177	0.000	0.019
Group III								
Benz(a)anthracene	0.889	0.889	0.889	0.889	0.889	0.889	0.000	0.008
Chrysene-d12 (Surr.)	0.891	0.891	0.891	0.891	0.891	0.891	0.000	0.011
Chrysene	0.893	0.893	0.893	0.893	0.893	0.893	0.000	0.009
Benzofluoranthenes	0.976	0.974	0.975	0.975	0.975	0.975	0.000	0.042
Benz(e)pyrene	0.997	0.998	0.997	0.998	0.998	0.998	0.000	0.004
Benz(a)pyrene	1.002	1.002	1.002	1.002	1.002	1.002	0.000	0.007
Perylene-d12 (Surr.)	1.007	1.007	1.007	1.007	1.007	1.007	0.000	0.004
Perylene	1.009	1.009	1.009	1.009	1.009	1.009	0.000	0.007
Indeno(123,cd)pyrene	1.115	1.115	1.115	1.115	1.115	1.115	0.000	0.009
Dibenz(ah)anthracene	1.117	1.117	1.117	1.117	1.117	1.117	0.000	0.011
Dibenzo(ghi)perylene	1.147	1.147	1.147	1.147	1.147	1.147	0.000	0.010

RRT = Relative Retention Time

APPENDIX B

Matrix Spike Recovery Analyses

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-01 ERT NO.: 36755

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	50	45
FLUORENE	21	8.3	39
CHRYSENE	24	14	57
BENZO (G,H,I) PERYLENE	22	4.5	20
INDENE	25	6.9	28
QUINOLINE	24	11	46
BENZO (E) PYRENE	20	5.9	31
2-METHYLNAPHTHALENE	21	8.2	39
			==========
AVERAGE % RECOVERY			38

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-02 ERT NO.: 37018

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	54	49
FLUORENE	21	9.1	43
CHRYSENE	24	14	58
BENZO (G,H,I) PERYLENE	22	4.3	20
INDENE	25	6.9	28
QUINOLINE	24	12	50
BENZO (E) PYRENE	20	6.0	30
2-METHYLNAPHTHALENE	21	11	52
			==========
AVERAGE % RECOVERY			41

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-03 ERT NO.: 37140

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	94	85
FLUORENE	21	17	81
CHRYSENE	24	12	50
BENZO (G,H,I) PERYLENE	22	0.86	4.0
INDENE	25	10	40
QUINOLINE	24	18	75
BENZO (E) PYRENE	20	4.0	20
2-METHYLNAPHTHALENE	21	15	71
			==========
AVERAGE % RECOVERY			50

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: LF860648 *

ERT NO.: 37306

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	63	57
FLUORENE	21	14	67
CHRYSENE	24	14	58
BENZO (G,H,I) PERYLENE	22	16	73
INDENE	25	9.0	36
QUINOLINE	24	17	71
BENZO (E) PYRENE	20	20	100
2-METHYLNAPHTHALENE	21	12	57
			==========
AVERAGE % RECOVERY			65

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

* Replaces MS-04 which had been lost during extraction.

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-05 ERT NO.: 37856

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	40	36
FLUORENE	21	14	67
CHRYSENE	24	4.6	19
BENZO (G,H,I) PERYLENE	22	1.6	7.4
INDENE	25	5.3	21
QUINOLINE	24	9.3	39
BENZO (E) PYRENE	20	2.2	11
2-METHYLNAPHTHALENE	21	6.9	33
			==========
AVERAGE % RECOVERY			29

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-08 ERT NO.: 38845

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	28	25
FLUORENE	21	13	62
CHRYSENE	24	15	63
BENZO (G,H,I) PERYLENE	22	3.0	14
INDENE	25	3.6	14
QUINOLINE	24	7.8	33
BENZO (E) PYRENE	20	7.6	38
2-METHYLNAPHTHALENE	21	7.0	33
			==========
AVERAGE % RECOVERY			35

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS(TD-09A) ERT NO.: 40147

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	110	42	38
FLUORENE	21	13	62
CHRYSENE	24	8.2	34
BENZO (G,H,I) PERYLENE	22	5.4	25
INDENE	25	6.8	27
QUINOLINE	24	11	46
BENZO (E) PYRENE	20	7.8	39
2-METHYLNAPHTHALENE	21	14	67
			==========
AVERAGE % RECOVERY			42

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

ERT ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
SURROGATE RECOVERY REPORT
POLYAROMATIC HYDROCARBONS

FIELD ID: MS-10 ERT NO.: 41042

PARAMETERS	SPIKE LEVE(NG/L)	OBS. LEVEL(NG/L)	% RECOVERY
NAPHTHALENE	114	112	98
FLUORENE	27	25	93
CHRYSENE	21	8.0	38
BENZO (G,H,I) PERYLENE	19	3.7	19
INDENE	20	26	130
QUINOLINE	23	30	130
BENZO (E) PYRENE	17	12	71
2-METHYLNAPHTHALENE	29	33	114
			==========
AVERAGE % RECOVERY			87

AVERAGE % RECOVERY TARGET RANGE = 20% - 150%

APPENDIX C

Continuing Calibration Check Standards

Set #1

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD06 Date Analyze : 08/07/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	18.034	575822	547101	5.2%
Phenanthrene-d10	62.5	21.859	1590584	1527126	4.2%
Benz(a)pyrene-d12	49.6	32.540	885377	957487	-7.5%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	0.05%	10.171	782783	1.566	1.598	-2.0%
dihydroinden	41.0	0.604	0.04%	10.900	398184	0.894	0.924	-3.3%
indene	40.0	0.613	0.06%	11.056	492574	1.133	1.198	-5.4%
Naphthalene-d8 (Surr.)	39.0	0.748	0.01%	13.486	1026497	2.423	2.442	-0.8%
Naphthalene	40.0	0.750	0.02%	13.527	1646733	3.789	3.515	7.8%
Benz(b)thio	66.0	0.758	0.01%	13.680	1455119	2.029	2.027	0.1%
Quinoline	47.0	0.798	0.02%	14.390	470682	0.922	0.976	-5.6%
Indole	48.0	0.841	0.02%	15.172	589403	1.130	1.135	-0.4%
2-methyl	40.0	0.848	0.00%	15.292	830989	1.912	1.832	4.4%
methyl	35.0	0.864	0.03%	15.578	685557	1.803	1.825	-1.2%
biphenyl	44.0	0.917	-0.00%	16.530	9700758	20.293	18.290	10.9%
Acenaphthylene	40.0	0.977	0.00%	17.626	703851	1.620	1.578	2.6%
Acenaphthene	40.0	1.004	-0.00%	18.114	656715	1.511	1.417	6.6%
Dibenzofuran	48.0	1.027	-0.00%	18.528	1236005	2.370	2.378	-0.3%
Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.21%	19.351	469067	0.485	0.517	-6.1%
Fluorene	40.0	0.891	-0.21%	19.428	735683	0.723	0.764	-5.3%
Dibenzothiophene	48.0	0.990	-0.23%	21.586	1521981	1.246	1.088	14.5%
Phenanthrene	40.0	1.004	-0.19%	21.904	1849474	1.817	1.596	13.8%
Anthracene	40.0	1.010	-0.22%	22.023	928386	0.912	0.929	-1.9%
Acridine	41.0	1.015	-0.22%	22.138	416909	0.400	0.458	-12.8%
Carbazole	43.0	1.029	-0.22%	22.448	759473	0.694	0.726	-4.4%
Fluoranthene	40.0	1.147	-0.23%	25.021	1125328	1.105	1.180	-6.3%
Pyrene-d10 (Surr.)	40.0	1.172	-0.22%	25.566	776579	0.763	0.801	-4.8%
Pyrene	40.0	1.174	-0.22%	25.606	1143763	1.124	1.273	-11.7%
Group III								
Benz(a)anthracene	40.0	0.883	0.01%	28.722	862743	1.208	1.263	-4.3%
Chrysene-d12 (Surr.)	39.0	0.884	-0.02%	28.764	313064	0.450	0.473	-4.9%
Chrysene	40.0	0.883	0.30%	28.823	1028573	1.441	1.485	-3.0%
Benzofluoranthenes	80.0	0.973	-0.04%	31.639	2277546	1.595	1.655	-3.6%
Benz(e)pyrene	45.0	0.997	0.00%	32.456	1469919	1.830	1.796	1.9%
Benz(a)pyrene	40.0	1.002	-0.00%	32.613	889099	1.245	1.200	3.8%
Perylene-d12 (Surr.)	38.0	1.008	0.01%	32.808	446237	0.658	0.710	-7.4%
Perylene	34.0	1.010	0.01%	32.884	734871	1.211	1.255	-3.5%
Indeno(123,cd)pyrene	40.0	1.124	1.09%	36.967	885860	1.241	1.479	-16.1%
Dibenz(ah)anthracene	40.0	1.126	1.10%	37.038	612121	0.857	0.966	-11.2%
Benzo(ghi)perylene	40.0	1.160	1.16%	38.186	952367	1.334	1.447	-7.8%

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #1

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD12 Date Analyze : 08/12/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	575822	547101	5.2%
Phenanthrene-d10	62.5	20.897	1590584	1527126	4.2%
Benz(a)pyrene-d12	49.6	31.115	885377	957487	-7.5%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	-2.69%	9.395	782783	1.566	1.598	-2.0%
dihydroinden	41.0	0.604	-2.55%	10.084	398184	0.894	0.924	-3.3%
indene	40.0	0.613	-2.35%	10.247	492574	1.133	1.198	-5.4%
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	1026497	2.423	2.442	-0.8%
Naphthalene	40.0	0.750	-1.26%	12.682	1646733	3.789	3.515	7.8%
Benz(b)thio	66.0	0.758	-1.21%	12.834	1455119	2.029	2.027	0.1%
Quinoline	47.0	0.798	-0.80%	13.555	186821	0.366	0.976	-62.5% *
Indole	48.0	0.841	-0.05%	14.398	589403	1.130	1.135	-0.4%
2-methyl	40.0	0.848	-0.71%	14.419	830989	1.912	1.832	4.4%
methyl	35.0	0.864	-0.61%	14.700	685557	1.803	1.825	-1.2%
phenyl	44.0	0.917	-0.24%	15.661	9700758	20.293	18.290	10.9%
Acenaphthylene	40.0	0.977	-0.05%	16.730	703851	1.620	1.578	2.6%
Acenaphthene	40.0	1.004	-0.02%	17.200	656715	1.511	1.417	6.6%
Dibenzofuran	48.0	1.027	0.13%	17.620	1236005	2.370	2.378	-0.3%
Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	469067	0.485	0.517	-6.1%
Fluorene	40.0	0.891	-0.61%	18.497	735683	0.723	0.764	-5.3%
Dibenzothiophene	48.0	0.990	-0.23%	20.635	1521981	1.246	1.088	14.5%
Phenanthrene	40.0	1.004	-0.17%	20.944	1849474	1.817	1.596	13.8%
Anthracene	40.0	1.010	-0.17%	21.063	928386	0.912	0.929	-1.9%
Acridine	41.0	1.015	-0.11%	21.186	416909	0.400	0.458	-12.8%
Carbazole	43.0	1.029	0.18%	21.546	759473	0.694	0.726	-4.4%
Fluoranthene	40.0	1.147	0.20%	24.023	1125328	1.105	1.180	-6.3%
Pyrene-d10 (Surr.)	40.0	1.172	0.23%	24.550	776579	0.763	0.801	-4.8%
rene	40.0	1.174	0.24%	24.590	1143763	1.124	1.273	-11.7%
Group III								
Benz(a)anthracene	40.0	0.883	0.78%	27.678	862743	1.208	1.263	-4.3%
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	313064	0.450	0.473	-4.9%
Chrysene	40.0	0.883	1.10%	27.783	1028573	1.441	1.485	-3.0%
Benzofluoranthenes	80.0	0.973	0.21%	30.327	2277546	1.595	1.655	-3.6%
Benz(e)pyrene	45.0	0.997	0.02%	31.038	1469919	1.830	1.796	1.9%
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	889099	1.245	1.200	3.8%
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	446237	0.658	0.710	-7.4%
Perylene	34.0	1.010	-0.13%	31.399	734871	1.211	1.255	-3.5%
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	885860	1.241	1.479	-16.1%
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	612121	0.857	0.966	-11.2%
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	952367	1.334	1.447	-7.8%

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #2

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD13 Date Analyze : 08/13/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	366530	547101	-33.0%
Phenanthrene-d10	62.5	20.897	853084	1527126	-44.1%
Benz(a)pyrene-d12	49.6	31.115	729043	957487	-23.9%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %	
benzofuran	46.0	0.564	-2.69%	9.395	579573	1.822	1.598	14.0%	
dihydroinden	41.0	0.604	-2.55%	10.084	289193	1.020	0.924	10.4%	
indene	40.0	0.613	-2.35%	10.247	369160	1.335	1.198	11.4%	
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	690121	2.559	2.442	4.8%	
Naphthalene	40.0	0.750	-1.26%	12.682	1729214	6.251	3.515	77.9%	*
Benz(b)thio	66.0	0.758	-1.21%	12.834	1020150	2.235	2.027	10.2%	
Quinoline	47.0	0.798	-0.80%	13.555	297859	0.916	0.976	-6.1%	
Indole	48.0	0.841	-0.05%	14.398	463328	1.396	1.135	23.0%	
2-methyl	40.0	0.848	-0.71%	14.419	552927	1.999	1.832	9.1%	
methyl	35.0	0.864	-0.61%	14.700	445525	1.841	1.825	0.9%	
Biphenyl	44.0	0.917	-0.24%	15.661	3228482	10.610	18.290	-42.0%	*
Acenaphthylene	40.0	0.977	-0.05%	16.730	435365	1.574	1.578	-0.3%	
Acenaphthene	40.0	1.004	-0.02%	17.200	465277	1.682	1.417	18.7%	
Dibenzofuran	48.0	1.027	0.13%	17.620	817103	2.462	2.378	3.5%	
Group II									
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	342056	0.659	0.517	27.7%	
Fluorene	40.0	0.891	-0.61%	18.497	517422	0.948	0.764	24.1%	
Dibenzothiophene	48.0	0.990	-0.23%	20.635	864337	1.319	1.088	21.2%	
Phenanthrene	40.0	1.004	-0.17%	20.944	967399	1.772	1.596	11.0%	
Anthracene	40.0	1.010	-0.17%	21.063	512820	0.939	0.929	1.1%	
Acridine	41.0	1.015	-0.11%	21.186	257972	0.461	0.458	0.6%	
Carbazole	43.0	1.029	0.18%	21.546	490537	0.836	0.726	15.2%	
Fluoranthene	40.0	1.147	0.20%	24.023	676999	1.240	1.180	5.1%	
rene-d10 (Surr.)	40.0	1.172	0.23%	24.550	564665	1.034	0.801	29.1%	
rene	40.0	1.174	0.24%	24.590	812489	1.488	1.273	16.9%	
Group III									
Benz(a)anthracene	40.0	0.883	0.78%	27.678	586314	0.997	1.263	-21.0%	
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	173180	0.302	0.473	-36.1%	*
Chrysene	40.0	0.883	1.10%	27.783	633791	1.078	1.485	-27.4%	
Benzofluoranthenes	80.0	0.973	0.21%	30.327	1289945	1.097	1.655	-33.7%	
Benz(e)pyrene	45.0	0.997	0.02%	31.038	812818	1.229	1.796	-31.6%	
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	697275	1.186	1.200	-1.1%	
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	289030	0.517	0.710	-27.1%	
Perylene	34.0	1.010	-0.13%	31.399	488765	0.978	1.255	-22.1%	
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	528766	0.899	1.479	-39.2%	*
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	357323	0.608	0.966	-37.1%	*
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	554892	0.944	1.447	-34.8%	

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #3

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD14 Date Analyze : 08/15/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	657685	547101	20.2%
Phenanthrene-d10	62.5	20.897	1738860	1527126	13.9%
Benz(a)pyrene-d12	49.6	31.115	4513449	957487	371.4%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	-2.69%	9.395	734381	1.287	1.598	-19.5%
dihydroinden	41.0	0.604	-2.55%	10.084	412346	0.810	0.924	-12.3%
indene	40.0	0.613	-2.35%	10.247	537290	1.082	1.198	-9.7%
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	1011098	2.089	2.442	-14.4%
Naphthalene	40.0	0.750	-1.26%	12.682	4859316	9.790	3.515	178.5% *
Benz(b)thio	66.0	0.758	-1.21%	12.834	1579435	1.928	2.027	-4.9%
Quinoline	47.0	0.798	-0.80%	13.555	461967	0.792	0.976	-18.9%
Indole	48.0	0.841	-0.05%	14.398	544128	0.914	1.135	-19.5%
2-methyl	40.0	0.848	-0.71%	14.419	1084894	2.186	1.832	19.3%
[illegible]ethyl	35.0	0.864	-0.61%	14.700	894290	2.059	1.825	12.8%
Biphenyl	44.0	0.917	-0.24%	15.661	3889130	7.123	18.290	-61.1% *
Acenaphthylene	40.0	0.977	-0.05%	16.730	857182	1.727	1.578	9.4%
Acenaphthene	40.0	1.004	-0.02%	17.200	797214	1.606	1.417	13.3%
Dibenzofuran	48.0	1.027	0.13%	17.620	1608933	2.701	2.378	13.6%
Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	720329	0.681	0.517	31.9%
Fluorene	40.0	0.891	-0.61%	18.497	1004545	0.903	0.764	18.2%
Dibenzothiophene	48.0	0.990	-0.23%	20.635	1745579	1.307	1.088	20.1%
Phenanthrene	40.0	1.004	-0.17%	20.944	2514616	2.260	1.596	41.6% *
Anthracene	40.0	1.010	-0.17%	21.063	1112053	0.999	0.929	7.5%
Acridine	41.0	1.015	-0.11%	21.186	490107	0.430	0.458	-6.2%
Carbazole	43.0	1.029	0.18%	21.546	1088738	0.910	0.726	25.4%
Fluoranthene	40.0	1.147	0.20%	24.023	1490130	1.339	1.180	13.5%
[illegible]ene-d10 (Surr.)	40.0	1.172	0.23%	24.550	990973	0.890	0.801	11.1%
[illegible]ene	40.0	1.174	0.24%	24.590	1584732	1.424	1.273	11.9%
Group III								
Benz(a)anthracene	40.0	0.883	0.78%	27.678	1657918	0.455	1.263	-63.9% *
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	513174	0.145	0.473	-69.4% *
Chrysene	40.0	0.883	1.10%	27.783	1722782	0.473	1.485	-68.1% *
Benzofluoranthenes	80.0	0.973	0.21%	30.327	4816182	0.662	1.655	-60.0% *
Benz(e)pyrene	45.0	0.997	0.02%	31.038	3276665	0.800	1.796	-55.5% *
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	2339798	0.643	1.200	-46.4% *
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	1404990	0.406	0.710	-42.8% *
Perylene	34.0	1.010	-0.13%	31.399	2764128	0.893	1.255	-28.8%
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	2168683	0.596	1.479	-59.7% *
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	1566803	0.430	0.966	-55.4% *
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	2696819	0.741	1.447	-48.8% *

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #3

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD16 Date Analyze : 08/19/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	463186	547101	-15.3%
Phenanthrene-d10	62.5	20.897	1233497	1527126	-19.2%
Benz(a)pyrene-d12	49.6	31.115	971355	957487	1.4%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	-2.69%	9.395	456469	1.135	1.598	-29.0%
dihydroinden	41.0	0.604	-2.55%	10.084	277698	0.775	0.924	-16.1%
indene	40.0	0.613	-2.35%	10.247	450806	1.290	1.198	7.6%
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	664252	1.949	2.442	-20.2%
Naphthalene	40.0	0.750	-1.26%	12.682	1191663	3.409	3.515	-3.0%
Benz(b)thio	66.0	0.758	-1.21%	12.834	635733	1.102	2.027	-45.6% *
Quinoline	47.0	0.798	-0.80%	13.555	348535	0.849	0.976	-13.1%
Indole	48.0	0.841	-0.05%	14.398	281026	0.670	1.135	-41.0% *
[illegible]ethyl	40.0	0.848	-0.71%	14.419	530442	1.517	1.832	-17.2%
[illegible]hyl	35.0	0.864	-0.61%	14.700	618210	2.021	1.825	10.8%
[illegible]enyl	44.0	0.917	-0.24%	15.661	4520744	11.756	18.290	-35.7% *
Acenaphthylene	40.0	0.977	-0.05%	16.730	610072	1.745	1.578	10.6%
Acenaphthene	40.0	1.004	-0.02%	17.200	557763	1.596	1.417	12.6%
Dibenzofuran	48.0	1.027	0.13%	17.620	700049	1.669	2.378	-29.8%

Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	447593	0.597	0.517	15.5%
Fluorene	40.0	0.891	-0.61%	18.497	595491	0.754	0.764	-1.2%
Dibenzothiophene	48.0	0.990	-0.23%	20.635	717174	0.757	1.088	-30.4%
Phenanthrene	40.0	1.004	-0.17%	20.944	1205906	1.528	1.596	-4.3%
Anthracene	40.0	1.010	-0.17%	21.063	727443	0.921	0.929	-0.8%
Acridine	41.0	1.015	-0.11%	21.186	379221	0.469	0.458	2.3%
Carbazole	43.0	1.029	0.18%	21.546	572287	0.674	0.726	-7.1%
Fluoranthene	40.0	1.147	0.20%	24.023	935247	1.185	1.180	0.4%
[illegible]ene-d10 (Surr.)	40.0	1.172	0.23%	24.550	605382	0.767	0.801	-4.3%
[illegible]ene	40.0	1.174	0.24%	24.590	976870	1.237	1.273	-2.8%

Group III								
Benz(a)anthracene	40.0	0.883	0.78%	27.678	888787	1.135	1.263	-10.1%
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	315730	0.413	0.473	-12.6%
Chrysene	40.0	0.883	1.10%	27.783	1000218	1.277	1.485	-14.0%
Benzofluoranthenes	80.0	0.973	0.21%	30.327	2281334	1.456	1.655	-12.0%
Benz(e)pyrene	45.0	0.997	0.02%	31.038	981656	1.114	1.796	-38.0% *
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	1018228	1.300	1.200	8.3%
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	796872	1.071	0.710	50.8% *
Perylene	34.0	1.010	-0.13%	31.399	1118245	1.679	1.255	33.8%
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	1018434	1.300	1.479	-12.1%
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	688097	0.878	0.966	-9.1%
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	1053089	1.344	1.447	-7.1%

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #3

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD17 Date Analyze : 08/20/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	259799	547101	-52.5%
Phenanthrene-d10	62.5	20.897	781017	1527126	-48.9%
Benz(a)pyrene-d12	49.6	31.115	656389	957487	-31.4%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	-2.69%	9.395	216590	0.961	1.598	-39.9% *
dihydroinden	41.0	0.604	-2.55%	10.084	135572	0.675	0.924	-27.0%
indene	40.0	0.613	-2.35%	10.247	229018	1.168	1.198	-2.5%
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	365310	1.911	2.442	-21.7%
Naphthalene	40.0	0.750	-1.26%	12.682	736154	3.754	3.515	6.8%
Benz(b)thio	66.0	0.758	-1.21%	12.834	331300	1.024	2.027	-49.5% *
Quinoline	47.0	0.798	-0.80%	13.555	234072	1.016	0.976	4.1%
Indole	48.0	0.841	-0.05%	14.398	63071	0.268	1.135	-76.4% *
ethyl	40.0	0.848	-0.71%	14.419	297382	1.517	1.832	-17.2%
hyl	35.0	0.864	-0.61%	14.700	355190	2.070	1.825	13.5%
enyl	44.0	0.917	-0.24%	15.661	1095663	5.080	18.290	-72.2% *
Acenaphthylene	40.0	0.977	-0.05%	16.730	339162	1.730	1.578	9.6%
Acenaphthene	40.0	1.004	-0.02%	17.200	308385	1.573	1.417	11.0%
Dibenzofuran	48.0	1.027	0.13%	17.620	403124	1.713	2.378	-28.0%
Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	261883	0.551	0.517	6.8%
Fluorene	40.0	0.891	-0.61%	18.497	347027	0.694	0.764	-9.1%
Dibenzothiophene	48.0	0.990	-0.23%	20.635	458863	0.765	1.088	-29.7%
Phenanthrene	40.0	1.004	-0.17%	20.944	783333	1.567	1.596	-1.8%
Anthracene	40.0	1.010	-0.17%	21.063	476989	0.954	0.929	2.7%
Acridine	41.0	1.015	-0.11%	21.186	269979	0.527	0.458	15.0%
Carbazole	43.0	1.029	0.18%	21.546	376254	0.700	0.726	-3.5%
Fluoranthene	40.0	1.147	0.20%	24.023	636241	1.273	1.180	7.9%
ene-d10 (Surr.)	40.0	1.172	0.23%	24.550	437170	0.875	0.801	9.2%
ene	40.0	1.174	0.24%	24.590	690557	1.382	1.273	8.5%
Group III								
Benz(a)anthracene	40.0	0.883	0.78%	27.678	629952	1.190	1.263	-5.8%
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	219839	0.426	0.473	-9.9%
Chrysene	40.0	0.883	1.10%	27.783	705953	1.334	1.485	-10.2%
Benzofluoranthenes	80.0	0.973	0.21%	30.327	1553085	1.467	1.655	-11.4%
Benz(e)pyrene	45.0	0.997	0.02%	31.038	672988	1.130	1.796	-37.1% *
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	614231	1.160	1.200	-3.3%
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	474072	0.943	0.710	32.8%
Perylene	34.0	1.010	-0.13%	31.399	499212	1.109	1.255	-11.6%
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	659795	1.246	1.479	-15.7%
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	444371	0.839	0.966	-13.1%
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	682903	1.290	1.447	-10.9%

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #4

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD19 Date Analyze : 08/21/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	1433973	547101	162.1%
Phenanthrene-d10	62.5	20.897	4316564	1527126	182.7%
Benz(a)pyrene-d12	49.6	31.115	2611658	957487	172.8%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %	
benzofuran	46.0	0.564	-2.69%	9.395	1044087	0.839	1.598	-47.5%	*
dihydroinden	41.0	0.604	-2.55%	10.084	662943	0.598	0.924	-35.3%	*
indene	40.0	0.613	-2.35%	10.247	1079914	0.998	1.198	-16.7%	
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	1750421	1.659	2.442	-32.1%	
Naphthalene	40.0	0.750	-1.26%	12.682	3560462	3.290	3.515	-6.4%	
Benz(b)thio	66.0	0.758	-1.21%	12.834	1490925	0.835	2.027	-58.8%	*
Quinoline	47.0	0.798	-0.80%	13.555	1051403	0.827	0.976	-15.3%	
Indole	48.0	0.841	-0.05%	14.398	56554	0.044	1.135	-96.2%	*
2-methyl	40.0	0.848	-0.71%	14.419	1509204	1.395	1.832	-23.9%	
methyl	35.0	0.864	-0.61%	14.700	1728752	1.826	1.825	0.0%	
phenyl	44.0	0.917	-0.24%	15.661	10601185	8.905	18.290	-51.3%	*
Acenaphthylene	40.0	0.977	-0.05%	16.730	1760129	1.626	1.578	3.1%	
Acenaphthene	40.0	1.004	-0.02%	17.200	1488970	1.376	1.417	-2.9%	
Dibenzofuran	48.0	1.027	0.13%	17.620	2096149	1.614	2.378	-32.1%	
Group II									
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	1488595	0.567	0.517	9.8%	
Fluorene	40.0	0.891	-0.61%	18.497	1823321	0.660	0.764	-13.6%	
Dibenzothiophene	48.0	0.990	-0.23%	20.635	2267823	0.684	1.088	-37.1%	*
Phenanthrene	40.0	1.004	-0.17%	20.944	4675784	1.693	1.596	6.0%	
Anthracene	40.0	1.010	-0.17%	21.063	2538572	0.919	0.929	-1.1%	
Acridine	41.0	1.015	-0.11%	21.186	1400846	0.495	0.458	8.0%	
Carbazole	43.0	1.029	0.18%	21.546	1847126	0.622	0.726	-14.3%	
Fluoranthene	40.0	1.147	0.20%	24.023	3092535	1.119	1.180	-5.1%	
vrene-d10 (Surr.)	40.0	1.172	0.23%	24.550	2164681	0.784	0.801	-2.2%	
rene	40.0	1.174	0.24%	24.590	3258231	1.179	1.273	-7.4%	
Group III									
Benz(a)anthracene	40.0	0.883	0.78%	27.678	2400442	1.140	1.263	-9.7%	
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	993471	0.484	0.473	2.3%	
Chrysene	40.0	0.883	1.10%	27.783	2798909	1.329	1.485	-10.5%	
Benzofluoranthenes	80.0	0.973	0.21%	30.327	6194480	1.471	1.655	-11.1%	
Benz(e)pyrene	45.0	0.997	0.02%	31.038	2606745	1.100	1.796	-38.8%	*
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	2398781	1.139	1.200	-5.1%	
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	2045375	1.022	0.710	44.0%	*
Perylene	34.0	1.010	-0.13%	31.399	2006881	1.121	1.255	-10.7%	
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	2320766	1.102	1.479	-25.5%	
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	1608813	0.764	0.966	-20.9%	
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	2497927	1.186	1.447	-18.1%	

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #4

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD20 Date Analyze : 08/22/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	1291384	547101	136.0%
Phenanthrene-d10	62.5	20.897	4197166	1527126	174.8%
Benz(a)pyrene-d12	49.6	31.115	3941520	957487	311.7%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	46.0	0.564	-2.69%	9.395	865142	0.772	1.598	-51.7% *
dihydroinden	41.0	0.604	-2.55%	10.084	558445	0.559	0.924	-39.5% *
indene	40.0	0.613	-2.35%	10.247	931603	0.956	1.198	-20.2%
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	1481060	1.559	2.442	-36.2% *
Naphthalene	40.0	0.750	-1.26%	12.682	3160783	3.243	3.515	-7.7%
Benz(b)thio	66.0	0.758	-1.21%	12.834	1295587	0.806	2.027	-60.3% *
Quinoline	47.0	0.798	-0.80%	13.555	1017216	0.888	0.976	-9.0%
Indole	48.0	0.841	-0.05%	14.398	308159	0.263	1.135	-76.8% *
2-methyl	40.0	0.848	-0.71%	14.419	1271491	1.305	1.832	-28.8%
methyl	35.0	0.864	-0.61%	14.700	1433650	1.681	1.825	-7.9%
Biphenyl	44.0	0.917	-0.24%	15.661	4689075	4.374	18.290	-76.1% *
Acenaphthylene	40.0	0.977	-0.05%	16.730	1747840	1.793	1.578	13.7%
Acenaphthene	40.0	1.004	-0.02%	17.200	1348314	1.383	1.417	-2.4%
Dibenzofuran	48.0	1.027	0.13%	17.620	1958734	1.675	2.378	-29.6%
Group II								
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	1399134	0.548	0.517	6.1%
Fluorene	40.0	0.891	-0.61%	18.497	1714146	0.638	0.764	-16.4%
Dibenzothiophene	48.0	0.990	-0.23%	20.635	2170791	0.673	1.088	-38.1% *
Phenanthrene	40.0	1.004	-0.17%	20.944	3744878	1.394	1.596	-12.7%
Anthracene	40.0	1.010	-0.17%	21.063	2459635	0.916	0.929	-1.5%
Acridine	41.0	1.015	-0.11%	21.186	1572738	0.571	0.458	24.7%
Carbazole	43.0	1.029	0.18%	21.546	1899506	0.658	0.726	-9.4%
Fluoranthene	40.0	1.147	0.20%	24.023	3454406	1.286	1.180	9.0%
rene-d10 (Surr.)	40.0	1.172	0.23%	24.550	2541121	0.946	0.801	18.1%
rene	40.0	1.174	0.24%	24.590	3790257	1.411	1.273	10.8%
Group III								
Benz(a)anthracene	40.0	0.883	0.78%	27.678	3241832	1.020	1.263	-19.2%
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	1240950	0.400	0.473	-15.3%
Chrysene	40.0	0.883	1.10%	27.783	3612274	1.136	1.485	-23.5%
Benzofluoranthenes	80.0	0.973	0.21%	30.327	8536010	1.343	1.655	-18.9%
Benz(e)pyrene	45.0	0.997	0.02%	31.038	3397648	0.950	1.796	-47.1% *
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	3620449	1.139	1.200	-5.1%
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	2889365	0.957	0.710	34.7%
Perylene	34.0	1.010	-0.13%	31.399	2876223	1.065	1.255	-15.2%
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	3258938	1.025	1.479	-30.7%
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	2643516	0.832	0.966	-13.9%
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	3290500	1.035	1.447	-28.5%

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #4

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD21 Date Analyze : 08/25/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	1033477	547101	88.9%
Phenanthrene-d10	62.5	20.897	3237622	1527126	112.0%
Benz(a)pyrene-d12	49.6	31.115	2759030	957487	188.2%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %	
benzofuran	46.0	0.564	-2.69%	9.395	882542	0.984	1.598	-38.4%	*
dihydroinden	41.0	0.604	-2.55%	10.084	597985	0.748	0.924	-19.1%	
indene	40.0	0.613	-2.35%	10.247	958124	1.228	1.198	2.5%	
Naphthalene-d8 (Surr.)	39.0	0.748	-1.23%	12.648	1363196	1.793	2.442	-26.6%	
Naphthalene	40.0	0.750	-1.26%	12.682	3339820	4.282	3.515	21.8%	
Benz(b)thio	66.0	0.758	-1.21%	12.834	1172605	0.911	2.027	-55.1%	*
Quinoline	47.0	0.798	-0.80%	13.555	822442	0.897	0.976	-8.1%	
Indole	48.0	0.841	-0.05%	14.398	308159	0.329	1.135	-71.0%	*
2-methyl	40.0	0.848	-0.71%	14.419	1110649	1.424	1.832	-22.3%	
ethyl	35.0	0.864	-0.61%	14.700	1230030	1.802	1.825	-1.2%	
phenyl	44.0	0.917	-0.24%	15.661	3318975	3.868	18.290	-78.8%	*
Acenaphthylene	40.0	0.977	-0.05%	16.730	1416988	1.817	1.578	15.1%	
Acenaphthene	40.0	1.004	-0.02%	17.200	1110958	1.424	1.417	0.5%	
Dibenzofuran	48.0	1.027	0.13%	17.620	1587670	1.696	2.378	-28.7%	
Group II									
Flourene-d10 (Surr.)	38.0	0.887	-0.58%	18.432	1122280	0.570	0.517	10.4%	
Fluorene	40.0	0.891	-0.61%	18.497	1384609	0.668	0.764	-12.5%	
Dibenzothiophene	48.0	0.990	-0.23%	20.635	1816455	0.731	1.088	-32.9%	
Phenanthrene	40.0	1.004	-0.17%	20.944	3406010	1.644	1.596	3.0%	
Anthracene	40.0	1.010	-0.17%	21.063	2052176	0.990	0.929	6.6%	
Acridine	41.0	1.015	-0.11%	21.186	1173501	0.553	0.458	20.6%	
Carbazole	43.0	1.029	0.18%	21.546	1289618	0.579	0.726	-20.2%	
Fluoranthene	40.0	1.147	0.20%	24.023	2656485	1.282	1.180	8.6%	
rene-d10 (Surr.)	40.0	1.172	0.23%	24.550	1863563	0.899	0.801	12.2%	
rene	40.0	1.174	0.24%	24.590	2898802	1.399	1.273	9.9%	
Group III									
Benz(a)anthracene	40.0	0.883	0.78%	27.678	2891074	1.299	1.263	2.9%	
Chrysene-d12 (Surr.)	39.0	0.884	0.78%	27.726	1028398	0.474	0.473	0.3%	
Chrysene	40.0	0.883	1.10%	27.783	2937957	1.320	1.485	-11.1%	
Benzofluoranthenes	80.0	0.973	0.21%	30.327	7026687	1.579	1.655	-4.6%	
Benz(e)pyrene	45.0	0.997	0.02%	31.038	2697761	1.078	1.796	-40.0%	*
Benz(a)pyrene	40.0	1.002	-0.04%	31.172	2511393	1.129	1.200	-5.9%	
Perylene-d12 (Surr.)	38.0	1.008	-0.10%	31.338	2104781	0.996	0.710	40.2%	*
Perylene	34.0	1.010	-0.13%	31.399	2015527	1.066	1.255	-15.1%	
Indeno(123,cd)pyrene	40.0	1.124	-0.81%	34.684	2240980	1.007	1.479	-31.9%	
Dibenz(ah)anthracene	40.0	1.126	-0.83%	34.741	1958632	0.880	0.966	-8.9%	
Benzo(ghi)perylene	40.0	1.160	-1.21%	35.658	2642231	1.188	1.447	-17.9%	

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #5

STD .# : MS860249 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD30 Date Analyze : 09/10/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.755	582645	547101	6.5%
Phenanthrene-d10	62.5	21.573	1605369	1527126	5.1%
Benz(a)pyrene-d12	49.6	32.132	903358	957487	-5.7%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %	
benzofuran	46.0	0.564	-0.86%	9.922	554242	1.096	1.598	-31.4%	
dihydroinden	41.0	0.604	-0.72%	10.649	339238	0.753	0.924	-18.6%	
indene	40.0	0.613	-0.68%	10.804	566402	1.288	1.198	7.5%	
Naphthalene-d8 (Surr.)	39.0	0.748	-0.34%	13.230	812419	1.895	2.442	-22.4%	
Naphthalene	40.0	0.750	-0.37%	13.266	1542800	3.509	3.515	-0.2%	
Benz(b)thio	66.0	0.758	-0.36%	13.419	715730	0.986	2.027	-51.3%	*
Quinoline	47.0	0.798	-0.25%	14.130	345501	0.669	0.976	-31.5%	
Indole	48.0	0.841	-0.13%	14.915	454886	0.862	1.135	-24.1%	
thyl	40.0	0.848	-0.16%	15.031	609671	1.386	1.832	-24.3%	
thyl	35.0	0.864	-0.16%	15.307	720397	1.872	1.825	2.6%	
Biphenyl	44.0	0.917	-0.03%	16.270	5526034	11.424	18.290	-37.5%	*
Acenaphthylene	40.0	0.977	-0.00%	17.352	669644	1.523	1.578	-3.5%	
Acenaphthene	40.0	1.004	0.01%	17.836	622593	1.416	1.417	-0.1%	
Dibenzofuran	48.0	1.027	0.05%	18.252	926330	1.755	2.378	-26.2%	
Group II									
Flourene-d10 (Surr.)	38.0	0.887	-0.28%	19.084	600616	0.615	0.517	19.1%	
Fluorene	40.0	0.891	-0.33%	19.150	769291	0.749	0.764	-1.9%	
Dibenzothiophene	48.0	0.990	-0.21%	21.307	941527	0.764	1.088	-29.8%	
Phenanthrene	40.0	1.004	-0.15%	21.624	1579133	1.537	1.596	-3.7%	
Anthracene	40.0	1.010	-0.19%	21.740	971422	0.945	0.929	1.7%	
Acridine	41.0	1.015	-0.17%	21.860	551517	0.524	0.458	14.3%	
Carbazole	43.0	1.029	-0.10%	22.181	715433	0.648	0.726	-10.8%	
Fluoranthene	40.0	1.147	-0.08%	24.730	1112671	1.083	1.180	-8.2%	
me-d10 (Surr.)	40.0	1.172	-0.04%	25.277	813464	0.792	0.801	-1.2%	
rene	40.0	1.174	-0.03%	25.317	1251829	1.218	1.273	-4.3%	
Group III									
Benz(a)anthracene	40.0	0.883	0.22%	28.424	1005195	1.380	1.263	9.3%	
Chrysene-d12 (Surr.)	39.0	0.884	0.23%	28.476	384103	0.541	0.473	14.4%	
Chrysene	40.0	0.883	0.54%	28.531	1199153	1.646	1.485	10.8%	
Benzofluoranthenes	80.0	0.973	0.04%	31.266	2493914	1.712	1.655	3.4%	
Benz(e)pyrene	45.0	0.997	-0.03%	32.039	1073139	1.309	1.796	-27.1%	
Benz(a)pyrene	40.0	1.002	-0.03%	32.196	921797	1.265	1.200	5.5%	
Perylene-d12 (Surr.)	38.0	1.008	-0.06%	32.375	713290	1.031	0.710	45.1%	*
Perylene	34.0	1.010	-0.05%	32.452	779864	1.259	1.255	0.3%	
Indeno(123,cd)pyrene	40.0	1.124	0.54%	36.305	739926	1.016	1.479	-31.3%	
Dibenz(ah)anthracene	40.0	1.126	0.56%	36.378	470921	0.646	0.966	-33.1%	
Benzo(ghi)perylene	40.0	1.160	0.47%	37.449	844438	1.159	1.447	-19.9%	

CALIBRATION RF's from : 05-Aug-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #8

STD # : MS860186 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD37 Date Analyze : 10/14/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.787	587277	676028	-13.1%
Phenanthrene-d10	62.5	21.610	1206059	2042693	-41.0%
Benz(a)pyrene-d12	49.6	32.179	875034	1136717	-23.0%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	40.0	0.559	-0.02%	9.943	503147	1.135	1.024	10.8%
dihydroinden	40.0	0.600	-0.04%	10.671	284139	0.641	0.639	0.4%
indene	40.0	0.604	0.84%	10.830	476191	1.074	1.051	2.2%
Naphthalene-d8 (Surr.)	40.0	0.745	-0.03%	13.252	700071	1.579	1.687	-6.4%
Naphthalene	40.0	0.748	-0.03%	13.292	1160616	2.619	2.726	-3.9%
Benz(b)thio	40.0	0.756	-0.01%	13.447	665127	1.501	1.493	0.5%
Quinoline	40.0	0.796	-0.05%	14.155	309936	0.699	0.826	-15.3%
Indole	40.0	0.840	-3.02%	14.495	384850	0.868	1.040	-16.5%
2-methyl	40.0	0.847	0.01%	15.060	585198	1.320	1.412	-6.5%
methyl	40.0	0.862	-0.03%	15.331	639333	1.442	1.551	-7.0%
biphenyl	40.0	0.916	-0.00%	16.294	3475051	7.840	8.654	-9.4%
Acenaphthylene	40.0	0.977	-0.00%	17.384	633181	1.429	1.631	-12.4%
Acenaphthene	40.0	1.005	0.00%	17.868	564804	1.274	1.542	-17.4%
Dibenzofuran	40.0	1.028	0.00%	18.286	875104	1.974	2.192	-9.9%
Group II								
Flourene-d10 (Surr.)	40.0	0.884	-0.02%	19.110	550406	0.713	0.571	24.8%
Fluorene	40.0	0.888	-0.04%	19.178	727777	0.943	0.741	27.2%
Dibenzothiophene	40.0	0.988	-0.02%	21.339	1073377	1.391	0.978	42.2% *
Phenanthrene	40.0	1.002	-0.03%	21.653	2303849	2.985	2.104	41.9% *
Anthracene	40.0	1.008	-0.02%	21.771	1057303	1.370	1.056	29.7%
Acridine	40.0	1.013	-0.02%	21.892	543009	0.703	0.608	15.7%
Carbazole	40.0	1.028	-0.00%	22.212	608913	0.789	0.738	6.9%
Fluoranthene	40.0	1.146	-0.01%	24.768	1196683	1.550	1.314	18.0%
Pyrene-d10 (Surr.)	40.0	1.171	-0.01%	25.310	718420	0.931	0.851	9.4%
Pyrene	40.0	1.173	-0.01%	25.351	1242041	1.609	1.419	13.4%
Group III								
Benz(a)anthracene	40.0	0.884	0.01%	28.465	1003694	1.422	1.468	-3.1%
Chrysene-d12 (Surr.)	40.0	0.886	-0.01%	28.510	304729	0.432	0.537	-19.5%
Chrysene	40.0	0.888	0.01%	28.571	1303564	1.847	1.756	5.2%
Benzofluoranthenes	80.0	0.973	0.01%	31.318	2360456	1.672	1.869	-10.5%
Benz(e)pyrene	40.0	0.997	0.02%	32.094	1300334	1.843	1.610	14.5%
Benz(a)pyrene	40.0	1.002	-0.00%	32.245	867477	1.229	1.414	-13.1%
Perylene-d12 (Surr.)	40.0	1.008	0.00%	32.428	635958	0.901	1.184	-23.9%
Perylene	40.0	1.010	0.02%	32.505	747630	1.059	1.283	-17.4%
Indeno(123,cd)pyrene	40.0	1.131	0.01%	36.385	763790	1.082	1.166	-7.2%
Dibenz(ah)anthracene	40.0	1.133	0.02%	36.460	485534	0.688	0.772	-10.9%
Benzo(ghi)perylene	40.0	1.166	-0.02%	37.526	1005524	1.425	1.287	10.8%

CALIBRATION RF's from : 05-Sep-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #8

STD # : MS860249 w/ IS MS860189 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD38 Date Analyze : 10/15/86

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.779	924958	676028	36.8%
Phenanthrene-d10	62.5	21.598	1814104	2042693	-11.2%
Benz(a)pyrene-d12	49.6	32.163	1572244	1136717	38.3%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	40.0	0.559	-0.04%	9.936	588487	0.843	1.024	-17.7%
dihydroinden	40.0	0.600	-0.07%	10.663	353733	0.507	0.639	-20.7%
indene	40.0	0.604	0.80%	10.820	577970	0.828	1.051	-21.2%
Naphthalene-d8 (Surr.)	40.0	0.745	-0.01%	13.249	884756	1.267	1.687	-24.9%
Naphthalene	40.0	0.748	-0.02%	13.287	1281026	1.835	2.726	-32.7%
Benz(b)thio	40.0	0.756	-0.03%	13.438	795501	1.140	1.493	-23.7%
Quinoline	40.0	0.796	-0.04%	14.149	420605	0.603	0.826	-27.0%
Indole	40.0	0.840	0.01%	14.941	596587	0.855	1.040	-17.8%
methyl	40.0	0.847	-0.02%	15.048	684528	0.981	1.412	-30.5%
thyl	40.0	0.862	-0.04%	15.323	838144	1.201	1.551	-22.6%
nenyl	40.0	0.916	-0.03%	16.282	2908347	4.166	8.654	-51.9% *
Acenaphthylene	40.0	0.977	-0.03%	17.371	976683	1.399	1.631	-14.2%
Acenaphthene	40.0	1.005	-0.02%	17.856	853593	1.223	1.542	-20.7%
Dibenzofuran	40.0	1.028	-0.03%	18.272	1237864	1.773	2.192	-19.1%
Group II								
Flourene-d10 (Surr.)	40.0	0.884	-0.03%	19.097	750362	0.646	0.571	13.1%
Fluorene	40.0	0.888	-0.03%	19.170	1057143	0.911	0.741	22.8%
Dibenzothiophene	40.0	0.988	-0.02%	21.328	1358671	1.170	0.978	19.7%
Phenanthrene	40.0	1.002	-0.01%	21.644	1998550	1.721	2.104	-18.2%
Anthracene	40.0	1.008	-0.02%	21.759	1369640	1.180	1.056	11.7%
Acridine	40.0	1.013	-0.02%	21.879	762303	0.657	0.608	8.0%
Carbazole	40.0	1.028	-0.01%	22.199	1007931	0.868	0.738	17.7%
Fluoranthene	40.0	1.146	-0.01%	24.754	1884070	1.623	1.314	23.5%
rene-d10 (Surr.)	40.0	1.171	-0.04%	25.289	1259769	1.085	0.851	27.5%
rene	40.0	1.173	-0.03%	25.330	2019824	1.740	1.419	22.6%
Group III								
Benz(a)anthracene	40.0	0.884	0.01%	28.451	1711335	1.350	1.468	-8.1%
Chrysene-d12 (Surr.)	40.0	0.886	-0.01%	28.496	539736	0.426	0.537	-20.7%
Chrysene	40.0	0.888	0.01%	28.556	2053667	1.620	1.756	-7.8%
Benzofluoranthenes	80.0	0.973	-0.11%	31.264	4140310	1.633	1.869	-12.6%
Benz(e)pyrene	40.0	0.997	-0.01%	32.069	1783620	1.407	1.610	-12.6%
Benz(a)pyrene	40.0	1.002	-0.00%	32.228	1615923	1.274	1.414	-9.9%
Perylene-d12 (Surr.)	40.0	1.008	-0.01%	32.409	1143686	0.902	1.184	-23.8%
Perylene	40.0	1.010	-0.01%	32.481	1399264	1.104	1.283	-14.0%
Indeno(123,cd)pyrene	40.0	1.131	-0.02%	36.355	1366526	1.078	1.166	-7.6%
Dibenz(ah)anthracene	40.0	1.133	-0.04%	36.421	879894	0.694	0.772	-10.2%
Benzo(ghi)perylene	40.0	1.166	-0.02%	37.507	1529128	1.206	1.287	-6.3%

CALIBRATION RF's from : 05-Sep-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

ont. Calib. Check Set #9

STD # : MS860249 w/ IS MS860256 Extract Vol., ml 1.000
STD CONC. : DAILY STD 40 ppt PAH Sample Vol., L 1.000
GC/MS File # : STD51 Date Analyze : 11/25/86

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Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	53.0	17.127	1207221	734295	64.4%
Phenanthrene-d10	62.5	20.897	1677718	1184552	41.6%
Benz(a)pyrene-d12	49.6	31.115	818603	801742	2.1%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	40.0	0.549	-0.05%	9.395	1338385	1.469	1.303	12.8%
dihydroinden	40.0	0.589	-0.04%	10.084	831976	0.913	0.783	16.6%
indene	40.0	0.599	-0.04%	10.247	1306239	1.434	1.310	9.4%
Naphthalene-d8 (Surr.)	40.0	0.739	-0.03%	12.648	1658104	1.820	2.018	-9.8%
Naphthalene	40.0	0.741	-0.05%	12.682	3235255	3.551	2.752	29.0%
Benz(b)thio	40.0	0.750	-0.10%	12.834	1618251	1.776	1.739	2.1%
Quinoline	40.0	0.792	-0.05%	13.555	1222473	1.342	0.989	35.6% *
Indole	40.0	0.841	-0.10%	14.398	1336256	1.467	1.485	-1.3%
[illegible]methyl	40.0	0.843	-0.08%	14.419	1322480	1.452	1.019	42.4% *
[illegible]thyl	40.0	0.859	-0.02%	14.700	1521530	1.670	1.459	14.5%
[illegible]phenyl	40.0	0.915	-0.03%	15.661	2672347	2.933	3.395	-13.6%
Acenaphthylene	40.0	0.976	0.05%	16.730	1455192	1.597	1.540	3.7%
Acenaphthene	40.0	1.005	-0.03%	17.200	1218769	1.338	1.268	5.5%
Dibenzofuran	40.0	1.029	-0.02%	17.620	1688463	1.853	1.619	14.5%
Group II								
Flourene-d10 (Surr.)	40.0	0.882	-0.01%	18.432	929631	0.866	0.770	12.4%
Fluorene	40.0	0.885	-0.02%	18.497	1273985	1.186	1.034	14.7%
Dibenzothiophene	40.0	0.987	0.02%	20.635	1198664	1.116	1.173	-4.9%
Phenanthrene	40.0	1.002	-0.02%	20.944	1757786	1.637	2.154	-24.0%
Anthracene	40.0	1.008	0.02%	21.063	1344146	1.252	1.221	2.5%
Acridine	40.0	1.014	-0.00%	21.186	716591	0.667	0.776	-14.0%
Carbazole	40.0	1.031	0.05%	21.546	1059626	0.987	1.026	-3.8%
Fluoranthene	40.0	1.149	0.02%	24.023	1268602	1.181	1.448	-18.4%
[illegible]rene-d10 (Surr.)	40.0	1.175	0.00%	24.550	813209	0.757	0.920	-17.7%
[illegible]rene	40.0	1.177	0.01%	24.590	1350589	1.258	1.525	-17.5%
Group III								
Benz(a)anthracene	40.0	0.889	0.03%	27.678	838970	1.271	1.493	-14.9%
Chrysene-d12 (Surr.)	40.0	0.891	0.01%	27.726	272804	0.413	0.451	-8.5%
Chrysene	40.0	0.893	0.02%	27.783	917174	1.389	1.513	-8.2%
Benzofluoranthenes	80.0	0.975	-0.01%	30.327	1834622	1.390	2.388	-41.8% *
Benz(e)pyrene	40.0	0.998	-0.00%	31.038	824836	1.249	1.841	-32.1%
Benz(a)pyrene	40.0	1.002	0.00%	31.172	784675	1.189	1.451	-18.1%
Perylene-d12 (Surr.)	40.0	1.007	0.00%	31.338	585425	0.887	1.074	-17.4%
Perylene	40.0	1.009	-0.00%	31.399	677032	1.026	1.316	-22.1%
Indeno(123,cd)pyrene	40.0	1.115	-0.05%	34.684	822419	1.246	1.312	-5.1%
Dibenz(ah)anthracene	40.0	1.117	-0.05%	34.741	549977	0.833	0.903	-7.7%
Benzo(ghi)perylene	40.0	1.147	-0.07%	35.658	920431	1.394	1.336	4.3%

CALIBRATION RF's from : 18-Nov-86 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

Set #9

Cont. Calib Check

31

ERT # : 40 Extract Vol., ml 1.000

Field ID : 40 ppt PAH Daily Check Sample Vol., L 1.000

GC/MS File # : STD51.D Date Analyze : 11/~~24~~/86 25 2/25/87

Internal Std.	Conc. ng/ml	RT (min)	Area
Acenaphthene-d10	53.0	17.127	1207221
Phenanthrene-d10	62.5	20.897	1677718
Benz(a)pyrene-d12	49.6	31.115	818603

Group I	Conc. ng/ml	RT (min)	Area	RF	Cal. RF's	Delta %	RRT	
benzofuran	40.0	9.395	1338385	1.469	1.598	-8.1%	0.549	
dihydroinden	40.0	10.084	831976	0.913	0.924	-1.2%	0.589	
indene	40.0	10.247	1306239	1.434	1.199	19.6%	0.598	
Naphthalene-d8 (Surr.)	40.0	12.648	1658104	1.820	2.442	-25.5%	0.738	
Naphthalene	40.0	12.682	3235255	3.551	3.515	1.0%	0.740	
Benz(b)thio	40.0	12.834	1618251	1.776	2.025	-12.3%	0.749	
Quinoline	40.0	13.555	1222473	1.342	0.976	37.5%	0.791	*
Indole	40.0	14.398	1336256	1.467	1.135	29.2%	0.841	
2-methyl	40.0	14.419	1322480	1.452	1.832	-20.8%	0.842	
1-methyl	40.0	14.700	1521530	1.670	1.825	-8.5%	0.858	
Biphenyl	40.0	15.661	2672347	2.933	18.290	-84.0%	0.914	*
Acenaphthylene	40.0	16.730	1455192	1.597	1.578	1.2%	0.977	
Acenaphthene	40.0	17.200	1218769	1.338	1.417	-5.6%	1.004	
Dibenzofuran	40.0	17.620	1688463	1.853	2.378	-22.1%	1.029	
Group II								
Flourene-d10 (Surr.)	40.0	18.432	929631	0.866	0.517	67.5%	0.882	*
Fluorene	40.0	18.497	1273985	1.186	0.764	55.3%	0.885	*
Dibenzothiophene	40.0	20.635	1198664	1.116	1.088	2.6%	0.987	
Phenanthrene	40.0	20.944	1757786	1.637	1.593	2.8%	1.002	
Anthracene	40.0	21.063	1344146	1.252	0.930	34.6%	1.008	*
Acridine	40.0	21.186	716591	0.667	0.458	45.7%	1.014	*
Carbazole	40.0	21.546	1059626	0.987	0.726	35.9%	1.031	*
Fluoranthene	40.0	24.023	1268602	1.181	1.180	0.1%	1.150	
Pyrene-d10 (Surr.)	40.0	24.550	813209	0.757	0.801	-5.4%	1.175	
Pyrene	40.0	24.590	1350589	1.258	1.273	-1.2%	1.177	
Group III								
Benz(a)anthracene	40.0	27.678	838970	1.271	1.263	0.6%	0.890	
Chyrsene-d12 (Surr.)	40.0	27.726	272804	0.413	0.473	-12.6%	0.891	
Chyrsene	40.0	27.783	917174	1.389	1.485	-6.4%	0.893	
Benzofluoranthenes	80.0	30.327	1834622	1.390	1.655	-16.0%	0.975	
Benz(e)pyrene	40.0	31.038	824836	1.249	1.654	-24.5%	0.998	
Benz(a)pyrene	40.0	31.172	784675	1.189	1.181	0.6%	1.002	
Perylene-d12 (Surr.)	40.0	31.338	585425	0.887	0.710	24.9%	1.007	
Perylene	40.0	31.399	677032	1.026	1.219	-15.9%	1.009	
Indeno(123,cd)pyrene	40.0	34.684	822419	1.246	1.479	-15.8%	1.115	
Dibenz(ah)anthracene	40.0	34.741	549977	0.833	0.966	-13.8%	1.117	
Benzo(ghi)perylene	40.0	35.658	920431	1.394	1.447	-3.6%	1.146	

Set #10

STD. #	: STD73	Extract Vol., ml	1.000
STD. CONC.	: DAILY 40 ppt PAH	Sample Vol., L	1.000
GC/MS File #	: STD73.I	Date Analyze :	01/29/87

Internal Std.	Conc. ng/ml	RT (min)	Area	AVG. Area	Delta %
Acenaphthene-d10	50.0	17.064	238467	577946	-58.7%
Phenanthrene-d10	50.0	20.840	404943	716761	-43.5%
Benz(a)pyrene-d12	50.0	31.045	418532	529645	-21.0%

Group I	Conc. ng/ml	AVG. RRT	RRT Delta %	RT (min)	Area	RF	Cal. RF's	Delta %
benzofuran	40.0	0.547	0.04%	9.341	307734	1.613	1.319	22.3%
dihydroinden	40.0	0.587	0.07%	10.031	172225	0.903	0.799	13.0%
indene	40.0	0.597	0.01%	10.190	277447	1.454	1.228	18.5%
Naphthalene-d8 (Surr.)	40.0	0.738	-0.01%	12.590	463517	2.430	1.923	26.3%
Naphthalene	40.0	0.740	-0.01%	12.629	718874	3.768	2.964	27.1%
Benz(b)thio	40.0	0.749	-0.04%	12.781	382309	2.004	1.736	15.4%
Quinoline	40.0	0.792	-0.08%	13.505	236409	1.239	0.996	24.5%
Indole	40.0	0.841	0.05%	14.354	311950	1.635	1.508	8.4%
2-methyl	40.0	0.842	-0.03%	14.361	314716	1.650	1.348	22.3%
[illegible]hyl	40.0	0.858	-0.03%	14.634	316873	1.661	1.323	25.6%
Biphenyl	40.0	0.914	0.02%	15.606	865382	4.536	2.558	77.3% *
Acenaphthylene	40.0	0.977	0.01%	16.670	492364	2.581	1.736	48.7% *
Acenaphthene	40.0	1.005	0.00%	17.141	362733	1.901	1.221	55.7% *
Dibenzofuran	40.0	1.029	0.01%	17.563	409105	2.144	1.485	44.4% *
Group II								
Flourene-d10 (Surr.)	40.0	0.882	-0.01%	18.373	208825	0.645	0.653	-1.3%
Fluorene	40.0	0.885	-0.02%	18.439	390051	1.204	1.110	8.5%
Dibenzothiophene	40.0	0.987	-0.03%	20.573	342246	1.056	1.116	-5.3%
Phenanthrene	40.0	1.002	-0.02%	20.884	662246	2.044	1.916	6.7%
Anthracene	40.0	1.008	0.00%	21.002	504033	1.556	1.176	32.3%
Acridine	40.0	1.014	-0.03%	21.130	204911	0.633	0.659	-4.0%
Carbazole	40.0	1.031	0.01%	21.491	339078	1.047	0.824	27.0%
Fluoranthene	40.0	1.150	-0.00%	23.958	552528	1.706	1.361	25.3%
[illegible]ene-d10 (Surr.)	40.0	1.175	0.01%	24.494	357503	1.104	0.851	29.7%
[illegible]ene	40.0	1.177	0.01%	24.533	571484	1.764	1.397	26.3%
Group III								
Benz(a)anthracene	40.0	0.889	0.03%	27.615	522568	1.561	1.599	-2.4%
Chyrsene-d12 (Surr.)	40.0	0.891	0.03%	27.667	324565	0.969	1.008	-3.9%
Chyrsene	40.0	0.893	0.04%	27.726	525686	1.570	1.704	-7.8%
Benzofluoranthenes	80.0	0.975	0.01%	30.268	1473610	2.201	2.109	4.3%
Benz(e)pyrene	40.0	0.997	0.02%	30.969	496593	1.483	1.856	-20.1%
Benz(a)pyrene	40.0	1.002	0.03%	31.102	652723	1.949	1.867	4.4%
Perylene-d12 (Surr.)	40.0	1.007	0.02%	31.263	330494	0.987	1.005	-1.8%
Perylene	40.0	1.009	0.01%	31.323	647130	1.933	1.634	18.3%
Indeno(123,cd)pyrene	40.0	1.114	0.02%	34.577	718095	2.145	2.072	3.5%
Dibenz(ah)anthracene	40.0	1.116	0.00%	34.634	594533	1.776	1.732	2.5%
Benzo(ghi)perylene	40.0	1.145	0.02%	35.543	664925	1.986	2.107	-5.7%

CALIBRATION RF's from : 27-Jan-87 USED THE AVERAGE RRT and INT.STD. Areas TO COMPUTE DELTA %

11/13/86
N.

APPENDIX A

Initial Five Point Calibration Curves

Curve #1: August 5, 1986

Utilized for the following sampling dates:

Set #1: July 15, 1986
Set #2: July 22, 1986
Set #3: July 23, 1986
Set #4: August 7, 1986
Set #5: August 27, 1986

Curve #2: September 5, 1986

Utilized for the following sampling dates:

Set #8: October 7, 1986

Curve #3: November 18, 1986

Set #9: November 13, 1986

CAL CURVE	:							Cal Curve #1
STD. CONC.	:	20 ng/ml	40 ng/ml	100 ng/ml	160ng/ml	200ng/ml	40 ng/ml	08/05/86
GC/MS File #	:	STD02	STD01	STD04	STD05	STD03	STD06	cc080586

Internal Std.

Acenaphthene-d10
Phenanthrene-d10
Benz(a)pyrene-d12

Group I	RRT	RRT	RRT	RRT	RRT	RRT	AVG	SD	% RSD
benzofuran	0.563	0.564	0.564	0.564	0.564	0.564	0.564	0.000	0.035
dihydroinden	0.604	0.604	0.604	0.604	0.604	0.604	0.604	0.000	0.035
indene	0.612	0.613	0.613	0.612	0.612	0.613	0.613	0.000	0.046
Naphthalene-d8 (Surr.)	0.748	0.748	0.748	0.748	0.748	0.748	0.748	0.000	0.009
Naphthalene	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.000	0.011
Benz(b)thio	0.758	0.758	0.759	0.759	0.758	0.759	0.758	0.000	0.006
Quinoline	0.798	0.798	0.798	0.798	0.798	0.798	0.798	0.000	0.008
Indole	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.000	0.022
2-methyl	0.848	0.848	0.848	0.848	0.848	0.848	0.848	0.000	0.003
1-methyl	0.863	0.863	0.864	0.864	0.864	0.864	0.864	0.000	0.033
B[illegible]nyl	0.917	0.917	0.917	0.917	0.917	0.917	0.917	0.000	0.002
Acenaphthylene	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.000	0.006
Acenaphthene	1.004	1.004	1.004	1.004	1.004	1.004	1.004	0.000	0.004
Dibenzofuran	1.027	1.028	1.027	1.027	1.027	1.027	1.027	0.000	0.005
Group II									
Flourene-d10 (Surr.)	0.896	0.885	0.885	0.885	0.885	0.885	0.887	0.004	0.464
Fluorene	0.900	0.889	0.889	0.889	0.889	0.889	0.891	0.004	0.464
Dibenzothiophene	1.000	0.988	0.988	0.988	0.988	0.988	0.990	0.005	0.466
Phenanthrene	1.013	1.002	1.002	1.002	1.002	1.002	1.004	0.004	0.397
Anthracene	1.020	1.008	1.008	1.008	1.008	1.008	1.010	0.005	0.464
Acridine	1.026	1.013	1.013	1.013	1.013	1.013	1.015	0.005	0.473
Carbazole	1.040	1.027	1.027	1.027	1.027	1.027	1.029	0.005	0.466
Fluoranthene	1.159	1.145	1.145	1.145	1.145	1.145	1.147	0.005	0.469
Pyrene-d10 (Surr.)	1.184	1.170	1.170	1.170	1.170	1.170	1.172	0.005	0.467
[illegible]ne	1.186	1.172	1.172	1.171	1.172	1.171	1.174	0.005	0.466
Group III									
Benz(a)anthracene	0.883	0.883	0.883	0.883	0.883	0.883	0.883	0.000	0.007
Chrysene-d12 (Surr.)	0.884	0.884	0.884	0.884	0.884	0.884	0.884	0.000	0.013
Chrysene	0.886	0.886	0.886	0.886	0.869	0.886	0.883	0.006	0.697
Benzofluoranthenes	0.971	0.972	0.975	0.972	0.972	0.972	0.973	0.001	0.129
Benz(e)pyrene	0.997	0.997	0.997	0.997	0.997	0.997	0.997	0.000	0.005
Benz(a)pyrene	1.002	1.002	1.002	1.002	1.002	1.002	1.002	0.000	0.004
Perylene-d12 (Surr.)	1.008	1.008	1.008	1.008	1.008	1.008	1.008	0.000	0.006
Perylene,	1.010	1.010	1.011	1.010	1.011	1.011	1.010	0.000	0.010
Indeno(123,cd)pyrene	1.063	1.136	1.136	1.136	1.136	1.136	1.124	0.027	2.438
Dibenz(ah)anthracene	1.064	1.138	1.138	1.138	1.138	1.138	1.126	0.027	2.439
Dibenzo(ghi)perylene	1.092	1.174	1.174	1.174	1.174	1.174	1.160	0.030	2.624

RRT = Relative Retention Time

CAL CURVE :									Cal Curve #1
STD. CONC. :	20 ng/ml	40 ng/ml	100 ng/ml	160ng/ml	200ng/ml	40 ng/ml			08/05/86
GC/MS File # :	STD02	STD01	STD04	STD05	STD03	STD06			cc080586
Internal Std.	RT	RT	RT	RT	RT	RT	AVG	SD	% RSD
Acenaphthene-d10	18.026	18.024	18.029	18.030	18.028	18.034	18.029	0.003	0.017
Phenanthrene-d10	21.580	21.847	21.852	21.855	21.850	21.859	21.807	0.102	0.466
Benz(a)pyrene-d12	32.532	32.524	32.531	32.531	32.533	32.540	32.532	0.005	0.014
Group I	RT	RT	RT	RT	RT	RT	AVG	SD	% RSD
benzofuran	10.156	10.160	10.166	10.160	10.162	10.171	10.163	0.005	0.047
dihydroinden	10.885	10.886	10.897	10.894	10.890	10.900	10.892	0.006	0.051
indene	11.039	11.040	11.053	11.043	11.042	11.056	11.046	0.007	0.059
Naphthalene-d8 (Surr.)	13.476	13.476	13.481	13.481	13.480	13.486	13.480	0.003	0.025
Naphthalene	13.516	13.516	13.521	13.521	13.520	13.527	13.520	0.004	0.027
Benz(b)thio	13.671	13.671	13.675	13.676	13.674	13.680	13.675	0.003	0.023
Quinoline	14.380	14.379	14.383	14.384	14.382	14.390	14.383	0.004	0.025
Indole	15.156	15.157	15.167	15.167	15.165	15.172	15.164	0.006	0.038
2-methyl	15.285	15.284	15.287	15.289	15.286	15.292	15.287	0.003	0.017
1-methyl	15.559	15.557	15.572	15.573	15.571	15.578	15.568	0.008	0.049
B[illegible]nyl	16.523	16.521	16.525	16.527	16.524	16.530	16.525	0.003	0.017
Ac[illegible]aphthylene	17.618	17.616	17.621	17.619	17.619	17.626	17.620	0.003	0.018
Acenaphthene	18.107	18.105	18.108	18.111	18.108	18.114	18.109	0.003	0.016
Dibenzofuran	18.521	18.520	18.523	18.524	18.522	18.528	18.523	0.003	0.014
Group II									
Flourene-d10 (Surr.)	19.343	19.341	19.346	19.348	19.345	19.351	19.346	0.003	0.017
Fluorene	19.419	19.416	19.421	19.425	19.420	19.428	19.422	0.004	0.020
Dibenzothiophene	21.581	21.578	21.585	21.582	21.587	21.586	21.583	0.003	0.015
Phenanthrene	21.857	21.893	21.900	21.900	21.899	21.904	21.892	0.016	0.073
Anthracene	22.015	22.014	22.019	22.019	22.018	22.023	22.018	0.003	0.013
Acridine	22.135	22.126	22.134	22.135	22.134	22.138	22.134	0.004	0.017
Carbazole	22.441	22.439	22.442	22.444	22.442	22.448	22.443	0.003	0.013
Fluoranthene	25.018	25.013	25.021	25.017	25.021	25.021	25.019	0.003	0.012
Pyrene-d10 (Surr.)	25.559	25.557	25.560	25.562	25.560	25.566	25.561	0.003	0.011
P[illegible]ne	25.598	25.596	25.600	25.601	25.600	25.606	25.600	0.003	0.012
Group III									
Benz(a)anthracene	28.711	28.708	28.712	28.715	28.712	28.722	28.713	0.004	0.015
Chrysene-d12 (Surr.)	28.765	28.761	28.763	28.759	28.765	28.764	28.763	0.002	0.008
Chrysene	28.821	28.818	28.822	28.817	28.284	28.823	28.731	0.200	0.696
Benzofluoranthenes	31.601	31.626	31.730	31.629	31.632	31.639	31.643	0.041	0.129
Benz(e)pyrene	32.444	32.439	32.445	32.448	32.446	32.456	32.446	0.005	0.016
Benz(a)pyrene	32.603	32.599	32.604	32.606	32.607	32.613	32.605	0.004	0.013
Perylene-d12 (Surr.)	32.796	32.790	32.797	32.800	32.797	32.808	32.798	0.005	0.016
Perylene	32.873	32.865	32.873	32.865	32.875	32.884	32.873	0.006	0.020
Indeno(123,cd)pyrene	34.566	36.949	36.954	36.958	36.961	36.967	36.559	0.891	2.438
Dibenz(ah)anthracene	34.629	37.009	37.028	37.028	37.028	37.038	36.627	0.893	2.439
Dibenzo(ghi)perylene	35.524	38.169	38.180	38.186	38.185	38.186	37.738	0.990	2.624

RT = Retention Time

CAL CURVE :								Cal Curve #1	
STD. CONC. :	20 ng/ml	40 ng/ml	100 ng/ml	160ng/ml	200ng/ml	40 ng/ml		08/05/86	
GC/MS File # :	STD02	STD01	STD04	STD05	STD03	STD06		cc080586	
Internal Std.	**Area**	**Area**	**Area**	**Area**	**Area**	**Area**	**AVG**	**SD**	**% RSD**
Acenaphthene-d10	534245	506420	529964	521454	614701	575822	547101	36892	6.743
Phenanthrene-d10	1635788	1424011	1440108	1471483	1600781	1590584	1527126	84222	5.515
Benz(a)pyrene-d12	944023	1025374	829436	1121300	939414	885377	957487	94471	9.867
Group I	**RF**	**RF**	**RF**	**RF**	**RF**	**RF**	**AVG**	**SD**	**% RSD**
benzofuran	1.708	1.702	1.708	1.481	1.426	1.566	1.598	0.115	7.184
dihydroinden	1.073	0.966	0.965	0.832	0.815	0.894	0.924	0.088	9.574
indene	1.235	1.207	1.186	1.043	1.387	1.133	1.198	0.104	8.716
Naphthalene-d8 (Surr.)	2.552	2.507	2.677	2.269	2.221	2.423	2.442	0.158	6.491
Naphthalene	5.016	3.572	3.218	2.994	2.498	3.789	3.515	0.788	22.418
Benz(b)thio	2.154	1.946	2.234	1.939	1.861	2.029	2.027	0.129	6.387
Quinoline	1.144	0.877	1.047	1.012	0.856	0.922	0.976	0.101	10.383
Indole	1.300	1.092	1.218	1.045	1.024	1.130	1.135	0.097	8.539
2-methyl	2.282	1.767	1.862	1.619	1.551	1.912	1.832	0.238	12.970
1-methyl	2.406	1.757	1.839	1.655	1.489	1.803	1.825	0.284	15.582
nyl		16.566	15.500	5.224	7.955	20.293	18.290	5.622	42.888
aphthylene	1.568	1.802	1.561	1.483	1.435	1.620	1.578	0.117	7.402
Acenaphthene	1.502	1.381	1.475	1.373	1.262	1.511	1.417	0.088	6.225
Dibenzofuran	2.589	2.364	2.400	2.360	2.186	2.370	2.378	0.117	4.926
Group II									
Flourene-d10 (Surr.)	0.610	0.556	0.507	0.470	0.473	0.485	0.517	0.051	9.832
Fluorene	0.969	0.749	0.743	0.688	0.710	0.723	0.764	0.094	12.296
Dibenzothiophene	1.232	1.233	0.956	0.932	0.930	1.246	1.088	0.149	13.710
Phenanthrene		2.022	1.325	1.292	1.525	1.817	1.596	0.283	17.736
Anthracene	1.309	0.885	0.809	0.842	0.820	0.912	0.929	0.173	18.667
Acridine	0.596	0.406	0.433	0.488	0.426	0.400	0.458	0.068	14.837
Carbazole	0.782	0.701	0.707	0.779	0.692	0.694	0.726	0.039	5.367
Fluoranthene	1.413	1.111	1.060	1.318	1.073	1.105	1.180	0.135	11.465
Pyrene-d10 (Surr.)	0.774	0.798	0.766	0.962	0.745	0.763	0.801	0.074	9.183
Pyrene	1.436	1.142	1.125	1.679	1.134	1.124	1.273	0.213	16.725
Group III									
Benz(a)anthracene	1.223	1.498	1.188	1.325	1.134	1.208	1.263	0.120	9.471
Chrysene-d12 (Surr.)	0.500	0.531	0.454	0.469	0.432	0.450	0.473	0.033	7.030
Chrysene	1.407	1.651	1.455	1.490	1.466	1.441	1.485	0.079	5.290
Benzofluoranthenes	1.891	1.752	1.627	1.584	1.481	1.595	1.655	0.132	7.985
Benz(e)pyrene	2.011	1.806	1.807	1.637	1.688	1.830	1.796	0.119	6.598
Benz(a)pyrene	1.328	1.173	1.216	1.131	1.104	1.245	1.200	0.075	6.215
Perylene-d12 (Surr.)	0.788	0.679	0.728	0.727	0.681	0.658	0.710	0.043	6.093
Perylene	1.437	1.102	1.216	1.407	1.159	1.211	1.255	0.124	9.899
Indeno(123,cd)pyrene	1.410	2.074	1.498	1.018	1.633	1.241	1.479	0.330	22.285
Dibenz(ah)anthracene	0.994		1.086	0.742	1.150	0.857	0.966	0.149	15.408
Dibenzo(ghi)perylene	1.728	1.568	1.534	1.039	1.481	1.334	1.447	0.217	14.971

RF = Response Factor

11/24/86
N.

CH2M HILL TRANSMITTAL

RECEIVED
NOV 28 1986
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

To: Dan Bicknell
U.S EPA
Region V
230 South Dearborn
Chicago, IL 60604

Attn:

Re: St. Louis Park, MN Lab Results

From: Alan Scrivner

Date: 11/26/86

Our Project No. W63720.FR

IF MATERIAL RECEIVED IS NOT AS LISTED, PLEASE NOTIFY US AT ONCE

WE ARE SENDING YOU

☑ ATTACHED, ☐ UNDER SEPARATE COVER VIA _____

☐ SHOP DRAWINGS (SD) ☐ DOCUMENTS (D) ☐ TRACING (T) ☐ COPY OF LETTER (CL)

☐ PRINTS (P) ☐ SPECIFICATIONS (S) ☐ CATALOGS (C) ☐ _____

STATUS: SUBMITTED FOR APPROVAL (A)
SUBMITTED FOR RECORD ONLY (B)
SUBMITTED FOR INFORMATION (I)

QUANTITY	ATTACHED	DOCUMENT/DRAWING/SHEET NUMBER (if applicable)	REV	DESCRIPTION	STATUS
1	X			the original laboratory analysis summary for composite treated water & travel blank, collected Nov 13, 1986	

REMARKS

COPY TO

REV 8/85 FORM 6

Engineers
Planners
Economists
Scientists

November 24, 1986

W63720.FR

Ms. Linda Rogalinski
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data For Laboratory No. 8352

Dear Ms. Rogalinski:

On ~~May~~ Nov 14, 1986 the CH2M HILL Montgomery Laboratory received three water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 8352

Client: Reilly Tar Attention: Linda Rogalinski

Address: CH2M HILL Inc., P.O. Box 2090, Milwaukee, Wisconsin 53201

Date Received: November 14, 1986 Date Reported: November 24, 1986

SAMPLE MATRICES: Water 3 Soil ____ Sludge ____ Other ____

ANALYSIS REQUESTED:

1. Priority Pollutants:	Volatiles	____	2. SDWA Pesticides	____
	Base/Neutrals	____	3. SDWA Herbicides	____
	Acids	____	4. Trihalomethanes	____
	Pesticides	____	5. Ethylene Dibromide	____
	PCBs	____	6. Total Organic Halogen	____

7. Other: Three PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

____ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

____ Dohrman DX-20 Total Organic Halide System.

____ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38, No.75, Part II, November 28, 1973.

3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

5. Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TRAVEL BLANK, GRAB, 1:15

Lab No. :8352-1

Date Sampled :11/13/86

Date Extracted :11/20/86

Date Received :11/14//86

Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	9.0	Acridine	1.8	BMDL
1H-Indene	1.0	2.5	Phenanthridine	1.4	BMDL
·hthalene	1.9	5.7	Carbazole	1.1	BMDL
zo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	3.0	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.6	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.0	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =76

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED, GRAB, 1:07

Lab No. :8352-2

Date Sampled :11/13/86

Date Extracted :11/20/86

Date Received :11/14//86

Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	28	Acridine	1.8	BMDL
1H-Indene	1.0	3.5	Phenanthridine	1.4	BMDL
›hthalene	1.9	4.6	Carbazole	1.1	BMDL
,zo(b)thiophene	1.0	1.6	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.8	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	2.1	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	2.2	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	2.5	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.6	Perylene	1.0	BMDL
Dibenzofuran	2.0	1.9	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.0	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =80

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED DUPLICATE, GRAB, 1:10

Lab No. :8352-3

Date Sampled :11/13/86

Date Extracted :11/20/86

Date Received :11/14//86

Date Analyzed :11/23/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	32	Acridine	1.8	BMDL
1H-Indene	1.0	4.0	Phenanthridine	1.4	BMDL
›hthalene	1.9	4.8	Carbazole	1.1	BMDL
›zo(b)thiophene	1.0	1.6	Fluoranthene	1.0	BMDL
Quinoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	2.8	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	2.1	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	1.8	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	3.9	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.0	Perylene	1.0	BMDL
Dibenzofuran	2.0	1.6	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	3.5	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =71

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

Engineers
Planners
Economists
Scientists

September 18, 1986

MG156.35

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, WI 53201-2090

RE: Analytical Data For Laboratory No. 7994

Dear Mr. Scrivner

On August 26, 1986 the CH2M Hill Montgomery Laboratory received four water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 7994

Client: Reilly Tar

Address: CH2M Hill, Inc., P.O. Box 2090, Milwaukee, WI 53201-2090

Date Received: 8/26/86 Date Reported: 9/18/86

SAMPLE MATRICES: Water X Soil ____ Sludge ____ Other ____

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles ____ Base/Neutrals ____ Acids ____ Pesticides ____ PCBs ____
2. SDWA Pesticides ____
3. SDWA Herbicides ____
4. Trihalomethanes ____
5. Ethylene Dibromide ____
6. Total Organic Halogen ____

7. Other: PAH, N, and S Heterocyclic Compunds 4 samples

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

____ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

____ Dohrman DX-20 Total Organic Halide System.

____ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38, No.75, Part II, November 28, 1973.

3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

5. Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TRAVEL BLANK, 8/26/86, GRAB

Lab No. :7994-1

Date Sampled :8/26/86

Date Extracted :9/4/86

Date Received :8/27/86

Date Analyzed :9/11/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	9.0	Acridine	1.8	BMDL
1H-Indene	1.0	9.4	Phenanthridine	1.4	BMDL
Naphthalene	1.9	79	Carbazole	1.1	2.1
[illegible]o(b)thiophene	1.0	3.1	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	8.2	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	4.4	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	8.2	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =66

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED, 8/26/86, GRAB

Lab No. :7994-2

Date Sampled :8/26/86 Date Extracted :9/4/86

Date Received :8/27/86 Date Analyzed :9/11/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	28	Acridine	1.8	BMDL
1H-Indene	1.0	2.1	Phenanthridine	1.4	BMDL
Naphthalene	1.9	7.5	Carbazole	1.1	BMDL
[illegible]o(b)thiophene	1.0	2.4	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.8	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	3.4	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	11	Perylene	1.0	BMDL
Dibenzofuran	2.0	2.6	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	5.1	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	3.0	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =69

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED DUPLICATE, 8/26/86, GRAB

Lab No. :7994-3

Date Sampled :8/26/86 Date Extracted :9/4/86

Date Received :8/27/86 Date Analyzed :9/11/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	26	Acridine	1.8	BMDL
1H-Indene	1.0	1.2	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.8	Carbazole	1.1	BMDL
[illegible]o(b)thiophene	1.0	1.9	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.8	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	3.4	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	12	Perylene	1.0	BMDL
Dibenzofuran	2.0	2.5	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	4.9	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	2.5	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =64

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon
REVIEW

Comments:

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - FEED, 8/26/86, GRAB

Lab No. :7994-4

Date Sampled :8/26/86

Date Extracted :9/4/86

Date Received :8/27/86

Date Analyzed :9/11/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	4.0	100
2,3-Dihydro-1H-Indene	5.6	590	Acridine	7.2	BMDL
1H-Indene	4.0	26	Phenanthridine	5.6	BMDL
Naphthalene	7.6	11	Carbazole	4.4	BMDL
zo(b)thiophene	4.0	220	Fluoranthene	4.0	250
noline	4.0	BMDL	Pyrene	4.0	230
Isoquinoline	*	BMDL	Benzo(a)anthracene	4.0	BMDL
Indole	11.6	BMDL	Chrysene/Triphenylene	4.0	BMDL
2-Methylnaphthalene	8.0	BMDL	Benzo(b & k)fluoranthene	4.0	BMDL
1-Methylnaphthalene	4.8	84	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	4.0	220	Benzo(e)pyrene	4.0	BMDL
Acenaphthylene	4.0	450	Benzo(a)pyrene	4.0	BMDL
Acenaphthene	5.2	860	Perylene	4.0	BMDL
Dibenzofuran	8.0	510	3-Methyl cholanthrene	*	BMDL
Fluorene	5.6	900	Indeno(1,2,3-cd)Pyrene	6.8	BMDL
Dibenzothiophene	*	100	Dibenzo(a,h)anthracene	5.6	BMDL
Phenanthrene	4.0	630	Benzo(g,h,i)perylene	4.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =38

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon

REVIEW

Comments:

Engineers
Planners
Economists
Scientists

September 18, 1986

MG156.35

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, WI 53201-2090

RE: Analytical Data For Laboratory No. 8037

Dear Mr. Scrivner

On September 9, 1986 the CH2M Hill Montgomery Laboratory received four water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 8037

Client: Reilly Tar

Address: CH2M Hill, Inc., P.O. Box 2090, Milwaukee, WI 53201-2090

Date Received: 9/9/86 Date Reported: 9/18/86

SAMPLE MATRICES: Water X Soil ____ Sludge ____ Other ____

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles ____ Base/Neutrals ____ Acids ____ Pesticides ____ PCBs ____
2. SDWA Pesticides ____
3. SDWA Herbicides ____
4. Trihalomethanes ____
5. Ethylene Dibromide ____
6. Total Organic Halogen ____
7. Other: PAH, N, and S Heterocyclic Compunds 4 samples

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021, 5100, 4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

____ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

____ Dohrman DX-20 Total Organic Halide System.

____ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedures described in Methods 608, 624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080, 8240, and 8270, Test Methods for Evaluating Solid Waste, 1982.

2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38, No.75, Part II, November 28, 1973.

3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Solid Waste, 1982, SW-846, Second Edition.

4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, Federal Register, Vol. 44, No. 231, Part II, November 29, 1979.

5. Ethylene dibromide: Water samples are analyzed in accordance with procedures outlined in Method 504, Federal Register (50 FR 46902), November 13, 1985.

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TRAVEL BLANK#1, 1030, GRAB

Lab No. :8037-1

Date Sampled :9/8/86

Date Extracted :9/12/86

Date Received :9/9/86

Date Analyzed :9/16/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	2.0	BMDL
2,3-Dihydro-1H-Indene	2.8	7.1	Acridine	3.6	BMDL
1H-Indene	2.0	BMDL	Phenanthridine	2.8	BMDL
N[illegible]hthalene	3.8	58	Carbazole	2.2	BMDL
[illegible]o(b)thiophene	2.0	BMDL	Fluoranthene	2.0	BMDL
[illegible]noline	2.0	4.7	Pyrene	2.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	2.0	BMDL
Indole	5.8	BMDL	Chrysene/Triphenylene	2.0	BMDL
2-Methylnaphthalene	4.0	14	Benzo(b & k)fluoranthene	2.0	BMDL
1-Methylnaphthalene	2.4	7.3	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	2.0	BMDL	Benzo(e)pyrene	2.0	BMDL
Acenaphthylene	2.0	BMDL	Benzo(a)pyrene	2.0	BMDL
Acenaphthene	2.6	BMDL	Perylene	2.0	BMDL
Dibenzofuran	4.0	4.1	3-Methyl cholanthrene	*	BMDL
Fluorene	2.8	3.0	Indeno(1,2,3-cd)Pyrene	3.4	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	2.8	BMDL
Phenanthrene	2.0	BMDL	Benzo(g,h,i)perylene	2.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =58

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon

REVIEW.

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED #2, 1040, GRAB

Lab No. :8037-2

Date Sampled :9/8/86

Date Extracted :9/12/86

Date Received :9/9/86

Date Analyzed :9/16/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	15	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
N[illegible]hthalene	1.9	4.5	Carbazole	1.1	BMDL
[illegible]o(b)thiophene	1.0	1.6	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	2.1	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.3	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.2	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.1	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =67

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - TREATED DUP. #3, 1050, GRAB

Lab No. :8037-3

Date Sampled :9/8/86

Date Extracted :9/12/86

Date Received :9/9/86

Date Analyzed :9/16/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	15	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
N[illegible]hthalene	1.9	5.6	Carbazole	1.1	BMDL
[illegible]o(b)thiophene	1.0	1.8	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	1.7	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	2.3	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	6.4	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	2.3	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	1.6	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =74

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandon

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR - FEED #4, 1100, GRAB

Lab No. :8037-4

Date Sampled :9/8/86

Date Extracted :9/12/86

Date Received :9/9/86

Date Analyzed :9/16/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	4.0	130
2,3-Dihydro-1H-Indene	5.6	710	Acridine	7.2	BMDL
1H-Indene	4.0	40	Phenanthridine	5.6	BMDL
Naphthalene	7.6	17	Carbazole	4.4	BMDL
zo(b)thiophene	4.0	270	Fluoranthene	4.0	250
noline	4.0	BMDL	Pyrene	4.0	240
Isoquinoline	*	BMDL	Benzo(a)anthracene	4.0	7.4
Indole	11.6	BMDL	Chrysene/Triphenylene	4.0	7.8
2-Methylnaphthalene	8.0	BMDL	Benzo(b & k)fluoranthene	4.0	BMDL
1-Methylnaphthalene	4.8	100	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	4.0	240	Benzo(e)pyrene	4.0	BMDL
Acenaphthylene	4.0	490	Benzo(a)pyrene	4.0	BMDL
Acenaphthéne	5.2	900	Perylene	4.0	BMDL
Dibenzofuran	8.0	570	3-Methyl cholanthrene	*	BMDL
Fluorene	5.6	820	Indeno(1,2,3-cd)Pyrene	6.8	BMDL
Dibenzothiophene	*	100	Dibenzo(a,h)anthracene	5.6	BMDL
Phenanthrene	4.0	640	Benzo(g,h,i)perylene	4.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =51

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

Clark Brandar

REVIEW

Comments:

Engineers
Planners
Economists
Scientists

August 25, 1986

MG156.35

Ms. Linda Rogalinski
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, Wisconsin 53201

RE: Analytical Data For Laboratory No. 7867

Dear Ms. Rogalinski:

On July 23 1986 the CH2M HILL Montgomery Laboratory received four water samples with a request for analysis for polynuclear aromatic hydrocarbons at low parts-per-trillion concentrations. Two of the samples bottles were received broken. Therefore, we are submitting results for samples labeled travel blank and treated #1 and 2B only.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR, TRAVEL BLANK

Lab No. :7867-1

Date Sampled :7/22/86

Date Extracted :7/30/86

Date Received :7/23/86

Date Analyzed :8/21/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	BMDL	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	BMDL	Carbazole	1.1	BMDL
[illegible](b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
[illegible]oline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =70

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

H. Cole
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification REILLY TAR, TREATED #1 & 2B

Lab No. :7867-3

Date Sampled :7/22/86
Date Received :7/23/86

Date Extracted :7/30/86
Date Analyzed :8/21/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	BMDL	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
N[illegible]hthalene	1.9	5.5	Carbazole	1.1	BMDL
[illegible]o(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
[illegible]noline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =68

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

H. Cole
REVIEW

Comments:

Engineers
Planners
Economists
Scientists

June 20, 1986

Mr. Allen Scrivner
CH2M HILL, Inc.
P.O. Box 2090
Milwaukee, WI 53201

RE: Analytical Data For Laboratory No.7608

Dear Mr. Scrivner:

On May 27, 1986 the CH2M HILL Montgomery Laboratory received four water samples with a request for analysis of selected organic parameters.

The analytical results and the associated surrogate quality control data are enclosed. No unusual difficulties were encountered during the analysis of these samples.

If you should have any questions concerning the data, please call.

Sincerely,

Harold E. Cole

Harold E. Cole
Manager, Organic Analysis

Enclosures
cc: Craig Vinson

RECEIVED
JUN 24 1986
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT BRANCH

ORGANIC ANALYSIS

SAMPLE INFORMATION

Lab No: 7608

Client: US EPA Reilly Tar Attention: Allen Scrivner

Address: P.O. Box 2090, Milwaukee, WI

Date Received: May 27, 1986 Date Reported: June 20, 1986

SAMPLE MATRICES: Water 4 Soil _____ Sludge _____ Other _____

ANALYSIS REQUESTED:

1. Priority Pollutants: Volatiles _____
   Base/Neutrals _____
   Acids _____
   Pesticides _____
   PCBs _____
2. SDWA Pesticides _____
3. SDWA Herbicides _____
4. Trihalomethanes _____
5. Ethylene Dibromide _____
6. Total Organic Halogen _____
7. Other: PAH

ANALYTICAL INSTRUMENTATION

X Finnigan Models 4021,5100,4510 Gas Chromatographs/Mass Spectrometer/Data Systems equipped with Tekmar's LSC-2, LSC-3, and the 4200 Automatic Heated Sampler Module.

____ Varian Models 3700 and 6000 Gas Chromatographs equipped with flame ionization, electron capture, thermionic specific, flame photometric detectors and autosamplers. State of the art Varian Vista 402 Data System and Hewlett Packard integrators.

____ Dohrman DX-20 Total Organic Halide System.

____ Waters High Pressure Liquid Chromatograph with UV and Fluorescence detectors.

ANALYTICAL METHODOLOGY

1. Priority Pollutants: The water samples are analyzed in accordance with procedure described in Methods 608,624, and 625, EPA-600/4-82-057 (1982). The soil samples are analyzed in accordance with procedures described in Methods 8080,8240,and 8270, *Test Methods for Evaluating Solid Waste*, 1982.

2. Phenoxyacid Herbicides: Samples are analyzed in accordance with procedures outlined in Method 7, Federal Register, Vol.38,NO.75, Part II, November 28, 1973.

3. Total Organic Halides: Samples are analyzed in accordance with procedures outlined in Method 9020, USEPA, Test Methods for Evaluating Soild Waste, 1982, SW-846, Second Edition

4. Trihalomethanes: Samples are analyzed in accordance with procedures described in Method 501.2, USEPA, EMSL/Cincinnati, OH (1979).

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification US EPA REILLY TAR (EFFLUENT #1,GRAB,1:00PM)
Lab No. :7608-1

Date Sampled : 5/23/86
Date Received 5/27/86

Date Extracted :6/3/86
Date Analyzed :6/17/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	BMDL	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.9	Carbazole	1.1	BMDL
nzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
inoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =55

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification US EPA REILLY TAR (EFFLUENT #2,GRAB,1:00PM)
Lab No. :7608-2

Date Sampled : 5/23/86
Date Received 5/27/86

Date Extracted :6/3/86
Date Analyzed :6/18/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	2.1	Acridine	1.8	BMDL
1H-Indene	1.0	BMDL	Phenanthridine	1.4	BMDL
Naphthalene	1.9	3.4	Carbazole	1.1	BMDL
nzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	BMDL
inoline	1.0	BMDL	Pyrene	1.0	BMDL
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =54

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification US EPA REILLY TAR (FEED #3,GRAB,1:00PM)

Lab No. :7608-3

Date Sampled : 5/23/86

Date Extracted :6/3/86

Date Received 5/27/86

Date Analyzed :6/18/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	8.0	24
2,3-Dihydro-1H-Indene	11.2	BMDL	Acridine	14.4	BMDL
1H-Indene	8.0	930	Phenanthridine	11.2	BMDL
Naphthalene	15.2	BMDL	Carbazole	8.8	BMDL
nzo(b)thiophene	8.0	200	Fluoranthene	8.0	360
inoline	8.0	BMDL	Pyrene	8.0	290
Isoquinoline	*	BMDL	Benzo(a)anthracene	8.0	BMDL
Indole	23.2	BMDL	Chrysene/Triphenylene	8.0	BMDL
2-Methylnaphthalene	16.0	BMDL	Benzo(b & k)fluoranthene	8.0	BMDL
1-Methylnaphthalene	9.6	41	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	8.0	300	Benzo(e)pyrene	8.0	BMDL
Acenaphthylene	8.0	210	Benzo(a)pyrene	8.0	BMDL
Acenaphthene	10.4	920	Perylene	8.0	BMDL
Dibenzofuran	16.0	510	3-Methyl cholanthrene	*	BMDL
Fluorene	11.2	740	Indeno(1,2,3-cd)Pyrene	13.6	BMDL
Dibenzothiophene	*	100	Dibenzo(a,h)anthracene	11.2	BMDL
Phenanthrene	8.0	140	Benzo(g,h,i)perylene	8.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =48

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

REVIEW

Comments:

CH2M HILL

A N A L Y T I C A L R E P O R T

PAH, N and S Heterocyclic Compounds

Sample Identification US EPA REILLY TAR (TRAVEL BLANK #4,GRAB,1:00PM)

Lab No. :7608-4

Date Sampled : 5/23/86 Date Extracted :6/3/86

Date Received 5/27/86 Date Analyzed :6/18/86

Compounds	MDL1 ng/l	Conc. ng/l	Compounds	MDL1 ng/l	Conc.2 ng/l
2,3-Benzofuran	*	BMDL	Anthracene	1.0	BMDL
2,3-Dihydro-1H-Indene	1.4	1.8	Acridine	1.8	BMDL
1H-Indene	1.0	1.3	Phenanthridine	1.4	BMDL
Naphthalene	1.9	4.1	Carbazole	1.1	BMDL
nzo(b)thiophene	1.0	BMDL	Fluoranthene	1.0	1.3
inoline	1.0	BMDL	Pyrene	1.0	1.6
Isoquinoline	*	BMDL	Benzo(a)anthracene	1.0	BMDL
Indole	2.9	BMDL	Chrysene/Triphenylene	1.0	BMDL
2-Methylnaphthalene	2.0	BMDL	Benzo(b & k)fluoranthene	1.0	BMDL
1-Methylnaphthalene	1.2	BMDL	7,12-Dimethyl benzo(a)anthracene	*	BMDL
Biphenyl	1.0	BMDL	Benzo(e)pyrene	1.0	BMDL
Acenaphthylene	1.0	BMDL	Benzo(a)pyrene	1.0	BMDL
Acenaphthene	1.3	BMDL	Perylene	1.0	BMDL
Dibenzofuran	2.0	BMDL	3-Methyl cholanthrene	*	BMDL
Fluorene	1.4	BMDL	Indeno(1,2,3-cd)Pyrene	1.7	BMDL
Dibenzothiophene	*	BMDL	Dibenzo(a,h)anthracene	1.4	BMDL
Phenanthrene	1.0	BMDL	Benzo(g,h,i)perylene	1.0	BMDL

Percent Recovery of 1-Fluoronaphthalene =61

1MDL = Method Detection Limit
2BMDL = Below Method Detection Limit
ND = Not Detected
*Detection Limit not determined

W. Dickens
REVIEW

Comments:

10/86
N.

SURROGATE LIMITS
AS PRESENTED FOR THE CITY OF ST. LOUIS PARK, MN

	July 1986	October 1986	All values actual lab 1986 Feb-Nov.
naphthalene-d8	42-102	14-305	8-108
fluorene-d10	60-128	27-238	41-162
chrysene-d12	10-54	13-512	MDL-118

25 data pts.

2

120 data pt

NOTE: these values are presented as the limits proposed in the July QAPP, the October QAPP (representing the limits prescribed in Method 1625 of the U.S. EPA Chemical Analysis Guidelines [40 CFR, Part 136; Federal Register, 26 October 1984, page 43425]), and the calculated values for the ERT surrogate recoveries from February through November 1986, respectively.

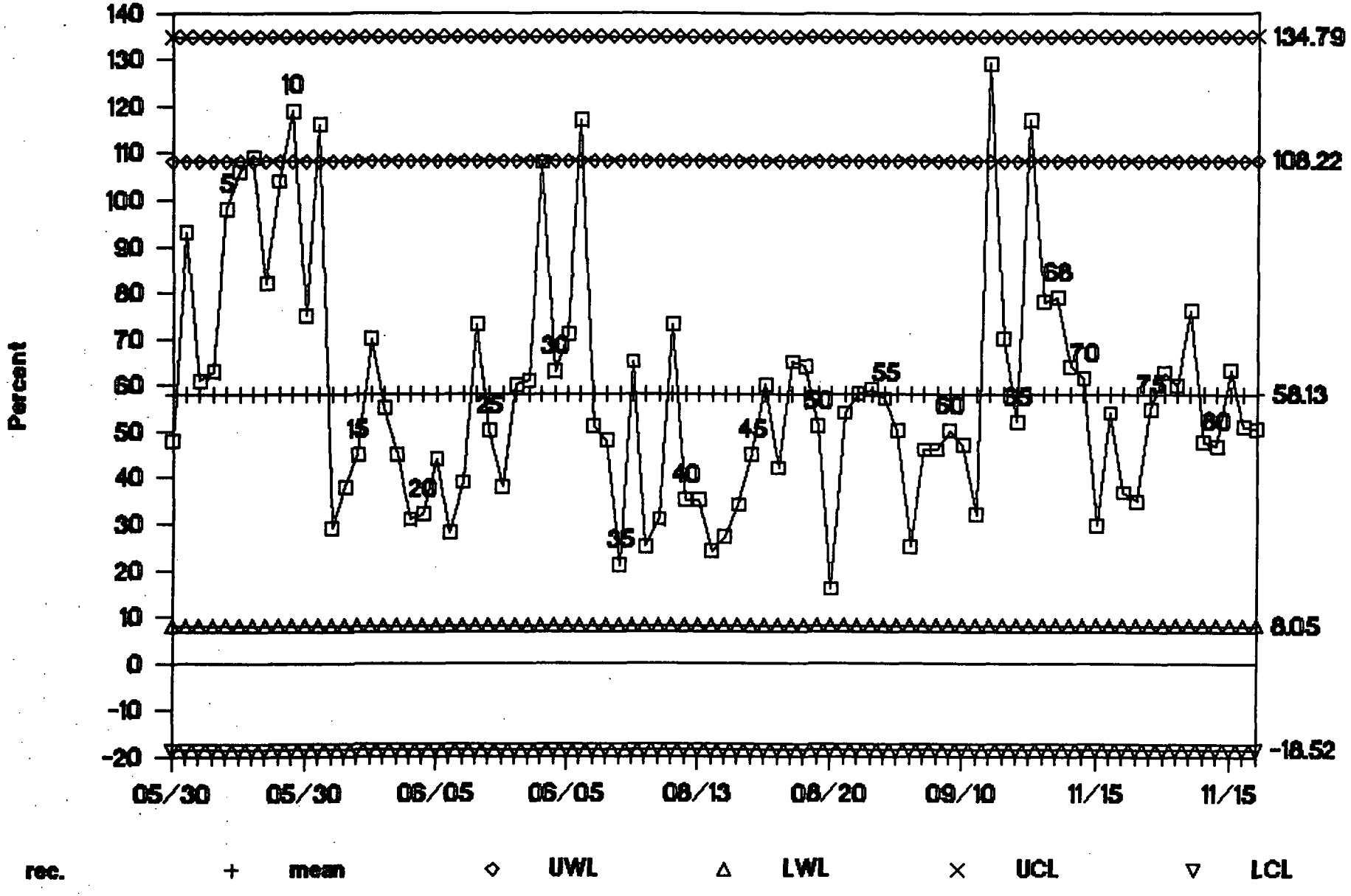
The July 1986 and "All values" ranges are the 95% confidence limits. - 2σ

10-13 118 - chrysene

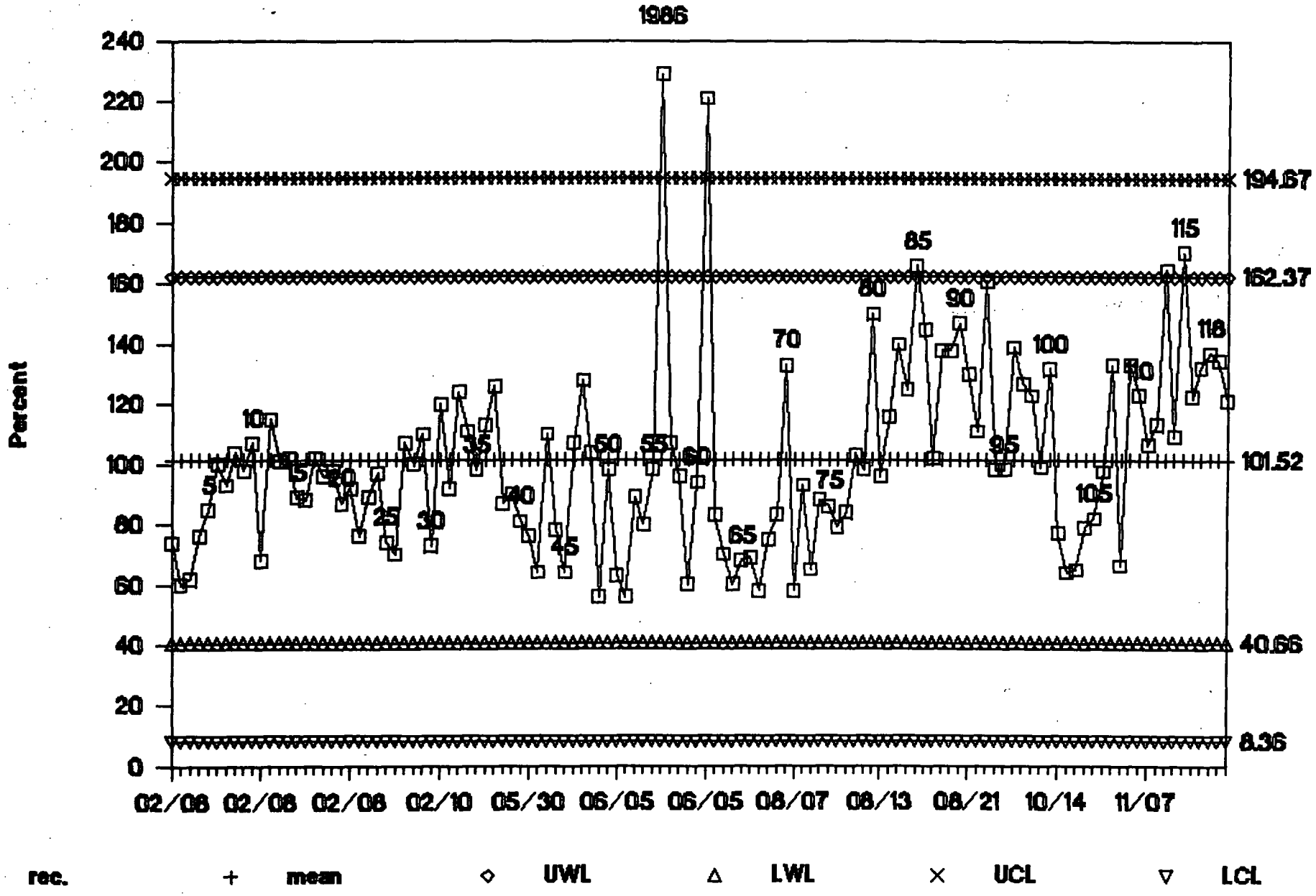
14 - 108
41 - 162
10 - 118

Naphthalene Surrogate Control Chart

1986

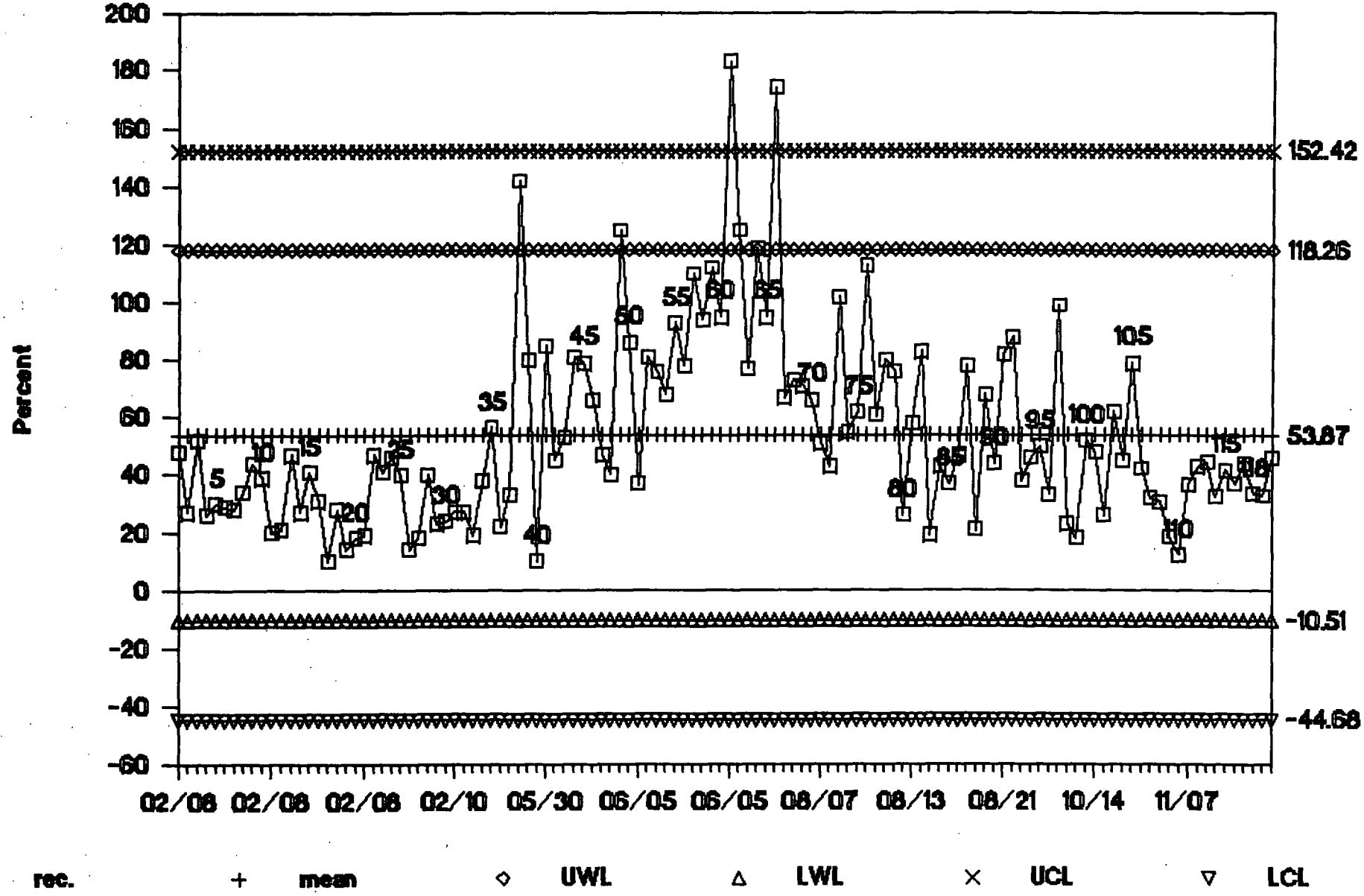


Fluorene Surrogates Control Chart



Chrysene Surrogate Control Chart

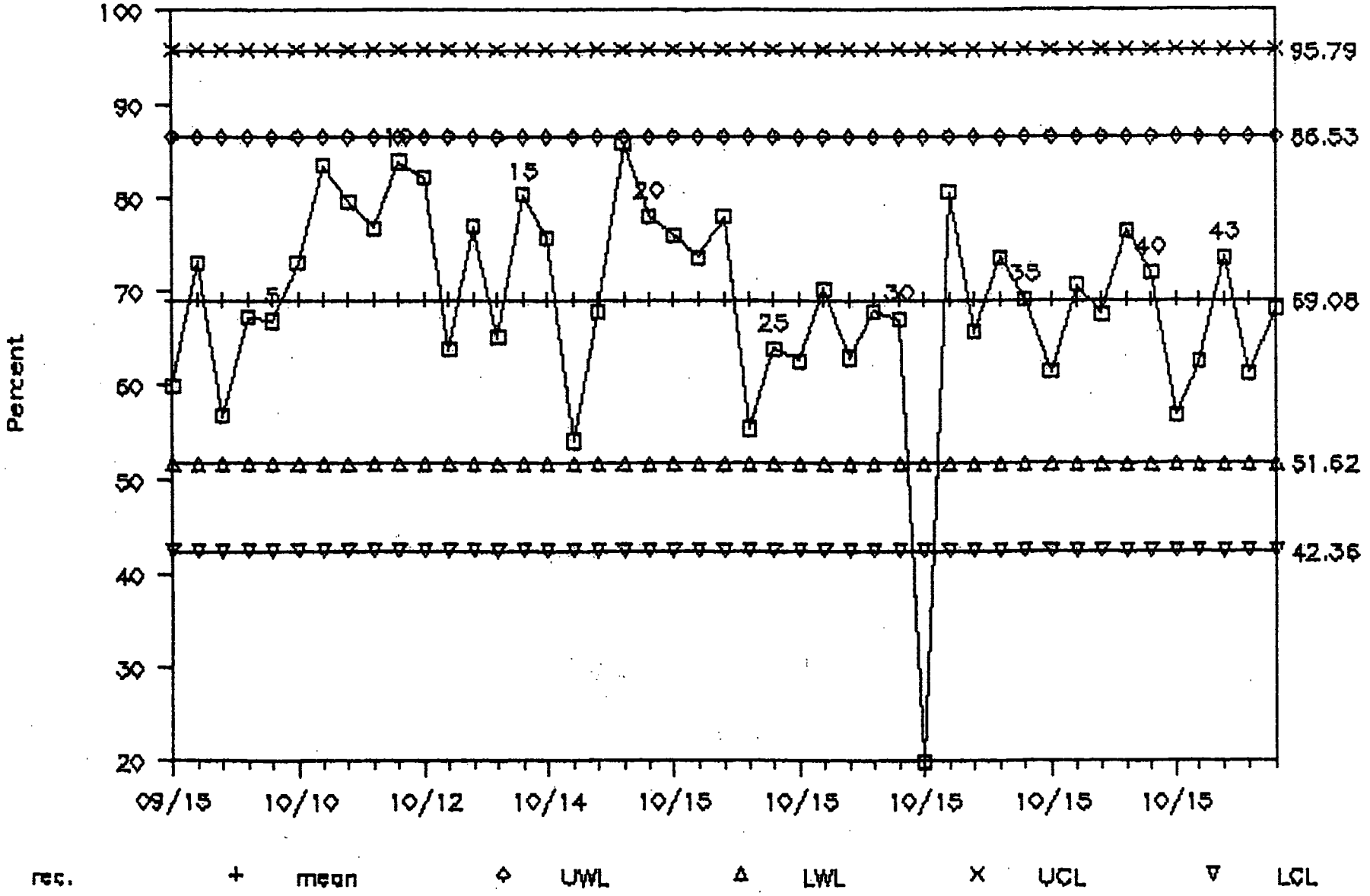
1986



EPA 625 PPb

Fluorobiphenyl Surrogate Control Chart

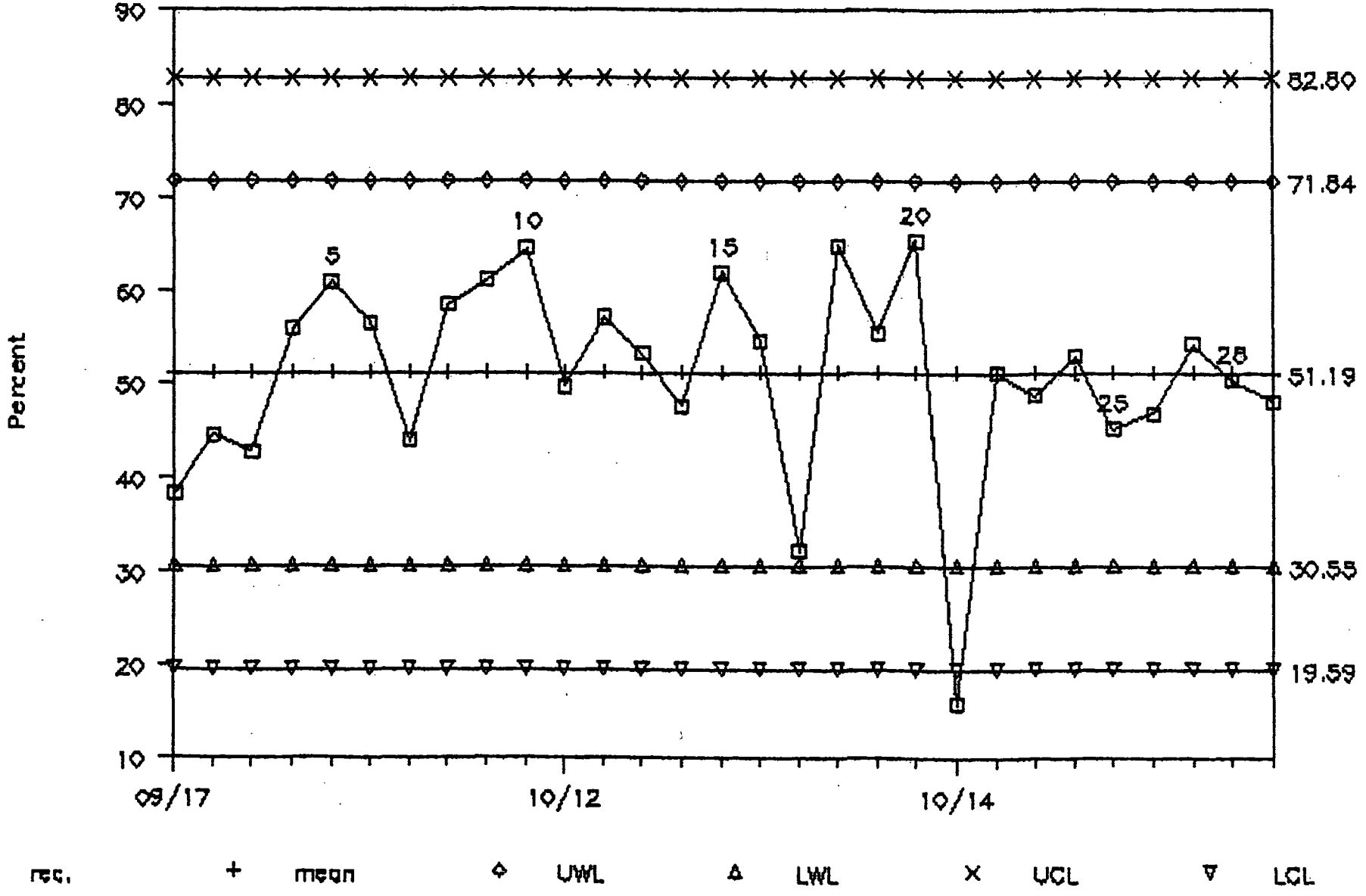
1986



ppb

2—Fluorophenol Surrogate Control Chart

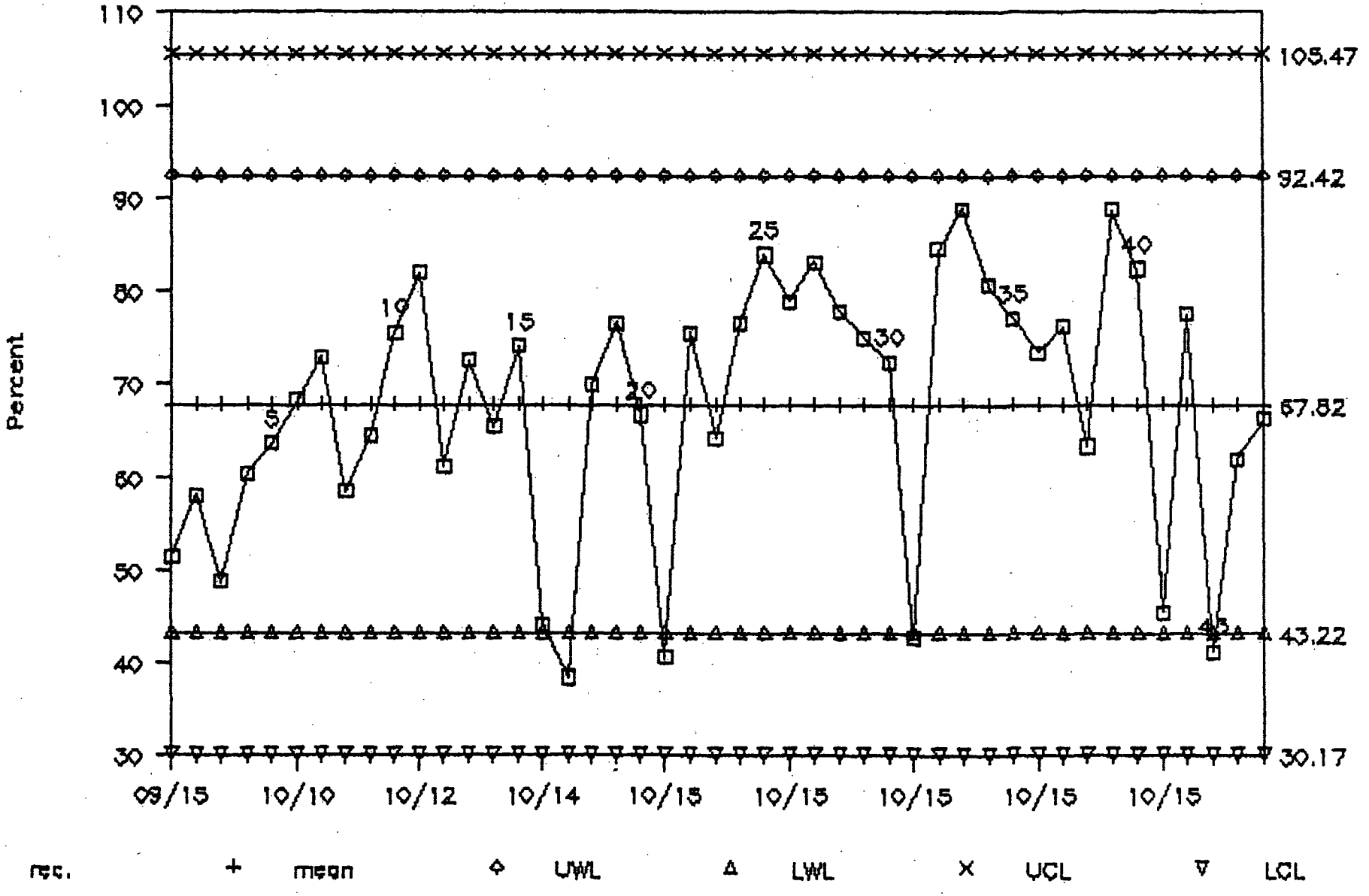
1986



PPD

Nitrobenzene Surrogate Control Chart

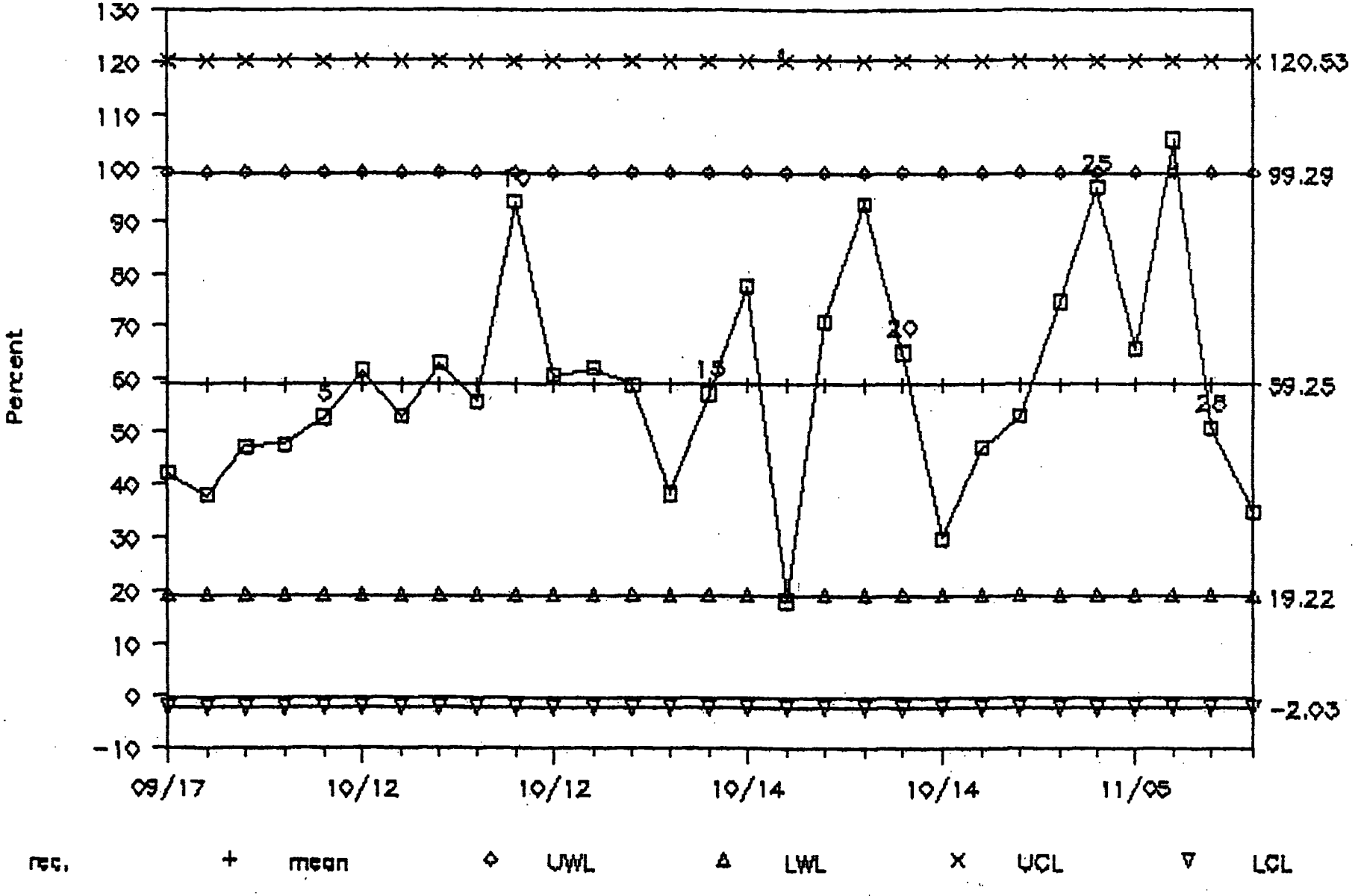
1986



ppb

Tribromophenol Surrogate Control Chart

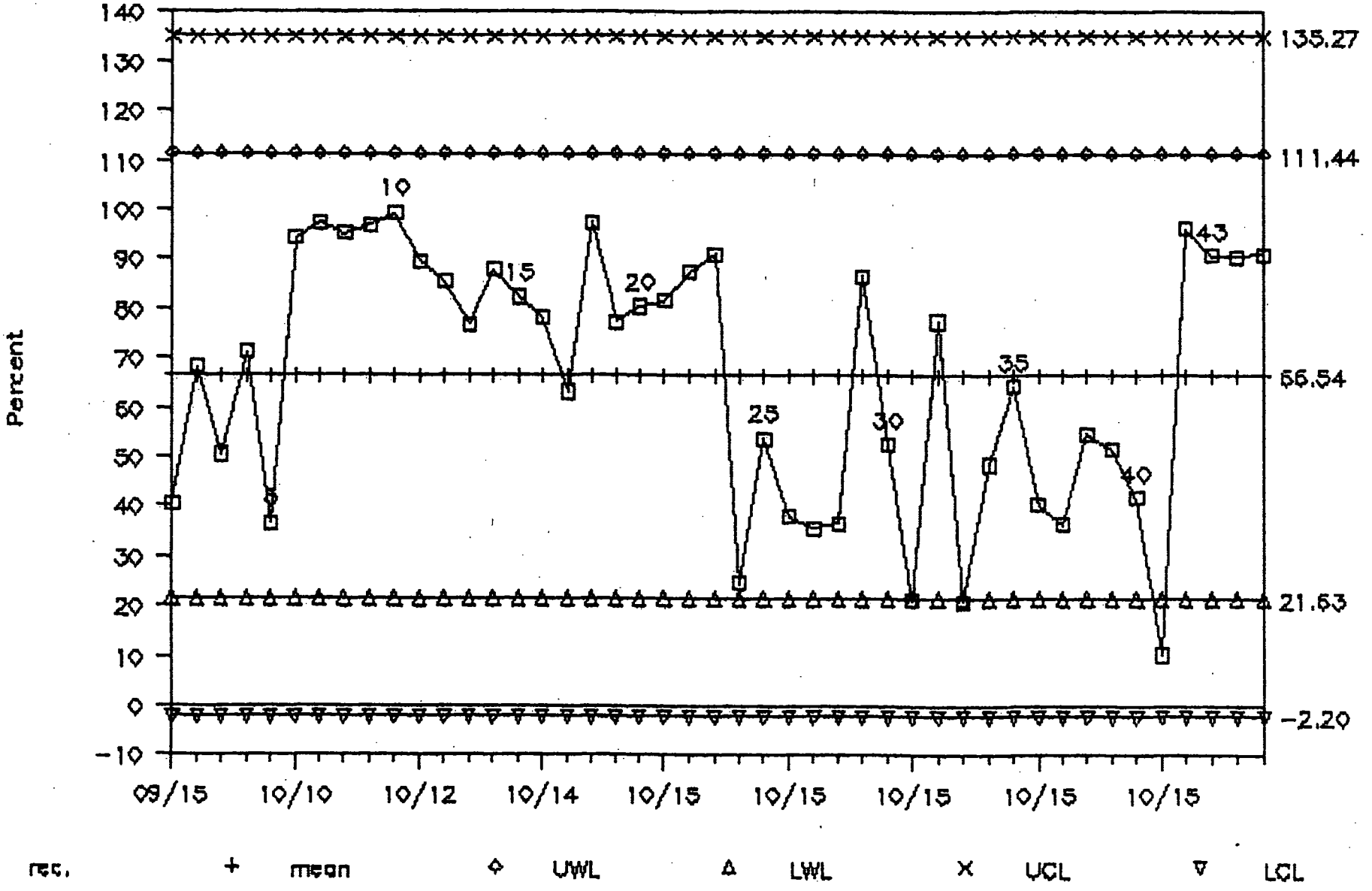
1986



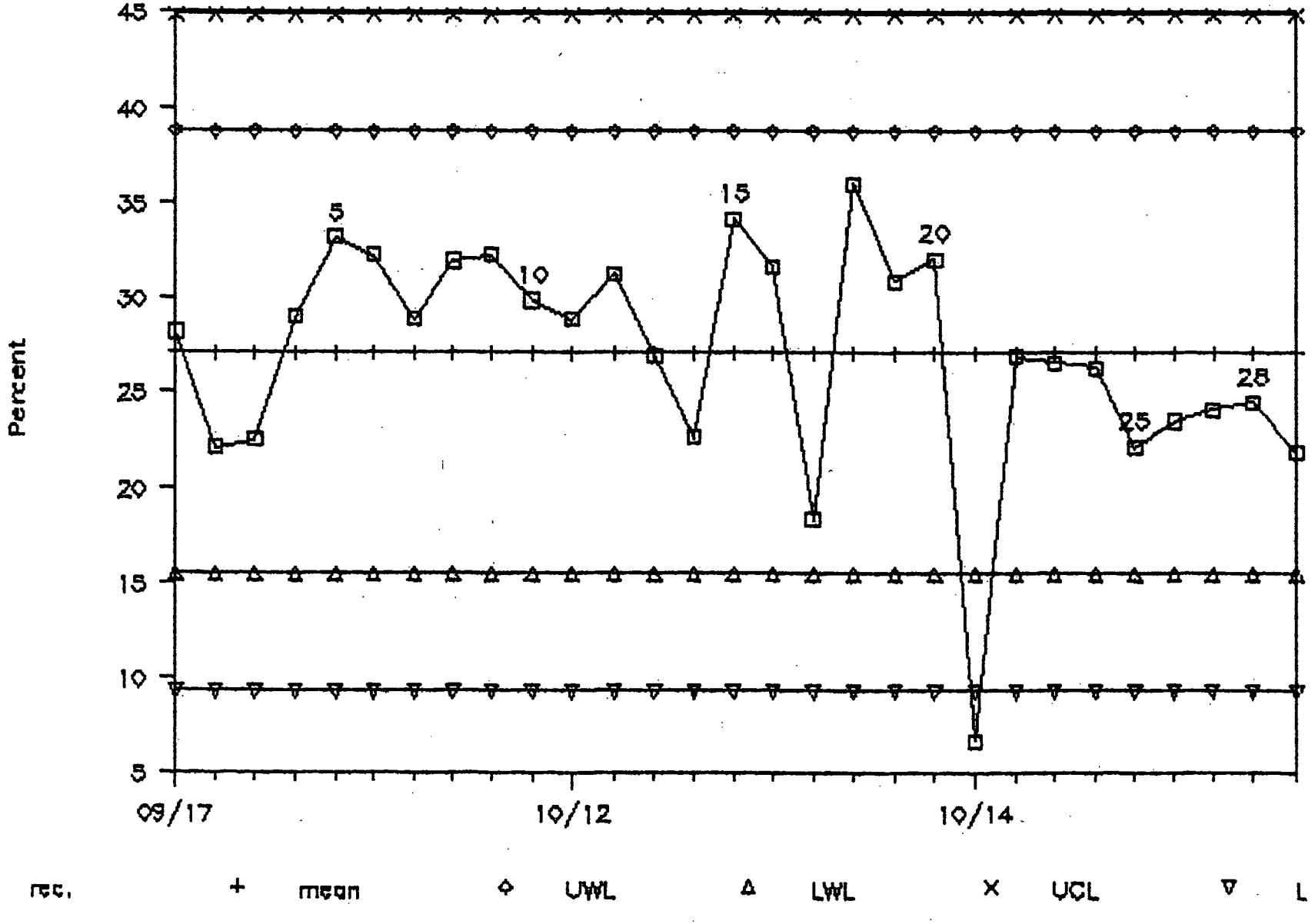
P.Pb

Benzo(a)pyrene Surrogate Control Chart

1986



ppb

Phenol-d5 Surrogate Control Chart

1986