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ANNUAL PERFORMANCE REPORT OF THE GRANULAR ACTIVATED CARBON TREATMENT SYSTEM FOR 1989

REILLY TAR & CHEMICAL CORP. N.P.L. SITE ST. LOUIS PARK, MINNESOTA

SUBMITTED MARCH 15, 1990

CITY

ENSR ——— RMAL

ANNUAL PERFORMANCE REPORT

OF THE

GRANULAR ACTIVATED CARBON TREATMENT SYSTEM

FOR 1989

SUBMITTED TO THE

REGIONAL ADMINISTRATOR
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

EXECUTIVE DIRECTOR
MINNESOTA POLLUTION CONTROL AGENCY
COMMISSIONER
MINNESOTA DEPARTMENT OF HEALTH

BY

THE CITY OF ST. LOUIS PARK, MINNESOTA

PURSUANT TO
CONSENT DECREE - REMEDIAL ACTION PLAN
SECTION 4.3.5.

UNITED STATES OF AMERICA, ET AL.

VS.

REILLY TAR & CHEMICAL CORPORATION, ET AL.

UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA
CIVIL NO. 4-80-469

MARCH 15, 1990

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INTRODUCTION

The Consent Decree in the United States of America, et al. vs. Reilly Tar & Chemical Corporation (now known as Reilly Industries, Inc. -- Reilly), et al. (United States District Court, Minnesota, Civil No. 4-80-469) was signed by Judge Magnuson on September 3, 1986 and entered by the Court on the following day. The Effective Date of the Consent Decree is, therefore, September 4, 1986 (see Part EE of the Consent Decree).

Exhibit A (the Remedial Action Plan RAP) to, and an integral and enforceable part of, the Consent Decree (per Part F thereof) requires the responsible party to report the results of all monitoring of the Granular Activated Carbon (GAC) treatment system during the previous calendar year in accordance with the provisions of Section 4.3.5. therein. By Agreement between the City of St. Louis Park, Minnesota (City) and Reilly (City/Reilly Agreement) (Exhibit B to, and an integral and enforceable part of the Consent Decree, per Part Q thereof, as to the rights and responsibilities between the City and Reilly) the City is responsible for monitoring the treatment system and submitting the results of said monitoring.

HISTORY OF GAC PLANT PREOPERATIONAL ACTIVITIES

Construction

Reilly gave notice to the United States Environmental Protection Agency (USEPA), Minnesota Pollution Control Agency (MPCA), and Minnesota Department of Health (MDH) on December 30, 1985, that construction of the GAC plant was completed on December 12, 1985. During the final stages of construction and inspection of the facility, it was noticed that the approved design allowed for a potential cross-connection between the iron removal filters for municipal wells SLP 10 and SLP 15 and for municipal wells SLP 3 and SLP 11 via the filter backwash effluent system. Backwash piping modifications required to eliminate the potential cross-connection were completed on June 23, 1986.

Testing, Inspection, Approval

Pursuant to submittal, revision, and approval of a proposed test plan, a two week GAC plant test was conducted between February 4 and February 18, 1986. A report of the test results was issued to the USEPA, MPCA, and MDH on April 1, 1986, and pursuant to discussions relative to concerns over certain analytical issues associated with the test, a plan proposing a one week validation test was submitted to the USEPA, MPCA, and MDH. The plan was approved by the Agencies, and the validation test was conducted between May 21 and May 27, 1986. A report of the validation test results was issued to the Agencies on June 13, 1986.

Representatives of the USEPA, MPCA, and MDH inspected the GAC plant on June 25, 1986, and approved the plant in accordance with Section 4.1.6. of the RAP on the same day.

Reilly submitted an Operation and Maintenance Plan for the GAC plant to the USEPA, MPCA, and MDH on March 11, 1986. The Agencies approved the Plan on May 15, 1986, and the plant was placed into operation in July, 1986.

HISTORY OF GAC TREATMENT SYSTEM OPERATIONS - 1989

Operation

The City operated the GAC treatment system in compliance with Section 4.2. of the RAP during 1989, treating 348.5 million gallons of water. The lowest monthly pumping total was 13.2 million gallons (in February), while the highest monthly pumping total was 49.2 million gallons (in December).

Reilly, the City, and Calgon Carbon Corporation (Calgon) conducted a pilot column test during the latter months of 1988 and the first five months of 1989. The objective of the test was to ascertain the cause of the shortened GAC service life and develop a possible means whereby the service life could be extended. Although the test is more completely detailed in the monitoring section and in the test report (attached as Appendix A), the test results appear to indicate that the optimum operational procedure places the system in a full time, non-stop mode. Accordingly, the system has been placed in a continuous operational mode since the carbon was replaced on October 18, 19, and 20, 1989.

As noted above, the carbon filter media was replaced in October, 1989. On September 19, 1989, the City notified the USEPA, MPCA, MDH, and Reilly that the August 29, 1989 monitoring detected levels of Other PAH in the treated effluent in exceedance of the Drinking Water Criterion, indicating that the carbon would be replaced. The treatment system was actually shut down on September 13, 1989 and was not operated until October 12 to October 17, 1989, when the treated effluent was discharged to surface waters. The goal of the October 12 to October 17 pumping was to attain a minimum monthly treatment volume of 10 million gallons.

While greater detail relative to monitoring is provided later in this Report, following is a summary of the monthly pumpage volumes which confirms that the intent of RAP Section 4.2.1. has been met (i.e. a minimum of 200 million gallons must be pumped from SLP 10/15 annually and 10 million gallons must be pumped monthly).

Month	Treated Water Volume (Million Gallons)
January	16.3
February	13.2
March	13.4
April	24.7
May	33.9
June	39.5
July	40.9
August	41.5
September	16.8
SUBTOTAL (PRIOR TO GAC REPLACEMENT)	240.2
October	19.3
November	39.8
December	49.2
SUBTOTAL (AFTER GAC REPLACEMENT)	108.3
TOTAL (ANNUAL PUMPAGE)	348.5

A review of records indicates 302.3 million gallons of water were treated by the system's third carbon load between September, 1988 and September, 1989 (62.1 million gallons in 1988, 240.2 million gallons in 1989). Although significant testing and monitoring was undertaken in 1988 and 1989 to better understand the dynamics of the carbon filter media, the City has noted that from an operational perspective, the treatment system continues to perform well.

Monitoring

The 1989 monitoring program was jointly conducted by the City and Rocky Mountain Analytical Laboratory (RMAL). The City retrieved all samples and RMAL was responsible for analytical services. Laboratory analyses were conducted at the RMAL laboratory in Arvada, Colorado.

1989 began with the City monitoring the performance of the GAC treatment system as it operated pursuant to operational guidelines established and followed in 1986, 1987, and 1988. Concurrently, Reilly, the City, and Calgon (GAC supplier in 1986-1987/1987-1988/1988-1989) conducted a study wherein GAC pilot-scale columns were operated in parallel with the full-scale system pursuant to a proposal submitted by Reilly to the USEPA and MPCA Project Leaders on March 17, 1988. The pilot-scale columns were connected in series to resemble the treatment capability of the full-scale system; however the columns treated feed water in a continuous fashion.

Whereas the full-scale system was monitored on a monthly basis, the pilot-scale system was monitored on a biweekly basis. The comparative monitoring terminated on May 22 when one of the pilot-scale columns inexplicably cracked and broke. Results on the May 1 sampling event indicated levels of Other PAH had become elevated (150-160 parts per trillion - ppt) in the full-scale system, while PAH levels in the lead pilot-column remained low (16.3 ppt). The results of the monitoring appeared to support continuous operation of the full-scale system to achieve greatest treatment system efficiency (see Appendix A - Results of Pilot Column Testing at the St. Louis Park GAC Plant, by Calgon Carbon Corporation, City of St. Louis Park, Reilly Industries).

Based upon the results of the June 29, 1989 monitoring, the City notified the USEPA, MPCA, MDH, and Reilly on September 8, 1989, that it appeared the Advisory Level for Other PAH, established in Section 2.2. of the RAP, had been exceeded and that monitoring of the GAC treatment system effluent had been completed pursuant to the provisions of RAP Section 12.1.1. The September 8 letter also indicated that between the time of RAP Section 12.1.1. sample retrieval and September 8, the City had received the results of

the July 31, 1989 monitoring. The results of the July 31, 1989 monitoring indicated an exceedance of the Drinking Water Criterion for Other PAH established in RAP Section 2.2. had occurred. Accordingly, the letter concluded that monitoring pursuant to the provisions of RAP Section 12.1.2. had been scheduled for September 11, 1989.

On September 19, 1989, the City notified the USEPA, MPCA, MDH, and Reilly that the results of August 29, 1989 monitoring indicated an exceedance of the Drinking Water Criterion for Other PAH had occurred in the GAC effluent. Accordingly, the City indicated it had elected to forego laboratory analyses on samples retrieved pursuant to RAP Sections 12.1.1. and 12.1.2., and had taken the treatment system out of service on September 13, 1989. The carbon filter media was replaced on October 18-20, 1989.

A summary of the January, 1989-August, 1989 monitoring of the full-scale treatment system is provided below:

NOTED: ALL REPORTED CONCENTRATIONS ARE IN PARTS PER TRILLION

	GAC FEED WATER SAMPLES		GAC TREATED WATER SAMPLES		FIELD BLANK/METHOD BLANK	
DATE	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL
1/9/89	4,560	ND	24.2/18.9	ND/ND	48.5/8.0/6.3	ND/ND/ND
2/6/89	6,350	ND	35.8/73.2	ND/ND	70.1/15.5	1.6/ND
3/7/89	9,550	ND	85.7/71.2	ND/ND	59.4/19.0	7.0/1.9
4/4/89	7,265	ND	49.6/67.3	ND/ND	7.5/1.6/9.1	ND/ND/ND
5/1/89	8,798	ND	152.1/158.9	ND/ND	14.9/6.1	ND/ND
6/29/89	NS	NS	189.7/193.4	ND/ND	24.3/9.4	ND/ND
7/31/89	NS	NS	873.7/338.3	ND/ND	9.7/2.4	ND/ND
8/29/89	4,877	ND	442.9/482.8	ND/ND	9.5/3.0	ND/ND

ND - Not Detected
XX/XX - Indicates results of multiple monitoring (except Field Blank/Method Blank)
- For Field Blank/Method Blank monitoring
- Indicates Field Blank/Method Blank results
XX/XX/XX - For Field Blank/Method Blank monitoring
- Indicates Field Blank/Method Blank/Method Blank results
NS - Not Sampled

Pursuant to replacement of the GAC filter media on October 18-20, 1989, the City placed the treatment facility in continuous operation on October 27, 1989. A summary of the results of the only monitoring event of the final quarter of 1989 is offered below:

NOTE: ALL REPORTED CONCENTRATIONS ARE IN PARTS PER TRILLION

	GAC FEED WATER SAMPLES		GAC TREATED WATER SAMPLES		FIELD BLANK/METHOD BLANK	
DATE	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL	OTHER PAH TOTAL	CARCINOGENIC PAH TOTAL
12/13/89	5,230	ND	25.9/ND	1.3/ND	25.1/27.6/ND	ND/1.6/4.2

ND - Not Detected
XX/XX - Indicates results of multiple monitoring (except Field Blank/Method Blank)
XX/XX/XX - For Field Blank/Method Blank monitoring - Indicates Field Blank/Method Blank/Method Blank results

The December 13, 1989 monitoring also included laboratory analysis of the treated water for an extended list of PAH and for acid fraction compounds pursuant to the provisions of Section 4.3.4. of the RAP. No compounds contained in the extended list of PAH were detected, nor were any acid fraction compounds detected.

The results of the fourth quarter, 1989 monitoring indicate the GAC treatment system is operating well with established parameters.

Included with this report are analytical results for 1989 (see Appendix B).

R2/apr89

RESULTS OF PILOT COLUMN TESTING AT THE ST. LOUIS PARK GAC PLANT

Prepared by

Calgon Carbon Corporation

City of St. Louis Park

Reilly Industries, Inc.

October, 1989

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INTRODUCTION

The granular activated carbon (GAC) treatment plant at St. Louis Park wells 10 and 15 started operation on July 9, 1986. The plant has operated successfully since then in terms of producing treated water that meets the specified drinking water criteria of 28 ng/l for carcinogenic PAH and 280 ng/l for other PAH. However, the carbon life and carbon utilization rate have been less than expected. The first carbon load lasted 10 1/2 months with a utilization rate of 0.16 lb PAH per 1000 lb carbon, and the second load lasted 9 1/2 months with a utilization rate of 0.25 lb/1000 lb (see Table 1)*. In contrast, the expected carbon life was greater than two years, with an expected utilization rate in the range of 2 to 3 lb PAH for 1000 lb carbon**.

In order to determine the cause of the shortened carbon life and possible means to improve it, Calgon Carbon Corporation, the City of St. Louis Park and Reilly Industries cooperated in developing and performing a pilot column testing program at the GAC plant. The testing was conducted in accordance with a plan submitted by Reilly on March 17, 1988 ("Plan for Conducting Pilot Column Testing at the St. Louis Park GAC Plant") and approved by the U.S. EPA and MPCA Project Managers on July 26, 1988 (letter from Erin Moran, U.S. EPA and Michael Vennewitz, MPCA, to the President of Reilly Tar & Chemical Corporation). This report presents the results of the pilot testing program, as required by the approved plan.

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* These carbon lives are based on breakthrough relative to the 175 ng/l advisory level. Actual run durations were two to three months longer.

** The background section in Reilly's March 1988 pilot column testing plan provides further details on actual vs. expected carbon lives.

TABLE 1

CARBON PERFORMANCE
DURING THE FIRST TWO LOADS

	FIRST LOAD	SECOND LOAD
Startup date	7/9/86	8/12/87
Date of first breakthrough [a]	5/26/87	5/25/88
No. of days on line	321	286
Total pumpage (millions of gallons) [b]	214	207
Average flow rate (gpm)	463	503
Avg. PAH concentration in feed (ug/l)	3.6 [c]	5.8 [d]
PAH in feed, startup to breakthrough (lbs)	6.4	10.0
Carbon use rate (lb PAH/lb GAC)	0.00016	0.00025

Notes:

(a) Date of samples first showing effluent concentrations greater than the advisory level (175 ng/l).

(b) From City pumpage records.

(c) Average of 7/15/86, 7/30/86, 10/7/86, 3/17/87 and 6/16/87 sample results by ERT and 8/26/86 result by CH2M Hill.

(d) Average of 9/15/87, 1/11/88, and 3/29/88 sample results by ERT; 12/21/87, 3/29/88 and 6/30/88 sample results by CH2M Hill; and 3/29/88 sample results by RMA.

TEST DESCRIPTION

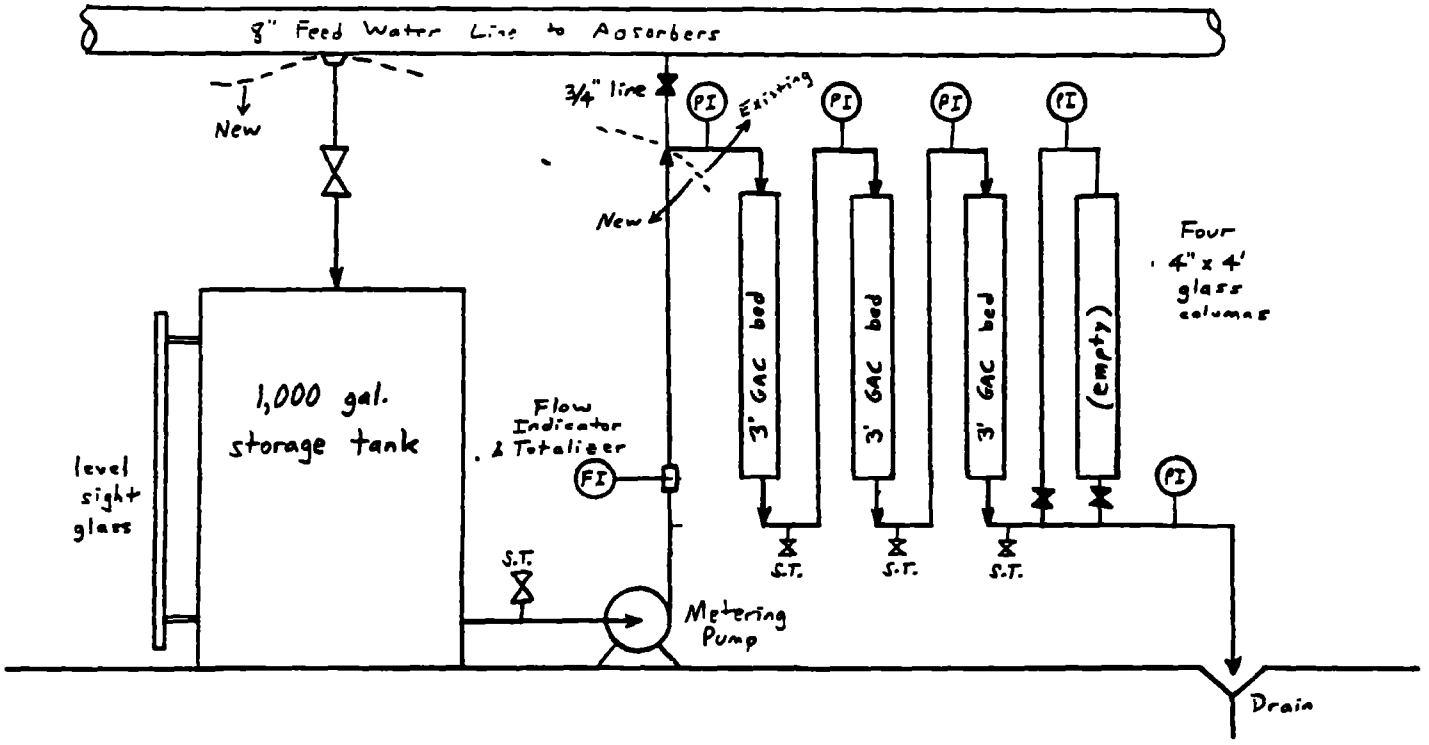
The basic design of the test was to operate the pilot-scale columns at the GAC plant in parallel with the operation of the full-scale columns. Both systems began operation on October 3, 1988 with fresh loads of Calgon Filtrasorb 300 activated carbon. Both systems treated the same feed water (viz., the effluent from the iron removal sand filters). However, the pilot system was operated at a constant feed rate 24 hours a day throughout the test, while the main plant was operated at varying flow rates as the City's water demand required. In particular, the main columns were operated in their historical pattern of full flow (at about 1200 gpm) for part of the day -- until the daily requirement of treated water was satisfied -- and no flow for the balance of the day. The two sytems were operated with these different flow patterns in order to test the effect of flow patterns on carbon life.

In order to operate the pilot columns at a constant flow rate, a 1000-gallon feed water storage tank and a metering pump were installed in the pilot column feed line. These were required because the well pumps were shut down during the daily periods of no flow to the main columns. Figure 1 shows a schematic flow diagram of the pilot column test equipment.

The pilot columns were loaded with Filtrasorb 300 carbon, inspected and tested by a Calgon engineer on September 28, 1988 (see Appendix A). The main columns were loaded with a new charge of Filtrasorb 300 carbon by Calgon on September 28 and 29, 1988. Both systems began operation on October 3, 1988. The pilot columns were shut down on May 22, 1989 when the first column inexplicably cracked and broke. The main columns continued operating through October 12, 1989.

FIGURE 1

SCHEMATIC FLOW DIAGRAM FOR PILOT COLUMN TESTING



The pilot columns were operated by personnel of the St. Louis Park Water Department in conjunction with their normal operating duties, and were inspected daily. The inspection logs for the pilot system are provided in Appendix B. Flow data logs for the main columns are provided in Appendix C.

Both the pilot and main columns were operated without major incident during the test. The pilot columns were backwashed when pressure drops built up (see Appendix B). No backwashing was required for the main columns, which is normal. Some mechanical difficulties were encountered with the pilot column flow meter after a few months, and it was later replaced (see Appendix B). Some fouling of the top portion of the first pilot column (probably from iron bacteria) was observed early in the test, but this did not progress further and had no apparent adverse effects.

Samples of the effluent from the first pilot column were collected at two-week intervals throughout the test. The feed water and main column effluent were sampled monthly throughout the test. The second and third pilot columns were sampled at irregular intervals. Field blanks were collected with each major sampling round. All samples were analyzed for PAH at the ng/l level by Enseco in accordance with the methods specified in the City's Sampling and Analysis Plan. Most samples were also analyzed for TOC by Enseco using EPA Method 415.1. All analytical reports are provided in Appendix D, arranged chronologically. The sampling program generally followed that outlined in the approved test plan, although some adjustments were made because of the longer than expected test duration.

TEST RESULTS

Table 2 summarizes the flow rate data for the pilot and main columns during the test. The pilot columns operated at an average flow rate of 0.44 gpm, with very little variation. This corresponds to a hydraulic loading rate of 5.1 gpm/ft^2 for the 4-inch diameter columns. The main columns operated at rates ranging from 9 million to 40 million gallons per month, corresponding to monthly average flow rates of from 200 to 1000 gpm. The average flow rate was 526 gpm, which corresponds to an average hydraulic loading rate of 3.35 gpm/ft^2 for the two 10-foot columns in parallel. However, the main columns actually operated by cycling between a flow rate near 1200 gpm (7.64 gpm/ft^2 hydraulic loading rate) and no flow. The variations in flow rates for the main GAC plant followed the expected pattern of low rates in the winter and high rates in the summer.

Table 3 summarizes the results of the PAH analyses for all samples collected. The most noteworthy aspects of these results are 1) that there was no sign of PAH breakthrough from the first pilot column after 231 days of operation and 2) that the main columns showed breakthrough after 269 days (where breakthrough is defined as exceeding the advisory level of 175 ng/l for other PAH). The average PAH concentration in the feed water was about 5,600 ng/l, with some indication of increasing PAH concentrations with higher pumping rates in the spring. There were sporadic indications of elevated PAH concentrations (>100 ng/l) in the pilot column effluents near the start of the test. These were not seen later in the test, however, and may have reflected initial equilibration of the system. Except for the initial samples, the effluents from the second and third pilot columns showed no signs of PAH breakthrough (compare column 2 and 3 effluents with field and method blank results

TABLE 2

Summary of Flow Rate Data

	Pilot Columns		Main Plant	
Month	Monthly pumpage, gallons	Average Monthly Flow Rate, gpm	Monthly Pumpage, gallons	Average Monthly Flow Rate, gpm
Oct. 1988	17,901	0.44	40,330,200	1,000
Nov.	18,971	0.44	12,846,300	297
Dec.	19,514	0.44	9,021,000	202
Jan. 1989	18,700(a)	0.42	16,296,600	365
Feb.	18,100(b)	0.45	13,156,000	326
March	20,100(c)	0.45	13,435,900	301
April	18,600(d)	0.43	24,675,800	571
May	8,387(e)	0.42(e)	33,885,200	759
June	0	0.00	39,471,200	914
Total	140,300	0.44(f)	203,118,200	526(g)

(a) Estimate - Flowmeter out of service for eight days

(b) Estimate - Flowmeter out of service for 17 days. Physical check of rate gave 0.45 gpm.

(c) Estimate - Flowmeter out of service all month. Daily physical checks gave 0.45 gpm.

(d) Estimate - Flowmeter replaced 4/5 and worked rest of month.

(e) Through May 22, when the first pilot column broke.

(f) Corresponds to hydraulic loading rate of 5.1 gpm/ft^2 for the three 4-inch diameter columns in series.

(g) Corresponds to hydraulic loading rate of 3.35 gpm/ft^2, with monthly range of 1.3 to 6.4 gpm/ft^2, for the two 10-foot diameter columns in parallel.

TOTAL PAH CONCENTRATIONS, ng/l (a,b,c)

DATE	TEST DAY NO.	FEED	MAIN PLANT EFFL.	COLUMN 1 EFFLUENT	COLUMN 2 EFFLUENT	COLUMN 3 EFFLUENT	FIELD BLANK(s)	METHOD BLANK(s)
10/17/88	14	3,640	15.6/14.4	92.8			34.7/41.4	7.7
10/17/88(d)	14	6,041(e)		186.0				7.9(f)
10/31/88	28			18.7/19.5			17.7	9.5
10/31/88(d)	28			16.4(g)				8.6
11/14/88	42	2,018	30.9/28.6(h)	105.8(i)	258.5(j)		62.4(i)	13.5
11/28/88	56			42.2(k)	33.5(l)	204.2/13.1(m)	23.3(k)	19.9
12/12/88	70	2,343	24.2/19.9	45.7	9.8	20.1	37.3	6.0
12/27/88	85			26.7				15.9
1/9/89	98	4,560	24.2/18.9	ND(n)	470(o)	16.3	48.5	8.0/6.3
1/23/89	112			41.7/27.9(p)				30.2/12.1
2/6/89	126	6,350	35.8/73.2	57.0			71.7(q)	15.5
2/21/89	141			72.8(r)				12.3
3/7/89	155	9,550	85.7/71.2	32.5	20.7(s)	12.5(t)	66.4(u)	20.9(v)
3/20/89	168			46.1				12.5
4/4/89	183	7,265	49.6/67.3	36.2	4.7	2.4	7.5	1.6/9.1
4/17/89	196			67.4				12.1
5/1/89	210	8,798	152.1/158.9	16.3			14.9	6.1
5/22/89	231			65.7				25.7
6/29/89	269		189.7/193.4				24.3	9.4
7/31/89	301		873.7/338.3					
8/29/89	330	4,877	442.9/482.8				9.5	3.0

Notes to Table 3

(a) Total PAH concentrations equal noncarcinogenic PAH concentrations (i.e, no detectable carcinogenic PAH) unless otherwise noted.

(b) All analyses by Enseco's Rocky Mountain Analytical Laboratory unless otherwise noted.

(c) x/x indicates results from analyses of duplicate samples.

(d) Results of split samples analyses by ENSR's Wilmington, MA laboratory.

(e) Includes 44 ng/l carcinogenic PAH (quinoline, benz(a)anthracene and chrysene).

(f) Includes 1.4 ng/l carcinogenic PAH (benzofluoranthenes).

(g) Includes 1.3 ng/l carcinogenic PAH (indeno (1,2,3-cd) pyrene and dibenz(a,h) anthracene).

(h) Include 1.0/0.4 ng/l quinoline.

(i) Includes 0.9 ng/l quinoline.

(j) Average of two analyses of a single sample.

(k) Includes 0.8 ng/l quinoline.

(l) Includes 0.7 ng/l quinoline.

(m) First result is for column 3 effluent as reported; second result is for the matrix spike sample prepared from column 3 effluent water (excluding the results from spiked compounds).

(n) None detected, but detection limits were unduly high at about 100-200 ng/l per compound.

(o) Comprised solely of naphthalene. Detection limits were unduly high at about 100-200 ng/l per compound.

(p) Include 0/0.4 ng/l carcinogenic PAH (chrysene).

(q) Includes 1.6 ng/l quinoline.

(r) Includes 2.1 ng/l carcinogenic PAH (quinoline and chrysene).

(s) Includes 3.0 ng/l quinoline.

(t) Includes 1.6 ng/l quinoline.

(u) Includes 7.0 ng/l quinoline.

(v) Includes 1.9 ng/l quinoline.

for test days 70, 155 and 183). Finally, it should be noted that total PAH concentrations generally reflected the detection only of other PAH; carcinogenic PAH were detected in only a few samples at very low ng/l levels (see footnotes to Table 3).

Table 4 summarizes the results of all of the TOC analyses performed. The data show considerable scatter and no clear temporal trend. The average results indicate about 50% removal of TOC in the main columns (from 1.7 to 0.9 mg/l). The pilot column results indicate no removal in the first column (1.7 mg/l average effluent), while the effluents from the second two columns were comparable to that of the main plant.

The flow rate and PAH data from Tables 2 and 3 allow carbon utilization rates to be calculated and compared for the pilot and main columns. The main plant showed breakthrough (compared to the 175 ng/l advisory level) at day 269 after treating 202 million gallons of water with an average PAH concentration of 5.6 ug/l*. Since the two columns each contain 20,000 lbs of carbon, this translates to a utilization rate of 0.24 lb PAH per 1000 lb carbon. This is comparable to the utilization rates observed for the first two carbon loads (see Table 1). In contrast, the first pilot column showed no sign of breakthrough after treating 140,000 gallons of water. This column contained about 7.2 lbs of carbon (see Appendix A), so the utilization rate at breakthrough would be greater than 0.91 lb/1000 lb. This is about four times greater than the rate observed for the main plant. Since breakthrough was never seen at the first column, it is possible that the carbon utilization

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* To be precise, this should be a flow-weighted average. It turns out that a flow-weighted average, where the monthly feed analysis result is weighted by the total pumpage for that month, is also 5.6 ug/l.

TAB

TOC CONCENTRATIONS, mg/l

DATE	TEST DAY NO.	FEED	MAIN PLANT EFFL.	COLUMN 1 EFFLUENT	COLUMN 2 EFFLUENT	COLUMN 3 EFFLUENT
10/17/88	14	0.8	0.8	1.0		
10/31/88	28					
11/14/88	42					
11/28/88	56			1.5	0.6	0.5
12/12/88	70	1.9	0.8	1.4	0.7	±.3
12/27/88	85			1.3		
1/9/89	98	1.7	0.8	1.4	0.9	0.8
1/23/89	112			1.5		
2/6/89	126	1.6	1.0	1.4		
2/21/89	141			1.9		
3/7/89	155	2.3	1.6	2.0	1.9	1.7
3/20/89	168			3.2		
4/4/89	183	1.5	0.7	1.6	1.2	0.9
4/17/89	196			1.5		
5/1/89	210	1.8	0.7	1.4		
5/22/89	231			2.4		
Averages		1.7	0.9	1.7	1.1	1.0

rate was greater than 0.91 lb/1000 lb.

The substantially greater carbon utilization rate in the pilot system must be attributed to the different flow rate patterns in the operation of the two systems, viz., the constant flow rate in the pilot system versus the daily on/off cycle in the main plant. In all other aspects the two systems operated similarly -- treating the same water, achieving similar TOC removals and operating at comparable hydraulic loading rates.

The adverse consequences of repeated on/off cycling on carbon utilization are consistent with adsorption theory. With constant flow rates, a mass transfer zone is established in the carbon bed and progresses steadily down the length of the bed as the carbon's adsorptive capacity is exhausted. The top of the mass transfer zone is defined by the point at which the carbon's adsorptive capacity is exhausted, and the bottom is defined by the point at which no adsorptive capacity has been used. Breakthrough occurs when the front end of the mass transfer zone reaches the bottom of the bed. (Only the initial toe of the mass transfer zone has to reach the bottom since breakthrough in this case is defined as only a small portion of the feed concentration -- viz., 175 vs. 5600 ng/l). With repeated on/off cycling, the mass transfer zone is disturbed every time the flow is stopped. Under stagnant conditions, PAH compounds -- especially the more soluble, lower molecular weight compounds -- begin to desorb and migrate down the column before re-adsorbing and re-equilibrating. (This effect would eventually lead to uniform PAH loadings throughout the bed). When flow is resumed, the original equilibrium adsorption front is re-established. However, the PAH that migrated lower in the bed under no-flow conditions

now equilibrate to contaminant-free water, which produces further desorption and broadening of the front of the mass transfer zone. The net result is that the mass transfer zone is lengthened a little bit every time the flow is stopped. When this is repeated every day, the lengthening becomes substantial and the initial toe of the mass transfer zone reaches the bottom of the bed much faster. In addition the adsorption capacity of the carbon is not used efficiently. The different progressions of the mass transfer zones when operating at a steady flow versus cyclic on/off flow are illustrated schematically in Figure 2.

CONCLUSIONS AND RECOMMENDATIONS

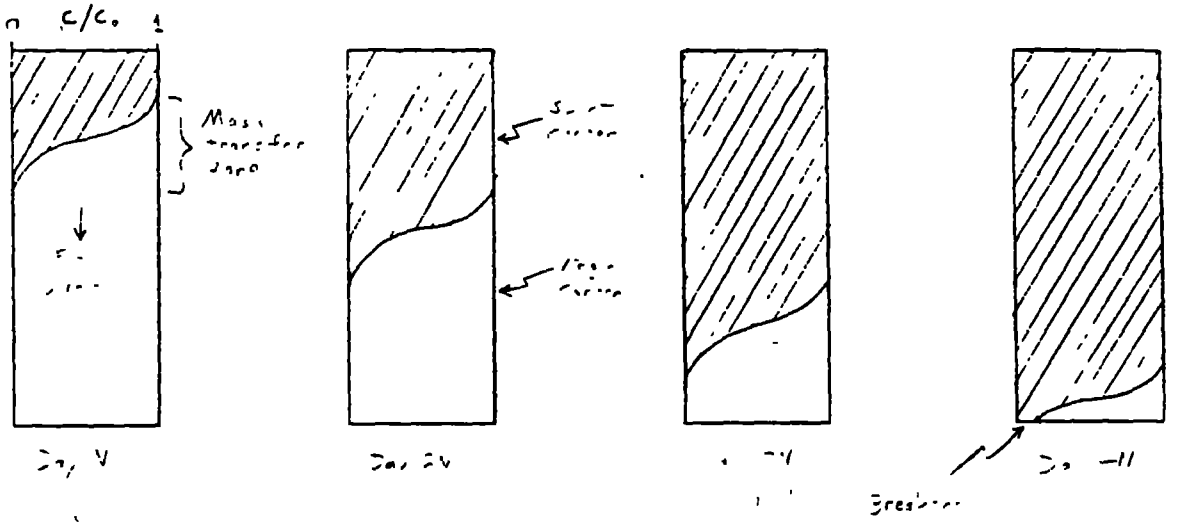
The pilot testing program conducted at the St. Louis Park GAC plant from October 1988 through May 1989 was successful in identifying the cause of shorter than expected carbon lives experienced in operating the GAC plant since July 1986. The pilot columns achieved a carbon utilization rate greater than 0.91 lb PAH/1000 lb carbon (how much greater is unknown, since the test had to be concluded before breakthrough occured). The main GAC plant achieved a utilization rate of 0.24 lb/1000 lb, which is comparable to those observed during previous carbon loads (0.16 and 0.25 lb/1000 lb). The substantially higher utilization rate achieved in the pilot columns is attributable to the different operating patterns between the two systems. The pilot columns were operated at a constant flow rate throughout the test (24 hours a day, 7 days a week), while the main columns were cycled on and off. The main plant was run at design capacity for a portion of each day (for however long required to meet the day's demand), and then shut down for the rest of the day. This has been the standard operating

Figure 2

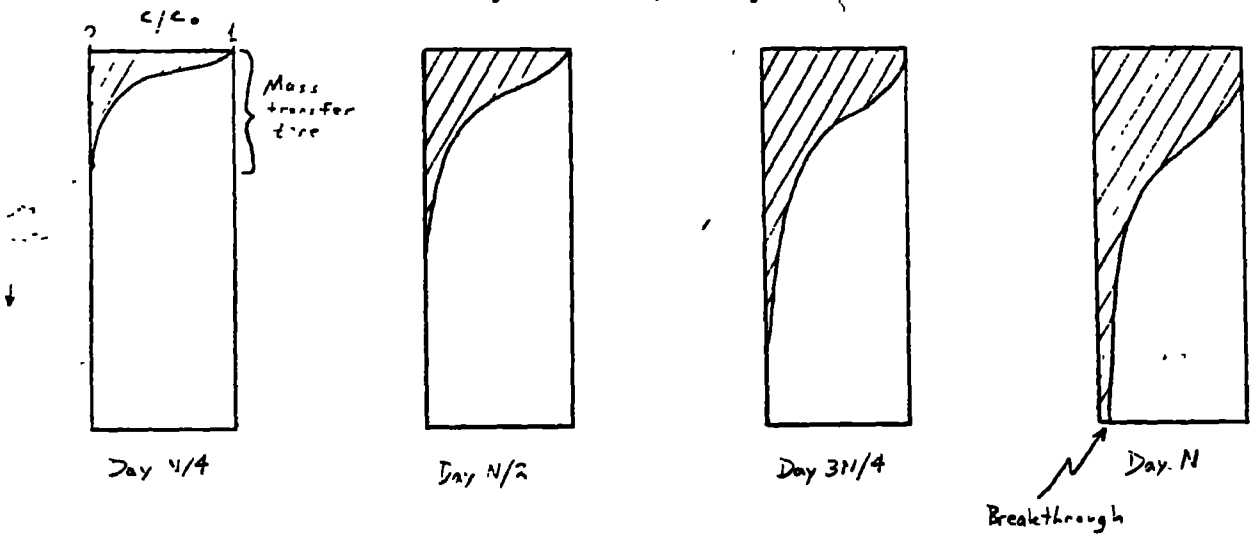
Schematic Representation Of

Different Carbon Adsorption Profiles

Constant Flow Rate Operation:



Cyclical On/Off Operations:



practice at the GAC plant since it began operation. This on/off cycling gradually lengthens the mass transfer zone in the carbon bed, which results in premature breakthrough and inefficient use of the carbon's adsorption capacity.

The clear recommendation resulting from this test program is that if the City of St. Louis Park wants to achieve substantially better carbon utilization and longer carbon lives, then it should operate the GAC plant (and hence wells 10 and 15) continuously at a relatively constant rate (which may vary seasonally). Changing the plant operation to a continuous mode (round the clock, day-in, day-out) should increase the carbon life by about a factor of four. The benefits of such a change on carbon utilization will have to be balanced, however, against the other constraints that the City faces in operating its water supply system. In this context, it is noteworthy that a recent report by an engineering consultant to the City recommended -- based on economic and operational considerations independent of the carbon plant -- that wells 10 and 15 should be operated continuously (Triangle Engineering, Inc., Load Management Study, March 1989).

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

February 9, 1989

Enseco - RMAL Project Number 003277

Introduction

Six aqueous samples were received at Rocky Mountain Analytical Laboratory on January 10, 1989. The samples were logged in under RMAL project number 003277. Sample GAC-SLP15FBD-010989 was extracted and held per the 1989 QAPP. This sample is a field blank duplicate. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. All samples were analyzed for part-per-trillion (ppt) polynuclear aromatic hydrocarbons.

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below per the 1989 QAPP.

PPT PAH

Samples 3277-01, 02, 03, Blk 1/11 and Blk 1/23 showed compounds out of control limits for secondary ion confirmation. In some instances a compound may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I).

During the extraction of sample 3277-03MS, the spiked compounds were inadvertantly added at twice the required concentration. The sample was reextracted and reanalyzed using corrected concentrations, however, the reextraction took place outside of holding times. Since the original extraction took place within the holding time it has been included in the data package. All spike recoveries are within control limits.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 2/9/89
Tracy Giberson
Data Control Supervisor

Approved by: Rebecca A. Williams **Date:** 2/9/89
Rebecca Williams
Client Service Representative

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003277-0001-SA	GAC-SLP15C3-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003277-0002-SA	GAC-SLP15FB-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003277-0002-DU	GAC-SLP15FBD-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003277-0003-SA	GAC-SLP15T-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003277-0003-DU	GAC-SLP15TD-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003277-0003-MS	GAC-SLP15MS-010989	AQUEOUS	09 JAN 89	13:00	10 JAN 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC # 3277

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X282

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.8	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	5.1	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	3.4	B
90-12-0	1-Methylnaphthalene	1.8	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.5	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.7	B *
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.0	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X283

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	4.6	
95-13-6	1H-Indene	1.4	
91-20-3	Naphthalene	12.	B *
4565-32-6	Benzo(B)Thiophene	1.0	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	11.	B *
90-12-0	1-Methylnaphthalene	6.4	B
92-52-4	Biphenyl	1.9	J
208-96-8	Acenaphthylene	1.1	J
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	2.4	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	5.0	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.7	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X284

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	8.8	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.1	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.4	B *
90-12-0	1-Methylnaphthalene	1.3	J B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	
83-32-9	Acenaphthene	2.8	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.6	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.6	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.2	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-03DUP

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-03DUP

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X286

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	5.3	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	4.7	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.3	B
90-12-0	1-Methylnaphthalene	1.3	J B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.8	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.1	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.4	J
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.0	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-03MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-03MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X285

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	5.5	
95-13-6	1H-Indene	15.	SP
91-20-3	Naphthalene	19.	B SP
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	24.	SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	20.	B SP
90-12-0	1-Methylnaphthalene	1.8	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.0	J
83-32-9	Acenaphthene	1.6	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	22.	SP
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.6	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.2	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	16.	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	4.1	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3277-03MS RE

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3277-03MS RE

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X327

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/23/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/26/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	13.	
95-13-6	1H-Indene	7.3	SP
91-20-3	Naphthalene	8.8	B SP
4565-32-6	Benzo(B)Thiophene	1.1	
91-22-5	Quinoline	9.9	SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	8.9	B SP
90-12-0	1-Methylnaphthalene	1.4	J
92-52-4	Biphenyl	1.7	J
208-96-8	Acenaphthylene	2.6	
83-32-9	Acenaphthene	4.5	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	11.	SP
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.2	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	11.	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	4.1	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 2314 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	3277-01	39	62	36
2	3277-02	52	44 #	48
3	3277-03	41	84	41
4	3277-03DUP	38	78	38
5	3277-03MS	38	49	36
6	3277-03MS RE	70	80	92
7	BLK-01	37	52	50
8	BLK-02	65	70 #	78

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

= Quantitation of the secondary ion used to measure the recovery of D10-Fluorene as per the 1989 QAPP

* Values outside of contract required QC limits

D Surrogates diluted out

FORM II SV-1 1/87 Rev.

3C
WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 3277-03

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	20	0.0	15.	75
Naphthalene	20	3.1	19.	80
Quinolene	20	0.0	24.	120
2-Methylnaphthalene	20	2.4	20.	88
Fluorene	20	1.6	22.	102
Chrysene	20	0.0	16.	80
Benzo(E)Pyrene	20	0.0	4.1	20

COMMENTS: from 1/11/89 extraction

3C
WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 3277-03

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	0.0	7.3	73
Naphthalene	10	3.1	8.8	58
Quinolene	10	0.0	9.9	99
2-Methylnaphthalene	10	2.4	8.9	63
Fluorene	10	1.6	11.	97
Chrysene	10	0.0	11.	106
Benzo(E)Pyrene	10	0.0	4.1	41

COMMENTS: From 1/23/89 extraction

3C
WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

EPA Sample No.: 3277-03

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Dihydroindene	8.8	5.3	50
Naphthalene	3.1	4.7	41
2-Methylnaphthalene	2.4	2.3	4
1-Methylnaphthalene	1.3	1.3	0
Acenaphthene	2.8	1.8	43
Phenanthrene	1.6	1.1	37
Pyrene	1.2	1.0	18

COMMENTS:

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Lab File ID: S3277X281 Lab Sample ID: BLK-01

Date Extracted: 01/11/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 01/18/89 Time Analyzed: 12:40

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3277-01	3277-01	S3277X282	01/18/89
2	3277-02	3277-02	S3277X283	01/18/89
3	3277-03	3277-03	S3277X284	01/18/89
4	3277-03DUP	3277-03DUP	S3277X286	01/18/89
	3277-03MS	3277-03MS	S3277X285	01/18/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X281

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	1.4	U	
95-13-6	1H-Indene	0.9	U	
91-20-3	Naphthalene	2.6	J	*
4565-32-6	Benzo(B)Thiophene	0.9	U	
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	2.5	U	
91-57-6	2-Methylnaphthalene	2.7		
90-12-0	1-Methylnaphthalene	1.4	J	
92-52-4	Biphenyl	4.3	U	
208-96-8	Acenaphthylene	1.4	U	
83-32-9	Acenaphthene	1.3	U	
132-64-9	Dibenzofuran	1.0	U	
86-73-7	Fluorene	1.0	U	
132-65-0	Dibenzothiophene	1.1	U	
85-01-8	Phenanthrene	1.3		*
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9	U	
206-44-0	Fluoranthene	1.4	U	
129-00-0	Pyrene	1.4	U	
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
57-97-6	7,12-Dimethylbenzanthracene	2.8	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
56-49-5	3-Methylcholanthrene	3.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	
215-58-7	Dibenz(A,C)Anthracene	1.6	U	

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Lab File ID: S3277X328 Lab Sample ID: BLK-02

Date Extracted: 01/23/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 01/26/89 Time Analyzed: 19:25

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3277-03MS RE	3277-03 RE	S3277X327	01/26/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3277 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3277X328

Level: (low/med) LOW Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/23/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/26/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	1.8	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.3	*
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	*
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.9	*
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3277 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX277	01/18/89	08:31
BLK-01	S3277X281	01/18/89	12:40
3277-01	S3277X282	01/18/89	13:28
3277-02	S3277X283	01/18/89	14:16
3277-03	S3277X284	01/18/89	15:04
3277-03MS	S3277X285	01/18/89	15:52
3277-03DUP	S3277X286	01/18/89	16:39

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3277 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX326	01/26/89	15:41
3277-03MS RE	S3277X327	01/26/89	18:37
BLK-02	S3277X328	01/26/89	19:25

INITIAL CALIBRATION
PAH COMPOUNDS

CASE NO: 3297
CONTRACTOR: RMAL
CONTRACT NO: ——

INSTRUMENT ID: X
CALIBRATION DATE: 1-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS 35%

LABORATORY ID: STDX268 STDX266 STDX264 STDX265 STDX267

COMPOUND	RF	2. RF	4. RF	24. RF	120. RF	480.	AVG RF	%RSD	CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007	1.057	11.2		
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904	0.988	14.5		
1H-INDENE	1.875	1.762	1.463	1.400	1.535	1.607	12.6		
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033	2.214	15.6		
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432	1.524	13.1		
QUINOLINE	0.733	0.677	0.680	0.784	0.939	0.762	14.1		
1H-INDOLE	0.872	0.907	0.826	0.926	1.075	0.921	10.2		
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016	1.086	14.1		
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030	1.110	14.6		
BIPHENYL	1.798	1.739	1.370	1.332	1.419	1.532	14.3		
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663	1.616	9.3		
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045	1.092	11.8		
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487	1.601	15.6		
FLUORENE	1.311	1.375	1.145	1.146	1.247	1.245	8.1		
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950	1.008	11.8		
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966	1.005	12.0		
ANTHRACENE	0.962	1.049	0.869	0.884	0.984	0.950	7.7		
ACRIDINE	0.810	0.812	0.549	0.652	0.738	0.712	15.7		
CARBAZOLE	0.955	1.009	0.764	0.793	0.889	0.882	11.7		
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013	1.068	13.6		
PYRENE	1.398	1.258	0.932	0.903	0.978	1.094	20.1		
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990	1.131	16.6		
CHRYSENE	1.643	1.468	1.057	1.014	0.966	1.230	24.8		
BENZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014	1.151	22.2		
BENZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292	1.488	15.7		
7,12-DIMETHYLBENZANTHRACENE	0.620	0.628	0.471	0.411	0.460	0.518	19.1		
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048	1.362	29.5		
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976	1.089	16.8		
PERYLENE	1.239	1.157	0.914	0.929	0.961	1.040	14.2		
3-METHYLCHOLANTHRENE #	0.000	0.538	0.423	0.444	0.469	0.469	10.7		
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130	1.240	17.0		
DIBENZ(A,C)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7		
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7		
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986	1.112	18.1		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3277
CONTRACTOR: RMAL
CONTRACT NO: ---NA
INSTRUMENT ID: X

CALIBRATION DATE: 01-26-89
TIME: ~~15:14~~ 15:41 AM 1/31/89
LABORATORY ID: STDX326
INITIAL CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.097	1.012	4.2		
2,3-DIHYDROINDENE	0.988	0.921	6.8		
1H-INDENE	1.607	1.585	1.3		
NAPHTHALENE	2.214	2.440	-10.1		
BENZO(B)THIOPHENE	1.524	1.460	4.1		
QUINOLINE	0.762	0.906	-18.8		
1H-INDOLE	0.921	1.072	-16.3		
2-METHYLNAPHTHALENE	1.086	1.110	-2.2		
1-METHYLNAPHTHALENE	1.110	1.134	-2.0		
BIPHENYL	1.532	1.465	4.3		
ACENAPHTHYLENE	1.616	1.650	-2.1		
ACENAPHTHENE	1.092	1.050	3.7		
DIBENZOFURAN	1.601	1.391	13.1		
FLUORENE	1.245	1.129	9.3		
DIBENZOTHIOPHENE	1.008	0.987	2.0		
PHENANTHRENE	1.005	1.071	-6.5		
ANTHRACENE	0.950	0.978	-3.0		
ACRIDINE	0.712	0.627	11.9		
CARBAZOLE	0.882	0.915	-3.6		
FLUORANTHENE	1.068	0.954	10.6		
PYRENE	1.094	1.136	-3.8		
BENZO(A)ANTHRACENE	1.131	1.113	1.6		
CHRYSENE	1.230	1.062	13.6		
BENZO(B)FLUORANTHENE	1.151	1.245	-8.1		
BENZO(K)FLUORANTHENE	1.488	1.255	15.6		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.363	29.9		
BENZO(E)PYRENE	1.362	1.157	15.0		
BENZO(A)PYRENE	1.089	1.053	3.3		
PERYLENE	1.040	1.041	-0.0		
3-METHYLCHOLANTHRENE	0.469	0.313	33.1		
INDENO(1,2,3-CD)PYRENE	1.240	1.486	-19.8		
DIBENZ(A,C)ANTHRACENE	0.977	1.066	-9.0		
DIBENZ(A,H)ANTHRACENE	0.977	1.066	-9.0		
BENZO(G,H,I)PERYLENE	1.112	1.236	-11.1		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(*)
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VII

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3277
CONTRACTOR: RMAL
CONTRACT NO: --N/A
INSTRUMENT ID: X

CALIBRATION DATE: 1-18-89
TIME: 08:31
LABORATORY ID: STDX277
INITIAL CALIBRATION DATE: 1-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.033	2.2		
2,3-DIHYDROINDENE	0.988	0.967	2.1		
1H-INDENE	1.607	1.562	2.7		
NAPHTHALENE	2.214	2.469	-11.4		
BENZO(B)THIOPHENE	1.524	1.461	4.1		
QUINOLINE	0.762	0.719	5.7		
1H-INDOLE	0.921	0.849	7.7		
2-METHYLNAPHTHALENE	1.086	1.051	3.2		
1-METHYLNAPHTHALENE	1.110	1.049	5.4		
BIPHENYL	1.532	1.446	5.5		
ACENAPHTHYLENE	1.616	1.460	9.6		
ACENAPHTHENE	1.092	1.003	8.1		
DIBENZOFURAN	1.601	1.549	3.2		
FLUORENE	1.245	1.089	12.5		
DIBENZOTHIOPHENE	1.008	0.908	9.8		
PHENANTHRENE	1.005	0.908	9.6		
ANTHRACENE	0.950	0.827	12.8		
ACRIDINE	0.712	0.663	6.9		
CARBAZOLE	0.882	0.818	7.3		
FLUORANTHENE	1.068	0.941	11.8		
PYRENE	1.094	0.966	11.6		
BENZO(A)ANTHRACENE	1.131	0.979	13.5		
CHRYSENE	1.230	1.060	13.7		
BENZO(B)FLUORANTHENE	1.151	0.951	17.3		
BENZO(K)FLUORANTHENE	1.488	1.184	20.4		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.445	13.9		
BENZO(E)PYRENE	1.362	1.220	10.4		
BENZO(A)PYRENE	1.089	0.881	19.0		
PERYLENE	1.040	0.827	20.5		
3-METHYLCHOLANTHRENE	0.469	0.314	32.9		
INDENO(1,2,3-CD)PYRENE	1.240	0.904	27.0		
DIBENZ(A,C)ANTHRACENE	0.977	0.696	28.7		
DIBENZ(A,H)ANTHRACENE	0.977	0.696	28.7		
BENZO(G,H,I)PERYLENE	1.112	0.864	22.2		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(*)
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

DJK 1-30-89

Form VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3277 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX326 Date Analyzed: 01/26/89

Instrument ID: X TIme Analyzed: 15:41

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	24358	33552	17726
UPPER LIMIT	48716	67104	35452
LOWER LIMIT	12179	16776	8863
SAMPLE NO.			
3277-03MS RE	26794	44624	19853
BLK-02	33127	57709	24994

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

8C
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3277 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX277 Date Analyzed: 01/18/89

Instrument ID: X TIme Analyzed: 08:31

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	66305	114238	72657
UPPER LIMIT	132610	228476	145314
LOWER LIMIT	33152	57119	36328
SAMPLE NO.			
3277-01	62327	107384	66118
3277-02	57022	94818	63938
3277-03	54370	90248	55946
3277-03MS	58348	95960	65391
3277-03DUP	55696	92533	62485
BLK-01	56359	97102	61758

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

February 10, 1989

Enseco - RMAL Project Number 003278

Introduction

Three aqueous samples were received at Rocky Mountain Analytical Laboratory on January 10, 1988. The samples were logged in under RMAL project number 003278. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. All samples were analyzed for medium level part-per-trillion (PPT) polynuclear aromatic hydrocarbons (PAH's).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below per the 1989 QAPP.

PPT PAH

Due to an an interference in the matrix of sample 3278-03, the recovery of D8-Naphthalene is outside of control limits The presence of this interference has been confirmed by evaluating chromatographic peak shapes and ion intensities of the surrogate. Since this interference is specific to the surrogate, it has not affected the quantitation of target compounds.

Samples 3278-01 and 02 showed target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I).

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax. 303/431-7171

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 2/10/89
Tracy Giberson
Data Control Supervisor

Approved by: Rebecca A. Williams **Date:** 2/10/89
Rebecca Williams
Client Service Representative

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003278-0001-SA	GAC-SLP15C2-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003278-0002-SA	GAC-SLP15F-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89
003278-0003-SA	GAC-SLP15C1-010989	AQUEOUS	09 JAN 89	13:30	10 JAN 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC# 3278

PPT/PAH

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3278-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3278-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3278X274

Level: (low/med) MED Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/17/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	408.	U
496-11-7	2,3-Dihydroindene	112.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	470.	J *
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	112.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	128.	U
92-52-4	Biphenyl	344.	U
208-96-8	Acenaphthylene	112.	U
83-32-9	Acenaphthene	104.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	104.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	232.	U
86-74-8	Carbazole	152.	U
206-44-0	Fluoranthene	112.	U
129-00-0	Pyrene	112.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	224.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	184.	U
57-97-6	7,12-Dimethylbenzanthracene	224.	U
192-97-2	Benzo(E)Pyrene	152.	U
50-32-8	Benzo(A)Pyrene	184.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	168.	U
53-70-3	Dibenz(A,H)Anthracene	128.	U
191-24-2	Benzo(G,H,I)Perylene	224.	U
215-58-7	Dibenz(A,C)Anthracene	128.	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3278-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3278-02

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3278X275

Level: (low/med) MED Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/17/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	408.	U
496-11-7	2,3-Dihydroindene	1300.	
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	240.	J
4565-32-6	Benzo(B)Thiophene	300.	
91-22-5	Quinoline	112.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	128.	U
92-52-4	Biphenyl	220.	J
208-96-8	Acenaphthylene	540.	
83-32-9	Acenaphthene	980.	
132-64-9	Dibenzofuran	180.	
86-73-7	Fluorene	660.	
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	104.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	232.	U
86-74-8	Carbazole	152.	U
206-44-0	Fluoranthene	112.	U
129-00-0	Pyrene	140.	*
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	224.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	184.	U
57-97-6	7,12-Dimethylbenzanthracene	224.	U
192-97-2	Benzo(E)Pyrene	152.	U
50-32-8	Benzo(A)Pyrene	184.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	168.	U
53-70-3	Dibenz(A,H)Anthracene	128.	U
191-24-2	Benzo(G,H,I)Perylene	224.	U
215-58-7	Dibenz(A,C)Anthracene	128.	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3278-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3278-03

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3278X288

Level: (low/med) MED Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/18/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	408.	U
496-11-7	2,3-Dihydroindene	112.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	112.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	128.	U
92-52-4	Biphenyl	344.	U
208-96-8	Acenaphthylene	112.	U
83-32-9	Acenaphthene	104.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	104.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	232.	U
86-74-8	Carbazole	152.	U
206-44-0	Fluoranthene	112.	U
129-00-0	Pyrene	112.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	224.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	184.	U
57-97-6	7,12-Dimethylbenzanthracene	224.	U
192-97-2	Benzo(E)Pyrene	152.	U
50-32-8	Benzo(A)Pyrene	184.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	168.	U
53-70-3	Dibenz(A,H)Anthracene	128.	U
191-24-2	Benzo(G,H,I)Perylene	224.	U
215-58-7	Dibenz(A,C)Anthracene	128.	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	3278-01	98	134	102
2	3278-02	108	143	103
3	3278-03	116 *	137	118
4	BLK-01	100	121	113

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

FORM II SV-1 1/87 Rev.

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

Lab File ID: S3284X292 Lab Sample ID: BLK-01

Date Extracted: 01/11/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 01/20/89 Time Analyzed: 13:06

Matrix: (soil/water) WATER Level: (low/med) MED

Instrument ID: X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3278-01	3278-01	S3278X274	01/17/89
2	3278-02	3278-02	S3278X275	01/17/89
3	3278-03	3278-03	S3278X288	01/18/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3278 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3284X292

Level: (low/med) MED Date Received: 01/10/89

% Moisture: not dec. dec. Date Extracted: 01/11/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/20/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	408.	U
496-11-7	2,3-Dihydroindene	112.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	112.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	128.	U
92-52-4	Biphenyl	344.	U
208-96-8	Acenaphthylene	112.	U
83-32-9	Acenaphthene	104.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	104.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	232.	U
86-74-8	Carbazole	152.	U
206-44-0	Fluoranthene	112.	U
129-00-0	Pyrene	112.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	224.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	184.	U
57-97-6	7,12-Dimethylbenzanthracene	224.	U
192-97-2	Benzo(E)Pyrene	152.	U
50-32-8	Benzo(A)Pyrene	184.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	168.	U
53-70-3	Dibenz(A,H)Anthracene	128.	U
191-24-2	Benzo(G,H,I)Perylene	224.	U
215-58-7	Dibenz(A,C)Anthracene	128.	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3278 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX269	01/17/89	09:46
3278-01	S3278X274	01/17/89	15:52
3278-02	S3278X275	01/17/89	16:41

FORM V 1/87 Rev.

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3278 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX277	01/18/89	08:31
3278-03	S3278X288	01/18/89	18:15

FORM V 1/87 Rev.

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3278 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX291	01/20/89	09:44
BLK-01	S3284X292	01/20/89	13:06

FORM V 1/87 Rev.

INITIAL CALIBRATION
PAH COMPOUNDS

CASE NO: 3278
CONTRACTOR: RMAL
CONTRACT NO: N/A

INSTRUMENT ID: X
CALIBRATION DATE: 1-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS 35%

LABORATORY ID: STDX268 STDX266 STDX264 STDX265 STDX267

COMPOUND	RF	2. RF	4. RF	24. RF	120. RF	480.	AVG RF	%RSD	CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007	1.057	11.2		
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904	0.988	14.5		
1H-INDENE	1.875	1.762	1.463	1.400	1.535	1.607	12.6		
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033	2.214	15.6		
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432	1.524	13.1		
QUINOLINE	0.733	0.677	0.680	0.784	0.939	0.762	14.1		
1H-INDOLE	0.872	0.907	0.826	0.926	1.075	0.921	10.2		
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016	1.086	14.1		
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030	1.110	14.6		
BIPHENYL	1.798	1.739	1.370	1.332	1.419	1.532	14.3		
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663	1.616	9.3		
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045	1.092	11.8		
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487	1.601	15.6		
FLUORENE	1.311	1.375	1.145	1.146	1.247	1.245	8.1		
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950	1.008	11.8		
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966	1.005	12.0		
ANTHRACENE	0.962	1.049	0.869	0.884	0.984	0.950	7.7		
ACRIDINE	0.810	0.812	0.549	0.652	0.738	0.712	19.7		
CARBAZOLE	0.955	1.009	0.764	0.793	0.889	0.882	11.7		
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013	1.068	13.6		
PYRENE	1.398	1.258	0.932	0.903	0.978	1.094	20.1		
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990	1.131	16.6		
CHRYSENE	1.643	1.468	1.057	1.014	0.966	1.230	24.8		
BENZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014	1.151	22.2		
BENZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292	1.488	15.7		
7,12-DIMETHYLBENZANTHRACENE	0.620	0.628	0.471	0.411	0.460	0.518	19.1		
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048	1.362	29.5		
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976	1.089	16.8		
PERYLENE	1.239	1.157	0.914	0.929	0.961	1.040	14.2		
3-METHYLCHOLANTHRENE #	0.000	0.538	0.423	0.444	0.469	0.469	10.7		
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130	1.240	17.0		
DIBENZ(A,C)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7		
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7		
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986	1.112	18.1		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(*)
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCS - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3273
CONTRACTOR: RMAL
CONTRACT NO: NA
INSTRUMENT ID: X

CALIBRATION DATE: 1-17-~~88~~ 89
TIME: 09:46
LABORATORY ID: STDX269 AV 1/20/89
INITIAL CALIBRATION DATE: 1-16-~~88~~ 89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.037	1.8		
2,3-DIHYDROINDENE	0.988	0.997	-0.9		
1H-INDENE	1.607	1.529	4.8		
NAPHTHALENE	2.214	2.198	0.7		
BENZO(B)THIOPHENE	1.524	1.426	6.3		
QUINOLINE	0.762	0.558	26.7		
1H-INDOLE	0.921	0.637	30.8		
2-METHYLNAPHTHALENE	1.086	1.042	4.0		
1-METHYLNAPHTHALENE	1.110	1.062	4.3		
BIPHENYL	1.532	1.354	11.5		
ACENAPHTHYLENE	1.616	1.398	13.4		
ACENAPHTHENE	1.092	1.002	8.2		
DIBENZOFURAN	1.601	1.338	16.4		
FLUORENE	1.245	1.121	9.9		
DIBENZOTHIOPHENE	1.008	0.876	13.0		
PHENANTHRENE	1.005	0.885	11.9		
ANTHRACENE	0.950	0.790	16.8		
ACRIDINE	0.712	0.515	27.7		
CARBAZOLE	0.882	0.647	26.6		
FLUORANTHENE	1.068	0.921	13.6		
PYRENE	1.094	1.001	8.5		
BENZO(A)ANTHRACENE	1.131	0.916	19.0		
CHRYSENE	1.230	1.181	3.9		
BENZO(B)FLUORANTHENE	1.151	0.965	16.1		
BENZO(K)FLUORANTHENE	1.488	1.208	18.7		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.406	21.5		
BENZO(E)PYRENE	1.362	1.304	4.2		
BENZO(A)PYRENE	1.089	0.824	24.3		
PERYLENE	1.040	0.818	21.3		
3-METHYLCHOLANTHRENE	0.469	0.227	51.5		
INDENO(1,2,3-CD)PYRENE	1.240	0.924	25.4		
DIBENZ(A,C)ANTHRACENE	0.977	0.669	31.5		
DIBENZ(A,H)ANTHRACENE	0.977	0.669	31.5		
BENZO(G,H,I)PERYLENE	1.112	0.946	14.9		

92K 1:50 T

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VII

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3278
CONTRACTOR: RMAL
CONTRACT NO: N/A
INSTRUMENT ID: X

CALIBRATION DATE: 1-18-89
TIME: 08:31
LABORATORY ID: STDX277
INITIAL CALIBRATION DATE: 1-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.033	2.2		
2,3-DIHYDROINDENE	0.988	0.967	2.1		
1H-INDENE	1.607	1.562	2.7		
NAPHTHALENE	2.214	2.469	-11.4		
BENZO(B)THIOPHENE	1.524	1.461	4.1		
QUINOLINE	0.762	0.719	5.7		
1H-INDOLE	0.921	0.849	7.7		
2-METHYLNAPHTHALENE	1.086	1.051	3.2		
1-METHYLNAPHTHALENE	1.110	1.049	5.4		
BIPHENYL	1.532	1.446	5.5		
ACENAPHTHYLENE	1.616	1.460	9.6		
ACENAPHTHENE	1.092	1.003	8.1		
DIBENZOFURAN	1.601	1.549	3.2		
FLUORENE	1.245	1.089	12.5		
DIBENZOTHIOPHENE	1.008	0.908	9.8		
PHENANTHRENE	1.005	0.908	9.6		
ANTHRACENE	0.950	0.827	12.8		
ACRIDINE	0.712	0.663	6.9		
CARBAZOLE	0.882	0.818	7.3		
FLUORANTHENE	1.068	0.941	11.8		
PYRENE	1.094	0.966	11.6		
BENZO(A)ANTHRACENE	1.131	0.979	13.5		
CHRYSENE	1.230	1.060	13.7		
BENZO(B)FLUORANTHENE	1.151	0.951	17.3		
BENZO(K)FLUORANTHENE	1.488	1.184	20.4		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.445	13.9		
[illegible]ZO(E)PYRENE	1.362	1.220	10.4		
[illegible]O(A)PYRENE	1.089	0.881	19.0		
[illegible]YLENE	1.040	0.827	20.5		
3-METHYLCHOLANTHRENE	0.469	0.314	32.9		
INDENO(1,2,3-CD)PYRENE	1.240	0.904	27.0		
DIBENZ(A,C)ANTHRACENE	0.977	0.696	28.7		
DIBENZ(A,H)ANTHRACENE	0.977	0.696	28.7		
BENZO(G,H,I)PERYLENE	1.112	0.864	22.2		

JDK 1-25-89

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VII

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3278
CONTRACTOR: RMAL
CONTRACT NO: NA
INSTRUMENT ID: X

CALIBRATION DATE: 1-20-89
TIME: 09:44
LABORATORY ID: STDX291
INITIAL CALIBRATION DATE: 1-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.214	-14.8		
2,3-DIHYDROINDENE	0.988	1.087	-9.9		
1H-INDENE	1.607	1.832	-14.0		
NAPHTHALENE	2.214	2.347	-5.9		
BENZO(B)THIOPHENE	1.524	1.601	-5.0		
QUINOLINE	0.762	0.947	-24.1		
1H-INDOLE	0.921	1.158	-25.7		
2-METHYLNAPHTHALENE	1.086	1.045	3.7		
1-METHYLNAPHTHALENE	1.110	1.049	5.5		
BIPHENYL	1.532	1.455	5.0		
ACENAPHTHYLENE	1.616	1.615	0.0		
ACENAPHTHENE	1.092	1.131	-3.6		
DIBENZOFURAN	1.601	1.545	3.5		
FLUORENE	1.245	1.215	2.3		
DIBENZOTHIOPHENE	1.008	0.985	2.2		
PHENANTHRENE	1.005	0.998	0.7		
ANTHRACENE	0.950	0.944	0.6		
[illegible]RIDINE	0.712	0.721	-1.2		
CARBAZOLE	0.882	0.962	-9.0		
FLUORANTHENE	1.068	0.953	10.7		
PYRENE	1.094	0.967	11.6		
BENZO(A)ANTHRACENE	1.131	1.264	-11.6		
CHRYSENE	1.230	1.289	-4.8		
BENZO(B)FLUORANTHENE	1.151	1.048	8.9		
BENZO(K)FLUORANTHENE	1.488	1.561	-4.9		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.515	0.5		
BENZO(E)PYRENE	1.362	1.275	6.4		
BENZO(A)PYRENE	1.089	1.002	7.9		
PERYLENE	1.040	0.944	9.2		
3-METHYLCHOLANTHRENE	0.469	0.403	14.0		
INDENO(1,2,3-CD)PYRENE	1.240	0.950	23.3		
DIBENZ(A,C)ANTHRACENE	0.977	0.730	25.2		
DIBENZ(A,H)ANTHRACENE	0.977	0.730	25.2		
BENZO(G,H,I)PERYLENE	1.112	0.906	18.5		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3278 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX269 Date Analyzed: 01/17/89

Instrument ID: X TIme Analyzed: 09:46:00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	33913.	57260.	31621.
UPPER LIMIT	67826.	114520.	63242.
LOWER LIMIT	16956.	28630.	15810.
SAMPLE NO.			
3278-01	29843.	51534.	35099.
3278-02	29843.	50389.	32570.

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3278 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX277 Date Analyzed: 01/18/89

Instrument ID: X TIme Analyzed: 08:31:00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	66305.	114238.	72657.
UPPER LIMIT	132610.	228476.	145314.
LOWER LIMIT	33152.	57119.	36328.
SAMPLE NO.			
3278-03	56359.	95960.	55219.

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

 1/87 Rev.

FORM VIII SV-2

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3278 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX291 Date Analyzed: 01/20/89

Instrument ID: X TIme Analyzed: 09:44:00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	109775.	184944.	73592.
UPPER LIMIT	219550.	369888.	147184.
LOWER LIMIT	54887.	92472.	36796.
SAMPLE NO.			
BLK-01	109775.	184944.	73592.

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

March 13, 1989

Enseco - RMAL Project Number 003557

Introduction

Six aqueous samples were received at Rocky Mountain Analytical Laboratory on February 7, 1989. The samples were logged in under RMAL project number 003557. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. Sample GAC-SLP10FBD-020689 was extracted and held per the 1989 QAPP. All other samples were analyzed for part-per-trillion (ppt) polynuclear aromatic hydrocarbons.

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below per the 1989 QAPP.

PPT PAH

Due to an interference in the matrix of sample 3557-03, the recovery of D8-Naphthalene exceeded the upper control limit. The presence of this interference has been confirmed by evaluating chromatographic peak shapes and ion intensities of the surrogate. Since this interference is specific to the surrogate, it has not affected the quantitation of target compounds.

Samples 3557-01, 01DUP, 02, 03, 01MS and Blk 2/08 showed compounds out of control limits for secondary ion confirmation. In some instances a compound may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I).

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax· 303/431-7171

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Audrey Verniero **Date:** 3/13/89
Audrey Verniero
Data Control

Approved by: Rebecca A. Williams **Date:** 3/13/89
Rebecca Williams
Client Service Representative

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003557-0001-SA	GAC SLP10T-020689	AQUEOUS	06 FEB 89	13:45	07 FEB 89
003557-0001-DU	GAC-SLP10TD-020689	AQUEOUS	06 FEB 89	14:00	07 FEB 89
003557-0001-MS	GAC SLP10TMS-020689	AQUEOUS	06 FEB 89	13:45	07 FEB 89
003557-0002-SA	GAC SLP10C1-020689	AQUEOUS	06 FEB 89	13:45	07 FEB 89
003557-0003-SA	GAC-SLP10FB-020689	AQUEOUS	06 FEB 89	13:30	07 FEB 89
003557-0003-DU	GAC SLP10FBD-020689	AQUEOUS	06 FEB 89	13:30	07 FEB 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC# 3557

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3557-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 2611-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X402

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	9.7	B
95-13-6	1H-Indene	1.1	B
91-20-3	Naphthalene	3.7	J B *
4565-32-6	Benzo(B)Thiophene	1.0	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.9	B
90-12-0	1-Methylnaphthalene	1.7	B
92-52-4	Biphenyl	1.5	J *
208-96-8	Acenaphthylene	1.8	
83-32-9	Acenaphthene	3.8	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	2.7	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	2.9	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.5	B
129-00-0	Pyrene	1.5	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

* = Compound does not meet secondary ion confirmation criteria.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3557-01DUP

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3557-01DUP

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X403

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	24.	B	
95-13-6	1H-Indene	1.5	B	
91-20-3	Naphthalene	4.5	J B	*
4565-32-6	Benzo(B)Thiophene	2.5		
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	2.5	U	
91-57-6	2-Methylnaphthalene	3.0	B	
90-12-0	1-Methylnaphthalene	2.4	B	
92-52-4	Biphenyl	2.6	J	*
208-96-8	Acenaphthylene	5.0		
83-32-9	Acenaphthene	11.		
132-64-9	Dibenzofuran	1.6		*
86-73-7	Fluorene	7.1		
132-65-0	Dibenzothiophene	0.8	J	
85-01-8	Phenanthrene	3.1	B	
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9	U	
206-44-0	Fluoranthene	2.1	B	
129-00-0	Pyrene	2.0	B	
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
57-97-6	7,12-Dimethylbenzanthracene	2.8	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
56-49-5	3-Methylcholanthrene	3.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	
215-58-7	Dibenz(A,C)Anthracene	1.6	U	

* = Compound does not meet secondary ion comfirmation criteria.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3557-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3557-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X405

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	17.	B	
95-13-6	1H-Indene	2.5	B	
91-20-3	Naphthalene	3.7	J B	*
4565-32-6	Benzo(B)Thiophene	8.2		
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	3.0		*
91-57-6	2-Methylnaphthalene	2.8	B	*
90-12-0	1-Methylnaphthalene	1.5	J B	
92-52-4	Biphenyl	0.8	J	
208-96-8	Acenaphthylene	2.4		
83-32-9	Acenaphthene	6.5		
132-64-9	Dibenzofuran	1.5		*
86-73-7	Fluorene	2.2		
132-65-0	Dibenzothiophene	1.1	U	
85-01-8	Phenanthrene	2.2	B	
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9	U	
206-44-0	Fluoranthene	1.3	J B	
129-00-0	Pyrene	1.4	B	*
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
57-97-6	7,12-Dimethylbenzanthracene	2.8	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
56-49-5	3-Methylcholanthrene	3.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	
215-58-7	Dibenz(A,C)Anthracene	1.6	U	

* = Compound does not meet secondary ion confirmation criteria.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3557-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3557-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X406

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	7.9	B	
95-13-6	1H-Indene	2.3	B	*
91-20-3	Naphthalene	15.	B	*
4565-32-6	Benzo(B)Thiophene	0.9	U	
91-22-5	Quinoline	1.6		
120-72-9	1H-Indole	1.5	J	*
91-57-6	2-Methylnaphthalene	13.	B	*
90-12-0	1-Methylnaphthalene	7.3	B	
92-52-4	Biphenyl	2.5	J	*
208-96-8	Acenaphthylene	1.5		*
83-32-9	Acenaphthene	0.6	J	
132-64-9	Dibenzofuran	2.0		*
86-73-7	Fluorene	2.6		
132-65-0	Dibenzothiophene	1.2		
85-01-8	Phenanthrene	7.1	B	
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9		*
206-44-0	Fluoranthene	1.6	B	
129-00-0	Pyrene	2.1	B	*
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
57-97-6	7,12-Dimethylbenzanthracene	2.8	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
56-49-5	3-Methylcholanthrene	3.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	
215-58-7	Dibenz(A,C)Anthracene	1.6	U	

* = Compound does not meet secondary ion confirmation criteria.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3557-01MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3557-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X404

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	14.	B
95-13-6	1H-Indene	9.6	B SP
91-20-3	Naphthalene	12.	B SP
4565-32-6	Benzo(B)Thiophene	1.5	*
91-22-5	Quinoline	14.	SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	14.	B SP
90-12-0	1-Methylnaphthalene	2.1	B
92-52-4	Biphenyl	1.4	J
208-96-8	Acenaphthylene	2.8	
83-32-9	Acenaphthene	6.3	
132-64-9	Dibenzofuran	1.5	*
86-73-7	Fluorene	16.	SP
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	2.7	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.7	B
129-00-0	Pyrene	1.7	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	9.9	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	2.4	SP *
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

* = Compound does not meet secondary ion confirmation criteria.

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	3557-01	91	108	67
2	3557-01DUP	107	116	84
3	3557-01MS	88	110	82
4	3557-02	98	116	80
5	3557-03	110 *	127	95
	BLK-01	92	57	11

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

FORM II SV-1 1/87 Rev.

3C
WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 3557-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	1.1	9.6	85
Naphthalene	10	3.7	12.	83
Quinolene	10	0.0	14.	140
2-Methylnaphthalene	10	2.9	14.	110
Fluorene	10	2.7	16.	130
Chrysene	10	0.0	9.9	99
Benzo(E)Pyrene	10	0.0	2.4	24

COMMENTS:

3C
WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

EPA Sample No.: 3557-01

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Dihydroindene	9.7	24.	85
1H-Indene	1.1	1.5	31
Naphthalene	3.7	4.5	20
Benzo(B)Thiophene	1.0	2.5	86
2-Methylnaphthalene	2.9	3.0	3.4
1-Methylnaphthalene	1.7	2.4	34
Biphenyl	1.5	2.6	54
Acenaphthene	3.8	11.	97
Fluorene	2.7	7.1	90
Phenanthrene	2.9	3.1	6.7
Fluoranthene	1.5	2.1	33
Pyrene	1.5	2.0	28

COMMENTS:

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Lab File ID: S3557X401 Lab Sample ID: BLK-01

Date Extracted: 02/08/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 02/20/89 Time Analyzed: 12:56

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3557-01	3557-01	S3557X402	02/20/89
2	3557-01DUP	3557-01DUP	S3557X403	02/20/89
3	3557-01MS	3557-01MS	S3557X404	02/20/89
4	3557-02	3557-02	S3557X405	02/20/89
5	3557-03	3557-03	S3557X406	02/20/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3557 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X401

Level: (low/med) LOW Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/08/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	2.2		
95-13-6	1H-Indene	1.0		
91-20-3	Naphthalene	4.2	J	*
4565-32-6	Benzo(B)Thiophene	0.9	U	
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	2.5	U	
91-57-6	2-Methylnaphthalene	2.7		
90-12-0	1-Methylnaphthalene	1.5	J	
92-52-4	Biphenyl	4.3	U	
208-96-8	Acenaphthylene	1.4	U	
83-32-9	Acenaphthene	1.3	U	
132-64-9	Dibenzofuran	1.0	U	
86-73-7	Fluorene	1.0	U	
132-65-0	Dibenzothiophene	1.1	U	
85-01-8	Phenanthrene	2.0		
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9	U	
206-44-0	Fluoranthene	0.9	J	
129-00-0	Pyrene	1.0	J	
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
57-97-6	7,12-Dimethylbenzanthracene	2.8	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
56-49-5	3-Methylcholanthrene	3.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	
215-58-7	Dibenz(A,C)Anthracene	1.6	U	

* = Compound does not meet secondary ion confirmation criteria.

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3557 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX396	02/20/89	07:59:00
BLK-01	S3557X401	02/20/89	12:56:00
3557-01	S3557X402	02/20/89	13:46:00
3557-01DUP	S3557X403	02/20/89	14:36:00
3557-01MS	S3557X404	02/20/89	15:26:00
3557-02	S3557X405	02/20/89	16:15:00
3557-03	S3557X406	02/20/89	17:04:00

INITIAL CALIBRATION
PAH COMPOUNDS

CASE NO. 3557
CONTRACTOR: RMAL
NTRACT NO: Db

INSTRUMENT ID. X
CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS 35%

LABORATORY ID: STDX268 STDX266 STDX338 STDX265 STDX267

COMPOUND	RF	2. RF	4. RF	24. RF	120. RF	460.	AVG RF	%RSD	CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007		1.057	11.2	
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904		0.968	14.5	
1H-INDENE	1.875	1.762	1.463	1.400	1.535		1.607	12.6	
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033		2.214	15.6	
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432		1.524	13.1	
QUINOLINE	0.733	0.677	0.680	0.784	0.939		0.762	14.1	
1H-INDOLE	0.872	0.907	0.825	0.926	1.075		0.921	10.2	
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016		1.086	14.1	
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030		1.110	14.6	
BIPHENYL	1.798	1.739	1.370	1.332	1.419		1.532	14.3	
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663		1.616	9.3	
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045		1.092	11.8	
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487		1.601	15.6	
FLUORENE	1.311	1.375	1.145	1.146	1.247		1.245	8.1	
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950		1.008	11.8	
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966		1.005	12.0	
ANTHRACENE	0.962	1.049	0.869	0.884	0.984		0.950	7.7	
ACRIDINE	0.810	0.812	0.549	0.652	0.738		0.712	15.7	
CARBAZOLE	0.955	1.009	0.764	0.793	0.889		0.882	11.7	
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013		1.068	13.6	
PYRENE	1.398	1.258	0.932	0.903	0.978		1.094	20.1	
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990		1.131	16.6	
CHRYSENE	1.643	1.468	1.057	1.014	0.966		1.230	24.8	
BENZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014		1.151	22.2	
BENZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292		1.488	15.7	
7,12-DIMETHYLBENZANTHRACENE	0.620	0.628	0.471	0.411	0.460		0.518	19.1	
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048		1.362	29.5	
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976		1.089	16.8	
PERYLENE	1.239	1.197	0.914	0.929	0.961		1.040	14.2	
3-METHYLCHOLANTHRENE #	0.000	0.938	0.423	0.444	0.469		0.469	10.7	
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130		1.240	17.0	
DIBENZ(A,C)ANTHRACENE	0.943	1.318	0.852	0.869	0.905		0.977	19.7	
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905		0.977	19.7	
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986		1.112	18.1	

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3557
CONTRACTOR: RMAL
CONTRACT NO: N/A
INSTRUMENT ID: X

CALIBRATION DATE: 02-20-89
TIME: 07:59
LABORATORY ID: STDX396
INITIAL CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 25%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.094	-3.5		
2,3-DIHYDROINDENE	0.988	0.974	1.3		
1H-INDENE	1.607	1.591	0.9		
NAPHTHALENE	2.214	2.653	-19.8		
BENZO(B)THIOPHENE	1.524	1.479	2.9		
QUINOLINE	0.762	0.794	-4.1		
1H-INDOLE	0.921	0.864	6.1		
2-METHYLNAPHTHALENE	1.086	1.024	5.7		
1-METHYLNAPHTHALENE	1.110	1.073	3.3		
BIPHENYL	1.532	1.720	-12.3		
ACENAPHTHYLENE	1.616	1.405	13.0		
ACENAPHTHENE	1.092	0.976	10.6		
DIBENZOFURAN	1.601	1.503	6.1		
FLUORENE	1.245	1.127	9.4		
DIBENZOTHIOPHENE	1.008	0.902	10.5		
PHENANTHRENE	1.005	0.918	8.6		
ANTHRACENE	0.950	0.775	18.3		
ACRIDINE	0.712	0.509	28.4		
CARBAZOLE	0.882	0.860	2.4		
FLUORANTHENE	1.068	0.902	15.4		
PYRENE	1.094	0.894	18.2		
BENZO(A)ANTHRACENE	1.131	1.183	-4.5		
CHRYSENE	1.230	1.276	-3.7		
BENZO(B)FLUORANTHENE	1.151	1.343	-16.6		
BENZO(K)FLUORANTHENE	1.488	1.387	6.8		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.504	2.7		
BENZO(E)PYRENE	1.362	1.414	-3.7		
BENZO(A)PYRENE	1.089	0.964	11.5		
PERYLENE	1.040	0.902	13.3		
3-METHYLCHOLANTHRENE	0.469	0.314	32.9		
INDENO(1,2,3-CD)PYRENE	1.240	0.992	19.9		
DIBENZ(A,C)ANTHRACENE	0.977	0.843	13.7		
DIBENZ(A,H)ANTHRACENE	0.977	0.843	13.7		
BENZO(G,H,I)PERYLENE	1.112	0.941	15.3		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**)
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form I

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3557 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX396 Date Analyzed: 02/20/89

Instrument ID: X TIme Analyzed: 07:59:00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	401605	654561	341364
UPPER LIMIT	803210	1309122	682728
LOWER LIMIT	200802	327280	170682
SAMPLE NO.			
BLK-01	344000	534000	359000
3557-01	300000	476000	365000
3557-01DUP	290000	452000	342000
3557-01MS	313000	504000	353000
3557-02	314000	491000	366000
3557-03	335000	529000	400000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 7066

Attn: _____

Enseco Client: CITY OF ST LOUIS PARK
Project: _____
Sampling Co.: SAME
Sampling Site: SAME
Team Leader: MZA

SAMPLE SAFE™ CONDITIONS

1. Packed by: MZA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status. Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory. (Yes) No
8. Contents Temperature Upon Receipt by Lab 8° °C
9. Condition of Contents: Good

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	RMA #	Remarks
2/6/89	1400	GAC-SLP10T-020689	LT AMBER	6	ppt-PAH	-01	
		GAC-SLP10TD-020689	LT AMBER	6	ppt-PAH	-01DW	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by. (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: MZA
Method of Shipment: FEDERAL EXP. Airbill # 4709378181
Received for Lab: RMAL Signed: [signature] Date/Time 2-7-89 0815
Enseco Project No. 3557

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile. 303/431-7171

CHAIN OF CUSTODY

No. 7067

Attn: _____

Enseco Client: CITY OF ST LOUIS PARK
Project: _____
Sampling Co.: SAME
Sampling Site: SAME
Team Leader: MZR

SAMPLE SAFE™ CONDITIONS

1. Packed by: MZR Seal #: _____
2. Seal Intact Upon Receipt by Sampling Co: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal #: _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: 10" °C
9. Condition of Contents: Good

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
2/6/89	1345	GAC SLP10F TOC -020689	16oz cl	1	TOC	
}		GAC SLP10T -TOC- 020689	16oz cl	1	TOC -01	
}		GAC SLP10 C1 TOC .020689	16oz cl	1	TOC -02	
2/6/89		GAC SLP10 C1-020689	Lt. Amber	6	ppt-PAH -02	
2/6/89		GAC SLP10MS-020689	Lt Amber	6	ppt-PAH -01MS	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)	Received by: (signed)	Date	Time
1			
2			
3			

SHIPPING DETAILS

Delivered to Shipper by: MZR
Method of Shipment: FEDERAL EXP. Airbill #: 4719378181
Received for Lab: RMAL Signed: Jul S. Holt Date/Time: 2-7-89 0815
Enseco Project No.: 3557

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile. 303/431-7171

CHAIN OF CUSTODY

No. 7068

Attn: _____

Enseco Client: CITY OF ST LOUIS PARK
Project: _____
Sampling Co.: SAME
Sampling Site: SAME
Team Leader: MZK

SAMPLE SAFE™ CONDITIONS

1 Packed by: MZK Seal # _____
2 Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents _____
4 Sealed for Shipping by. _____
5 Initial Contents Temp.. _____ °C Seal # _____
6 Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8 Contents Temperature Upon Receipt by Lab 10° °C
9. Condition of Contents. Good

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
2/6/89	1330	GAC-SLP10F-020689	LT AMBER	6	ppt-PAH	HIGH ppt-PAH
2/6/89		GAC-SLP10FB-020689	LT AMBER	6	ppt-PAH-03	
2/6/89		GAC SLP 10FBD-020689	LT AMBER	6	ppt-PAH-03	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)	Received by. (signed)	Date	Time
1			
2			
3			

SHIPPING DETAILS

Delivered to Shipper by: MZK
Method of Shipment: FEDERAL EXP Airbill # 4709378181
Received for Lab: RMAL Signed: [signature] Date/Time 2-7-89 0815
Enseco Project No. 3557

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

March 7, 1989

Enseco - RMAL Project Number 003558

Introduction

One aqueous sample was received at Rocky Mountain Analytical Laboratory on February 7, 1989. The sample was logged in under RMAL project number 003558. A cross reference associating the RMAL sample number to the actual field sample number is included. The sample was analyzed for medium level part-per-trillion (ppt) polynuclear aromatic hydrocarbons.

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below per the 1989 QAPP.

PPT PAH

No problems were encountered in the polynuclear aromatic hydrocarbon analysis.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Audrey Verniero Date: 3/7/89
Audrey Verniero
Data Control

Approved by: Rebecca A. Williams Date: 3/7/89
Rebecca Williams
Client Service Representative

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003558-0001-SA	GAC-SLP10F-020689	AQUEOUS	06 FEB 89	13:30	07 FEB 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC # 3558

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3558-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3558 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3558-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3558X399

Level: (low/med) MED Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/09/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	1400.	
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	300.	
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	120.	J
92-52-4	Biphenyl	310.	J
208-96-8	Acenaphthylene	610.	
83-32-9	Acenaphthene	1300.	
132-64-9	Dibenzofuran	370.	
86-73-7	Fluorene	1200.	
132-65-0	Dibenzothiophene	110.	
85-01-8	Phenanthrene	150.	
120-12-7	Anthracene	88.	U
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	250.	
129-00-0	Pyrene	230.	
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3558 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	3558-01	92	100	97
2	BLK-01	94	99	75

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

FORM II SV-1 1/87 Rev.

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3558 SAS No.: N/A SDG No.: N/A

Lab File ID: S3558X400 Lab Sample ID: BLK-01

Date Extracted: 02/09/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 02/20/89 Time Analyzed: 12:06

Matrix: (soil/water) WATER Level: (low/med) MED

Instrument ID: X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3558-01	3558-01	S3558X399	02/20/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3558 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3558X400

Level: (low/med) MED Date Received: 02/07/89

% Moisture: not dec. dec. Date Extracted: 02/09/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 02/20/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	110.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	130.	U
92-52-4	Biphenyl	340.	U
208-96-8	Acenaphthylene	110.	U
83-32-9	Acenaphthene	100.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	100.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	110.	U
129-00-0	Pyrene	110.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3558 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX396	02/20/89	07:59:00
3558-01	S3558X399	02/20/89	11:17:00
BLK-01	S3558X400	02/20/89	12:06:00

INITIAL CALIBRATION

PAH COMPOUNDS

CASE NO: 3558
CONTRACTOR: RMAL
CONTRACT NO: DA

INSTRUMENT ID: X
CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS ~~25%~~ 35%
AN 2/22/89

LABORATORY ID:	STDX268	STDX265	STDX266	STDX267	STDX338			
COMPOUND	RF 2.	RF 4.	RF 24.	RF 120.	RF 480.	AVG RF	%RSD	CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007	1.057	11.2	
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904	0.988	14.5	
1H-INDENE	1.875	1.762	1.463	1.400	1.535	1.607	12.6	
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033	2.214	15.6	
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432	1.524	13.1	
QUINOLINE	0.733	0.677	0.680	0.784	0.939	0.762	14.1	
1H-INDOLE	0.872	0.907	0.826	0.926	1.075	0.921	10.2	
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016	1.086	14.1	
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030	1.110	14.6	
BIPHENYL	1.798	1.739	1.370	1.332	1.419	1.532	14.3	
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663	1.616	9.3	
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045	1.092	11.8	
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487	1.601	15.6	
FLUORENE	1.311	1.375	1.145	1.146	1.247	1.245	8.1	
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950	1.008	11.8	
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966	1.005	12.0	
ANTHRACENE	0.962	1.049	0.869	0.884	0.984	0.950	7.7	
ACRIDINE	0.810	0.812	0.549	0.652	0.738	0.712	15.7	
CARBAZOLE	0.955	1.009	0.764	0.793	0.889	0.882	11.7	
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013	1.068	13.6	
PYRENE	1.398	1.258	0.932	0.903	0.978	1.094	20.1	
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990	1.131	16.6	
CHRYSENE	1.643	1.468	1.057	1.014	0.966	1.230	24.8	
BENZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014	1.151	22.2	
BENZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292	1.488	15.7	
7,12-DIMETHYLBENZANTHRACENE	0.620	0.628	0.471	0.411	0.460	0.518	19.1	
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048	1.362	29.5	
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976	1.089	16.8	
PERYLENE	1.239	1.157	0.914	0.929	0.961	1.040	14.2	
3-METHYLCHOLANTHRENE #	0.000	0.538	0.423	0.444	0.469	0.469	10.7	
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130	1.240	17.0	
DIBENZ(A,C)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7	
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905	0.977	19.7	
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986	1.112	18.1	

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: 3558
CONTRACTOR: RMAL
CONTRACT NO: DA
INSTRUMENT ID: X

CALIBRATION DATE: 02-20-89
TIME: 07:59
LABORATORY ID: STDX396
INITIAL CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS ~~25%~~ 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.094	-3.5		
2,3-DIHYDROINDENE	0.988	0.974	1.3		
1H-INDENE	1.607	1.591	0.9		
NAPHTHALENE	2.214	2.653	-19.8		
BENZO(B)THIOPHENE	1.524	1.479	2.9		
QUINOLINE	0.762	0.794	-4.1		
1H-INDOLE	0.921	0.864	6.1		
2-METHYLNAPHTHALENE	1.086	1.024	5.7		
1-METHYLNAPHTHALENE	1.110	1.073	3.3		
BIPHENYL	1.532	1.720	-12.3		
ACENAPHTHYLENE	1.616	1.405	13.0		
ACENAPHTHENE	1.092	0.976	10.6		
DIBENZOFURAN	1.601	1.503	6.1		
FLUORENE	1.245	1.127	9.4		
DIBENZOTHIOPHENE	1.008	0.902	10.5		
PHENANTHRENE	1.005	0.918	8.6		
ANTHRACENE	0.950	0.775	18.3		
ACRIDINE	0.712	0.509	28.4		
C[illegible]ZOLE	0.882	0.860	2.4		
FL[illegible]ANTHENE	1.068	0.902	15.4		
PYRENE	1.094	0.894	18.2		
BENZO(A)ANTHRACENE	1.131	1.183	-4.5		
CHRYSENE	1.230	1.276	-3.7		
BENZO(B)FLUORANTHENE	1.151	1.343	-16.6		
BENZO(K)FLUORANTHENE	1.488	1.387	6.8		
7,12-DIMETHYLBENZANTHRACENE	0.518	0.504	2.7		
BENZO(E)PYRENE	1.362	1.414	-3.7		
BENZO(A)PYRENE	1.089	0.964	11.5		
PERYLENE	1.040	0.902	13.3		
3-METHYLCHOLANTHRENE	0.469	0.314	32.9		
INDENO(1,2,3-CD)PYRENE	1.240	0.992	19.9		
DIBENZ(A,C)ANTHRACENE	0.977	0.843	13.7		
DIBENZ(A,H)ANTHRACENE	0.977	0.843	13.7		
BENZO(G,H,I)PERYLENE	1.112	0.941	15.3		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**)
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

Form VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3558 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX396 Date Analyzed: 02/20/89

Instrument ID: X TIme Analyzed: 07:59:00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	401614	654561	341363
UPPER LIMIT	803228	1309122	682726
LOWER LIMIT	200807	327280	170681
SAMPLE NO.			
3558-01	327000	562000	307000
BLK-01	316000	505000	304000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile 303/431-7171

CHAIN OF CUSTODY

No. 1115

Attn: _____

Enseco Client: CITY OF ST LOUIS PARK
Project: _____
Sampling Co.: SAME
Sampling Site: SAME
Team Leader: MZK

SAMPLE SAFE™ CONDITIONS

1. Packed by: MZK Seal # _____
2. Seal Intact Upon Receipt by Sampling Co. Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory (Yes) No
8. Contents Temperature Upon Receipt by Lab 10°C
9. Condition of Contents: Good

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
2/6/89	1330	GAC-SLP10F-020689	LT AMBER	6	ppt-PAH -01	HIGH ppt
2/6/89		GAC-SLP10FB-020689	LT AMBER	6	ppt-PAH -03	
2/6/89		GAC SLP 10FBD-020689	LT AMBER	6	ppt-PAH -03	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by. (signed)	Received by (signed)	Date	Time
1				
2				

SHIPPING DETAILS

Delivered to Shipper by: MZK
Method of Shipment: FEDERAL EXP Airbill # 4309[illegible]
Received for Lab: RMAL Signed: [illegible] Date/Time [illegible]

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

April 14, 1989

Enseco - RMAL Project Number 003828

Introduction

Eight aqueous samples were received at Rocky Mountain Analytical Laboratory on March 8, 1989. Sample GAC SLP10FBD-030789 was extracted and held per the 1989 QAPP. The remaining samples were logged in under RMAL project number 003828. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. The samples were analyzed for part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

During the extraction of samples 003828-02DUP and 02MS, the surrogate concentration required for a medium level analysis was inadvertently added to the samples. All surrogate recoveries for these samples are outside control limits.

All samples and the associated blank show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I) as per the 1989 QAPP.

The method blank associated with these samples (BLK-01) shows phenanthrene at a concentration greater than five times the method detection limit. Corrective action taken in the preparation lab included thoroughly cleaning all related glassware prior to the extraction of any more samples.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 4/14/89
Tracy Giberson
Data Control Supervisor

Approved by: Rebecca A. Williams **Date:** 4/14/89
Rebecca Williams
Program Administrator

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003828-0001-SA	GAC-SLP10FB-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0001-DU	GAC-SLP10FBD-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0002-SA	GAC-SLP10T-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0002-DU	GAC-SLP10TD-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0002-MS	GAC-SLP10TMS-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0003-SA	GAC-SLP10C1-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0004-SA	GAC-SLP10C2-030789	AQUEOUS	07 MAR 89		08 MAR 89
003828-0005-SA	GAC-SLP10C3-030789	AQUEOUS	07 MAR 89		08 MAR 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC # 3828

PPT PAH

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X861

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	3.1	
95-13-6	1H-Indene	1.7	
91-20-3	Naphthalene	16.	B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	7.0	B *
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	11.	B *
90-12-0	1-Methylnaphthalene	6.6	B
92-52-4	Biphenyl	2.2	J
208-96-8	Acenaphthylene	1.5	*
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.9	*
86-73-7	Fluorene	2.3	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	8.3	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	2.2	B
129-00-0	Pyrene	2.6	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X862

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	31.	
95-13-6	1H-Indene	1.0	
91-20-3	Naphthalene	2.8	J B *
4565-32-6	Benzo(B)Thiophene	4.3	*
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.1	B *
90-12-0	1-Methylnaphthalene	2.4	B
92-52-4	Biphenyl	3.2	
208-96-8	Acenaphthylene	5.8	
83-32-9	Acenaphthene	13.	
132-64-9	Dibenzofuran	2.9	
86-73-7	Fluorene	8.5	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	3.5	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	2.9	B
129-00-0	Pyrene	2.3	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-02DUP

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-02DUP

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3557X403

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	27.	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	2.5	J B *
4565-32-6	Benzo(B)Thiophene	3.8	*
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.5	B *
90-12-0	1-Methylnaphthalene	1.9	B
92-52-4	Biphenyl	2.7	
208-96-8	Acenaphthylene	4.9	
83-32-9	Acenaphthene	11.	
132-64-9	Dibenzofuran	2.4	
86-73-7	Fluorene	6.7	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	2.5	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	2.2	B
129-00-0	Pyrene	2.1	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X865

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	1.2	
91-20-3	Naphthalene	2.0	J B *
4565-32-6	Benzo(B)Thiophene	14.	*
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.6	B *
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	2.1	
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.7	B
120-12-7	Anthracene	1.2	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	3.6	B
129-00-0	Pyrene	5.1	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-04

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-04

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X866

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.0	J B *
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	3.0	B
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	3.1	B *
90-12-0	1-Methylnaphthalene	1.7	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	5.9	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	2.0	B
129-00-0	Pyrene	2.0	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-05

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-05

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X867

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	1.9	J B *
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.6	B *
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.6	B *
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	3.8	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.8	B
129-00-0	Pyrene	1.8	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3828-02MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3828-02MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X864

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	50.	
95-13-6	1H-Indene	11.	SP
91-20-3	Naphthalene	14.	B SP
4565-32-6	Benzo(B)Thiophene	7.0	*
91-22-5	Quinoline	26.	B SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	15.	B SP
90-12-0	1-Methylnaphthalene	3.3	B *
92-52-4	Biphenyl	5.2	
208-96-8	Acenaphthylene	9.2	
83-32-9	Acenaphthene	20.	
132-64-9	Dibenzofuran	2.8	
86-73-7	Fluorene	29.	SP
132-65-0	Dibenzothiophene	1.5	
85-01-8	Phenanthrene	5.1	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	3.9	B
129-00-0	Pyrene	3.4	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	13.	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	5.6	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP)	#	S2 (FLU)	#	S3 (CHR)	#
1	3828-01	96		105		88	
2	3828-02	76		89		86	
3	3828-02DUP	7150	*	9250	*	6850	*
4	3828-02MS	5500	*	6800	*	5000	*
5	3828-03	60		80		70	
6	3828-04	90		97		68	
7	3828-05	80		85		71	
	BLK-01	84		64		11	

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C

WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 3828-02

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	1.0	11.	100
Naphthalene	10	2.8	14.	110
Quinolene	10	0.0	26.	260
2-Methylnaphthalene	10	2.1	15.	130
Fluorene	10	8.5	29.	200
Chrysene	10	0.0	13.	130
Benzo(E)Pyrene	10	0.0	5.6	56

COMMENTS:

3C
WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

EPA Sample No.: 3828-02

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Dihydroindene	31.	27.	14
1H-Indene	1.0	ND	NC
Naphthalene	2.8	2.5	11
Benzo(B)Thiophene	4.3	3.8	12
2-Methylnaphthalene	2.1	1.5	33
1-Methylnaphthalene	2.4	1.9	23
Biphenyl	3.2	2.7	17
Acenaphthylene	5.8	4.9	17
Acenaphthene	13.	11.	17
Dibenzofuran	2.9	2.4	19
Fluorene	8.5	6.7	24
Phenanthrene	3.5	2.5	23
Fluoranthene	2.9	2.2	27
Pyrene	2.3	2.1	9.1

COMMENTS:

ND = Not found
NC = Not calculated

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Lab File ID: S3828X860 Lab Sample ID: BLK-01

Date Extracted: 03/13/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 03/31/89 Time Analyzed: 13:07

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3828-01	3828-01	S3828X861	03/31/89
2	3828-02	3828-02	S3828X862	03/31/89
3	3828-02DUP	3828-02DUP	S3828X863	03/31/89
4	3828-02MS	3828-02MS	S3828X864	03/31/89
5	3828-03	3828-03	S3828X865	03/31/89
6	3828-04	3828-04	S3828X866	03/31/89
7	3828-05	3828-05	S3828X867	03/31/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3828 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S3828X860

Level: (low/med) LOW Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/13/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	2.5	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.9	
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.5	*
90-12-0	1-Methylnaphthalene	1.3	J
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	7.8	
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	2.6	
129-00-0	Pyrene	2.3	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3828 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX855	03/31/89	08:54
BLK-01	S3828X860	03/31/89	13:07
3828-01	S3828X861	03/31/89	13:58
3828-02	S3828X862	03/31/89	14:48
3828-02DUP	S3828X863	03/31/89	15:38
3828-02MS	S3828X864	03/31/89	16:29
3828-03	S3828X865	03/31/89	17:19
3828-04	S3828X866	03/31/89	18:08
3828-05	S3828X867	03/31/89	18:58

INITIAL CALIBRATION
PAH COMPOUNDS

CASE NO: ----
CONTRACTOR: RMAL
CONTRACT NO: -----

INSTRUMENT ID: X
CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS 35%

LABORATORY ID:	STDX443	STDX440	STDX444	STDX442	STDX441			
COMPOUND	RF	2. RF	4. RF	24. RF	120. RF	480.	AVG RF	%RSD CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007		1.057	11.2
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904		0.988	14.5
1H-INDENE	1.875	1.762	1.463	1.400	1.535		1.607	12.6
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033		2.214	15.6
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432		1.524	13.1
QUINOLINE	0.733	0.677	0.680	0.784	0.939		0.762	14.1
1H-INDOLE	0.872	0.907	0.826	0.926	1.075		0.921	10.2
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016		1.086	14.1
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030		1.110	14.6
BIPHENYL	1.798	1.739	1.370	1.332	1.419		1.532	14.3
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663		1.616	9.3
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045		1.092	11.8
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487		1.601	15.6
FLUORENE	1.311	1.375	1.145	1.146	1.247		1.245	8.1
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950		1.008	11.8
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966		1.005	12.0
ANTHRACENE	0.962	1.049	0.869	0.884	0.984		0.950	7.7
ACRIDINE	0.810	0.812	0.549	0.652	0.738		0.712	15.7
CARBAZOLE	0.955	1.009	0.764	0.793	0.889		0.882	11.7
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013		1.068	13.6
PYRENE	1.398	1.258	0.932	0.903	0.978		1.094	20.1
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990		1.131	16.6
RYSENE	1.643	1.468	1.057	1.014	0.966		1.230	24.8
ZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014		1.151	22.2
ZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292		1.488	15.7
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048		1.362	29.5
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976		1.089	16.8
PERYLENE	1.239	1.157	0.914	0.929	0.961		1.040	14.2
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130		1.240	17.0
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905		0.977	19.7
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986		1.112	18.1

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

FORM VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: ----
TRACTOR: RMAL
TRACT NO: -----
INSTRUMENT ID: X

CALIBRATION DATE: 03-31-89
TIME: 08:54
LABORATORY ID: STDX855
INITIAL CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.225	-15.8		
2,3-DIHYDROINDENE	0.988	1.040	-5.2		
1H-INDENE	1.607	1.641	-2.1		
NAPHTHALENE	2.214	2.233	-0.8		
BENZO(B)THIOPHENE	1.524	1.386	9.0		
QUINOLINE	0.762	0.557	26.9		
1H-INDOLE	0.921	0.759	17.6		
2-METHYLNAPHTHALENE	1.086	1.006	7.3		
1-METHYLNAPHTHALENE	1.110	1.017	8.4		
BIPHENYL	1.532	1.271	16.9		
ACENAPHTHYLENE	1.616	1.413	12.5		
ACENAPHTHENE	1.092	0.998	8.5		
DIBENZOFURAN	1.601	1.514	5.4		
FLUORENE	1.245	1.101	11.5		
DIBENZOTHIOPHENE	1.008	0.843	16.3		
PHENANTHRENE	1.005	0.876	12.8		
ANTHRACENE	0.950	0.771	18.7		
ACRIDINE	0.712	0.501	29.6		
CARBAZOLE	0.882	0.751	14.8		
FLUORANTHENE	1.068	0.925	13.3		
PYRENE	1.094	0.969	11.3		
BENZO(A)ANTHRACENE	1.131	1.107	2.1		
CHRYSENE	1.230	1.129	8.1		
BENZO(B)FLUORANTHENE	1.151	1.324	-14.9		
BENZO(K)FLUORANTHENE	1.488	1.517	-1.9		
BENZO(E)PYRENE	1.362	1.131	16.9		
BENZO(A)PYRENE	1.089	0.990	9.1		
PERYLENE	1.040	0.908	12.7		
INDENO(1,2,3-CD)PYRENE	1.240	1.012	18.4		
DIBENZ(A,H)ANTHRACENE	0.977	0.796	18.5		
BENZO(G,H,I)PERYLENE	1.112	0.912	17.9		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

FORM VII

8C
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3828 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX855 Date Analyzed: 03/31/89

Instrument ID: 4500-X TIme Analyzed: 08:54

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	146926	251056	148573
UPPER LIMIT	293852	502112	297146
LOWER LIMIT	73463	125528	74286
SAMPLE NO.			
BLK-01	120900	202500	134700
3828-01	121900	214600	143000
3828-02	119700	208200	136500
3828-02DUP	110500	184600	125200
3828-02MS	123200	205100	147300
3828-03	125400	214300	143100
3828-04	120500	206600	146600
3828-05	116800	190900	130800

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 78

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: M. Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status. Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	RMA #	Analysis Parameters	Remarks
3/7/89		GAC-SLP10C2-030789	AmberLiter	6	3828-04	ppt-PAH	
		GAC-SLP10C3-030789	"	"	3828-05	"	
		GAC-SLP10FTOC-030789	16oz Cl	1	~~3831-01~~ 3828	TOC	
		GAC-SLP10TTOC-030789	"	1	~~3831~~ 3828-02	TOC	
		GAC-SLP10C1TOC-030789	"	1	-03	TOC	
		GAC-SLP10C2TOC-030789	"	1	-04	TOC	
3/7/89		GAC-SLP10C3TOC-030789	"	1	-05	TOC	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by. (signed)	Received by: (signed)	Date	Time

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed-X Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/8/89 0815

Enseco Project No. 3828, ~~3831~~

White and Pink Copies to Lab Yellow to Sampler

SS-001

Ense... - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. ... 08

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: M. Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	RMA#	Analysis Parameters	Remarks
3/7/89		GAC-SLP10F-030789	Liter Amber	6		ppt-PAH	MEDIUM
3/7/89		GAC-SLP10FB-030789	"	"	3828-01	"	
3/7/89		GAC-SLP10FBD-030789	"	"	-01DW	"	

pw 3/11/89

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed X Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/8/89 0815

Enseco Project No. 3828

White and Pink Copies to Lab Yellow to Sampler

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Arvada, Colorado 80002
303/421-6611 Facsimile. 303/431-7171

CHAIN OF C TODY

No. 78(

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: M Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
3/7/89		GAC-SLP10T-030789	Amber Liter	6 -02	ppt-PAH	
3/7/89		GAC-SLP 10TD-030789	"	" -02DW	"	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by. (signed)	Received by: (signed)	Date	Time
1			
2			
3			

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed X Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/9/89 0815

Enseco Project No. 3828

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421 6611 Facsimile. 303/431-7171

CHAIN OF CUSTODY

NO. 7010

Attn: _____

Enseco Client: St. City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: M. Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
'89		-SLP10MS-030 89	water	-02 S	t-PAH	
7 8		-SL. -0 0	"	" - 3	"	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed X - Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/8/89 0815

Enseco Project No. 3828

White and Pink Copies to Lab Yellow to Sampler

SS-001

Rocky Mountain
Analytical Laboratory

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

April 18 1989

Enseco - RMAL Project Number 003831

Introduction

One aqueous sample was received at Rocky Mountain Analytical Laboratory on March 8, 1989. The sample was logged in under RMAL project number 003831. A cross reference associating the RMAL sample number to the actual field sample number is included. The sample was analyzed for medium level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

Sample 3831-01 and the associated blank show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I) as per the 1989 QAPP.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson Date: April 18, 1989
Tracy Giberson
Data Control Supervisor

Approved by: Jean Zimmerman Date: April 18, 1989
Jean Zimmerman
Program Administrator

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
003831-0001-SA	GAC-SLP10F-030789	AQUEOUS	07 MAR 89		08 MAR 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC # 3831

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3831-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3831 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 3831-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3831X859

Level: (low/med) MED Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/14/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) N pH: 6.5 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	2100.	
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	590.	
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	190.	
92-52-4	Biphenyl	540.	
208-96-8	Acenaphthylene	870.	
83-32-9	Acenaphthene	1700.	
132-64-9	Dibenzofuran	620.	*
86-73-7	Fluorene	1600.	
132-65-0	Dibenzothiophene	160.	
85-01-8	Phenanthrene	350.	
120-12-7	Anthracene	110.	
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	390.	
129-00-0	Pyrene	330.	
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3831 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	3831-01	88	101	92
2	BLK-01	77	87	80

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 3831 SAS No.: N/A SDG No.: N/A

Lab File ID: S3831X858 Lab Sample ID: BLK-01

Date Extracted: 03/14/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 03/31/89 Time Analyzed: 11:28

Matrix: (soil/water) WATER Level: (low/med) MED

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	3831-01	3831-01	S3831X859	03/31/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 3831 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S3831X858

Level: (low/med) MED Date Received: 03/08/89

% Moisture: not dec. dec. Date Extracted: 03/14/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/31/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U *
496-11-7	2,3-Dihydroindene	110.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U *
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	150.	
90-12-0	1-Methylnaphthalene	130.	U
92-52-4	Biphenyl	340.	U
208-96-8	Acenaphthylene	110.	U
83-32-9	Acenaphthene	100.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	100.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	110.	U
129-00-0	Pyrene	110.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 3831 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX855	03/31/89	08:54
BLK-01	S3831X858	03/31/89	11:28
3831-01	S3831X859	03/31/89	12:16

INITIAL CALIBRATION
PAH COMPOUNDS

'E NO: ——
TRACTOR: RMAL
..NTRACT NO: ———

INSTRUMENT ID: X
CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM % RSD FOR CCC IS 35%

LABORATORY ID: STDX443 STDX444 STDX441 STDX440 STDX442

COMPOUND	RF	2. RF	4. RF	24. RF	120. RF	480.	AVG RF	%RSD	CCS
2,3-BENZOFURAN	1.182	1.186	0.982	0.929	1.007		1.057	11.2	
2,3-DIHYDROINDENE	1.159	1.127	0.902	0.848	0.904		0.988	14.5	
1H-INDENE	1.875	1.762	1.463	1.400	1.535		1.607	12.6	
NAPHTHALENE	2.597	2.578	1.994	1.871	2.033		2.214	15.6	
BENZO(B)THIOPHENE	1.737	1.742	1.376	1.331	1.432		1.524	13.1	
QUINOLINE	0.733	0.677	0.680	0.784	0.939		0.762	14.1	
1H-INDOLE	0.872	0.907	0.826	0.926	1.075		0.921	10.2	
2-METHYLNAPHTHALENE	1.272	1.230	0.973	0.938	1.016		1.086	14.1	
1-METHYLNAPHTHALENE	1.312	1.257	1.001	0.953	1.030		1.110	14.6	
BIPHENYL	1.798	1.739	1.370	1.332	1.419		1.532	14.3	
ACENAPHTHYLENE	1.774	1.733	1.459	1.453	1.663		1.616	9.3	
ACENAPHTHENE	1.237	1.223	0.993	0.961	1.045		1.092	11.8	
DIBENZOFURAN	1.858	1.886	1.373	1.401	1.487		1.601	15.6	
FLUORENE	1.311	1.375	1.145	1.146	1.247		1.245	8.1	
DIBENZOTHIOPHENE	1.149	1.123	0.924	0.892	0.950		1.008	11.8	
PHENANTHRENE	1.153	1.113	0.904	0.890	0.966		1.005	12.0	
ANTHRACENE	0.962	1.049	0.869	0.884	0.984		0.950	7.7	
ACRIDINE	0.810	0.812	0.549	0.652	0.738		0.712	15.7	
CARBAZOLE	0.955	1.009	0.764	0.793	0.889		0.882	11.7	
FLUORANTHENE	1.206	1.240	0.944	0.936	1.013		1.068	13.6	
PYRENE	1.398	1.258	0.932	0.903	0.978		1.094	20.1	
BENZO(A)ANTHRACENE	1.249	1.407	0.993	1.019	0.990		1.131	16.6	
'YSENE	1.643	1.468	1.057	1.014	0.966		1.230	24.8	
ZO(B)FLUORANTHENE	1.201	1.579	0.991	0.972	1.014		1.151	22.2	
NZO(K)FLUORANTHENE	1.568	1.860	1.400	1.321	1.292		1.488	15.7	
BENZO(E)PYRENE	1.870	1.728	1.106	1.059	1.048		1.362	29.5	
BENZO(A)PYRENE	1.301	1.280	0.954	0.936	0.976		1.089	16.8	
PERYLENE	1.239	1.157	0.914	0.929	0.961		1.040	14.2	
INDENO(1,2,3-CD)PYRENE	1.413	1.520	1.072	1.066	1.130		1.240	17.0	
DIBENZ(A,H)ANTHRACENE	0.943	1.318	0.852	0.869	0.905		0.977	19.7	
BENZO(G,H,I)PERYLENE	1.296	1.367	0.969	0.944	0.986		1.112	18.1	

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

FORM VI

CONTINUING CALIBRATION CHECK
PAH COMPOUNDS

CASE NO: ——
CONTRACTOR: RMAL
CONTRACT NO: ——
INSTRUMENT ID: X

CALIBRATION DATE: 03-31-89
TIME: 08:54
LABORATORY ID: STDX855
INITIAL CALIBRATION DATE: 01-16-89

MINIMUM RF FOR SPCC IS 0.050 MAXIMUM %D FOR CCC IS 35%

COMPOUND	AVG RF	RF 4.	% DIFF	CCC	SPCC
2,3-BENZOFURAN	1.057	1.225	-15.8		
2,3-DIHYDROINDENE	0.988	1.040	-5.2		
1H-INDENE	1.607	1.641	-2.1		
NAPHTHALENE	2.214	2.233	-0.8		
BENZO(B)THIOPHENE	1.524	1.386	9.0		
QUINOLINE	0.762	0.557	26.9		
1H-INDOLE	0.921	0.759	17.6		
2-METHYLNAPHTHALENE	1.086	1.006	7.3		
1-METHYLNAPHTHALENE	1.110	1.017	8.4		
BIPHENYL	1.532	1.271	16.9		
ACENAPHTHYLENE	1.616	1.413	12.5		
ACENAPHTHENE	1.092	0.998	8.5		
DIBENZOFURAN	1.601	1.514	5.4		
FLUORENE	1.245	1.101	11.5		
DIBENZOTHIOPHENE	1.008	0.843	16.3		
PHENANTHRENE	1.005	0.876	12.8		
ANTHRACENE	0.950	0.771	18.7		
ACRIDINE	0.712	0.501	29.6		
CARBAZOLE	0.882	0.751	14.8		
FLUORANTHENE	1.068	0.925	13.3		
PYRENE	1.094	0.969	11.3		
BENZO(A)ANTHRACENE	1.131	1.107	2.1		
CHRYSENE	1.230	1.129	8.1		
BENZO(B)FLUORANTHENE	1.151	1.324	-14.9		
BENZO(K)FLUORANTHENE	1.488	1.517	-1.9		
BENZO(E)PYRENE	1.362	1.131	16.9		
BENZO(A)PYRENE	1.089	0.990	9.1		
PERYLENE	1.040	0.908	12.7		
INDENO(1,2,3-CD)PYRENE	1.240	1.012	18.4		
DIBENZ(A,H)ANTHRACENE	0.977	0.796	18.5		
BENZO(G,H,I)PERYLENE	1.112	0.912	17.9		

AVG RF - AVERAGE RESPONSE FACTOR SPCC - SYSTEM PERFORMANCE CHECK COMPOUND(**
%RSD - PERCENT RELATIVE STANDARD DEVIATION
CCC - CALIBRATION CHECK COMPOUNDS(*) # - NOT DETECTABLE AT LOW LEVEL

JJK 4-7-89

FORM VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 3831 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX855 Date Analyzed: 03/31/89

Instrument ID: 4500-X TIme Analyzed: 08:54_00

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	146925	251055	148573
UPPER LIMIT	293850	502110	297146
LOWER LIMIT	73462	125528	74286
SAMPLE NO.			
BLK-01	97400	152300	87600
3831-01	102600	160100	88400

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

pg 2 of 2

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 7811

Attn:

Enseco Client: City St. Louis Park

Project:

Sampling Co.:

Sampling Site:

Team Leader: M. Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal #
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents:
4. Sealed for Shipping by:
5. Initial Contents Temp.: °C Seal #
6. Sampling Status: Done Continuing Until
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: °C
9. Condition of Contents:

Date	Time	Sample ID/Description	Sample Type	No. Containers	~~RMA #~~ Analysis Parameters	Remarks
3/7/89		GAC-SLP10C2-030789	Amber Liter	6	ppt- PAH	
		GAC-SLP10C3-030789	"	"	"	
		GAC-SLP10FTOC-030789	16oz Cl	1 3831	-01 TOC	
		GAC-SLP10TTOC-030789	"	1	TOC	
		GAC-SLP10C1TOC-030789	"	1	TOC	
		GAC-SLP10C2TOC-030789	"	1	TOC	
3/7/89		GAC-SLP10C3TOC-030789	"	1	TOC	

CUSTODY TRANSFERS PRIOR TO SHIPPING

Relinquished by: (signed)	Received by: (signed)	Date	Time

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed-X Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/8/89 0815

Enseco Project No. 3831

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 7008

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: M. Higgins

SAMPLE SAFE™ CONDITIONS

1. Packed by: M. Higgins Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: Good °C
9. Condition of Contents: 10°

Date	Time	Sample ID/Description	Sample Type	No. Containers	RMA #	Analysis Parameters	Remarks
3/7/89		GAC-SLP10F-030789	Liquid Aqueous	6	3831-01	ppt-PAH	MEDIUM per Flow 3/10/89
3/7/89		GAC-SLP10FB-030789	"	"		"	
3/7/89		GAC-SLP10FBD-030789	"	"		"	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: M. Higgins

Method of Shipment: Fed X Airbill # 2865075662

Received for Lab: RMA Signed: [illegible] Date/Time 3/8/89 0815

Enseco Project No. 3831

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco

CASE NARRATIVE

City of St. Louis Park

April 28 1989

Enseco - RMAL Project Number 004190

Introduction

Eight aqueous samples were received at Rocky Mountain Analytical Laboratory on April 5, 1989. The samples were logged in under RMAL project number 004190. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

As requested per Jim Grube, a carbon filtered method blank as well as a DI blank was analyzed and reported with this set of samples.

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

Sample 4190-01MS did not meet secondary ion confirmation for quinoline. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in a sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (FORM I) as per the 1989 QAPP.

The surrogate recovery for D8-Napthalene was quantitated by using the secondary ion in sample 4190-04.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson — **Date:** 4/28/89
Tracy Giberson
Data Control Supervisor

Approved by: Jean Zimmerman FOR — **Date:** 4/28/89
Jean Zimmerman
Program Administrator

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
004190-0001-SA	GAC-SLP10T-040489	AQUEOUS	04 APR 89	14:30	05 APR 89
004190-0001-DU	GAC-SLP10TD-040489	AQUEOUS	04 APR 89	13:30	05 APR 89
004190-0001-MS	GAC-SLP10MS-040489	AQUEOUS	04 APR 89	13:30	05 APR 89
004190-0002-SA	GAC-SLP10FB-040489	AQUEOUS	04 APR 89	13:00	05 APR 89
004190-0002-DU	GAC-SLP10FBD-040489	AQUEOUS	04 APR 89	13:00	05 APR 89
004190-0003-SA	GAC-SLP10C1-040489	AQUEOUS	04 APR 89	14:30	05 APR 89
004190-0004-SA	GAC-SLP10C2-040489	AQUEOUS	04 APR 89	14:30	05 APR 89
004190-0005-SA	GAC-SLP10C3-040489	AQUEOUS	04 APR 89	14:30	05 APR 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA ac# 4190

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X991

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	16.	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.4	J B
4565-32-6	Benzo(B)Thiophene	1.5	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.4	B
90-12-0	1-Methylnaphthalene	1.6	B
92-52-4	Biphenyl	1.7	J
208-96-8	Acenaphthylene	3.8	
83-32-9	Acenaphthene	8.5	
132-64-9	Dibenzofuran	1.3	
86-73-7	Fluorene	5.4	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.2	J
129-00-0	Pyrene	1.5	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-01DUP

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-01DUP

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X992

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	24.	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	1.9	J B
4565-32-6	Benzo(B)Thiophene	2.4	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.1	B
90-12-0	1-Methylnaphthalene	1.2	J B
92-52-4	Biphenyl	2.6	J
208-96-8	Acenaphthylene	6.2	
83-32-9	Acenaphthene	13.	
132-64-9	Dibenzofuran	2.0	
86-73-7	Fluorene	8.4	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.2	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.5	
129-00-0	Pyrene	1.8	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X995

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.1	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.9	B
90-12-0	1-Methylnaphthalene	1.1	J B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.4	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X996

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	4.9	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	3.2	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.9	
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.8	
83-32-9	Acenaphthene	7.3	
132-64-9	Dibenzofuran	1.2	
86-73-7	Fluorene	2.4	
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.2	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	3.8	
129-00-0	Pyrene	7.5	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-04

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-04

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X997

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/14/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.0	J
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	1.4	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.2	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.1	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-05

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-05

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X998

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/14/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.1	J
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4190-01MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4190-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X993

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	15.	
95-13-6	1H-Indene	9.3	SP
91-20-3	Naphthalene	11.	B SP
4565-32-6	Benzo(B)Thiophene	1.5	
91-22-5	Quinoline	29.	* SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	11.	B SP
90-12-0	1-Methylnaphthalene	1.1	J B
92-52-4	Biphenyl	1.9	J
208-96-8	Acenaphthylene	4.0	
83-32-9	Acenaphthene	8.8	
132-64-9	Dibenzofuran	1.3	
86-73-7	Fluorene	17.	SP
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.2	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	
129-00-0	Pyrene	1.5	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	9.9	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	2.6	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X989

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.6	
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

DI BLANK

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: DI BLANK

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4190X990

Level: (low/med) LOW Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/13/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.8	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.0	
90-12-0	1-Methylnaphthalene	1.5	J
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.8	
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	4190-01	82	81	78
2	4190-01DUP	100	93	73
3	4190-01MS	86	90	84
5	4190-02	108	89	92
6	4190-03	77	83	86
7	4190-04	103 **	99	92
8	4190-05	92	89	76
9	BLK01	84	77	83
10	DI BLANK	94	99	96

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

** Surrogate quantitated from secondary ion

3C

WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 4190-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	0.0	9.3	93
Naphthalene	10	3.4	11.	76
Quinoline	10	0.0	29.	290
2-Methylnaphthalene	10	2.4	11.	86
Fluorene	10	5.4	17.	116
Chrysene	10	0.0	9.9	99
Benzo(E)Pyrene	10	0.0	2.6	26

COMMENTS:

3C
WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

EPA Sample No.: 4190-01

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Dihydroindene	16.	24.	40
Naphthalene	3.4	1.9	57
Benzo(B)Thiophene	1.5	2.4	46
2-Methylnaphthalene	2.4	1.1	74
1-Methylnaphthalene	1.6	1.2	29
Biphenyl	1.7	2.6	42
Acenaphthylene	3.8	6.2	48
Acenaphthene	8.5	13.	42
Dibenzofuran	1.3	2.0	42
Fluorene	5.4	8.4	43
Phenanthrene	1.3	1.2	8
Fluoranthene	1.2	1.5	22
Pyrene	1.5	1.8	18

COMMENTS:

ND = Not found
NC = Not calculated

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4190 SAS No.: N/A SDG No.: N/A

Lab File ID: S4190X989 Lab Sample ID: BLK-01

Date Extracted: 04/06/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 04/13/89 Time Analyzed: 17:00

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	DI BLANK	DI BLANK	S4190X990	04/13/89
2	4190-01	4190-01	S4190X991	04/13/89
3	4190-01DUP	4190-01DUP	S4190X992	04/13/89
4	4190-01MS	4190-01MS	S4190X993	04/13/89
6	4190-02	4190-02	S4190X995	04/13/89
7	4190-03	4190-03	S4190X996	04/13/89
8	4190-04	4190-04	S4190X997	04/14/89
9	4190-05	4190-05	S4190X998	04/14/89

COMMENTS:

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4190 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX988	04/13/89	15:41
BLK-01	S4190X989	04/13/89	17:00
DI BLANK	S4190X990	04/13/89	17:53
4190-01	S4190X991	04/13/89	18:46
4190-01DUP	S4190X992	04/13/89	19:40
4190-01MS	S4190X993	04/13/89	20:34
4190-02	S4190X995	04/13/89	22:22
4190-03	S4190X996	04/13/89	23:16
4190-04	S4190X997	04/14/89	00:10
4190-05	S4190X998	04/14/89	1:03

INITIAL CALIBRATION DATA
PAH COMPOUNDS

ıb Name: RMAL Lab Code: Enseco Case No: N/A

Instrument ID: 4500-X Calibration Date(s): 04/13/89

Minimum RF is 0.050 Maximum % RSD is 35%

Lab File ID:	RRF = STDX986	RRF = STDX984				
RRF = STDX987	RRF = STDX985	RRF = STDX983				
COMPOUND	20 PPT RRF	40 PPT RRF	240PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	2.648	2.513	2.437	2.666	2.301	2.513	6.0
D10-Flourene	1.360	1.278	1.306	1.368	1.525	1.367	7.0
D12-Chrysene	1.806	1.706	1.525	1.683	1.696	1.683	6.0
2,3-Benzofuran	1.487	1.438	1.347	1.488	1.513	1.455	4.5
2,3-Dihydroindene	1.481	1.456	1.392	1.541	1.586	1.491	5.0
1H-Indene	1.789	1.797	1.695	1.928	1.885	1.819	5.0
Naphthalene	3.034	2.882	2.745	3.077	2.515	2.851	8.0
Benzo(B)Thiophene	2.359	2.243	2.161	2.410	2.161	2.267	5.0
Quinoline	1.161	1.079	1.173	1.371	1.571	1.271	15.7
1H-Indole	1.641	1.623	1.591	1.803	1.912	1.714	8.0
2-Methylnaphthalene	1.533	1.457	1.414	1.568	1.663	1.527	6.4
.-Methylnaphthalene	1.584	1.508	1.462	1.621	1.693	1.574	5.8
Biphenyl	2.453	2.028	1.954	2.084	2.033	2.110	9.3
Acenaphthylene	1.701	1.683	1.695	2.001	2.111	1.838	11.0
Acenaphthene	1.472	1.310	1.301	1.418	1.539	1.408	7.3
Dibenzofuran	2.268	2.143	2.086	2.222	2.198	2.183	3.2
Flourene	1.608	1.460	1.504	1.619	1.823	1.603	8.8
Dibenzothiophene	1.305	1.218	1.163	1.085	1.329	1.220	8.3
Phenanthrene	1.362	1.263	1.219	1.127	1.355	1.265	7.8
Anthracene	1.089	1.042	1.063	1.035	1.346	1.115	11.7
Acridine	0.805	0.727	0.881	0.883	1.236	0.906	21.5
Carbazole	1.177	1.121	1.091	0.994	1.285	1.134	9.5
Fluoranthene	1.435	1.264	1.276	1.139	1.422	1.307	9.4
Pyrene	1.777	1.361	1.262	1.105	1.394	1.380	18.0
Benzo(A)Anthracene	1.832	1.786	1.580	1.851	1.933	1.796	7.4
Chrysene	1.851	1.896	1.611	1.802	1.843	1.801	6.2
Benzo(B)Fluoranthene	1.938	1.924	1.614	1.911	1.878	1.853	7.3
Benzo(K)Fluoranthene	2.230	1.991	1.602	1.897	2.114	1.967	12.2
Benzo(E)Pyrene	1.780	1.827	1.678	1.867	1.872	1.805	4.4
Benzo(A)Pyrene	1.412	1.437	1.356	1.562	1.750	1.503	10.5
Perylene	1.514	1.429	1.361	1.589	1.813	1.541	11.3
Indeno(1,2,3-CD)Pyrene	1.477	1.466	1.417	1.628	1.646	1.527	6.8
Dibenz(A,H)Anthracene	1.167	1.273	1.199	1.355	1.362	1.271	7.0
Benzo(G,H,I)Perylene	1.480	1.316	1.253	1.434	1.357	1.368	6.6

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

\b Name: RMAL Lab Code: Enseco Case No: 4190

Instrument ID: 4500-X Calibration Date(s): 04/13/89

Lab ID: STDX988 Calibration Time: 15:41

Minimum RF is 0.050 Maximum %RPD is 35%

COMPOUND	INITIAL AVE RRF	40 PPT RRF	%RPD
D8-Naphthalene	2.513	2.502	0.4
D10-Flourene	1.367	1.278	6.5
D12-Chrysene	1.683	1.520	9.7
2,3-Benzofuran	1.455	1.432	1.6
2,3-Dihydroindene	1.491	1.469	1.5
1H-Indene	1.819	1.765	3.0
Naphthalene	2.851	2.845	0.2
Benzo(B)Thiophene	2.267	2.183	3.7
Quinoline	1.271	1.023	19.5
1H-Indole	1.714	1.522	11.2
2-Methylnaphthalene	1.527	1.421	6.9
1-Methylnaphthalene	1.574	1.482	5.8
Biphenyl	2.110	1.901	9.9
Acenaphthylene	1.838	1.564	14.9
Acenaphthene	1.408	1.245	11.6
Dibenzofuran	2.183	2.023	7.3
Flourene	1.603	1.410	12.0
Dibenzothiophene	1.220	1.172	3.9
Phenanthrene	1.265	1.216	3.9
Anthracene	1.115	0.947	15.1
Acridine	0.906	0.639	29.5
Carbazole	1.134	1.019	10.1
Fluoranthene	1.307	1.239	5.2
Pyrene	1.380	1.273	7.8
Benzo(A)Anthracene	1.796	1.552	13.6
Chrysene	1.801	1.624	9.8
Benzo(B)Fluoranthene	1.853	1.677	9.5
Benzo(K)Fluoranthene	1.967	1.520	22.7
Benzo(E)Pyrene	1.805	1.626	9.9
Benzo(A)Pyrene	1.503	1.197	20.4
Perylene	1.541	1.315	14.7
Indeno(1,2,3-CD)Pyrene	1.527	1.306	14.5
Dibenz(A,H)Anthracene	1.271	1.082	14.9
Benzo(G,H,I)Perylene	1.368	1.213	11.3

FORM VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 4190 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX988 Date Analyzed: 04/13/89

Instrument ID: 4500-X TIme Analyzed: 15:41

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	65431	104005	64664
UPPER LIMIT	130862	208010	129328
LOWER LIMIT	32716	52002	32332
SAMPLE NO.			
4190-01	82100	129600	82600
4190-01DUP	68600	115600	79200
4190-01MS	71200	124900	86200
4190-02	68100	107700	70200
4190-02DUP	79100	137100	97700
4190-03	81000	137700	96100
4190-04	73400	119600	76400
4190-05	63300	106900	77000
BLK-01	87800	142200	92900
DI BLANK	78000	128900	90100

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

 1/87 Rev.

FORM VIII SV-2

Enseco

CASE NARRATIVE

City of St. Louis Park

April 28 1989

Enseco - RMAL Project Number 004191

Introduction

One aqueous sample was received at Rocky Mountain Analytical Laboratory on April 5, 1989. The sample was logged in under RMAL project number 004191. A cross reference associating the RMAL sample number to the actual field sample number is included. The sample was analyzed for medium level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

No problems were encountered in the PPT-PAH analysis.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson Date: 4/28/89
Tracy Giberson
Data Control Supervisor

Approved by: Kathryn K. Okonski for Date: 4/28/89
Jean Zimmerman
Program Administrator

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
004191-0001-SA	GAC-SLP10F-040489	AQUEOUS	04 APR 89	14:30	05 APR 89

SUMMARY DATA PACKAGE FOR

City of St. Louis Park

RMA QC# 4191

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4191-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4191-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S4191X999

Level: (low/med) MED Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/07/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/14/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	1800.	
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	340.	
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	92.	J
92-52-4	Biphenyl	370.	
208-96-8	Acenaphthylene	740.	
83-32-9	Acenaphthene	1500.	
132-64-9	Dibenzofuran	390.	
86-73-7	Fluorene	1400.	
132-65-0	Dibenzothiophene	120.	
85-01-8	Phenanthrene	100.	U
120-12-7	Anthracene	93.	
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	200.	
129-00-0	Pyrene	220.	
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4191 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	4191-01	87	87	84
2	BLK-01	89	90	87

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4191 SAS No.: N/A SDG No.: N/A

Lab File ID: S4191X001 Lab Sample ID: BLK-01

Date Extracted: 04/07/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 04/14/89 Time Analyzed: 02:51

Matrix: (soil/water) WATER Level: (low/med) MED

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	4191-01	4191-01	S4191X999	04/14/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S4191X001

Level: (low/med) MED Date Received: 04/05/89

% Moisture: not dec. dec. Date Extracted: 04/07/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 04/14/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	110.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	130.	U
92-52-4	Biphenyl	340.	U
208-96-8	Acenaphthylene	110.	U
83-32-9	Acenaphthene	100.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	100.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	110.	U
129-00-0	Pyrene	110.	U
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4191 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX988	04/13/89	15:41
4191-01	S4191X999	04/14/89	01:57
BLK-01	S4191X001	04/14/89	02:51

INITIAL CALIBRATION DATA
PAH COMPOUNDS

ab Name: RMAL Lab Code: Enseco Case No: 4191

Instrument ID: 4500-X Calibration Date(s): 04/13/89

Minimum RF is 0.050 Maximum % RSD is 35%

Lab File ID:	RRF = STDX986	RRF = STDX984
RRF = STDX987	RRF = STDX985	RRF = STDX983

COMPOUND	20 PPT RRF	40 PPT RRF	240PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	2.648	2.513	2.437	2.666	2.301	2.513	6.0
D10-Flourene	1.360	1.278	1.306	1.368	1.525	1.367	7.0
D12-Chrysene	1.806	1.706	1.525	1.683	1.696	1.683	6.0
2,3-Benzofuran	1.487	1.438	1.347	1.488	1.513	1.455	4.5
2,3-Dihydroindene	1.481	1.456	1.392	1.541	1.586	1.491	5.0
1H-Indene	1.789	1.797	1.695	1.928	1.885	1.819	5.0
Naphthalene	3.034	2.882	2.745	3.077	2.515	2.851	8.0
Benzo(B)Thiophene	2.359	2.243	2.161	2.410	2.161	2.267	5.0
Quinoline	1.161	1.079	1.173	1.371	1.571	1.271	15.7
1H-Indole	1.641	1.623	1.591	1.803	1.912	1.714	8.0
2-Methylnaphthalene	1.533	1.457	1.414	1.568	1.663	1.527	6.4
1-Methylnaphthalene	1.584	1.508	1.462	1.621	1.693	1.574	5.8
Biphenyl	2.453	2.028	1.954	2.084	2.033	2.110	9.3
Acenaphthylene	1.701	1.683	1.695	2.001	2.111	1.838	11.0
Acenaphthene	1.472	1.310	1.301	1.418	1.539	1.408	7.3
Dibenzofuran	2.268	2.143	2.086	2.222	2.198	2.183	3.2
Flourene	1.608	1.460	1.504	1.619	1.823	1.603	8.8
Dibenzothiophene	1.305	1.218	1.163	1.085	1.329	1.220	8.3
Phenanthrene	1.362	1.263	1.219	1.127	1.355	1.265	7.8
Anthracene	1.089	1.042	1.063	1.035	1.346	1.115	11.7
Acridine	0.805	0.727	0.881	0.883	1.236	0.906	21.5
Carbazole	1.177	1.121	1.091	0.994	1.285	1.134	9.5
Fluoranthene	1.435	1.264	1.276	1.139	1.422	1.307	9.4
Pyrene	1.777	1.361	1.262	1.105	1.394	1.380	18.0
Benzo(A)Anthracene	1.832	1.786	1.580	1.851	1.933	1.796	7.4
Chrysene	1.851	1.896	1.611	1.802	1.843	1.801	6.2
Benzo(B)Fluoranthene	1.938	1.924	1.614	1.911	1.878	1.853	7.3
Benzo(K)Fluoranthene	2.230	1.991	1.602	1.897	2.114	1.967	12.2
Benzo(E)Pyrene	1.780	1.827	1.678	1.867	1.872	1.805	4.4
Benzo(A)Pyrene	1.412	1.437	1.356	1.562	1.750	1.503	10.5
Perylene	1.514	1.429	1.361	1.589	1.813	1.541	11.3
Indeno(1,2,3-CD)Pyrene	1.477	1.466	1.417	1.628	1.646	1.527	6.8
Dibenz(A,H)Anthracene	1.167	1.273	1.199	1.355	1.362	1.271	7.0
Benzo(G,H,I)Perylene	1.480	1.316	1.253	1.434	1.357	1.368	6.6

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

ıb Name: RMAL Lab Code: Enseco Case No: 4191

Instrument ID: 4500-X Calibration Date(s): 04/13/89

Lab ID: STDX988 Calibration Time: 15:41

Minimum RF is 0.050 Maximum %RPD is 35%

COMPOUND	INITIAL AVE RRF	40 PPT RRF	%RPD
D8-Naphthalene	2.513	2.502	0.4
D10-Flourene	1.367	1.278	6.5
D12-Chrysene	1.683	1.520	9.7
2,3-Benzofuran	1.455	1.432	1.6
2,3-Dihydroindene	1.491	1.469	1.5
1H-Indene	1.819	1.765	3.0
Naphthalene	2.851	2.845	0.2
Benzo(B)Thiophene	2.267	2.183	3.7
Quinoline	1.271	1.023	19.5
1H-Indole	1.714	1.522	11.2
2-Methylnaphthalene	1.527	1.421	6.9
1-Methylnaphthalene	1.574	1.482	5.8
Biphenyl	2.110	1.901	9.9
Acenaphthylene	1.838	1.564	14.9
Acenaphthene	1.408	1.245	11.6
Dibenzofuran	2.183	2.023	7.3
Flourene	1.603	1.410	12.0
Dibenzothiophene	1.220	1.172	3.9
Phenanthrene	1.265	1.216	3.9
Anthracene	1.115	0.947	15.1
Acridine	0.906	0.639	29.5
Carbazole	1.134	1.019	10.1
Fluoranthene	1.307	1.239	5.2
Pyrene	1.380	1.273	7.8
Benzo(A)Anthracene	1.796	1.552	13.6
Chrysene	1.801	1.624	9.8
Benzo(B)Fluoranthene	1.853	1.677	9.5
Benzo(K)Fluoranthene	1.967	1.520	22.7
Benzo(E)Pyrene	1.805	1.626	9.9
Benzo(A)Pyrene	1.503	1.197	20.4
Perylene	1.541	1.315	14.7
Indeno(1,2,3-CD)Pyrene	1.527	1.306	14.5
Dibenz(A,H)Anthracene	1.271	1.082	14.9
Benzo(G,H,I)Perylene	1.368	1.213	11.3

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 4191 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDX988 Date Analyzed: 04/13/89

Instrument ID: 4500-X TIme Analyzed: 15:41

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	65431	104005	64664
UPPER LIMIT	130862	208010	129328
LOWER LIMIT	32716	52002	32332
SAMPLE NO.			
4191-01	67600	116800	69900
BLK-01	59300	100400	65000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 8357

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: 11 °C
9. Condition of Contents: Good

Date	Time	Sample ID/Description	Sample Type	No. Containers	RMA #	Analysis Parameters	Remarks
4/4/89	1330	GAC-SLP10T-040489	Lt Amber	6	01	ppt-PAH	
?	?	GAC-SLP10TD-0404-89	?	?	01du	?	
		GAC-SLP10MS-040489			01ms		

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by. (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: S.A.

Method of Shipment: FedEx Airbill # 2865075710

Received for Lab: RMAL Signed: [illegible] Date/Time 4/5/89 8:15

Enseco Project No. 4190

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 8316

Attn: _____

Enseco Client: St. Louis Park
Project: _____
Sampling Co.: _____
Sampling Site: _____
Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: S.A. Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: 11 °C
9. Condition of Contents: Good

Date	Time	Sample ID/Description	Sample Type	RMA #	No. Containers	Analysis Parameters	Remarks
4/4/89	1300	GAC-SLP10FB-040489	Lr Amber	02	6	ppt-PAH	
	〃	GAC-SLP10FBD-040489	〃	02dup	6	〃	
		GAC-SLP10TB-040489	do not analyze per J. Burbi SLP 4/5/89		6		Trip Blank

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: S.A.
Method of Shipment: FedEX Airbill # 2865075710
Received for Lab: RMAL Signed: [illegible] Date/Time 4/5/89 8:15
Enseco Project No. 4190

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 8315

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: S. Anderson Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: 11 °C
9. Condition of Contents: 1 BROKEN 1 LITER GAC-SLP10C3

Date	Time	Sample ID/Description	Sample Type	No. Containers	RMA# Analysis Parameters	Remarks
4/4/89	1400	GAC-SLP10C1 - 040489	liter Amber	6	- 03 ppt- PAH	
		~~[illegible] - 040489~~		~~[illegible]~~	~~-04~~ JGH ~~[illegible]~~	
		GAC-SLP10C2 - 040489			- ~~05~~ -04	
		GAC-SLP10C3 - 040489			-05	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: S. Anderson

Method of Shipment: FEDEX Airbill # 2865075710

Received for Lab: RMAL Signed: SCWyatt Date/Time 4/5/89 8:15

Enseco Project No. 4190

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 8358

Attn: _____

Enseco Client: St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: Scott Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: (Yes) No
8. Contents Temperature Upon Receipt by Lab: 11 °C
9. Condition of Contents: GOOD

Date	Time	Sample ID/Description	Sample Type	No. Containers	LAB #	Analysis Parameters	Remarks
4/4/89	1430	GAC-SLP10F - 040489	Ltr Amber	6		PPT-PAH	HIGH PPT-PAH
		GAC-SLP10F TOC-040489	16oz Cl.	1		TOC	
		GAC-SLP10T TOC-040489		-01			
		GAC-SLP10C1 TOC-040489		-03			
		GAC-SLP10C2 TOC-040489		-04			
		GAC-SLP10C3 TOC-040489		-05			

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed Ex Airbill # 2865025710

Received for Lab: Alex Rejzer RMAL Signed: Alex Rejzer Date/Time 4/5/89 08:15

Enseco Project No. 4190

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

May 25, 1989

Enseco - RMAL Project Number 004703

Introduction

Six aqueous samples were received at Enseco Rocky Mountain Analytical Laboratory on May 2, 1989. Sample GAC-SLP10FBD-050189 was extracted and held as per the QAPP. The remaining samples were logged in under RMAL project number 004703. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

All samples show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in the sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with an asterisk (*) on the data sheets (Form I) as per the 1989 QAPP.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 5/25/89
Tracy Giberson
Data Control Supervisor

Approved by: Jean Zimmerman **Date:** 5/25/89
Jean Zimmerman
Program Administrator

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
004703-0001-SA	GAC-SLP10T-050189	AQUEOUS	01 MAY 89		02 MAY 89
004703-0001-DU	GAC-SLP10TD-050189	AQUEOUS	01 MAY 89		02 MAY 89
004703-0001-MS	GAC-SLP10MS-050189	AQUEOUS	01 MAY 89		02 MAY 89
004703-0002-SA	GAC-SLP10FB-050189	AQUEOUS	01 MAY 89		02 MAY 89
004703-0002-DU	GAC-SLP10FBD-050189	AQUEOUS	01 MAY 89		02 MAY 89
004703-0003-SA	GAC-SLP10C1-050189	AQUEOUS	01 MAY 89		02 MAY 89

SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 4703

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4703-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4703-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X318

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/14/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	53.	
95-13-6	1H-Indene	1.8	
91-20-3	Naphthalene	3.6	J
4565-32-6	Benzo(B)Thiophene	8.4	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.7	
90-12-0	1-Methylnaphthalene	3.5	B
92-52-4	Biphenyl	6.4	
208-96-8	Acenaphthylene	9.2	*
83-32-9	Acenaphthene	28.	
132-64-9	Dibenzofuran	6.8	
86-73-7	Fluorene	16.	
132-65-0	Dibenzothiophene	1.6	
85-01-8	Phenanthrene	3.6	B
120-12-7	Anthracene	1.1	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	3.8	B
129-00-0	Pyrene	3.6	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4703-01DUP

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4703-01DUP

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X319

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/14/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	54.	
95-13-6	1H-Indene	1.7	
91-20-3	Naphthalene	2.1	J
4565-32-6	Benzo(B)Thiophene	8.7	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.1	
90-12-0	1-Methylnaphthalene	3.3	B
92-52-4	Biphenyl	6.2	
208-96-8	Acenaphthylene	14.	*
83-32-9	Acenaphthene	29.	
132-64-9	Dibenzofuran	7.0	
86-73-7	Fluorene	17.	
132-65-0	Dibenzothiophene	1.7	
85-01-8	Phenanthrene	3.7	B
120-12-7	Anthracene	1.1	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	4.3	B *
129-00-0	Pyrene	4.0	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4703-01MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4703-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X320

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	53.	
95-13-6	1H-Indene	9.4	SP
91-20-3	Naphthalene	10.	SP
4565-32-6	Benzo(B)Thiophene	8.5	
91-22-5	Quinoline	10.	SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	9.4	SP
90-12-0	1-Methylnaphthalene	3.3	B
92-52-4	Biphenyl	6.4	
208-96-8	Acenaphthylene	13.	*
83-32-9	Acenaphthene	29.	
132-64-9	Dibenzofuran	6.8	
86-73-7	Fluorene	25.	SP
132-65-0	Dibenzothiophene	1.5	
85-01-8	Phenanthrene	3.1	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	3.8	B
129-00-0	Pyrene	3.7	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	7.2	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	2.2	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4703-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4703-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X321

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	4.9	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.7	
90-12-0	1-Methylnaphthalene	1.6	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.4	*
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.6	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.3	J B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4703-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4703-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X337

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/16/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	6.8	
91-20-3	Naphthalene	4.1	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.7	*
90-12-0	1-Methylnaphthalene	1.4	J B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	B *
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	4703-01	67	60	79
2	4703-02	75	67	64
3	4703-03	49	47	11
4	4703-01DUP	82	68	84
5	4703-01MS	76	68	63
6	BLK01	56	60	50

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 4703-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	1.8	9.4	76
Naphthalene	10	3.6	10.	64
Quinoline	10	0.0	10.	100
2-Methylnaphthalene	10	1.7	9.4	77
Fluorene	10	16.	25.	90
Chrysene	10	0.0	7.2	72
Benzo(E)Pyrene	10	0.0	2.2	22

COMMENTS:

3C

WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

EPA Sample No.: 4703-01

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Dihydroindene	53.	54.	2
1H-Indene	1.8	1.7	6
Naphthalene	3.6	2.1	53
Benzo(B)Thiophene	8.4	8.7	4
2-Methylnaphthalene	1.7	1.1	43
1-Methylnaphthalene	3.5	3.3	6
Biphenyl	6.4	6.2	3
Acenaphthylene	9.2	14.	41
Acenaphthene	28.	29.	4
Dibenzofuran	6.8	7.0	3
Fluorene	16.	17.	6
Dibenzothiophene	1.6	1.7	6
Phenanthrene	3.6	3.7	3
Anthracene	1.1	1.1	0
Fluoranthene	3.8	4.3	12
Pyrene	3.6	4.0	11

COMMENTS:

ND = Not found
NC = Not calculated

4B

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Lab File ID: S4703X323 Lab Sample ID: BLK01

Date Extracted: 05/06/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 05/15/89 Time Analyzed: 02:47

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	4703-01	4703-01	S4703X318	05/14/89
2	4703-02	4703-02	S4703X321	05/15/89
3	4703-03	4703-03	S4703X337	05/16/89
4	4703-01MS	4703-01MS	S4703X320	05/15/89
5	4703-01DUP	4703-01DUP	S4703X319	05/14/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4703 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S4703X323

Level: (low/med) LOW Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/06/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/89

GPC Cleanup: (Y/N) pH: 6.5 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.7	
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.8	
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.2	J
129-00-0	Pyrene	1.4	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
57-97-6	7,12-Dimethylbenzanthracene	2.8	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
56-49-5	3-Methylcholanthrene	3.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U
215-58-7	Dibenz(A,C)Anthracene	1.6	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4703 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX314	05/14/89	18:01
4703-01	S4703X318	05/14/89	22:25
4703-02	S4703X321	05/15/89	01:02
4703-01MS	S4703X320	05/15/89	00:10
4703-01DUP	S4703X319	05/14/89	23:18
BLK01	S4703X323	05/15/89	02:47

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4703 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX334	05/15/89	23:41
4703-03	S4703X337	05/16/89	07:49

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

May 25, 1989

Enseco - RMAL Project Number 004706

Introduction

One aqueous sample was received at Enseco Rocky Mountain Analytical Laboratory on May 2, 1989. The sample was logged in under RMAL project number 004706. A cross reference associating the RMAL sample numbers to actual field sample numbers is included. The sample was analyzed for medium level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Internal Quality Control Processes, Corrective Actions, and Resolution

All quality control and/or analytical problems encountered in processing the samples and corrective actions taken have been summarized below as per the 1989 QAPP.

PPT PAH

There were no problems encountered in the medium level ppt-PAH analysis.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson Date: 5/25/89
Tracy Giberson
Data Control Supervisor

Approved by: Jean Zimmerman Date: 5/25/89
Jean Zimmerman
Program Administrator

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
004706-0001-SA	GAC-SLP10F-050189	AQUEOUS	01 MAY 89		02 MAY 89

SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 4706

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

4706-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4706 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 4706-01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S4706X338

Level: (low/med) MED Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/16/89

GPC Cleanup: (Y/N) pH: 7.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	1800.	
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	500.	
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	160.	
92-52-4	Biphenyl	470.	
208-96-8	Acenaphthylene	810.	
83-32-9	Acenaphthene	1700.	
132-64-9	Dibenzofuran	670.	
86-73-7	Fluorene	1500.	
132-65-0	Dibenzothiophene	140.	
85-01-8	Phenanthrene	300.	
120-12-7	Anthracene	98.	
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	350.	
129-00-0	Pyrene	300.	B
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4706 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	4706-01	90	97	90
2	BLK01	64	72	95

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 4706 SAS No.: N/A SDG No.: N/A

Lab File ID: S4706X315 Lab Sample ID: BLK01

Date Extracted: 05/04/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 05/14/89 Time Analyzed: 19:50

Matrix: (soil/water) WATER Level: (low/med) MED

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	4706-01	4706-01	S4706X338	05/16/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 4706 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 500 (g/ml) ML Lab File ID: S4706X315

Level: (low/med) MED Date Received: 05/02/89

% Moisture: not dec. dec. Date Extracted: 05/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/14/89

GPC Cleanup: (Y/N) pH: 6.0 Dilution Factor: 10.0

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	410.	U
496-11-7	2,3-Dihydroindene	110.	U
95-13-6	1H-Indene	72.	U
91-20-3	Naphthalene	520.	U
4565-32-6	Benzo(B)Thiophene	72.	U
91-22-5	Quinoline	110.	U
120-72-9	1H-Indole	200.	U
91-57-6	2-Methylnaphthalene	72.	U
90-12-0	1-Methylnaphthalene	130.	U
92-52-4	Biphenyl	340.	U
208-96-8	Acenaphthylene	110.	U
83-32-9	Acenaphthene	100.	U
132-64-9	Dibenzofuran	80.	U
86-73-7	Fluorene	80.	U
132-65-0	Dibenzothiophene	88.	U
85-01-8	Phenanthrene	100.	U
120-12-7	Anthracene	88.	U
260-94-6	Acridine	230.	U
86-74-8	Carbazole	150.	U
206-44-0	Fluoranthene	110.	U
129-00-0	Pyrene	35.	J
56-55-3	Benzo(A)Anthracene	200.	U
218-01-9	Chrysene	220.	U
205-99-2	Benzo(B)Fluoranthene	200.	U
207-08-9	Benzo(K)Fluoranthene	180.	U
57-97-6	7,12-Dimethylbenzanthracene	220.	U
192-97-2	Benzo(E)Pyrene	150.	U
50-32-8	Benzo(A)Pyrene	180.	U
198-55-0	Perylene	200.	U
56-49-5	3-Methylcholanthrene	280.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	170.	U
53-70-3	Dibenz(A,H)Anthracene	130.	U
191-24-2	Benzo(G,H,I)Perylene	220.	U
215-58-7	Dibenz(A,C)Anthracene	130.	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4706 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX314	05/14/89	18:01
BLK-01	S4706X315	05/14/89	18:50

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 4706 SAS No: N/A SGD No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 ppt PAH STD	STDX334	05/15/89	23:41
4706-01	S4706X338	05/16/89	08:44

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

August 22, 1989

Enseco - RMAL Project Number 005568

Introduction

Five aqueous samples (includes MS) were received at Enseco Rocky Mountain Analytical Laboratory on June 30, 1989. The samples were logged in under RMAL project number 005568. Sample GAC-SLP15FBD-0629899 (RMA # 005568-03) was extracted and held as per the QAPP. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in the 1989 QAPP for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered which would impact the interpretation or use of data in this report.

PPT PAH

Samples 5568-01, 01MS, 02 and the associated blank show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in the sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with asterisk (*) on the data sheets (Form I) as per the 1989 QAPP.

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax· 303/431-7171

The 1989 QAPP sets forth specific requirements for the measurement of benzo(j)fluoranthene. Results have not been provided previously for this compound. The special procedure in the QAPP will be implemented on all future projects.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 8/22/89
Tracy Giberson
Data Control Supervisor

Approved by: Debbie Fazio **Date:** 8/22/89
Debbie Fazio
Program Administrator

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
005568-0001-SA	GAC-SLP15T-062989	AQUEOUS	29 JUN 89		30 JUN 89
005568-0001-MS	GAC-SLP15TMS-062989	AQUEOUS	29 JUN 89		30 JUN 89
005568-0002-SA	GAC-SLP15TD-062989	AQUEOUS	29 JUN 89		30 JUN 89
005568-0003-SA	GAC-SLP15FBD-062989	AQUEOUS	29 JUN 89		30 JUN 89
005568-0004-SA	GAC-SLP15FB-062989	AQUEOUS	29 JUN 89		30 JUN 89

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for

City of St. Louis Park

RMAL QC# 5568

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6. Matrix Spike Duplicate Data.....N/A

SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 5568

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5568-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5568-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5568Z569

Level: (low/med) LOW Date Received: 06/30/89

% Moisture: not dec. dec. Date Extracted: 07/03/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 07/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	66.	B
95-13-6	1H-Indene	2.2	
91-20-3	Naphthalene	2.0	J B
4565-32-6	Benzo(B)Thiophene	10.	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.4	B
90-12-0	1-Methylnaphthalene	2.8	B *
92-52-4	Biphenyl	7.6	
208-96-8	Acenaphthylene	17.	
83-32-9	Acenaphthene	35.	
132-64-9	Dibenzofuran	8.7	
86-73-7	Fluorene	21.	
132-65-0	Dibenzothiophene	2.0	
85-01-8	Phenanthrene	2.6	B
120-12-7	Anthracene	1.7	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	4.7	
129-00-0	Pyrene	5.0	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5568-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5568-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5568Z571

Level: (low/med) LOW Date Received: 06/30/89

% Moisture: not dec. dec. Date Extracted: 07/03/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 07/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	68.	B
95-13-6	1H-Indene	2.3	
91-20-3	Naphthalene	2.1	J B
4565-32-6	Benzo(B)Thiophene	10.	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.4	B
90-12-0	1-Methylnaphthalene	2.6	B
92-52-4	Biphenyl	7.5	
208-96-8	Acenaphthylene	18.	
83-32-9	Acenaphthene	35.	
132-64-9	Dibenzofuran	8.6	
86-73-7	Fluorene	21.	
132-65-0	Dibenzothiophene	2.1	*
85-01-8	Phenanthrene	2.9	B
120-12-7	Anthracene	1.9	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	4.9	
129-00-0	Pyrene	5.1	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5568-04

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5568-04

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5568Z572

Level: (low/med) LOW Date Received: 06/30/89

% Moisture: not dec. dec. Date Extracted: 07/03/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 07/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	1.1	J
496-11-7	2,3-Dihydroindene	12.	B
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	5.7	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.1	B
90-12-0	1-Methylnaphthalene	1.2	J B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.0	J B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.2	J B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5568-01MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5568-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5568Z570

Level: (low/med) LOW Date Received: 06/30/89

% Moisture: not dec. dec. Date Extracted: 07/03/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 07/28/89

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	110.	B
95-13-6	1H-Indene	12.	SP
91-20-3	Naphthalene	11.	B SP
4565-32-6	Benzo(B)Thiophene	19.	
91-22-5	Quinoline	12.	SP
120-72-9	1H-Indole	1.0	J
91-57-6	2-Methylnaphthalene	11.	B SP
90-12-0	1-Methylnaphthalene	4.6	B*
92-52-4	Biphenyl	15.	
208-96-8	Acenaphthylene	34.	
83-32-9	Acenaphthene	64.	
132-64-9	Dibenzofuran	18.	
86-73-7	Fluorene	53.	SP
132-65-0	Dibenzothiophene	4.2	*
85-01-8	Phenanthrene	5.0	B
120-12-7	Anthracene	3.3	*
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.2	J
206-44-0	Fluoranthene	9.2	
129-00-0	Pyrene	8.5	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	9.1	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	2.8	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	5568-01	65	68	44
2	5568-02	60	66	58
3	5568-04	76	78	69
4	5568-01MS	77	69	66
5	BLK01	69	74	69

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C

WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 5568-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	2.2	12.	98
Naphthalene	10	2.0	11.	90
Quinoline	10	ND	12.	120
2-Methylnaphthalene	10	1.4	11.	96
Fluorene	10	21.	53.	320
Chrysene	10	ND	9.1	91
Benzo(E)Pyrene	10	ND	2.8	28

COMMENTS:

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Lab File ID: S5568Z573 Lab Sample ID: BLK01

Date Extracted: 07/03/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 07/28/89 Time Analyzed: 06:08

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-Z

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	5568-01	5568-01	S5568Z569	07/28/89
2	5568-02	5568-02	S5568Z571	07/28/89
3	5568-04	5568-04	S5568Z572	07/28/89
4	5568-01MS	5568-01MS	S5568Z570	07/28/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5568 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5568Z573

Level: (low/med) LOW Date Received: 06/30/89

% Moisture: not dec. dec. Date Extracted: 07/03/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 07/28/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	1.2	J	
95-13-6	1H-Indene	0.9	U	
91-20-3	Naphthalene	2.8	J	*
4565-32-6	Benzo(B)Thiophene	0.9	U	
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	2.5	U	
91-57-6	2-Methylnaphthalene	2.0		*
90-12-0	1-Methylnaphthalene	1.2	J	*
92-52-4	Biphenyl	4.3	U	
208-96-8	Acenaphthylene	1.4	U	
83-32-9	Acenaphthene	1.3	U	
132-64-9	Dibenzofuran	1.0	U	
86-73-7	Fluorene	1.0	U	
132-65-0	Dibenzothiophene	1.1	U	
85-01-8	Phenanthrene	1.1	J	
120-12-7	Anthracene	1.1	U	
260-94-6	Acridine	2.9	U	
86-74-8	Carbazole	1.9	U	
206-44-0	Fluoranthene	1.4	U	
129-00-0	Pyrene	1.1	J	
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No: N/A

Lab Code: ENSECO Case No: 5568 SAS No: N/A SDG No: N/A

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 PPT PAH STD	STDZ565	07/27/89	22:12
5568-01	S5568Z569	07/28/89	02:40
5568-01MS	S5568Z570	07/28/89	03:32
5568-02	S5568Z571	07/28/89	04:24
5568-04	S5568Z572	07/28/89	05:16
BLK01	S5568Z573	07/28/89	06:08

INITIAL CALIBRATION DATA
PAH COMPOUNDS

Lab Name: RMAL Lab Code: Enseco Case No: 5568

Instrument ID: 4500-Z Calibration Date(s): 07/11/89

Minimum RRF is 0.050 Maximum % RSD is 35%

Lab File ID: RRF 40.= STDZ338 RRF 1200.= STDZ337
RRF 20.= STDZ335 RRF 240.= STDZ334 RRF 4800.= STDZ332

COMPOUND	20 PPT RRF	40 PPT RRF	240 PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	1.931	2.037	2.441	2.318	1.722	2.090	13.9
D10-Flourene	2.201	1.340	1.625	1.444	1.286	1.579	23.5
D12-Chrysene	1.356	1.460	1.519	1.461	1.152	1.390	10.4
2,3-Benzofuran	1.061	1.104	1.285	1.165	0.992	1.121	9.9
2,3-Dihydroindene	1.047	1.126	1.301	1.176	1.011	1.132	10.1
1H-Indene	1.367	1.474	1.714	1.537	1.287	1.476	11.1
Naphthalene	2.165	2.305	2.680	2.508	1.855	2.303	13.8
Benzo(B)Thiophene	1.873	1.936	2.223	2.057	1.665	1.951	10.7
Quinoline	0.783	0.938	1.280	1.289	1.213	1.101	20.7
1H-Indole	1.249	1.357	1.673	1.634	1.427	1.468	12.4
2-Methylnaphthalene	1.127	1.150	1.349	1.289	1.125	1.208	8.6
1-Methylnaphthalene	1.158	1.304	1.470	1.381	1.188	1.300	10.0
Biphenyl	1.834	1.802	2.315	2.029	1.664	1.929	13.1
Acenaphthylene	1.963	2.112	2.485	2.352	1.870	2.156	12.0
Acenaphthene	1.385	1.403	1.711	1.458	1.263	1.444	11.5
Dibenzofuran	1.974	1.970	2.465	2.219	1.740	2.074	13.3
Flourene	1.599	1.674	1.869	1.707	1.436	1.657	9.5
Dibenzothiophene	1.206	1.338	1.488	1.476	1.061	1.314	13.9
Phenanthrene	1.537	1.477	1.554	1.475	1.099	1.428	13.1
Anthracene	1.296	1.318	1.503	1.433	1.066	1.323	12.6
Acridine	0.967	0.953	1.223	1.229	1.017	1.078	12.7
Carbazole	1.096	1.121	1.353	1.355	1.077	1.200	11.8
Fluoranthene	1.621	1.563	1.762	1.717	1.237	1.580	13.1
Pyrene	1.430	1.441	1.782	1.639	1.148	1.488	16.1
Benzo(A)Anthracene	1.410	1.647	1.726	1.873	1.434	1.618	12.2
Chrysene	1.504	1.736	1.696	1.721	1.366	1.605	10.2
Benzo(B)Fluoranthene	1.315	1.653	1.941	1.777	1.476	1.632	15.1
Benzo(K)Fluoranthene	1.677	1.912	1.743	2.015	1.404	1.750	13.4
Benzo(E)Pyrene	1.450	1.667	1.802	1.882	1.304	1.621	14.9
Benzo(A)Pyrene	1.382	1.403	1.574	1.659	1.349	1.473	9.2
Perylene	1.363	1.425	1.630	1.734	1.372	1.505	11.1
Indeno(1,2,3-CD)Pyrene	1.350	1.543	1.745	1.934	1.622	1.639	13.3
Dibenz(A,H)Anthracene	1.087	1.202	1.418	1.549	1.279	1.307	13.9
Benzo(G,H,I)Perylene	1.216	1.452	0.561	1.493	1.385	1.221	31.4

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

`ab Name: RMAL Lab Code: Enseco Case No: 5568

Instrument ID: 4500-Z Calibration Date(s): 07/27/89 Time: 22:12

Lab ID: STDZ565 Initial Calibration Date : 07/11/89

Minimum RRF is 0.050 Maximum %D is 35%

COMPOUND	RRF	40 PPT RRF	%D
D8-Naphthalene	2.090	2.021	3.3
D10-Fluorene	1.579	1.305	17.4
D12-Chrysene	1.390	1.415	-1.8
2,3-Benzofuran	1.121	1.001	10.7
2,3-Dihydroindene	1.132	1.040	8.1
1H-Indene	1.476	1.351	8.5
Naphthalene	2.303	2.455	-6.6
Benzo(B)Thiophene	1.951	1.811	7.2
Quinoline	1.101	1.086	1.4
1H-Indole	1.468	1.392	5.2
2-Methylnaphthalene	1.208	1.220	-1.0
1-Methylnaphthalene	1.300	1.238	4.8
Biphenyl	1.929	1.845	4.4
Acenaphthylene	2.156	2.041	5.3
Acenaphthene	1.444	1.404	2.8
Dibenzofuran	2.074	1.944	6.3
Flourene	1.657	1.513	8.7
Dibenzothiophene	1.314	1.285	2.2
Phenanthrene	1.428	1.395	2.3
Anthracene	1.323	1.302	1.6
Acridine	1.078	1.190	-10.4
Carbazole	1.200	1.311	-9.3
Fluoranthene	1.580	1.508	4.6
Pyrene	1.488	1.756	-18.0
Benzo(A)Anthracene	1.618	1.796	-11.0
Chrysene	1.605	1.642	-2.3
Benzo(B)Fluoranthene	1.632	1.705	-4.5
Benzo(K)Fluoranthene	1.750	1.528	12.7
Benzo(E)Pyrene	1.621	1.624	-0.2
Benzo(A)Pyrene	1.473	1.434	2.6
Perylene	1.505	1.596	-6.0
Indeno(1,2,3-CD)Pyrene	1.639	1.502	8.4
Dibenz(A,H)Anthracene	1.307	1.263	3.4
Benzo(G,H,I)Perylene	1.221	1.338	-9.6

FORM VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 5568 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDZ565 Date Analyzed: 07/27/89

Instrument ID: 4500-Z Time Analyzed: 22:12

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	167500	261500	172900
UPPER LIMIT	335000	523000	345800
LOWER LIMIT	83800	130800	86400
SAMPLE NO.			
5568-01	182700	296300	273200
5568-02	169100	269500	190600
5568-04	192900	321700	255000
5568-01MS	163600	271500	216100
BLK01	202300	339500	258300

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

FORM VIII SV-2

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 9043

Attn: _____

Enseco Client: St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: 14.3 °C
9. Condition of Contents: 1 bottle broken 16 FB

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
1 MS 6/29/89		GAC-SLP15TMS - 062989	Amber	6	PPT-PAH	
4		GAC-SLP15FB - 062989	Amber	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by. (signed)	Received by (signed)	Date	Time
1	S. Anderson		6/29/89	1400
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill # 2865075861

Received for Lab: RMA Signed: CF Date/Time 6-30-89 05:30

Enseco Project No. _____

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 5039

Attn: _____

Enseco Client: St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal #: _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal #: _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: 14.3 °C
9. Condition of Contents: OK

	Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
1	6/29/89		GAC-SLP15T - 062989	Amber	6	PPT-PAH	
2			GAC-SLP15TD - 062989	Amber	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	[signature]		6/29/89	1400
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill #: 2865075861

Received for Lab: RMA Signed: [signature] Date/Time: 6/30/89 0830

Enseco Project No.: _____

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 9842

Attn:

Enseco Client: St. Louis Park

Project:

Sampling Co.:

Sampling Site:

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal #
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents:
4. Sealed for Shipping by:
5. Initial Contents Temp.: °C Seal #
6. Sampling Status: Done Continuing Until
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: 14.5 °C
9. Condition of Contents: ok

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
6/29/89	RMA 5568-03	GAC-SLP15FBD - 062989	Amber	6	PPT-PAH	
5562-03MS		MSH-SLP12MS - 062989	Amber	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	[signature]		6/29/89	1400
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill # 2865075841

Received for Lab: RMA Signed: [signature] Date/Time 6-29-89 08:30

Enseco Project No. 5562

White and Pink Copies to Lab Yellow to Sampler

RR-001

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

September 6, 1989

Enseco - RMAL Project Number 005936

Introduction

Five aqueous samples (includes MS) were received at Enseco Rocky Mountain Analytical Laboratory on August 1, 1989. The samples were logged in under RMAL project number 005936. Sample GAC-SLP10FBD-073189 (RMA # 005936-04) was extracted and held as per the QAPP. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in the 1989 QAPP for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered which would impact the interpretation or use of data in this report.

PPT PAH

Samples 5936-01, 02 and 01MS show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in the sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with asterisk (*) on the data sheets (Form I) as per the 1989 QAPP.

The matrix spike recovery for fluorene could not be calculated due to high concentrations of this compounds present in the sample.

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax· 303/431-7171

The 1989 QAPP sets forth specific requirements for the measurement of benzo(j)fluoranthene. Results have not been provided previously for this compound. The special procedure in the QAPP will be implemented on all future projects.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 9/6/89
Tracy Giberson
Data Control Supervisor

Approved by: Debbie Fazio **Date:** 9/6/89
Debbie Fazio
Program Administrator

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
005936-0001-SA	GAC-SLP10T-073189	AQUEOUS	31 JUL 89	13:30	01 AUG 89
005936-0001-MS	GAC-SLP10MS-073189	AQUEOUS	31 JUL 89	13:30	01 AUG 89
005936-0002-SA	GAC-SLP10TD-073189	AQUEOUS	31 JUL 89	13:30	01 AUG 89
005936-0003-SA	GAC-SLP10FB-073189	AQUEOUS	31 JUL 89	13:30	01 AUG 89
005936-0004-SA	GAC-SLP10FBD-073189	AQUEOUS	31 JUL 89	13:30	01 AUG 89

TABLE OF CONTENTS

for

City of St. Louis Park

RMAL QC# 5936

PAH

1. QC Summary Package.....001
2. Sample Data Package.....005
3. Standards Data Package..... 141
4. Blank Raw Data..... 427
5. Matrix Spike Data.....473
6. Matrix Spike Duplicate Data.....N/A

SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 5936

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5936-01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5936-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5936Z929

Level: (low/med) LOW Date Received: 08/01/89

% Moisture: not dec. dec. Date Extracted: 08/05/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 08/30/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	5.1	U	
496-11-7	2,3-Dihydroindene	250.		
95-13-6	1H-Indene	8.2		
91-20-3	Naphthalene	4.7	J B	
4565-32-6	Benzo(B)Thiophene	49.		
91-22-5	Quinoline	1.4	U	
120-72-9	1H-Indole	1.2	J	
91-57-6	2-Methylnaphthalene	2.1		
90-12-0	1-Methylnaphthalene	16.		
92-52-4	Biphenyl	42.		
208-96-8	Acenaphthylene	80.		
83-32-9	Acenaphthene	160.		
132-64-9	Dibenzofuran	56.		
86-73-7	Fluorene	120.		
132-65-0	Dibenzothiophene	9.9		*
85-01-8	Phenanthrene	19.		
120-12-7	Anthracene	7.4		
260-94-6	Acridine	1.8	J	*
86-74-8	Carbazole	3.4		
206-44-0	Fluoranthene	23.		
129-00-0	Pyrene	20.		
56-55-3	Benzo(A)Anthracene	2.5	U	
218-01-9	Chrysene	2.8	U	
205-99-2	Benzo(B)Fluoranthene	2.5	U	
207-08-9	Benzo(K)Fluoranthene	2.3	U	
192-97-2	Benzo(E)Pyrene	1.9	U	
50-32-8	Benzo(A)Pyrene	2.3	U	
198-55-0	Perylene	2.5	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U	
53-70-3	Dibenz(A,H)Anthracene	1.6	U	
191-24-2	Benzo(G,H,I)Perylene	2.8	U	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5936-02

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5936-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5936Z931

Level: (low/med) LOW Date Received: 08/01/89

% Moisture: not dec. dec. Date Extracted: 08/05/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 08/30/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	110.	
95-13-6	1H-Indene	3.3	
91-20-3	Naphthalene	2.8	J B
4565-32-6	Benzo(B)Thiophene	18.	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.6	
90-12-0	1-Methylnaphthalene	6.1	
92-52-4	Biphenyl	15.	
208-96-8	Acenaphthylene	30.	
83-32-9	Acenaphthene	62.	
132-64-9	Dibenzofuran	19.	
86-73-7	Fluorene	41.	
132-65-0	Dibenzothiophene	3.4	*
85-01-8	Phenanthrene	7.1	
120-12-7	Anthracene	2.8	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.3	J *
206-44-0	Fluoranthene	7.9	
129-00-0	Pyrene	7.0	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5936-03

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5936-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5936Z932

Level: (low/med) LOW Date Received: 08/01/89

% Moisture: not dec. dec. Date Extracted: 08/05/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 08/30/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.3	J
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	3.9	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	3.1	
90-12-0	1-Methylnaphthalene	1.4	J
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

5936-01MS

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 5936-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5936Z930

Level: (low/med) LOW Date Received: 08/01/89

% Moisture: not dec. dec. Date Extracted: 08/05/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 08/30/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	180.	
95-13-6	1H-Indene	13.	SP
91-20-3	Naphthalene	12.	B SP
4565-32-6	Benzo(B)Thiophene	38.	
91-22-5	Quinoline	17.	*SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	10.	SP
90-12-0	1-Methylnaphthalene	12.	*
92-52-4	Biphenyl	33.	
208-96-8	Acenaphthylene	62.	
83-32-9	Acenaphthene	120.	
132-64-9	Dibenzofuran	42.	
86-73-7	Fluorene	100.	SP
132-65-0	Dibenzothiophene	8.1	*
85-01-8	Phenanthrene	16.	
120-12-7	Anthracene	6.2	*
260-94-6	Acridine	1.4	J *
86-74-8	Carbazole	2.8	
206-44-0	Fluoranthene	18.	
129-00-0	Pyrene	16.	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	8.7	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	3.3	SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	5936-01	81	92	92
2	5936-02	65	71	66
3	5936-03	63	71	81
4	5936-01MS	60	71	72
5	BLK01	100	98	116

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C

WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix Spike - EPA Sample No.: 5936-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	10	8.2	13	48
Naphthalene	10	4.7	12	73
Quinoline	10	ND	17	170
2-Methylnaphthalene	10	2.1	10	79
Fluorene	10	120	100	NC
Chrysene	10	ND	8.7	87
Benzo(E)Pyrene	10	ND	3.3	33

COMMENTS: NC = Not Calculated

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Lab File ID: S5936Z928 Lab Sample ID: BLK01

Date Extracted: 08/05/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 08/30/89 Time Analyzed: 00:46

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-Z

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	5936-01	5936-01	S5936Z929	08/30/89
2	5936-02	5936-02	S5936Z931	08/30/89
3	5936-03	5936-03	S5936Z932	08/30/89
4	5936-01MS	5936-01MS	S5936Z930	08/30/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.: N/A

Lab Code: ENSECO Case No.: 5936 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S5936Z928

Level: (low/med) LOW Date Received: 08/01/89

% Moisture: not dec. dec. Date Extracted: 08/05/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 08/30/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	2.4	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

INITIAL CALIBRATION DATA
PAH COMPOUNDS

'b Name: RMAL Lab Code: ENSECO Case No: 5936

Instrument ID: 4500-Z Calibration Date(s): 07/11/89

Minimum RRF is 0.050 Maximum % RSD is 35%

Lab File ID: RRF 40.= STDZ338 RRF 1200.= STDZ337
RRF 20.= STDZ335 RRF 240.= STDZ334 RRF 4800.= STDZ332

COMPOUND	20 PPT RRF	40 PPT RRF	240 PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	1.931	2.037	2.441	2.318	1.722	2.090	13.9
D10-Flourene	2.201	1.340	1.625	1.444	1.286	1.579	23.5
D12-Chrysene	1.356	1.460	1.519	1.461	1.152	1.390	10.4
2,3-Benzofuran	1.061	1.104	1.285	1.165	0.992	1.121	9.9
2,3-Dihydroindene	1.047	1.126	1.301	1.176	1.011	1.132	10.1
1H-Indene	1.367	1.474	1.714	1.537	1.287	1.476	11.1
Naphthalene	2.165	2.305	2.680	2.508	1.855	2.303	13.8
Benzo(B)Thiophene	1.873	1.936	2.223	2.057	1.665	1.951	10.7
Quinoline	0.783	0.938	1.280	1.289	1.213	1.101	20.7
1H-Indole	1.249	1.357	1.673	1.634	1.427	1.468	12.4
2-Methylnaphthalene	1.127	1.150	1.349	1.289	1.125	1.208	8.6
-Methylnaphthalene	1.158	1.304	1.470	1.381	1.188	1.300	10.0
Biphenyl	1.834	1.802	2.315	2.029	1.664	1.929	13.1
Acenaphthylene	1.963	2.112	2.485	2.352	1.870	2.156	12.0
Acenaphthene	1.385	1.403	1.711	1.458	1.263	1.444	11.5
Dibenzofuran	1.974	1.970	2.465	2.219	1.740	2.074	13.3
Flourene	1.599	1.674	1.869	1.707	1.436	1.657	9.5
Dibenzothiophene	1.206	1.338	1.488	1.476	1.061	1.314	13.9
Phenanthrene	1.537	1.477	1.554	1.475	1.099	1.428	13.1
Anthracene	1.296	1.318	1.503	1.433	1.066	1.323	12.6
Acridine	0.967	0.953	1.223	1.229	1.017	1.078	12.7
Carbazole	1.096	1.121	1.353	1.355	1.077	1.200	11.8
Fluoranthene	1.621	1.563	1.762	1.717	1.237	1.580	13.1
Pyrene	1.430	1.441	1.782	1.639	1.148	1.488	16.1
Benzo(A)Anthracene	1.410	1.647	1.726	1.873	1.434	1.618	12.2
Chrysene	1.504	1.736	1.696	1.721	1.366	1.605	10.2
Benzo(B)Fluoranthene	1.315	1.653	1.941	1.777	1.476	1.632	15.1
Benzo(K)Fluoranthene	1.677	1.912	1.743	2.015	1.404	1.750	13.4
Benzo(E)Pyrene	1.450	1.667	1.802	1.882	1.304	1.621	14.9
Benzo(A)Pyrene	1.382	1.403	1.574	1.659	1.349	1.473	9.2
Perylene	1.363	1.425	1.630	1.734	1.372	1.505	11.1
Indeno(1,2,3-CD)Pyrene	1.350	1.543	1.745	1.934	1.622	1.639	13.3
Dibenz(A,H)Anthracene	1.087	1.202	1.418	1.549	1.279	1.307	13.9
Benzo(G,H,I)Perylene	1.216	1.452	0.561	1.493	1.385	1.221	31.4

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

ıb Name: RMAL Lab Code: ENSECO Case No: 5936

Instrument ID: 4500-Z Calibration Date(s): 08/29/89 Time: 22:54

Lab ID: STDZ927 Initial Calibration Date : 07/11/89

Minimum RRF is 0.050 Maximum %D is 35%

COMPOUND	$\overline{\text{RRF}}$	40 PPT RRF	%D
D8-Naphthalene	2.090	1.975	5.5
D10-Fluorene	1.579	1.211	23.3
D12-Chrysene	1.390	1.496	-7.6
2,3-Benzofuran	1.121	1.197	-6.8
2,3-Dihydroindene	1.132	1.210	-6.9
1H-Indene	1.476	1.565	-6.0
Naphthalene	2.303	2.201	4.4
Benzo(B)Thiophene	1.951	1.815	7.0
Quinoline	1.101	0.748	32.1
1H-Indole	1.468	0.970	33.9
2-Methylnaphthalene	1.208	1.091	9.7
1-Methylnaphthalene	1.300	1.225	5.8
Biphenyl	1.929	1.600	17.1
Acenaphthylene	2.156	1.975	8.4
Acenaphthene	1.444	1.320	8.6
Dibenzofuran	2.074	1.657	20.1
Flourene	1.657	1.392	16.0
Dibenzothiophene	1.314	1.047	20.3
Phenanthrene	1.428	1.309	8.3
Anthracene	1.323	1.208	8.7
Acridine	1.078	0.792	26.5
Carbazole	1.200	0.914	23.8
Fluoranthene	1.580	1.511	4.4
Pyrene	1.488	1.489	-0.1
Benzo(A)Anthracene	1.618	1.470	9.1
Chrysene	1.605	1.592	0.8
Benzo(B)Fluoranthene	1.632	1.539	5.7
Benzo(K)Fluoranthene	1.750	1.878	-7.3
Benzo(E)Pyrene	1.621	1.832	-13.0
Benzo(A)Pyrene	1.473	1.394	5.4
Perylene	1.505	1.508	-0.2
Indeno(1,2,3-CD)Pyrene	1.639	1.279	22.0
Dibenz(A,H)Anthracene	1.307	1.086	16.9
Benzo(G,H,I)Perylene	1.221	1.545	-26.5

FORM VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract: N/A

Lab Code: Enseco Case No: 5936 SAS No.: N/A SDG No: N/A

Lab File ID (Standard): STDZ927 Date Analyzed: 08/29/89

Instrument ID: 4500-Z Time Analyzed: 22:54

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	121000	204000	133000
UPPER LIMIT	242000	408000	266000
LOWER LIMIT	60500	102000	66500
SAMPLE NO.			
5936-01	174000	304000	205000
5936-02	196000	329000	222000
5936-03	209000	353000	240000
5936-01MS	208000	341000	225000
BLK01	183000	229000	185000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

FORM VIII SV-2

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 9873

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: GOOD

	Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
1	7/31/89	1330	GAC-SLP10T - 073189	Ltr Amber	6	PPT-PAH	
2	7/31/89		GAC-SLP10TD - 073189	Ltr Amber	6	PPT_PAH	
MS	7/31/89		GAC-SLP10MS - 073189	Ltr Amber	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	S Anderson		7/31/89	1430
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: S.A

Method of Shipment: Fed X Airbill # 2865075872

Received for Lab: FMGL Signed: [illegible] Date/Time 8/1/89 0820

Enseco Project No. 5936

White and Pink Copies to Lab Yellow to Sampler SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No. 9874

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: Good

	Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
3	7/31/89	1330	GAC-SLP10FB - 073189	Gr Amber	6	PPT-PAH	
4	7/31/89	1330	GAC-SLP10FBD - 073189	Gr Amber	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	S. Anderson		7/31/89	1430
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: FED X Airbill # 2865075877

Received for Lab: RMAL Signed: KM Flaherty Date/Time 8/1/89 0820

Enseco Project No. 5936

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

September 18, 1989

Enseco - RMAL Project Number 006334

Introduction

Six aqueous samples (includes MS) were received at Enseco Rocky Mountain Analytical Laboratory on August 30, 1989. The samples were logged in under RMAL project number 006334. Sample GAC-SLP10FBD-082989 (RMA # 006443-06) was extracted and held as per the QAPP. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in the 1989 QAPP for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered which would impact the interpretation or use of data in this report.

PPT PAH

This report contains the results for one sample and its associated QC. The matrix spike compounds were inadvertently not added to the matrix spike sample. Thus, the report contains results for the sample and two replicates instead of the sample, a replicate and a spike.

In our professional judgement, the loss of the matrix spike information does not affect the validity of the reported results. The three sample results contained in this report compare very well, both in terms of identification and quantitation. Accordingly, this report contains three data points which substantiate the concentrations of PAH's in this well. You will not be charged for this sample analysis (006334-03).

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Sample 006334-04 was reanalyzed at a dilution due to concentrations of target compounds which were saturated in the original analysis. Both the original and dilution analyses are reported. Due to the dilution performed, surrogates could not be measured in the reanalysis of 006334-04.

All samples show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in the sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with asterisk (*) on the data sheets (Form I) as per the 1989 QAPP.

The 1989 QAPP sets forth specific requirements for the measurement of benzo(j)fluoranthene. Results have not been provided previously for this compound. The special procedure in the QAPP will be implemented on all future projects.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson **Date:** 9/18/89
Tracy Giberson
Data Control Supervisor

Approved by: Debbie Fazio **Date:** 9/18/89
Debbie Fazio
Program Administrator

Enseco

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
006334-0001-SA	GAC-SLP-10T-082989	AQUEOUS	29 AUG 89	11:00	30 AUG 89
006334-0002-SA	GAC-SLP-10TD-082989	AQUEOUS	29 AUG 89		30 AUG 89
006334-0003-SA	GAC-SLP-10MS-082989	AQUEOUS	29 AUG 89	11:15	30 AUG 89
006334-0004-SA	GAC-SLP-10F-082989	AQUEOUS	29 AUG 89		30 AUG 89
006334-0005-SA	GAC-SLP-10FB-082989	AQUEOUS	29 AUG 89	11:00	30 AUG 89
006334-0006-SA	GAC-SLP-10FBD-082989	AQUEOUS	29 AUG 89		30 AUG 89

TABLE OF CONTENTS

for

City of St. Louis Park

RMAL QC# 6334

PAH

1. QC Summary Package.....001
2. Sample Data Package.....007
3. Standards Data Package.....279
4. Blank Raw Data.....614
5. Matrix Spike Data.....N/A
6. Matrix Spike Duplicate Data.....N/A

SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 6334

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z052

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/10/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	150	
95-13-6	1H-Indene	4.7	
91-20-3	Naphthalene	3.0	J B
4565-32-6	Benzo(B)Thiophene	27	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.5	B
90-12-0	1-Methylnaphthalene	7.5	*
92-52-4	Biphenyl	20	
208-96-8	Acenaphthylene	39	
83-32-9	Acenaphthene	85	
132-64-9	Dibenzofuran	22	
86-73-7	Fluorene	51	
132-65-0	Dibenzothiophene	4.6	
85-01-8	Phenanthrene	6.1	
120-12-7	Anthracene	3.4	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.6	J
206-44-0	Fluoranthene	8.8	
129-00-0	Pyrene	7.7	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-02

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z053

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/10/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	160	
95-13-6	1H-Indene	5.2	
91-20-3	Naphthalene	3.3	J B
4565-32-6	Benzo(B)Thiophene	30	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.6	B
90-12-0	1-Methylnaphthalene	8.5	*
92-52-4	Biphenyl	22	
208-96-8	Acenaphthylene	43	
83-32-9	Acenaphthene	94	
132-64-9	Dibenzofuran	25	
86-73-7	Fluorene	56	
132-65-0	Dibenzothiophene	5.1	*
85-01-8	Phenanthrene	6.6	
120-12-7	Anthracene	3.6	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.8	J
206-44-0	Fluoranthene	9.3	
129-00-0	Pyrene	7.8	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-03

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z054

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/11/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	150	
95-13-6	1H-Indene	4.8	
91-20-3	Naphthalene	2.9	J B
4565-32-6	Benzo(B)Thiophene	27	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.6	B
90-12-0	1-Methylnaphthalene	7.5	*
92-52-4	Biphenyl	20	
208-96-8	Acenaphthylene	38	
83-32-9	Acenaphthene	87	
132-64-9	Dibenzofuran	23	
86-73-7	Fluorene	52	
132-65-0	Dibenzothiophene	5.3	
85-01-8	Phenanthrene	6.7	
120-12-7	Anthracene	3.9	
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.5	J
206-44-0	Fluoranthene	10	
129-00-0	Pyrene	8.9	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-04

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-04

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z055

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/11/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	2.0	J
496-11-7	2,3-Dihydroindene	490	* #
95-13-6	1H-Indene	33	
91-20-3	Naphthalene	10	B
4565-32-6	Benzo(B)Thiophene	230	
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	4.6	
91-57-6	2-Methylnaphthalene	4.0	B*
90-12-0	1-Methylnaphthalene	68	*
92-52-4	Biphenyl	220	
208-96-8	Acenaphthylene	300	* #
83-32-9	Acenaphthene	520	#
132-64-9	Dibenzofuran	270	
86-73-7	Fluorene	420	#
132-65-0	Dibenzothiophene	86	
85-01-8	Phenanthrene	100	
120-12-7	Anthracene	75	
260-94-6	Acridine	4.7	
86-74-8	Carbazole	20	
206-44-0	Fluoranthene	230	
129-00-0	Pyrene	190	
56-55-3	Benzo(A)Anthracene	6.4	*
218-01-9	Chrysene	4.9	
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

Compound is saturated. See dilution run.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-04DL

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-04DL

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z062

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/11/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 2.50

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q	
271-89-6	2,3-Benzofuran	100	U	
496-11-7	2,3-Dihydroindene	1000	D	
95-13-6	1H-Indene	37	D	
91-20-3	Naphthalene	130	U	
4565-32-6	Benzo(B)Thiophene	270	D	
91-22-5	Quinoline	28	U	
120-72-9	1H-Indole	50	U	
91-57-6	2-Methylnaphthalene	18	U	
90-12-0	1-Methylnaphthalene	74	D	*
92-52-4	Biphenyl	250	D	
208-96-8	Acenaphthylene	490	D	
83-32-9	Acenaphthene	1000	D	
132-64-9	Dibenzofuran	350	D	
86-73-7	Fluorene	830	D	
132-65-0	Dibenzothiophene	99	D	
85-01-8	Phenanthrene	120	D	
120-12-7	Anthracene	83	D	
260-94-6	Acridine	38	U	
86-74-8	Carbazole	20	DJ	
206-44-0	Fluoranthene	280	D	
129-00-0	Pyrene	240	D	
56-55-3	Benzo(A)Anthracene	50	U	
218-01-9	Chrysene	56	U	
205-99-2	Benzo(B)Fluoranthene	50	U	
207-08-9	Benzo(K)Fluoranthene	46	U	
192-97-2	Benzo(E)Pyrene	38	U	
50-32-8	Benzo(A)Pyrene	46	U	
198-55-0	Perylene	50	U	
193-39-5	Indeno(1,2,3-CD)Pyrene	42	U	
53-70-3	Dibenz(A,H)Anthracene	32	U	
191-24-2	Benzo(G,H,I)Perylene	56	U	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

6334-05

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 6334-05

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z056

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/11/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.2	J
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	4.9	J B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.2	B
90-12-0	1-Methylnaphthalene	1.2	J *
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

	EPA SAMPLE NO.	S1 (NAP)	#	S2 (FLU)	#	S3 (CHR)	#
1	6334-01	73		73		64	
2	6334-02	84		84		72	
3	6334-03	80		80		68	
4	6334-04	76		81		71	
5	6334-04DL		D		D		D
6	6334-05	67		61		73	
7	BLK01	80		82		92	

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Lab File ID: S6334Z051 Lab Sample ID: BLK01

Date Extracted: 08/30/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 09/10/89 Time Analyzed: 21:10

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-Z

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	6334-01	6334-01	S6334Z052	09/10/89
2	6334-02	6334-02	S6334Z053	09/10/89
3	6334-03	6334-03	S6334Z054	09/11/89
4	6334-04	6334-04	S6334Z055	09/11/89
5	6334-04DL	6334-04DL	S6334Z062	09/11/89
6	6334-05	6334-05	S6334Z056	09/11/89

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 6334 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: S6334Z051

Level: (low/med) LOW Date Received: 08/30/89

% Moisture: not dec. dec. Date Extracted: 09/04/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 09/10/89

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	1.9	J
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	1.1	
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: 6334 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
4800 PPT PAH STD	STDZ332	07/11/89	15:41
240 PPT PAH STD	STDZ334	07/11/89	17:29
20 PPT PAH STD	STDZ335	07/11/89	18:23
1200 PPT PAH STD	STDZ337	07/11/89	22:26
40 PPT PAH STD	STDZ338	07/11/89	23:40

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: 6334 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 PPT PAH STD	STDZ050	09/10/89	18:50
BLK01	S6334Z051	09/10/89	21:10
6334-01	S6334Z052	09/10/89	22:10
6334-02	S6334Z053	09/10/89	23:10
6334-03	S6334Z054	09/11/89	00:12
6334-04	S6334Z055	09/11/89	01:13
6334-05	S6334Z056	09/11/89	02:14

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: 6334 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 PPT PAH STD	STDZ061	09/11/89	10:52
6334-04DL	S6334Z062	09/11/89	13:00

INITIAL CALIBRATION DATA
PAH COMPOUNDS

b Name: RMAL Lab Code: ENSECO Case No: 6334

Instrument ID: 4500-Z Calibration Date(s): 07/11/89

Minimum RRF is 0.050 Maximum % RSD is 35%

Lab File ID: RRF 40.= STDZ338 RRF 1200.= STDZ337
RRF 20.= STDZ335 RRF 240.= STDZ334 RRF 4800.= STDZ332

COMPOUND	20 PPT RRF	40 PPT RRF	240 PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	1.931	2.037	2.441	2.318	1.722	2.090	13.9
D10-Flourene	2.201	1.340	1.625	1.444	1.286	1.579	23.5
D12-Chrysene	1.356	1.460	1.519	1.461	1.152	1.390	10.4
2,3-Benzofuran	1.061	1.104	1.285	1.165	0.992	1.121	9.9
2,3-Dihydroindene	1.047	1.126	1.301	1.176	1.011	1.132	10.1
1H-Indene	1.367	1.474	1.714	1.537	1.287	1.476	11.1
Naphthalene	2.165	2.305	2.680	2.508	1.855	2.303	13.8
Benzo(B)Thiophene	1.873	1.936	2.223	2.057	1.665	1.951	10.7
Quinoline	0.783	0.938	1.280	1.289	1.213	1.101	20.7
1H-Indole	1.249	1.357	1.673	1.634	1.427	1.468	12.4
2-Methylnaphthalene	1.127	1.150	1.349	1.289	1.125	1.208	8.6
1-Methylnaphthalene	1.158	1.304	1.470	1.381	1.188	1.300	10.0
Biphenyl	1.834	1.802	2.315	2.029	1.664	1.929	13.1
Acenaphthylene	1.963	2.112	2.485	2.352	1.870	2.156	12.0
Acenaphthene	1.385	1.403	1.711	1.458	1.263	1.444	11.5
Dibenzofuran	1.974	1.970	2.465	2.219	1.740	2.074	13.3
Flourene	1.599	1.674	1.869	1.707	1.436	1.657	9.5
Dibenzothiophene	1.206	1.338	1.488	1.476	1.061	1.314	13.9
Phenanthrene	1.537	1.477	1.554	1.475	1.099	1.428	13.1
Anthracene	1.296	1.318	1.503	1.433	1.066	1.323	12.6
Acridine	0.967	0.953	1.223	1.229	1.017	1.078	12.7
Carbazole	1.096	1.121	1.353	1.355	1.077	1.200	11.8
Fluoranthene	1.621	1.563	1.762	1.717	1.237	1.580	13.1
Pyrene	1.430	1.441	1.782	1.639	1.148	1.488	16.1
Benzo(A)Anthracene	1.410	1.647	1.726	1.873	1.434	1.618	12.2
Chrysene	1.504	1.736	1.696	1.721	1.366	1.605	10.2
Benzo(B)Fluoranthene	1.315	1.653	1.941	1.777	1.476	1.632	15.1
Benzo(K)Fluoranthene	1.677	1.912	1.743	2.015	1.404	1.750	13.4
Benzo(E)Pyrene	1.450	1.667	1.802	1.882	1.304	1.621	14.9
Benzo(A)Pyrene	1.382	1.403	1.574	1.659	1.349	1.473	9.2
Perylene	1.363	1.425	1.630	1.734	1.372	1.505	11.1
Indeno(1,2,3-CD)Pyrene	1.350	1.543	1.745	1.934	1.622	1.639	13.3
Dibenz(A,H)Anthracene	1.087	1.202	1.418	1.549	1.279	1.307	13.9
Benzo(G,H,I)Perylene	1.216	1.452	0.561	1.493	1.385	1.221	31.4

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

ab Name: RMAL Lab Code: ENSECO Case No: 6334

Instrument ID: 4500-Z Calibration Date(s): 09/10/89 Time: 18:50

Lab ID: STDZ050 Initial Calibration Date : 07/11/89

Minimum RRF is 0.050 Maximum %D is 35%

COMPOUND	RRF	40 PPT RRF	%D
D8-Naphthalene	2.090	2.209	-5.7
D10-Fluorene	1.579	1.326	16.0
D12-Chrysene	1.390	1.333	4.1
2,3-Benzofuran	1.121	1.313	-17.1
2,3-Dihydroindene	1.132	1.331	-17.6
1H-Indene	1.476	1.670	-13.1
Naphthalene	2.303	2.611	-13.4
Benzo(B)Thiophene	1.951	1.962	-0.6
Quinoline	1.101	1.131	-2.7
1H-Indole	1.468	1.417	3.5
2-Methylnaphthalene	1.208	1.308	-8.3
1-Methylnaphthalene	1.300	1.322	-1.7
Biphenyl	1.929	1.810	6.2
Acenaphthylene	2.156	2.249	-4.3
Acenaphthene	1.444	1.388	3.9
Dibenzofuran	2.074	2.030	2.1
Flourene	1.657	1.647	0.6
Dibenzothiophene	1.314	1.247	5.1
Phenanthrene	1.428	1.334	6.6
Anthracene	1.323	1.274	3.7
Acridine	1.078	1.070	0.7
Carbazole	1.200	1.139	5.1
Fluoranthene	1.580	1.446	8.5
Pyrene	1.488	1.502	-0.9
Benzo(A)Anthracene	1.618	1.573	2.8
Chrysene	1.605	1.498	6.7
Benzo(B)Fluoranthene	1.632	1.565	4.1
Benzo(K)Fluoranthene	1.750	1.441	17.7
Benzo(E)Pyrene	1.621	1.582	2.4
Benzo(A)Pyrene	1.473	1.318	10.5
Perylene	1.505	1.409	6.4
Indeno(1,2,3-CD)Pyrene	1.639	1.374	16.2
Dibenz(A,H)Anthracene	1.307	1.113	14.8
Benzo(G,H,I)Perylene	1.221	1.199	1.8

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

ıb Name: RMAL Lab Code: ENSECO Case No: 6334

Instrument ID: 4500-Z Calibration Date(s): 09/11/89 Time: 10:52

Lab ID: STDZ061 Initial Calibration Date : 07/11/89

Minimum RRF is 0.050 Maximum %D is 35%

COMPOUND	RRF	40 PPT RRF	%D
D8-Naphthalene	2.090	2.172	-3.9
D10-Fluorene	1.579	1.291	18.2
D12-Chrysene	1.390	1.245	10.4
2,3-Benzofuran	1.121	1.361	-21.4
2,3-Dihydroindene	1.132	1.385	-22.3
1H-Indene	1.476	1.818	-23.2
Naphthalene	2.303	2.777	-20.6
Benzo(B)Thiophene	1.951	2.006	-2.8
Quinoline	1.101	1.166	-5.9
1H-Indole	1.468	1.384	5.7
2-Methylnaphthalene	1.208	1.381	-14.3
1-Methylnaphthalene	1.300	1.363	-4.8
Biphenyl	1.929	1.884	2.3
Acenaphthylene	2.156	2.206	-2.3
Acenaphthene	1.444	1.407	2.6
Dibenzofuran	2.074	2.099	-1.2
Flourene	1.657	1.590	4.0
Dibenzothiophene	1.314	1.322	-0.6
Phenanthrene	1.428	1.469	-2.9
Anthracene	1.323	1.359	-2.7
Acridine	1.078	1.030	4.5
Carbazole	1.200	1.190	0.8
Fluoranthene	1.580	1.563	1.1
Pyrene	1.488	1.702	-14.4
Benzo(A)Anthracene	1.618	1.479	8.6
Chrysene	1.605	1.392	13.3
Benzo(B)Fluoranthene	1.632	1.527	6.4
Benzo(K)Fluoranthene	1.750	1.378	21.3
Benzo(E)Pyrene	1.621	1.491	8.0
Benzo(A)Pyrene	1.473	1.285	12.8
Perylene	1.505	1.336	11.2
Indeno(1,2,3-CD)Pyrene	1.639	1.374	16.2
Dibenz(A,H)Anthracene	1.307	1.100	15.8
Benzo(G,H,I)Perylene	1.221	1.142	6.5

FORM VII

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No: 6334 SAS No.: SDG No:

Lab File ID (Standard): STDZ050 Date Analyzed: 09/10/89

Instrument ID: 4500-Z Time Analyzed: 18:50

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	294000	519000	361000
UPPER LIMIT	588000	1000000	722000
LOWER LIMIT	147000	260000	180000
SAMPLE NO.			
6334-01	242000	427000	313000
6334-02	238000	412000	325000
6334-03	242000	418000	324000
6334-04	247000	418000	336000
6334-05	248000	394000	284000
BLK01	235000	398000	286000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No: 6334 SAS No.: SDG No:

Lab File ID (Standard): STDZ061 Date Analyzed: 09/11/89

Instrument ID: 4500-Z Time Analyzed: 10:52

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	225000	382000	321000
UPPER LIMIT	450000	764000	642000
LOWER LIMIT	112000	191000	160000
SAMPLE NO.			
6334-04DL	181000	307000	261000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No.

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
8/29	0	G 1-SLP - 8	Liter	6	PPT- PAH	
8/29		G -SLP 10 - 08	L		PPT- PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	S. Anderson			
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill # ~~[illegible]~~ 2845075883

Received for Lab: Rmax Signed: B Mason Date/Time 8-30-89 0800

Enseco Project No. 6334

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No.

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S. Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
8/29/89	1115	GAC-SLP 10MS - 082989	Liter	6	PPT-PAH	
8/29/89	[redacted]	GAC-SLP 10F - 082989	Liter	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill # 286575883

Received for Lab: Rmal Signed: B Megan Date/Time 8-30-89 0800

Enseco Project No. 6334

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco - Rocky Mountain Analytical

4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No.

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: S Anderson

SAMPLE SAFE™ CONDITIONS

1. Packed by: SA Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
5 8/29/89	1100	GAC-SLP10FB-082989	Liter	6	PPT-PAH	
8/29/89		GAC-SLP10FBD-082989	Liter	6	PPT-PAH	

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1				
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: SA

Method of Shipment: Fed X Airbill # 2865075883

Received for Lab: Rmax Signed: B Mago Date/Time 8-30-89 0800

Enseco Project No. 6334

White and Pink Copies to Lab Yellow to Sampler

SS-001

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

February 7, 1990

Enseco - RMAL Project Number 007850

Introduction

Five aqueous samples (includes MS and Dup) were received at Enseco Rocky Mountain Analytical Laboratory on December 14, 1989. The samples were logged in under RMAL project number 007850. Sample GAC-SLP10FBD-121389 (RMA # 007850-04) was extracted and held as per the QAPP. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for low level part-per-trillion (ppt) polynuclear aromatic hydrocarbons (PAH).

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in the 1989 QAPP for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered which would impact the interpretation or use of data in this report.

PPT PAH

Sample 007850-01DU was originally extracted and analyzed within holding times; however, due to surrogates which exceeded quality control limits, a reextraction was required. Surrogate recovery results from the reanalysis were all within quality control limits. Therefore the results from the reanalysis were reported. The reextraction took place outside of holding times.

Due to concentrations of target compounds present in excess of the linear range of the calibration curve, sample 007850-02 was reanalyzed at a ten percent dilution. Both the original and reanalysis are reported. Surrogates could not be measured in the reanalysis due to the dilution performed.

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4955 Yarrow Street
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The method blank (BLK01) associated with samples 007850-01, 02, 03 and 01MS shows quinoline (carcinogenic) above the method detection limit (MDL). This compound is present in sample 007850-01 below the MDL and is present at a significantly higher level in sample 007850-02. The method blank associated with sample 007850-01DU (BLK02) shows quinoline at a level greater than the MDL; however, this compound is not present in the associated sample.

The surrogate D12-chrysene is reported above the upper control limit in the method blank associated with sample 007850-01DU. All instrument calibration, surrogate standard concentration, etc. are in control. It has been concluded that an interference specific to the surrogate is present which resulted in the high recovery, and that this interference would not affect the quantitation of other target compounds.

Samples 007850-01, 02, 03 and 01MS show target compounds that do not meet secondary ion confirmation. In some instances a compound that does not meet secondary ion confirmation criteria may still be determined to be present in the sample after close inspection of the data by the analyst. Supportive data includes mass chromatograms maxima at the same scan for primary and secondary ions, as well as discernible quantitation interference with the secondary ion. These compounds are flagged with asterisk (*) on the data sheets (Form I) as per the 1989 QAPP.

The 1989 QAPP sets forth specific requirements for the measurement of benzo(j)fluoranthene. Results have not been provided previously for this compound. The special procedure in the QAPP will be implemented on all future projects.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson Date: 2/7/90
Tracy Giberson
Data Control Supervisor

Approved by: Debbie Fazio Date: 2/7/90
Debbie Fazio
Program Administrator

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SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007850-0001-SA	GAC-SLP10T-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007850-0001-DU	GAC-SLP10TD-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007850-0001-MS	GAC-SLP10MS-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007850-0002-SA	GAC-SLP10F-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007850-0003-SA	GAC-SLP10FB-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007850-0004-SA	GAC-SLP10FBD-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89

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for

City of St. Louis Park

RMAL QC# 7850

PPT PAH

QC Summary.....001

Sample Data.....010

Standards Data.....200

Raw QC Data.....528

Enseco

Qualifier Codes and their Usage

U = Indicates compound was analyzed for but not detected. The sample quantitation limit is corrected for dilution and for percent moisture. For soil samples subjected to GPC clean-up procedures, the CRQL (contract required quantitation limit) is multiplied by two to account for the fact that only half of the extract is recovered.

J = Indicates an estimated value. This flag is used when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

B = This flag is used when the analyte is found in the associated blank as well as in the sample. B codes do not necessarly invalidate the data but are dependent upon the judgement of the reviewer in applying the validation guidelines. This flag is used for a TIC as well as for a positively identified target compound list (TCL) compound.

E = This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

D = This flag identifies all compounds identified during a re-analysis of a diluted sample.

Additional Qualifiers for TIC data only:

I = Isomer The unknown may be this specific isomer or an isomer with the same molecular formula.

C = Class The unknown compound contains ions characteristic of a particular class of compounds.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
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SUMMARY

DATA

PACKAGE

FOR

City of St. Louis Park

RMA QC# 7850

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0917

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	1.6	J B *
496-11-7	2,3-Dihydroindene	5.8	B
95-13-6	1H-Indene	3.3	B
91-20-3	Naphthalene	6.5	B
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.3	J B
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	3.4	B
90-12-0	1-Methylnaphthalene	2.0	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.3	J B
129-00-0	Pyrene	2.0	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-01DU

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-01DU

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0922

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 01/24/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-01MS

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-01MS

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0918

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	1.9	J B *
496-11-7	2,3-Dihydroindene	5.5	B
95-13-6	1H-Indene	11.	B SP
91-20-3	Naphthalene	12.	B SP
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	7.0	B SP
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	9.9	B SP
90-12-0	1-Methylnaphthalene	2.2	B
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.1	J B *
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	8.5	SP
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	B
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.2	J B
129-00-0	Pyrene	1.8	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	4.9	SP
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.3	J SP
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-02

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0919

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	3.4	J B *
496-11-7	2,3-Dihydroindene	530.	B *
95-13-6	1H-Indene	52.	B
91-20-3	Naphthalene	12.	B
4565-32-6	Benzo(B)Thiophene	280.	
91-22-5	Quinoline	22.	B *
120-72-9	1H-Indole	5.3	
91-57-6	2-Methylnaphthalene	6.2	B
90-12-0	1-Methylnaphthalene	75.	B *
92-52-4	Biphenyl	250.	
208-96-8	Acenaphthylene	430.	B *
83-32-9	Acenaphthene	650.	E
132-64-9	Dibenzofuran	330.	
86-73-7	Fluorene	550.	
132-65-0	Dibenzothiophene	86.	
85-01-8	Phenanthrene	58.	B
120-12-7	Anthracene	71.	
260-94-6	Acridine	15.	*
86-74-8	Carbazole	45.	
206-44-0	Fluoranthene	310.	B
129-00-0	Pyrene	240.	B
56-55-3	Benzo(A)Anthracene	6.6	*
218-01-9	Chrysene	4.0	
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-02DL

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-02DL

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0928

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/26/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.25

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	51.	U
496-11-7	2,3-Dihydroindene	1100.	D B
95-13-6	1H-Indene	47.	D B
91-20-3	Naphthalene	18.	D B
4565-32-6	Benzo(B)Thiophene	300.	D
91-22-5	Quinoline	14.	U
120-72-9	1H-Indole	25.	U
91-57-6	2-Methylnaphthalene	14.	D B
90-12-0	1-Methylnaphthalene	85.	D B
92-52-4	Biphenyl	250.	D
208-96-8	Acenaphthylene	520.	D B
83-32-9	Acenaphthene	1100.	D
132-64-9	Dibenzofuran	370.	D
86-73-7	Fluorene	900.	D
132-65-0	Dibenzothiophene	60.	D
85-01-8	Phenanthrene	45.	D B
120-12-7	Anthracene	42.	D
260-94-6	Acridine	29.	U
86-74-8	Carbazole	30.	D
206-44-0	Fluoranthene	200.	D B
129-00-0	Pyrene	150.	D B
56-55-3	Benzo(A)Anthracene	25.	U
218-01-9	Chrysene	28.	U
205-99-2	Benzo(B)Fluoranthene	25.	U
207-08-9	Benzo(K)Fluoranthene	23.	U
192-97-2	Benzo(E)Pyrene	19.	U
50-32-8	Benzo(A)Pyrene	23.	U
198-55-0	Perylene	25.	U
193-39-5	Indeno(1,2,3-CD)Pyrene	21.	U
53-70-3	Dibenz(A,H)Anthracene	16.	U
191-24-2	Benzo(G,H,I)Perylene	28.	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7850-03

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7850-03

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0920

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	1.5	J B *
496-11-7	2,3-Dihydroindene	4.0	B
95-13-6	1H-Indene	2.8	B
91-20-3	Naphthalene	5.3	J B *
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.4	U
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	2.9	B
90-12-0	1-Methylnaphthalene	1.7	B *
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.0	J B *
83-32-9	Acenaphthene	1.8	*
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.8	B
129-00-0	Pyrene	2.3	B
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

	EPA SAMPLE NO.	S1 (NAP) #	S2 (FLU) #	S3 (CHR) #
1	7850-01	70	89	61
2	7850-01DU	69	75	88
3	7850-01MS	67	88	53
4	7850-02	62	87	66
5	7850-02DL	D	D	D
6	7850-03	73	85	62
7	BLK01	71	100	81
8	BLK02	71	66	195 *

	QC LIMITS
S1 (NAP) = D8-NAPHTHALENE	(14-108)
S2 (FLU) = D10-FLUORENE	(41-162)
S3 (CHR) = D12-CHRYSENE	(10-118)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C
WATER SEMIVOLATILE DUPLICATE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

EPA Sample No.: 7850-01

COMPOUND	SAMPLE CONCENTRATION (ng/L)	DUPLICATE CONCENTRATION (ng/L)	% RPD
2,3-Benzofuran	1.6	ND	NC
2,3-Dihydroindene	5.8	ND	NC
1H-Indene	3.3	ND	NC
Naphthalene	6.5	ND	NC
Quinoline	1.3	ND	NC
2-Methylnaphthalene	3.4	ND	NC
1-Methylnaphthalene	2.0	ND	NC
Fluoranthene	1.3	ND	NC
Pyrene	2.0	ND	NC

COMMENTS:

ND = Not found
NC = Not calculated

3C

WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix Spike - EPA Sample No.: 7850-01

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC
1H-Indene	5.0	3.3	11.	154
Naphthalene	5.0	6.5	12.	110
Quinolene	5.0	1.3	7.0	114
2-Methylnaphthalene	5.0	3.4	9.9	130
Fluorene	5.0	ND	8.5	170
Chrysene	5.0	ND	4.9	98
Benzo(E)Pyrene	5.0	ND	1.3	26

COMMENTS:

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Lab File ID: X0916 Lab Sample ID: BLK01

Date Extracted: 12/18/89 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 01/25/90 Time Analyzed: 11:45

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	7850-01	7850-01	X0917	01/25/90
2	7850-01MS	7850-01MS	X0918	01/25/90
3	7850-02	7850-02	X0919	01/25/90
4	7850-02DL	7850-02DL	X0928	01/26/90
5	7850-03	7850-03	X0920	01/25/90

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0916

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	1.7	J *
496-11-7	2,3-Dihydroindene	5.0	
95-13-6	1H-Indene	3.2	
91-20-3	Naphthalene	6.6	
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	1.6	
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	3.4	
90-12-0	1-Methylnaphthalene	1.9	*
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.0	J
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.7	*
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	
129-00-0	Pyrene	1.7	
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Lab File ID: X0926 Lab Sample ID: BLK02

Date Extracted: 01/24/90 Extraction: (SepF/Cont/Sonc) SEPF

Date Analyzed: 01/25/90 Time Analyzed: 21:10

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 4500-X

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
1	7850-01DU	7850-01DU	X0922	01/25/90

COMMENTS:

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK02

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7850 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: BLK02

Sample wt/vol: 4000 (g/ml) ML Lab File ID: X0926

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 01/24/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 01/25/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 0.125

CONCENTRATION UNITS: NG/L

CAS NO.	COMPOUND		Q
271-89-6	2,3-Benzofuran	5.1	U
496-11-7	2,3-Dihydroindene	1.4	U
95-13-6	1H-Indene	0.9	U
91-20-3	Naphthalene	6.5	U
4565-32-6	Benzo(B)Thiophene	0.9	U
91-22-5	Quinoline	4.2	*
120-72-9	1H-Indole	2.5	U
91-57-6	2-Methylnaphthalene	0.9	U
90-12-0	1-Methylnaphthalene	1.6	U
92-52-4	Biphenyl	4.3	U
208-96-8	Acenaphthylene	1.4	U
83-32-9	Acenaphthene	1.3	U
132-64-9	Dibenzofuran	1.0	U
86-73-7	Fluorene	1.0	U
132-65-0	Dibenzothiophene	1.1	U
85-01-8	Phenanthrene	1.3	U
120-12-7	Anthracene	1.1	U
260-94-6	Acridine	2.9	U
86-74-8	Carbazole	1.9	U
206-44-0	Fluoranthene	1.4	U
129-00-0	Pyrene	1.4	U
56-55-3	Benzo(A)Anthracene	2.5	U
218-01-9	Chrysene	2.8	U
205-99-2	Benzo(B)Fluoranthene	2.5	U
207-08-9	Benzo(K)Fluoranthene	2.3	U
192-97-2	Benzo(E)Pyrene	1.9	U
50-32-8	Benzo(A)Pyrene	2.3	U
198-55-0	Perylene	2.5	U
193-39-5	Indeno(1,2,3-CD)Pyrene	2.1	U
53-70-3	Dibenz(A,H)Anthracene	1.6	U
191-24-2	Benzo(G,H,I)Perylene	2.8	U

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: 7850 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40_PPT_PAH_STD	X0910	01/24/90	1439
4800_PPT_PAH_STD	X0911	01/24/90	1533
240_PPT_PAH_STD	X0912	01/24/90	1634
1200_PPT_PAH_STD	X0913	01/24/90	1812
20_PPT_PAH_STD	X0914	01/24/90	1906

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: _7850 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 PPT PAH STD	X0915	01/25/90	09:19
BLK01	X0916	01/25/90	11:45
7850-01	X0917	01/25/90	12:39
7850-01MS	X0918	01/25/90	13:33
7850-02	X0919	01/25/90	14:28
7850-03	X0920	01/25/90	15:22
7850-01DU	X0922	01/25/90	17:11
BLK02	X0926	01/25/90	21:10

5B
SEMIVOLATILE ORGANIC GC/MS PAH

Lab Name: RMAL Contract No:

Lab Code: ENSECO Case No: 7850 SAS No: SDG No:

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

SAMPLE ID	LAB FILE ID	DATE OF ANALYSIS	TIME OF ANALYSIS
40 PPT PAH STD	X0927	01/26/90	11:12
7850-02DL	X0928	01/26/90	12:19

INITIAL CALIBRATION DATA
PAH COMPOUNDS

Lab Name: RMAL Lab Code: ENSECO Case No: 7850

Instrument ID: 4500-X Calibration Date(s): 01/24/90

Maximum % RSD is 35%

Lab File ID: RRF 40 = X0910 RRF 1200 = X0913
RRF 20 = X0914 RRF 240 = X0912 RRF 4800 = X0911

COMPOUND	20 PPT RRF	40 PPT RRF	240PPT RRF	1200PPT RRF	4800PPT RRF	AVE RRF	%RSD
D8-Naphthalene	1.884	1.901	1.890	1.988	1.738	1.880	4.8
D10-Flourene	1.002	0.885	0.923	1.003	1.024	0.967	6.2
D12-Chrysene	1.709	1.301	1.446	1.406	1.331	1.439	11.2
2,3-Benzofuran	1.095	1.114	1.094	1.163	1.177	1.129	3.4
2,3-Dihydroindene	1.142	1.148	1.125	1.193	1.211	1.164	3.1
1H-Indene	1.197	1.193	1.211	1.325	1.336	1.252	5.7
Naphthalene	2.200	2.156	2.177	2.310	1.866	2.142	7.7
Benzo(B)Thiophene	1.657	1.645	1.616	1.723	1.619	1.652	2.6
Quinoline	1.267	0.944	0.962	1.063	1.160	1.079	12.6
1H-Indole	1.055	1.030	1.141	1.276	1.335	1.167	11.5
2-Methylnaphthalene	0.940	0.959	0.992	1.045	1.081	1.003	5.9
1-Methylnaphthalene	1.035	1.047	1.075	1.163	1.184	1.101	6.2
Biphenyl	1.469	1.457	1.500	1.566	1.455	1.489	3.1
Acenaphthylene	1.315	1.226	1.391	1.650	1.686	1.454	14.1
Acenaphthene	1.044	1.000	1.036	1.103	1.164	1.069	6.0
Dibenzofuran	1.512	1.473	1.511	1.590	1.522	1.522	2.8
Flourene	1.176	1.087	1.157	1.281	1.319	1.204	7.9
Dibenzothiophene	1.031	0.939	1.005	1.026	1.050	1.010	4.2
Phenanthrene	1.111	0.999	1.058	1.088	1.099	1.071	4.2
Anthracene	0.763	0.716	0.859	1.034	1.096	0.894	18.6
Acridine	0.642	0.526	0.596	0.764	0.843	0.674	19.0
Carbazole	0.622	0.547	0.562	0.662	0.701	0.619	10.5
Fluoranthene	0.987	0.819	0.889	0.985	1.031	0.942	9.2
Pyrene	1.189	0.941	0.961	1.060	1.074	1.045	9.5
Benzo(A)Anthracene	1.209	0.998	1.336	1.468	1.469	1.296	15.3
Chrysene	1.828	1.488	1.629	1.524	1.442	1.582	9.7
Benzo(B)Fluoranthene	1.474	1.336	1.564	1.491	1.628	1.499	7.3
Benzo(K)Fluoranthene	1.451	1.139	1.293	1.414	1.280	1.315	9.4
Benzo(E)Pyrene	1.605	1.316	1.443	1.383	1.377	1.425	7.7
Benzo(A)Pyrene	1.140	0.846	1.075	1.184	1.243	1.098	14.0
Perylene	0.975	0.702	0.784	1.067	1.032	0.912	17.6
Indeno(1,2,3-CD)Pyrene	1.212	1.010	1.224	1.335	1.383	1.233	11.7
Dibenz(A,H)Anthracene	0.991	0.864	1.024	1.110	1.105	1.019	9.9
Benzo(G,H,I)Perylene	1.322	1.001	1.132	1.141	1.147	1.149	9.9

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

Lab Name: RMAL Lab Code: ENSECO Case No: 7850

Instrument ID: 4500-X Calibration Date(s): 01/25/90 Time: 09:19

Lab ID: X0915 Initial Calibration Date: 01/24/90

Maximum %D is 35%

COMPOUND	INITIAL AVE RRF	40 PPT RRF	%D
D8-Naphthalene	1.880	1.739	4.6
D10-Flourene	0.967	0.865	10.5
D12-Chrysene	1.439	1.299	9.7
2,3-Benzofuran	1.129	1.065	5.7
2,3-Dihydroindene	1.164	1.108	4.8
1H-Indene	1.252	1.179	5.8
Naphthalene	2.142	2.869	-33.9
Benzo(B)Thiophene	1.652	1.587	3.9
Quinoline	1.079	0.992	8.1
1H-Indole	1.167	1.040	10.9
2-Methylnaphthalene	1.003	1.062	-5.9
1-Methylnaphthalene	1.101	1.085	1.5
Biphenyl	1.489	1.398	6.1
Acenaphthylene	1.454	1.342	7.7
Acenaphthene	1.069	0.946	11.5
Dibenzofuran	1.522	1.392	8.5
Flourene	1.204	1.066	11.5
Dibenzothiophene	1.010	0.857	15.1
Phenanthrene	1.071	0.911	14.9
Anthracene	0.894	0.688	23.0
Acridine	0.674	0.511	24.2
Carbazole	0.619	0.476	23.1
Fluoranthene	0.942	0.731	22.4
Pyrene	1.045	0.805	23.0
Benzo(A)Anthracene	1.296	1.085	16.3
Chrysene	1.582	1.457	7.9
Benzo(B)Fluoranthene	1.499	1.341	10.5
Benzo(K)Fluoranthene	1.315	1.140	13.3
Benzo(E)Pyrene	1.425	1.329	6.7
Benzo(A)Pyrene	1.098	0.874	20.4
Perylene	0.912	0.747	18.1
Indeno(1,2,3-CD)Pyrene	1.233	0.951	22.9
Dibenz(A,H)Anthracene	1.019	0.816	19.9
Benzo(G,H,I)Perylene	1.149	0.943	17.9

CONTINUING CALIBRATION DATA
PAH COMPOUNDS

Lab Name: RMAL Lab Code: ENSECO Case No: 7850

Instrument ID: 4500-X Calibration Date(s): 01/26/90 Time: 11:12

Lab ID: X0927 Initial Calibration Date: 01/24/90

Maximum %D is 35%

COMPOUND	INITIAL AVE RRF	40 PPT RRF	%D
D8-Naphthalene	1.880	1.768	6.0
D10-Flourene	0.967	0.847	12.4
D12-Chrysene	1.439	1.286	10.6
2,3-Benzofuran	1.129	1.079	4.4
2,3-Dihydroindene	1.164	1.117	4.0
1H-Indene	1.252	1.202	4.0
Naphthalene	2.142	2.093	2.3
Benzo(B)Thiophene	1.652	1.559	5.6
Quinoline	1.079	0.722	33.1
1H-Indole	1.167	0.961	17.7
2-Methylnaphthalene	1.003	0.916	8.7
1-Methylnaphthalene	1.101	1.017	7.6
Biphenyl	1.489	1.385	7.0
Acenaphthylene	1.454	1.256	13.6
Acenaphthene	1.069	0.971	9.2
Dibenzofuran	1.522	1.341	11.9
Flourene	1.204	1.022	15.1
Dibenzothiophene	1.010	0.930	7.9
Phenanthrene	1.071	0.961	10.3
Anthracene	0.894	0.737	17.6
Acridine	0.674	0.467	30.7
Carbazole	0.619	0.497	19.7
Fluoranthene	0.942	0.812	13.8
Pyrene	1.045	0.998	4.5
Benzo(A)Anthracene	1.296	1.129	12.9
Chrysene	1.582	1.470	7.1
Benzo(B)Fluoranthene	1.499	1.301	13.2
Benzo(K)Fluoranthene	1.315	1.122	14.7
Benzo(E)Pyrene	1.425	1.292	9.3
Benzo(A)Pyrene	1.098	0.886	19.3
Perylene	0.912	0.757	17.0
Indeno(1,2,3-CD)Pyrene	1.233	0.938	23.9
Dibenz(A,H)Anthracene	1.019	0.764	25.0
Benzo(G,H,I)Perylene	1.149	0.916	20.3

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No: 7850 SAS No.: SDG No:

Lab File ID (Standard): X0915 Date Analyzed: 01/25/90

Instrument ID: 4500-X Time Analyzed: 09:19

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	269000	436000	208000
UPPER LIMIT	538000	872000	416000
LOWER LIMIT	134000	218000	104000
SAMPLE NO.			
7850-01	225000	379000	227000
7850-01DU	329000	578000	260000
7850-01MS	264000	426000	270000
7850-02	295000	455000	307000
7850-03	251000	409000	290000
BLK01	221000	371000	275000
BLK02	327000	604000	173000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No: 7850 SAS No.: SDG No:

Lab File ID (Standard): X0927 Date Analyzed: 01/26/90

Instrument ID: 4500-X Time Analyzed: 11:12

	IS#1 (ACN) AREA #	IS#2 (PHN) AREA #	IS#3 (BAP) AREA #
12 HOUR STD	171000	246000	117000
UPPER LIMIT	342000	492000	234000
LOWER LIMIT	85500	123000	58500
SAMPLE NO.			
7850-02DL	235000	459000	178000

IS#1 (ACN) = D10-ACENAPHTHENE
IS#2 (PHN) = D10-PHENANTHRENE
IS#3 (BAP) = D12-BENZO(A)PYRENE

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

Column used to flag internal standard area values with an asterisk

Enseco

CASE NARRATIVE

FOR

City of St. Louis Park

February 7, 1990

Enseco - RMAL Project Number 007855

Introduction

Three aqueous samples (includes MS and MSD) were received at Enseco Rocky Mountain Analytical Laboratory on December 14, 1989. The samples were logged in under RMAL project number 007855. A cross reference associating the RMAL sample numbers to the actual field sample numbers is included. The samples were analyzed for the extended list semivolatile acid fraction compounds per EPA CLP protocol.

Data Quality Assessment

The results contained in this report were reviewed relative to data acceptance criteria as specified in the 1989 QAPP for completeness, precision, accuracy, representativeness and defensibility of the data. Unless otherwise stated below, no quality control problems or technical difficulties were encountered which would impact the interpretation or use of data in this report.

ACID's

The extended list of "other carcinogenic PAH" compounds listed in table 8-2 of the QAPP were searched for in sample 007855-01 using the laboratory's Tentatively Identified Compounds (TIC) program. No compounds on this list were detected in the sample.

There were no problems encountered in the semivolatile acid fraction analysis.

This data package is in compliance with the terms and conditions of the 1989 QAPP, both technically and for completeness, for other than the conditions detailed above.

Reported by: Tracy Giberson Date: 2/7/90
Tracy Giberson
Data Control Supervisor

Approved by: Debbie Fazio Date: 2/7/90
Debbie Fazio
Program Administrator

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax. 303/431-7171

Enseco
A CORNING Company

SAMPLE DESCRIPTION INFORMATION
for
City of St. Louis Park

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
007855-0001-SA	GAC-SLP10TAF-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007855-0001-MS	GAC-SLP10TAF-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89
007855-0001-SD	GAC-SLP10TAF-121389	AQUEOUS	13 DEC 89	13:00	14 DEC 89

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for

City of St. Louis Park

RMAL QC# 7855

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SUMMARY

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PACKAGE

FOR

City of St. Louis Park

RMA QC# 7855

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7855-01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7855-01

Sample wt/vol: 1000 (g/ml) ML Lab File ID: R1064

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/12/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	10.	U
95-57-8	2-Chlorophenol	10.	U
95-48-7	2-Methylphenol	10.	U
106-44-5	4-Methylphenol	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
59-50-7	4-Chloro-3-Methylphenol	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
534-52-1	4,6-Dinitro-2-Methylphenol	50.	U
87-86-5	Pentachlorophenol	50.	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7855-01MS

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7855-01MS

Sample wt/vol: 1000 (g/ml) ML Lab File ID: R1064

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/12/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	56.	SP
95-57-8	2-Chlorophenol	69.	SP
95-48-7	2-Methylphenol	10.	U
106-44-5	4-Methylphenol	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
59-50-7	4-Chloro-3-Methylphenol	36.	SP
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	80.	SP
534-52-1	4,6-Dinitro-2-Methylphenol	50.	U
87-86-5	Pentachlorophenol	79.	SP

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

7855-01MSD

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 7855-01MSD

Sample wt/vol: 1000 (g/ml) ML Lab File ID: R1065

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/12/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	46.	SP
95-57-8	2-Chlorophenol	64.	SP
95-48-7	2-Methylphenol	10.	U
106-44-5	4-Methylphenol	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
59-50-7	4-Chloro-3-Methylphenol	26.	SP
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	74.	SP
534-52-1	4,6-Dinitro-2-Methylphenol	50.	U
87-86-5	Pentachlorophenol	76.	SP

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

	EPA SAMPLE NO.	S1 (PHE) #	S2 (FLU) #	S3 (TRI) #
1	7855-01	19	21	60
2	7855-01MS	56	60	70
3	7855-01MSD	49	57	62
4	BLK01	50	52	66

	QC LIMITS
S1 (PHE) = D5-PHENOL	(10- 94)
S2 (FLU) = 2-FLUOROPHENOL	(21-100)
S3 (TRI) = 2,4,6-TRIBROMOPHENOL	(10-123)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3C
WATER SEMIVOLATILE MATRIX SPIKE RECOVERY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Matrix Spike - EPA Sample No.: 7855-01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC
Phenol	100.	ND	55.9	56
2-Chlorophenol	100.	ND	69.1	69
4-Chloro-3-Methylphenol	100.	ND	36.0	36
4-Nitrophenol	100.	ND	79.8	80
Pentachlorophenol	100.	ND	79.1	79

COMPOUND	DUPLICATE CONCENTRATION (ug/L)	MSD % REC	% RPD
Phenol	46.1	46	20
2-Chlorophenol	64.4	64	7
4-Chloro-3-Methylphenol	25.7	26	32
4-Nitrophenol	74.1	74	8
Pentachlorophenol	76.0	76	4

COMMENTS:

ND = Not found
NC = Not calculated

4B
SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: RMAL Contract:

Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Lab File ID: R1062 Lab Sample ID: BLK01

Date Extracted: 12/18/89 Extraction:(SepF/Cont/Sonc) CONT

Date Analyzed: 01/12/90 Time Analyzed: 1818

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: 4500-R

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	7855-01	7855-01	R1063	01/12/90
02	7855-01MS	7855-01MS	R1064	01/12/90
03	7855-01MSD	7855-01MSD	R1065	01/12/90

COMMENTS: 7855-BL121889WATER HSL ACID H20
1.00UG/ML*1.00ML *100%/100.% *(NA/NA)/1000.ML NA M

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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BLK01

Lab Name: RMAL Contract No.:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: BLK01

Sample wt/vol: 1000 (g/ml) ML Lab File ID: R1062

Level: (low/med) LOW Date Received: 12/14/89

% Moisture: not dec. dec. Date Extracted: 12/18/89

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 01/12/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CONCENTRATION UNITS: UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	10.	U
95-57-8	2-Chlorophenol	10.	U
95-48-7	2-Methylphenol	10.	U
106-44-5	4-Methylphenol	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
59-50-7	4-Chloro-3-Methylphenol	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
534-52-1	4,6-Dinitro-2-Methylphenol	50.	U
87-86-5	Pentachlorophenol	50.	U

5B
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Lab File ID: R1008 DFTPP Injection Date: 01/09/90

Instrument ID: 4500-R DFTPP Injection Time: 2101

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	57.5
68	Less than 2.0% of mass 69	0.0 (0.0)1
69	Mass 69 relative abundance	61.4
70	Less than 2.0% of mass 69	0.0 (0.0)1
127	40.0 - 60.0% of mass 198	45.0
197	Less than 1.0% of mass 198	0.0
198	Base peak, 100% relative abundance	100.0
199	5.0 to 9.0% of mass 198	8.1
275	10.0 - 30.0% of mass 198	24.0
365	Greater than 1.00% of mass 198	4.65
441	Present, but less than mass 443	10.5
442	Greater than 40.0% of mass 198	68.9
443	17.0 - 23.0% of mass 442	13.2 (19.2)2

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

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

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD050	50_PPM_HSL	R1009	01/09/90	2121
02	SSTD020	20_PPM_HSL	R1010	01/09/90	2217
03	SSTD120	120_PPM_HSL	R1011	01/09/90	2316
04	SSTD160	160_PPM_HSL	R1012	01/10/90	0012
05	SSTD080	80_PPM_HSL	R1013	01/10/90	0108

5B
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Lab File ID: R1055 DFTPP Injection Date: 01/12/90

Instrument ID: 4500-R DFTPP Injection Time: 1047

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	57.6
68	Less than 2.0% of mass 69	1.1 (2.0)1
69	Mass 69 relative abundance	56.0
70	Less than 2.0% of mass 69	0.0 (0.0)1
127	40.0 - 60.0% of mass 198	43.4
197	Less than 1.0% of mass 198	0.0
198	Base peak, 100% relative abundance	100.0
199	5.0 to 9.0% of mass 198	7.5
275	10.0 - 30.0% of mass 198	20.9
365	Greater than 1.00% of mass 198	2.90
441	Present, but less than mass 443	7.5
442	Greater than 40.0% of mass 198	49.9
443	17.0 - 23.0% of mass 442	9.7 (19.4)2

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

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

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	50_PPM_HSL	R1056	01/12/90	1227
02	BLK01	BLK01	R1062	01/12/90	1818
03	7855-01	7855-01	R1063	01/12/90	1913
04	7855-01MS	7855-01MS	R1064	01/12/90	2008
05	7855-01MSD	7855-01MSD	R1065	01/12/90	2102

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6B

SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: RMAL Contract:

Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Instrument ID: 4500-R Calibration Date(s): 01/09/90 01/10/90

Min $\overline{RRF}$ for SPCC(#) = 0.050 Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF20 = R1010 RRF50 = R1009
RRF80 = R1013 RRF120= R1011 RRF160= R1012

COMPOUND	RRF20	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD
Phenol *	2.281	2.828	2.774	3.761	4.322	3.193	25.9*
bis(2-Chloroethyl)Ether	2.164	2.497	2.391	2.692	2.820	2.513	10.2
2-Chlorophenol	1.635	1.936	1.883	2.077	2.118	1.930	9.9
1,3-Dichlorobenzene	1.867	2.167	2.123	2.348	2.332	2.167	9.0
1,4-Dichlorobenzene *	2.018	2.347	2.267	2.779	2.857	2.454	14.5*
Benzyl Alcohol	0.752	1.132	1.075	1.269	1.283	1.102	19.5
1,2-Dichlorobenzene	1.809	2.071	2.081	2.253	2.280	2.099	9.0
2-Methylphenol	1.609	1.759	1.708	1.905	1.965	1.789	8.1
bis(2-Chloroisopropyl)Ether	4.757	5.473	5.225	6.705	6.820	5.796	15.9
4-Methylphenol	1.663	1.887	1.832	2.027	2.054	1.893	8.4
N-Nitroso-Di-n-Propylamine #	1.729	2.018	1.945	2.127	2.139	1.992	8.4#
Hexachloroethane	0.797	0.888	0.890	0.955	0.956	0.897	7.3
Nitrobenzene	0.565	0.654	0.653	0.820	0.869	0.712	17.9
Isophorone	1.075	1.268	1.213	1.687	1.668	1.382	20.2
2-Nitrophenol *	0.239	0.270	0.264	0.299	0.295	0.273	9.0*
4-Dimethylphenol	0.402	0.437	0.445	0.500	0.502	0.457	9.4
nzoic Acid		0.165	0.106	0.196	0.191	0.165	25.0
is(2-Chloroethoxy)Methane	0.627	0.747	0.725	1.052	1.040	0.838	23.3
2,4-Dichlorophenol *	0.317	0.378	0.366	0.413	0.407	0.376	10.2*
1,2,4-Trichlorobenzene	0.345	0.393	0.394	0.446	0.437	0.403	10.0
Naphthalene	1.183	1.389	1.520	1.868	1.829	1.558	18.7
4-Chloroaniline	0.484	0.565	0.556	0.632	0.626	0.573	10.5
Hexachlorobutadiene *	0.197	0.226	0.229	0.249	0.246	0.229	9.1*
4-Chloro-3-Methylphenol *	0.362	0.418	0.409	0.455	0.459	0.421	9.4*
2-Methylnaphthalene	0.725	0.891	0.890	1.258	1.179	0.989	22.5
Hexachlorocyclopentadiene #	0.360	0.484	0.480	0.586	0.567	0.495	18.1#
2,4,6-Trichlorophenol *	0.418	0.488	0.469	0.557	0.554	0.497	11.9*
2,4,5-Trichlorophenol		0.536	0.537	0.622	0.623	0.580	8.6
2-Chloronaphthalene	1.392	1.678	1.625	2.289	2.320	1.861	22.5
2-Nitroaniline		0.797	0.800	0.904	0.904	0.851	7.2
Dimethyl Phthalate	1.614	1.839	1.825	2.540	2.478	2.059	20.4
Acenaphthylene	2.242	2.744	2.645	3.780	3.509	2.984	21.4
2,6-Dinitrotoluene	0.407	0.454	0.457	0.521	0.520	0.472	10.3
3-Nitroaniline		0.508	0.515	0.580	0.581	0.546	7.3
Acenaphthene *	1.352	1.630	1.602	2.159	2.295	1.808	22.2*
2,4-Dinitrophenol #		0.238	0.254	0.306	0.314	0.278	13.6#
4-Nitrophenol #		0.228	0.236	0.265	0.268	0.249	8.1#

6C
SEMIVOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: RMAL Contract:

Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Instrument ID: 4500-R Calibration Date(s): 01/09/90 01/10/90

Min $\overline{RRF}$ for SPCC(#) = 0.050 Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF20 = R1010 RRF50 = R1009
RRF80 = R1013 RRF120= R1011 RRF160= R1012

COMPOUND	RRF20	RRF50	RRF80	RRF120	RRF160	$\overline{RRF}$	% RSD
Dibenzofuran	1.839	2.214	2.214	2.991	3.314	2.514	24.4
2,4-Dinitrotoluene	0.535	0.625	0.619	0.689	0.707	0.635	10.7
Diethylphthalate	1.739	2.039	1.999	2.801	2.867	2.289	22.3
4-Chlorophenyl-phenylether	0.703	0.835	0.816	0.933	0.978	0.853	12.6
Fluorene	1.534	1.885	1.909	2.506	2.675	2.102	22.6
4-Nitroaniline		0.501	0.510	0.572	0.575	0.540	7.3
4,6-Dinitro-2-Methylphenol		0.188	0.188	0.234	0.234	0.211	12.6
N-Nitrosodiphenylamine (1) *	0.571	0.694	0.678	0.830	0.914	0.737	18.3*
4-Bromophenyl-phenylether	0.247	0.279	0.277	0.315	0.320	0.288	10.5
Hexachlorobenzene	0.301	0.342	0.339	0.383	0.389	0.351	10.3
Pentachlorophenol *		0.138	0.133	0.173	0.167	0.153	13.2*
Phenanthrene	1.153	1.378	1.351	1.987	1.958	1.565	24.4
Anthracene	1.207	1.482	1.571	1.998	1.999	1.651	20.8
Di-n-Butylphthalate	1.750	2.604	2.690	2.873	2.730	2.529	17.7
Fluoranthene *	1.257	1.483	1.499	2.090	2.061	1.678	22.4*
rene	1.379	1.683	1.663	2.090	2.119	1.787	17.6
ylbenzylphthalate	0.843	1.010	0.992	1.238	1.313	1.079	17.8
,3'-Dichlorobenzidine	0.513	0.593	0.597	0.648	0.667	0.604	9.9
Benzo(a)Anthracene	1.379	1.690	1.625	2.198	2.212	1.821	20.3
Chrysene	1.271	1.470	1.419	1.904	1.967	1.606	19.3
bis(2-Ethylhexyl)Phthalate	1.231	1.560	1.718	1.978	1.979	1.693	18.6
Di-n-Octyl Phthalate *	2.226	3.096	3.422	3.501	3.607	3.170	17.7*
Benzo(b)Fluoranthene	1.307	1.726	1.590	1.902	1.836	1.672	14.1
Benzo(k)Fluoranthene	1.419	1.598	1.706	1.963	2.168	1.771	16.8
Benzo(a)Pyrene *	1.245	1.453	1.478	1.581	1.652	1.482	10.4*
Indeno(1,2,3-cd)Pyrene	1.311	1.533	1.473	1.555	1.610	1.496	7.7
Dibenz(a,h)Anthracene	1.048	1.205	1.220	1.321	1.426	1.244	11.3
Benzo(g,h,i)Perylene	1.024	1.117	1.092	1.167	1.257	1.131	7.7
Nitrobenzene-d5	0.536	0.614	0.608	0.680	0.665	0.621	9.1
2-Fluorobiphenyl	1.548	1.857	1.824	2.565	2.695	2.098	24.0
Terphenyl-d14	1.154	1.409	1.353	1.763	1.872	1.510	19.8
Phenol-d5	2.248	2.837	2.995	3.646	3.672	3.080	19.4
2-Fluorophenyl	1.715	2.074	2.049	2.741	2.775	2.271	20.6
2,4,6-Tribromophenol	0.211	0.255	0.263	0.305	0.313	0.269	15.4

(1) Cannot be separated from Diphenylamine

7B
SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: RMAL Contract:

Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Instrument ID: 4500-R Calibration date: 01/12/90 Time: 1227

Lab File ID: R1056 Init. Calib. Date(s): 01/09/90 01/10/90

Min RRF50 for SPCC(#) = 0.050 Max %D for CCC(*) = 25.0%

COMPOUND		$\overline{RRF}$	RRF50	%D	
Phenol	*	3.193	2.977	6.8	*
bis(2-Chloroethyl)Ether		2.513	1.939	22.8	
2-Chlorophenol		1.930	1.773	8.1	
1,3-Dichlorobenzene		2.167	2.088	3.6	
1,4-Dichlorobenzene	*	2.454	2.389	2.6	*
Benzyl Alcohol		1.102	0.858	22.1	
1,2-Dichlorobenzene		2.099	2.013	4.1	
2-Methylphenol		1.789	1.482	17.2	
bis(2-Chloroisopropyl)Ether		5.796	3.676	36.6	
4-Methylphenol		1.893	1.562	17.5	
N-Nitroso-Di-n-Propylamine	#	1.992	1.536	22.9	#
Hexachloroethane		0.897	0.828	7.7	
Nitrobenzene		0.712	0.602	15.5	
Isophorone		1.382	1.197	13.4	
2-Nitrophenol	*	0.273	0.248	9.2	*
2,4-Dimethylphenol		0.457	0.383	16.2	
Benzoic Acid		0.165	0.166	-0.6	
bis(2-Chloroethoxy)Methane		0.838	0.632	24.6	
2,4-Dichlorophenol	*	0.376	0.367	2.4	*
1,2,4-Trichlorobenzene		0.403	0.402	0.2	
Naphthalene		1.558	1.316	15.5	
4-Chloroaniline		0.573	0.490	14.5	
Hexachlorobutadiene	*	0.229	0.215	6.1	*
4-Chloro-3-Methylphenol	*	0.421	0.344	18.3	*
2-Methylnaphthalene		0.989	0.925	6.5	
Hexachlorocyclopentadiene	#	0.495	0.478	3.4	#
2,4,6-Trichlorophenol	*	0.497	0.524	-5.4	*
2,4,5-Trichlorophenol		0.580	0.569	1.9	
2-Chloronaphthalene		1.861	1.888	-1.5	
2-Nitroaniline		0.851	0.674	20.8	
Dimethyl Phthalate		2.059	2.332	-13.3	
Acenaphthylene		2.984	3.061	-2.6	
2,6-Dinitrotoluene		0.472	0.462	2.1	
3-Nitroaniline		0.546	0.456	16.5	
Acenaphthene	*	1.808	1.731	4.3	*
2,4-Dinitrophenol	#	0.278	0.260	6.5	#
4-Nitrophenol	#	0.249	0.264	-6.0	#

7C
SEMIVOLATILE CONTINUING CALIBRATION CHECK

Lab Name: RMAL Contract:

Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Instrument ID: 4500-R Calibration date: 01/12/90 Time: 1227

Lab File ID: R1056 Init. Calib. Date(s): 01/09/90 01/10/90

Min RRF50 for SPCC(#) = 0.050 Max %D for CCC(*) = 25.0%

COMPOUND		$\overline{RRF}$	RRF50	%D	
Dibenzofuran		2.514	2.703	-7.5	
2,4-Dinitrotoluene		0.635	0.610	3.9	
Diethylphthalate		2.289	2.354	-2.8	
4-Chlorophenyl-phenylether		0.853	0.854	-0.1	
Fluorene		2.102	2.269	-7.9	
4-Nitroaniline		0.540	0.376	30.4	
4,6-Dinitro-2-Methylphenol		0.211	0.193	8.5	
N-Nitrosodiphenylamine (1)	*	0.737	0.738	-0.1	*
4-Bromophenyl-phenylether		0.288	0.261	9.4	
Hexachlorobenzene		0.351	0.296	15.7	
Pentachlorophenol	*	0.153	0.134	12.4	*
Phenanthrene		1.565	1.515	3.2	
Anthracene		1.651	1.687	-2.2	
Di-n-Butylphthalate		2.529	2.066	18.3	
Fluoranthene	*	1.678	1.662	1.0	*
Pyrene		1.787	2.081	-16.5	
Butylbenzylphthalate		1.079	1.088	-0.8	
3,3'-Dichlorobenzidine		0.604	0.507	16.1	
Benzo(a)Anthracene		1.821	1.959	-7.6	
Chrysene		1.606	1.752	-9.1	
bis(2-Ethylhexyl)Phthalate		1.693	1.801	-6.4	
Di-n-Octyl Phthalate	*	3.170	2.814	11.2	*
Benzo(b)Fluoranthene		1.672	1.708	-2.2	
Benzo(k)Fluoranthene		1.771	1.821	-2.8	
Benzo(a)Pyrene	*	1.482	1.508	-1.8	*
Indeno(1,2,3-cd)Pyrene		1.496	1.517	-1.4	
Dibenz(a,h)Anthracene		1.244	1.278	-2.7	
Benzo(g,h,i)Perylene		1.131	1.158	-2.4	
Nitrobenzene-d5		0.621	0.522	15.9	
2-Fluorobiphenyl		2.098	2.356	-12.3	
Terphenyl-d14		1.510	1.603	-6.2	
Phenol-d5		3.080	2.971	3.5	
2-Fluorophenyl		2.271	2.347	-3.3	
2,4,6-Tribromophenol		0.269	0.233	13.4	

(1) Cannot be separated from Diphenylamine

8B
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Lab File ID (Standard): R1056 Date Analyzed: 01/12/90

Instrument ID: 4500-R Time Analyzed: 1227

		IS1(DCB) AREA #	RT	IS2(NPT) AREA #	RT	IS3(ANT) AREA #	RT
	12 HOUR STD	16700	10.15	68800	13.25	31800	17.84
	UPPER LIMIT	33400		137600		63600	
	LOWER LIMIT	8350		34400		15900	
	EPA SAMPLE NO.						
01	7855-01	14800	10.17	54500	13.27	30000	17.87
02	7855-01MS	16000	10.17	67200	13.27	32600	17.87
03	7855-01MSD	14700	10.17	59700	13.27	30800	17.85
04	BLK01	16000	10.17	67200	13.27	33000	17.87

IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10

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

Column used to flag internal standard area values with an asterisk

FORM VIII SV-1 1/87 Rev.

8C

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: RMAL Contract:

Lab Code: ENSECO Case No.: 7855 SAS No.: SDG No.:

Lab File ID (Standard): R1056 Date Analyzed: 01/12/90

Instrument ID: 4500-R Time Analyzed: 1227

		IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
	12 HOUR STD	61100	21.72	50600	28.84	47600	32.91
	UPPER LIMIT	122200		101200		95200	
	LOWER LIMIT	30550		25300		23800	
	EPA SAMPLE NO.						
01	7855-01	60300	21.75	45700	28.86	43200	32.92
02	7855-01MS	66300	21.77	50300	28.86	48100	32.92
03	7855-01MSD	61200	21.75	46600	28.84	44700	32.92
04	BLK01	64600	21.75	51100	28.86	50100	32.94

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

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

Column used to flag internal standard area values with an asterisk

FORM VIII SV-2 1/87 Rev.

Enseco - Rocky Mountain Analytical
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Facsimile: 303/431-7171

CHAIN OF CUSTODY

No.

Attn: _____

Enseco Client: City St. Louis Park

Project: _____

Sampling Co.: _____

Sampling Site: _____

Team Leader: MH

SAMPLE SAFE™ CONDITIONS

1. Packed by: MH Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Date	Time	Sample ID/Description	Sample Type	No. Containers	Analysis Parameters	Remarks
12/13/89	1300	GAC-SLP10F - 121389	l	6	ppt PAH	REFER TO PROJECT #6334-04 FOR PPT GUIDANCE
855 01		GAC-SLP10TAF - 121389	l	6	ppt PAH	ANALYZE FOR ACID, FRACTION COMPOUNDS PER EPA 625
		GAC-SLP10MS - 121389	l	3	ppt-PAH	Low PPT-PAH

CUSTODY TRANSFERS PRIOR TO SHIPPING

	Relinquished by: (signed)	Received by: (signed)	Date	Time
1	[signature]			
2				
3				

SHIPPING DETAILS

Delivered to Shipper by: _____

Method of Shipment: _____ Airbill # _____

Received for Lab: Rmax Signed: B Magor Date/Time 0800

Enseco Project No. 7855 7850 12/14/89

White and Pink Copies to Lab Yellow to Sampler

SS-001