A Department of Ecology Report

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Chemical Evaluation of Intertidal Sediments at Boulevard Park, Bellingham, WA

Summary of Findings

The major findings of the present investigation, conducted in the nearshore area of Bellingham Bay adjacent to Boulevard Park, are summarized below:

- Sediments collected adjacent to the site were composed of predominately sand size particles. A slight hydrogen sulfide odor and light oil sheen were present in the majority of samples examined.
- Total organic carbon content was variable in the samples tested, ranging from 2.3 to 9.5%, on a dry weight basis.
- Metals concentrations were low and well below Ecology's Sediment Management Standards (173-204 WAC) at all stations.
- Twenty-five semivolatile organics, primarily PAHs and related compounds, were detected in sediments. The distribution of PAHs suggests that historical sources have played an important role in the contaminant patterns observed at the site.
- Concentrations of thirteen individual semivolatile organics were measured above Ecology's Sediment Quality Standards. The greatest number of exceedences were present at station BLVD3 located in the central portion of the site. Four exceedances of the Cleanup Screen Levels (2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, and benzoic acid) were measured in the present study.
- A station cluster analysis was performed and indicated that the cove area (southeast of the main dock) is classified as a "Sediment Station Cluster of Potential Concern" for 2-methylphenol and 4-methylphenol as defined by the SMS (173-204 WAC).

by Dale Norton and John Summers
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Ecology Report 98-308x
Waterbody No. WA-01-0050

Project Description

Boulevard Park, located along the shoreline of Bellingham Bay (Figure 1), was the site of a coal gasification plant and, like Gas Works Park in Seattle, had been converted into a city park. Several remnants from the old plant still exist at the site including a large product tank and various pipes below the tank. An earlier investigation at the site identified high concentrations of polynuclear aromatic hydrocarbons (PAHs) and BTX (benzene, toluene, and xylene) in water, soil, and sediments (E & E, 1991).

Sediment sampling was conducted in 1991 at Boulevard Park; however, this effort did not include total organic carbon (TOC) and metals analyses. As a result the data were not sufficient to allow a determination of whether or not a sediment station cluster of potential concern was present, as described in Ecology's Sediment Management Standards (SMS) (173-204-510 WAC).

In response to this data gap Lucy Pebles of Ecology's Northwest Regional Office requested that sediment sampling be conducted in the intertidal area below the park to facilitate a sediment station cluster analysis. Ecology's Environmental Investigations and Laboratory Services Program (EILS) conducted this survey.

The primary objectives of the study were as follows:

- Determine if intertidal sediments adjacent to the park approach or exceed chemical criteria set by the Department of Ecology SMS (Ecology, 1995a).

- If contaminated sediments are present determine if they qualify as a sediment station cluster of potential concern as described in the SMS (173-204-510 WAC)

Sediment samples were collected from the five intertidal locations shown in Figure 2. Three of the five stations occupied historic sampling locations to confirm earlier data. Two samples were collected from new locations to increase spatial coverage of the area and to aid in performing a sediment station cluster evaluation.

Sampling Methods

Sampling methods followed applicable Puget Sound Estuary Protocols (PSEP, 1996) and requirements of Ecology's SMS (Ecology, 1995a,b). Detailed information on sampling and analysis for this project is described in the Boulevard Park Quality Assurance Plan (Norton, 1997). Briefly, each sample consisted of a single composite from three individual grabs. The top 10-cm layer (biologically active zone - Ecology, 1995b) was retained for analysis from each individual grab.

All samples were collected from Ecology's 20' workboat using a 0.1 m^2 stainless steel van Veen grab. Sampling stations were located and positions recorded using a differentially corrected Global Positioning System. A grab was considered acceptable if it met the following conditions: it was not over-filled with sediment, overlying water was present and not excessively turbid, the sediment surface was relatively flat, and desired depth penetration had been achieved. A field log was maintained during sampling.

Processing of each grab consisted of first siphoning off the overlying water. The top 10 cm of sediment not in contact with the sidewalls of the samplers was then removed with a stainless steel scoop, placed in a stainless steel bucket, and homogenized by stirring.

Sub-samples of the homogenized sediment were placed in glass jars (Teflon lid liners) cleaned to EPA QA/QC specifications (EPA, 1990), or Whirl-Pak bags for grain size. Separate 8-oz jars were used for semivolatile organics, metals, and an excess sample. Four-oz jars were used for TOC samples.

Stainless steel scoops and buckets used to manipulate the sediments were cleaned by washing with Liquinox detergent, followed by sequential rinses with tap water, dilute (10%) nitric acid, deionized water, and pesticide-grade acetone. The equipment was then air-dried and wrapped in aluminum foil until used in the field. The same procedure was used to pre-clean the grab before going into the field. Between stations cleaning of the grab consisted of thorough brushing with on-site water. If oil or visible contamination was encountered the grab was cleaned with a detergent wash followed by a rinse with on-site water.

All samples were placed on ice immediately after collection and transported to the Manchester Environmental Laboratory (MEL) within three days. Storage temperature was maintained at 4°C. Chain-of-custody procedures were followed.

Data Quality

Puget Sound Estuary Protocols (PSEP) for collection, preservation, transportation, storage, and analysis of samples were used in this investigation in an effort to limit sources of bias (PSEP, 1996).

Analytical methods and laboratories used in this investigation are summarized in Table 1.

Table 1: Analytical Methods for the Boulevard Park Sediment Survey.

Analyte	Method	Reference	Laboratory
Percent Solids	Gravimetric (160.3)	PSEP, 1996	MEL
Total Organic Carbon	Combustion/CO2 Measurement @ 70°C and 104°C (9060)	PSEP, 1996	MEL
Grain Size	Sieve and Pipet	PSEP, 1996	Rosa Environmental
Arsenic	ICP (206.2)	PSEP, 1996	MEL
Cadmium, chromium, copper, lead, silver, zinc	ICP (200.7)	PSEP, 1996	MEL
Mercury	CVAA (245.5)	PSEP, 1996	MEL
Semivolatiles	GC/MS (8270)	PSEP, 1996	MEL

Staff from MEL performed quality assurance review of the data generated for this project. No major analytical problems were encountered with the analysis of samples for the project. Consequently, the data are considered acceptable for use as presented and noted in this report. Mercury results were qualified as estimates due to high results on continuing calibration standards. Copies of the case narratives and laboratory data sheets for all analytes are included in Appendix A.

In addition to laboratory prepared quality assurance samples, a field duplicate (a single sample homogenized and split in the field into two aliquots) for percent solids, TOC, grain size, metals, and organics was prepared in the field and submitted blind to the laboratory. Excellent precision was obtained for all analytes, except mercury, based on the blind field duplicate results. Mean relative percent differences (RPD) by Analyte group are shown below in Table 2.

Table 2: Mean Relative Percent Difference Between Blind Field Duplicates.

Analyte Group	Relative Percent Difference
Conventionals	23
Metals except Mercury	15
Mercury	128
Semivolatile Organics	33

Unless otherwise noted all results in this document are reported on a dry weight basis.

Results

Physical descriptions of the samples collected from Bellingham Bay adjacent to Boulevard Park are included in Table 3. Visually, the samples can be described as black to gray sand containing some shell and wood fragments. A mild hydrogen sulfide odor and light oil sheen were present in over half of the samples.

The results of conventionals and metals analysis are summarized in Table 4. Grain size analysis indicated the samples collected were predominately sand, which confirms field observations. TOC content were quite variable ranging from 2.3 - 9.5%, with a mean of 5.6%, on a dry weight basis (104°C). The highest levels were found at BLVD3 located in the central portion of the study area.

Concentrations of all SMS metals were low in the samples tested. Silver was not detected at any of the sites. For comparison Ecology's Sediment Quality Standards (SQS) and cleanup screening levels (CSL) for metals are also shown in Table 4. Examination of the metals data indicates that concentrations of all target metals were well below the SMS in all samples.

The results of semivolatile organics analysis are summarized in Table 5. Twenty-five target compounds were detected in the sediments analyzed. The majority of organics detected were polynuclear aromatic hydrocarbons (PAH) and closely related compounds. The highest concentrations of most compounds were measured at station BLVD3. At all stations the sum of low molecular weight PAHs (LPAH) were less than the sum of high molecular weight PAHs (HPAH). The apparent enrichment of HPAH relative to LPAH suggests that historical sources are primarily responsible for the sediment contamination observed adjacent to the site. This is based on the fact that weathering processes such as evaporation, photochemical oxidation, dissolution, and microbial degradation can preferentially remove PAHs with molecular weights less than that of fluoranthene (Merrill and Wade, 1985).

A complete list of semivolatile organics detected in sediments at similar locations during investigations in 1991 (E & E, 1991) and 1997 (present study) are shown in Table 5. For easier comparison, Table 6 below shows LPAH and HPAH levels only from these two investigations.

Table 6: Comparison of LPAH and HPAH Concentrations in Sediments from 1991 and 1997 (mg/kg, dry).

Station/Date	LPAH	HPAH
BLVD1		
1991	3.6j	20j
1997	5.8	30
BLVD3		
1991	-	28
1997	37	110
BLVD4		
1991	83	240
1997	13	31
BLVD5		
1991	17	14
1997	9.4	22

- = No Data
j = Estimated Concentration

Relatively good agreement was seen between the earlier data and the present study at station BLVD1 (northend of site). Results were also comparable at BLVD5 (north side of main dock) and SS10 which are located approximately 100' apart. At station BLVD3 HPAH concentrations in the present study were about on order of magnitude higher then the 1991 data. In contrast, 1991 results were higher then the present study at BLVD4 (south side of main dock). The apparent discrepancies in contaminant levels at BLVD3 and BLVD4 between 1991 and 1997 could be related to several factors including changes in analytical techniques and the depth of sampling. However, given the magnitude of the differences, the observed spatial patterns are more likely explained by a patchy distribution of contaminants in the nearshore sediments.

Non-ionizable organics detected during the present investigation are normalized to organic carbon content and compared to Ecology's SMS in Table 7. Ionizable organics detected are compared on a dry weight basis. Thirteen individual exceedences of sediment quality standards (SQS) chemical criteria were measured. The majority of exceedences (11) were measured at station BLVD3. Four exceedences of the cleanup screening levels (CSLs) were measured. Chemicals exceeding the CSLs included 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, and benzoic acid.

To determine if a station cluster of potential concern exists at a site, a minimum of three sediment stations are selected that 1) are spatially and chemically similar, and 2) have the highest concentration of each chemical or the highest degree of biological effects. The average concentration for the contaminant or biological effect at the three stations is then determined. If the average contaminant concentration or biological effect for any three

stations identified exceeds the applicable CSL, then the station cluster is defined as a station cluster of potential concern (Ecology, 199a).

Based on the above analysis, sediments within the cove area adjacent to Boulevard Park are classified as a sediment station cluster of "potential concern" based on concentrations of 2-methylphenol and 4-methylphenol. This designation indicates that the cove area should be scored as a potential sediment cleanup area as part of the Bellingham Bay Pilot Study.

References

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EPA, 1990. Specifications and Guidance for Obtaining Contaminant Free Sample Containers. OSWER Directive #93240.0-05

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PSEP, 1996. Puget Sound Estuary Program (PSEP): Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound. EPA Region 10, Office of Puget Sound, Seattle, WA.

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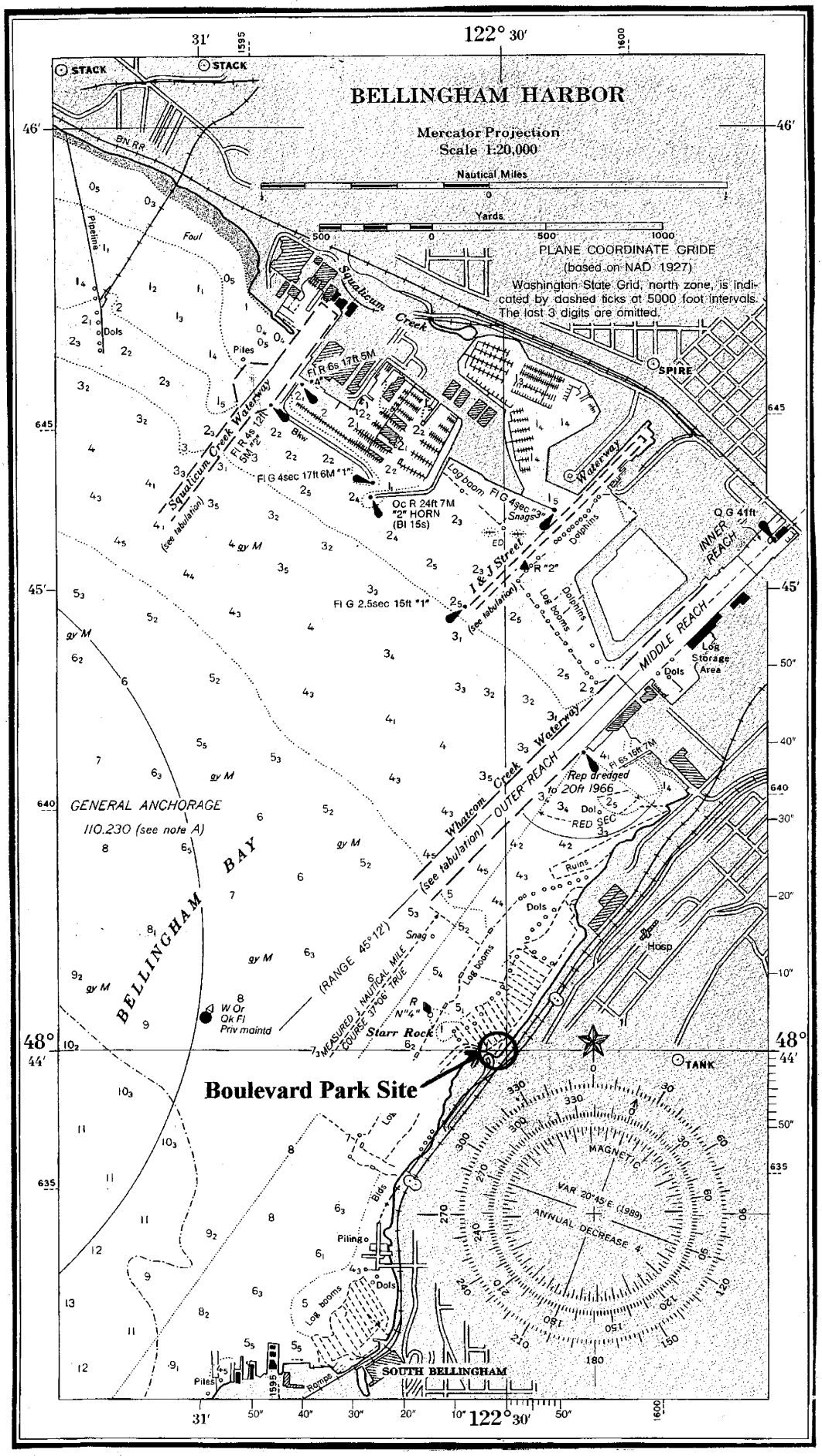

Figure 1: Location of Boulevard Park,Bellingham, Washington.

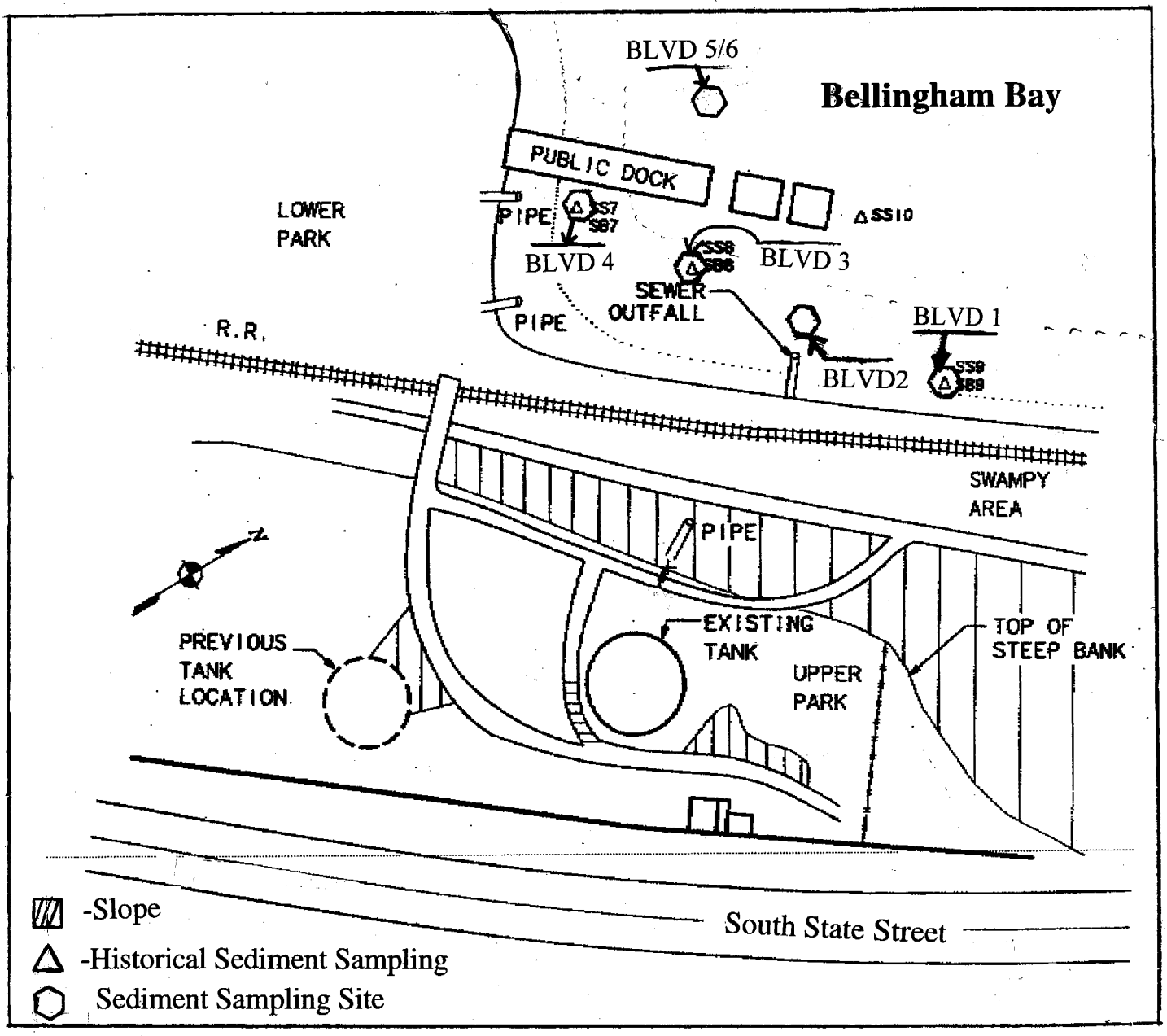

Figure 2: Sediment Sampling Locations, Boulevard Park, Bellingham, WA.

Table 3: Station Positions and Descriptions for Boulevard Park Intertidal Sediment Evaluation

I. Location

Station	Description	Position						Depth ft @ MLLW
		Latitude			Longitude			
		Deg	Min	Sec	Deg	Min	Sec	
BLVD1	Northend below Railroad Ditch	48	44	01.8	122	29	59.0	2.5
BLVD2	Offshore of Sewer Outfall	48	44	00.1	122	30	00.8	3.5
BLVD3	Center of Site	48	43	59.0	122	30	01.4	2.0
BLVD4	South of Main Dock	48	43	00.0	122	30	02.6	2.5
BLVD5	North of Main Dock	48	44	00.4	122	30	04.0	3.0
BLVD6	Duplicate of BLVD5	48	44	00.4	122	30	04.0	3.0

Position= Differentially corrected GPS

II Description

Station	Characteristics
BLVD1	Gray black sandy silt w/shell fragments and worms present. Some H_2S odor, no oil sheen
BLVD2	Black to gray sand w/shell fragments. Some oil odor and oil sheen present.
BLVD3	Black to gray sand w/shell and wood fragments. Some H_2S odor and oil sheen present.
BLVD4	Black to gray sand w/shell and wood fragments. Organics. H_2S odor present, no oil sheen.
BLVD5	Black to gray sand w/shell fragments and eel grass. Oil odor and light sheen present.
BLVD6	Black to gray sand w/shell fragments and eel grass. Oil odor and light sheen present.

Table 4: Results of Conventionals and Metals Analysis of Sediment Samples Adjacent to Boulevard Park, Bellingham Washington.

Station	BLVD1		BLVD2		BLVD3		BLVD4		BLVD5		BLVD6				
Decription	North End		Sewer Outfall		Central Area		Main Dock South		Main Dock North		Dup of 8024				
Depth (Feet @ MLLW)	2.5		3.5		2.0		2.5		3.0		3.0		Site	Ecology SMS[2]	
Sample No.	48-8020		48-8021		48-8922		48-8023		48-8024		48-8025		Mean[1]	SQS	CSL
Conventionals															
Percent Solids (%)	55.1		65.4		43.1		46.6		44.6		48.6		50.6	-	-
Total Organic Carbon (% @ 70°C)	3.4		2.3		8.8		6.9		5.8		4.6		5.3		
Total Organic Carbon (% @ 104°C)	3.7		2.3		9.5		7.3		5.9		4.8		5.6	-	-
Grain Size (%)														-	-
Gravel (<2mm)	3		11		2		2		3		2		4	-	-
Sand (2mm-62um)	69		73		76		78		75		79		75	-	-
Silt (62-2um)	24		14		20		18		20		16		19	-	-
Clay (>2um)	4		2		2		2		2		3		3	-	-
Metals (mg/kg, dry)															
Arsenic	5.0		4.0		5.5		3.7		5.6		3.4		4.5	57	93
Cadmium	0.4	u	0.4	u	0.69		0.47		0.48		0.4		0.5	5.1	6.7
Chromium	33		26		30		29		30		30		30	260	270
Copper	26		23		45		42		48		44		38	390	390
Lead	11		22		38		36		40		35		30	450	530
Mercury	0.095	j	0.074	j	0.094	j	0.072	j	0.38	j	0.084	j	0.13	j	0.41	0.59
Silver	0.5	u	0.5	u	0.5	u	0.5	u	0.5	u	0.5	u	-	6.1	6.1
Zinc	59		69		92		90		92		91		82	410	960

u= Not detected at detection limit shown

j= Estimated concentration (see data quality section for details)

1= Mean of detected values

2= Ecology Sediment Management Standards (173-204 WAC)

SQS= Sediment Quality Standards- Marine Criteria

CSL= Cleanup Screening Level

Table 5: Comparison of Semivolatile Organics Detected in Sediments Adjacent to Boulevard Park, Bellingham, WA.

Station No.	BLVD1	SS-9	BLVD2	BLVD3	SS-8	BLVD4	SS-7	BLVD5	BLVD6	SS-10
Source	Ecology	E&E	Ecology	Ecology	E&E	Ecology	E&E	Ecology	Duplicate	E&E
Year	1997	1991	1997	1997	1991	1997	1991	1997	1997	1991
Acenaphthene	0.26	0.5 uj	0.16	1.3	1.5 u	0.48	5	0.34	0.38	5 u
Acenaphthylene	0.8	0.7 j	0.44	3.4	1.5 u	1	3	0.68	0.95	5 u
Naphthalene	1.4	1.3 j	1.2	12	1.5 u	4.6	10	3.5	4	7
Fluorene	0.43	0.5 uj	0.23	2.1	1.5 u	0.74	6	0.6	0.59	5 u
Anthracene	1.3	0.8 j	0.55	4.5	1.5 u	1.5	12	0.78	1	5 u
Phenanthrene	1.6	0.8 j	0.98	14	1.5 u	4.5	47	2.9	3.2	7
Sum LPAH	5.8	3.6 j	3.6	37	-	13	83	8.8	10	14
Fluoranthene	4.8	2.5 j	2.2	21	3.7	6.3	35	3.5	5.8	7
Benzo(a)anthracene	3.3	2.2 j	1.4	11	2.7	2.8	22	1.1	2.8	5 u
Chrysene	3.7	3.5 j	1.5	13	3.4	3.5	31	1.3	3.2	5 u
Pyrene	6.5	4.7 j	2.7	24	4.5	6.9	54	3.2	6.2	7
Benzofluoranthenes	4.6	3.3 j	2.2	16	7.3	4.4	42	2.1 j	4.2	5 u
Benzo(a)pyrene	3.3	2.4 j	1.6	10	3.1	2.8	22	1.3	2.6	5 u
Dibenzo(a,h)anthracene	0.61	ND	0.4 j	1.8	ND	0.67 j	ND	0.78 u	0.59 j	ND
Indeno(1,2,3-cd)pyrene	1.8	0.9 j	0.97	6.3	1.8	1.8	15	0.94	1.7	5 u
Benzo(g,h,i)perylene	1.6	0.9 j	0.86	6.2	1.9	1.6	15	0.81	1.5	5 u
Sum HPAH	30	20 j	14 j	110	28	31 j	240	14 j	29 j	14
Total PAH	36	24 j	18 j	150	28	44 j	320	23 j	39 j	28
1-Methylnapthalene	0.38	ND	0.26	2.1	ND	0.64	ND	0.48	0.6	ND
2-Methylnaphthalene	0.39	ND	0.26	2.3	ND	0.77	ND	0.54	0.66	ND
Dibenzofuran	0.28	500 uj	0.17	1.7	1.5 u	0.62	4	0.53	0.5	5000 u
Carbazole	0.1 j	ND	0.066 j	0.95	ND	0.28	ND	0.26	0.24	ND
Retene	1.2	ND	0.69	5.3	ND	1.8	ND	1.5	1.5	ND
Coprostanol	2.3 u	ND	2.1 u	3.2 u	ND	1.9 j	ND	3.1 u	2.7 u	ND
2,4 Dimethylphenol	0.57 u	ND	0.1 u	0.1 j	ND	0.68 u	ND	0.78 u	0.67 u	ND
2-Methylphenol	0.018 j	ND	0.1 u	0.13 j	ND	0.052 j	ND	0.049 j	0.047 j	ND
4-Methylphenol	0.16	ND	0.18	1.4	ND	0.8	ND	0.53	0.68	ND
Benzoic Acid	1.1 u	ND	1 u	1.9 u	ND	1.7	ND	1.6 u	1.5 u	ND

u=Not detected at detection limit shown
j=Estimated concentration
uj= Estimated detection limit
ND= No data available

Table 7: Comparison of Semivolatile Organics Detected in Sediments Adjacent to Boulevard Park, Bellingham, WA. to Ecology's Sediment Management Standards.

Station No.	BLVD1	BLVD2	BLVD3	BLVD4	BLVD5	Average	Overall	Ecology SMS[1]	
Location	North End near Ditch	Sewer Outfall	Center of Site	South of Main Dock	North of Main Dock	of three Highest	Site Mean	SQS	CSL
TOC (%)	3.7	2.3	9.5	7.3	5.4	5.1	5.6	-	-
Semivolatiles (mg/kg Organic Carbon)									
Acenaphthene	7.0	7.0	14	6.6	6.8	9.3	8	16	57
Acenaphthylene	22	19	36	14	16	26	21	66	66
Naphthalene	38	52	**130**	63	71	88	71	99	170
Fluorene	12	10	22	10	11	15	13	23	79
Anthracene	35	24	47	21	17	35	29	220	1200
Phenanthrene	43	43	**150**	62	58	90	71	100	480
Sum LPAH	160	160	**390**	180	180	250	210	370	780
Fluoranthene	130	96	**220**	86	90	150	130	160	1200
Benzo(a)anthracene	89	61	**120**	38	38	90	69	110	270
Chrysene	100	65	**140**	48	44	100	79	110	460
Pyrene	180	117	250	95	92	180	150	1000	1400
Benzofluoranthenes	120	96	170	60	62 j	130	100 j	230	450
Benzo(a)pyrene	89	70	110	38	38	90	69	99	210
Dibenzo(a,h)anthracene	**16**	**17** j	**19**	9.2 j	**13** j	**17** j	**15** j	12	33
Indeno(1,2,3-cd)pyrene	**49**	**42**	**66**	25	26	**52**	**42**	34	88
Benzo(g,h,i)perylene	**43**	**37**	**65**	22	22	**48**	**38**	31	78
Sum HPAH	820	600 j	**1200**	420 j	430 j	870 j	690 j	960	5300
2-Methylnaphthalene	11	11	24	11	12	16	14	38	64
Dibenzofuran	7.6	7.4	**18**	8.5	9.5	12	10	15	58
Semivolatiles (mg/kg, dry)									
2,4 Dimethylphenol	0.57 u	.0.1 u	**0.1** j	0.68 u	0.73 u	-	-	0.029	0.029
2-Methylphenol	0.018 j	0.1 u	**0.13** j	0.052 j	0.048 j	**0.077** j	0.062 j	0.063	0.063
4-Methylphenol	0.16	0.18	**1.4**	**0.8**	0.61	**0.93**	0.63	0.67	0.67
Benzoic Acid	1.1 u	1.0 u	1.9 u	**1.7**	1.6 u	-	-	0.65	0.65

u=Not detected at detection limit shown

j=Estimated concentration

1= Ecology Sediment Management Standards (173-204 WAC)

Bold= Exceeds sediment quality standard

Bold and Underlined= Exceeds cleanup screening level

Appendix A

Case Narratives and Laboratory Data for Sediment Results

Washington State Department of Ecology
Manchester Laboratory

January 30, 1998

TO: Dale Norton

FROM: Catherine Bickle, Technician

THROUGH: Debbie Lacroix, Chemist

SUBJECT: General Chemistry Quality Assurance memo for the Boulevard Park Sediment project.

SUMMARY

The data generated by analyses of these samples can be used without qualification.

SAMPLE INFORMATION

The Manchester Laboratory received samples 97488020 - 25 from the Boulevard Park Sediment project on 12-01-97 in good condition. Percent solids were performed, then the samples were frozen until TOC's could be analyzed.

HOLDING TIMES

Analyses were performed within all applicable EPA holding times.

ANALYSIS PERFORMANCE

Instrument Calibration

Where applicable, instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. All initial and continuing calibration verification standards were within the relevant USEPA control limits. A correlation coefficient of 0.995 or greater was met as stated in CLP calibration requirements.
All balances are calibrated yearly with calibration verification performed monthly.

Procedural Blanks

All procedural blanks were within acceptable limits.

Precision Data

The results of the triplicate analyses of these samples were used to evaluate the precision on this project. The Relative Standard Deviation (RSD) was within the acceptance window of +/- 20%.

Laboratory Control Sample (LCS) Analyses

LCS analyses were within their acceptance windows of +/- 20%.

Please call Catherine Bickle @ 871-8807 or Debbie Lacroix @ 871-8812 with any questions or concerns about this project.

cc: project file

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Percent Solids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Project Officer: Dale Norton
Date Reported: 30-JAN-98

Method: EPA160.3
Matrix: Sediment/Soil
Analyte: Solids

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
97488020		BLVD1	**55.1**		%	12/01/97	12/04/97
97488021		BLVD2	**65.4**		%	12/01/97	12/04/97
97488022		BLVD3	**43.1**		%	12/01/97	12/04/97
97488023		BLVD4	**46.6**		%	12/01/97	12/04/97
97488024		BLVD5	**44.4**		%	12/01/97	12/04/97
97488024	Duplicate		**44.1**		%	12/01/97	12/04/97
97488024	Duplicate		**45.3**		%	12/01/97	12/04/97
97488025		BLVD6	**48.6**		%	12/01/97	12/04/97

Authorized By: C. Stoltz Release Date: 1/30/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Project Officer: Dale Norton
Date Reported: 29-JAN-98

Method: PSEP-TOC
Matrix: Sediment/Soil
Analyte: Total Organic Carbon 70 C dry weight

Sample	QC	Field ID	Result	Qualifier	Units		Received	Analyzed
97488020		BLVD1	3.41		%	Dry Wt.	12/01/97	01/28/98
97488021		BLVD2	2.30		%	Dry Wt.	12/01/97	01/28/98
97488022		BLVD3	8.83		%	Dry Wt.	12/01/97	01/28/98
97488023		BLVD4	6.94		%	Dry Wt.	12/01/97	01/28/98
97488024		BLVD5	5.67		%	Dry Wt.	12/01/97	01/28/98
97488024	Duplicate		5.80		%	Dry Wt.	12/01/97	01/28/98
97488024	Replicate		5.84		%	Dry Wt.	12/01/97	01/28/98
97488025		BLVD6	4.64		%	Dry Wt.	12/01/97	01/28/98

Authorized By: C Buckle Release Date: 1/30/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Project Officer: Dale Norton
Date Reported: 29-JAN-98

Method: PSEP-TOC
Matrix: Sediment/Soil
Analyte: Total Organic Carbon 104 C dry weight

Sample	QC	Field ID	Result	Qualifier	Units		Received	Analyzed
97488020		BLVD1	3.70		%	Dry Wt.	12/01/97	01/28/98
97488021		BLVD2	2.32		%	Dry Wt.	12/01/97	01/28/98
97488022		BLVD3	9.50		%	Dry Wt.	12/01/97	01/28/98
97488023		BLVD4	7.31		%	Dry Wt.	12/01/97	01/28/98
97488024		BLVD5	5.76		%	Dry Wt.	12/01/97	01/28/98
97488024	Duplicate		6.01		%	Dry Wt.	12/01/97	01/28/98
97488024	Replicate		5.78		%	Dry Wt.	12/01/97	01/28/98
97488025		BLVD6	4.76		%	Dry Wt.	12/01/97	01/28/98

Authorized By: C Buckle Release Date: 1/30/98

State of Washington Department of Ecology
Manchester Environmental Laboratory
7411 Beach Dr. East Port Orchard WA. 98366

December 30, 1997

Project: Boulevard Park

Samples: 48-8020-25

Laboratory: Rosa Environmental

By: Pam Covey

Case Summary

These samples required six (6) Grain Size analyses on sediment using Puget Sound Estuary Protocol (PSEP) method with salt correction. One sample was analyzed in duplicate.

The samples were received at the Manchester Environmental Laboratory on December 1, 1997 and transported to Rosa Environmental on December 5, 1997 for Grain Size analyses.

The analyses were reviewed for qualitative and quantitative accuracy, validity and usefulness.

The results are acceptable for use as reported.

REG Lab WMBE
Rosa Environmental & Geotechnical Laboratory, LLC

400 Ninth Avenue N., Suite B
Seattle, WA 98109-5187
(206) 287-9122

Client: Washington State Department of Ecology Manchester Laboratory	REGL Project No.: 1004-004
Client Project No.: Boulevard Park	Sample Batch No.: 1004-004-01

Case Narrative

1. The samples were received on December 5, 1997. They were packaged in a cardboard box and were cool, but not cold.

2. The testing was performed in accordance with the PSEP grain size distribution protocol. Two modifications were made at the request of the client. One sample was run in duplicate instead of triplicate, and a "dissolved solids" correction was applied to the data, as described below.

3. Although not required by the PSEP methodology, a dissolved solids correction was applied to the data at the request of WDOE. The dissolved solids correction was run as follows:

- Approximately 200 ml of the sample from the pipette fraction was placed in a centrifuge bottle and spun at 2,500 rpm for 15 minutes.
- The supernatant was filtered through a 0.45 um membrane filter.
- A 20 ml aliquot of the supernatant was pipetted into a weighed tare, along with 20 ml of DI water used to rinse the pipette.
- The aliquot was oven dried at 90° C.
- The mass of material in the tare was multiplied by 50 (to represent the entire 1000 ml in the starting sample.
- This mass of material in the correction sample was subtracted from the mass of the solids in each sediment pipette sample.

The effect of this correction was to lower the percent passing for each phi size by approximately 6-8 percent.

4. Sample 48-8021A had a piece of rusted metal retained on the #4 sieve. It was about 3/8" square and about 1/16" thick.

Approved by: Harold Berry Date: 12/18/97
Title: Laboratory Manager

Rosa Environmental and Geotechnical Laboratory, LLC

Apparent Grain Size Distribution

WDOE, Manchester Laboratory
Boulevard Park

Sample No.	Gravel				Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-4.00	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	1/2"	3/8"	#4	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (62)	31.00	15.60	7.80	3.90	2.00	1.00
48-8020	-	100	100	97	93	90	78	45	28	16	13	7	4	2	0
48-8021A	100	100	92	89	84	74	48	24	17	7	6	4	2	0	0
48-8021B	100	100	95	90	86	74	48	23	15	8	6	4	2	0	0
48-8022	-	100	99	98	96	87	68	43	22	12	7	3	1	0	0
48-8023	-	-	100	98	96	90	76	40	20	12	8	3	2	0	0
48-8024	-	-	100	97	93	86	73	40	22	14	10	5	2	0	0
48-8025	-	-	100	98	96	90	75	39	19	13	9	5	3	1	0

Notes to the testing:

1. Apparent grain size distributions according to PSEP protocols, with modifications requested by WDOE (dissolved solids corrections).
2. Sample 48-8021A had a piece of rusted metal retained on the #4 sieve.

Rosa Environmental and Geotechnical Laboratory, LLC

QA SUMMARY

PROJECT:	Department of Ecology, Manchester Laboratory	Project No.:	Boulevard Park
REGL Triplicate Sample ID:	97844	Batch No.:	1004-004-01
Client Triplicate Sample ID:	48-8021	Page:	1 of 1

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
48-8021A	100.00	92.00	88.82	84.25	73.66	48.01	24.46	16.80	7.47	5.82	3.63	1.95	0.17	0.00
48-8021B	100.00	94.73	90.36	85.56	74.40	47.87	23.25	15.28	8.10	6.09	4.05	2.20	0.44	0.00
AVE	100.00	93.36	89.59	84.91	74.03	47.94	23.86	16.04	7.78	5.95	3.84	2.07	0.31	0.00

The Triplicate Applies To The Following Samples

REGL ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
97843	48-8020	unknown	12/5/97	12/16/97	109.94
97844	48-8021	unknown	12/5/97	12/16/97	108.1, 104.1
97845	48-8022	unknown	12/5/97	12/16/97	107.58
97846	48-8023	unknown	12/5/97	12/16/97	106.33
97847	48-8024	unknown	12/5/97	12/16/97	106.21
97848	48-8025	unknown	12/5/97	12/16/97	103.39

* QA limits = 95-105%

Notes to the Testing:

1. Although not required by the PSEP grain size distribution protocol, a correction for "dissolved solids" was applied to the samples. Prior to application of this "correction factor" the QA (beforeweight/after weight) was within REGL limits. The values shown above are after the correction value was applied. This correction value causes a bias in the data of between 4-8 % on each of the pipette size fractions. Care must be taken in evaluation of this data.

December 26, 1997

To: Dale Norton

From: Randy Knox, Metals Chemist RSK

Subject: Boulevard Park Project Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project is generally good except that mercury continuing calibration verification standards gave a high result. No other significant quality assurance issues are noted with the data.

SAMPLE INFORMATION

The samples from the Boulevard Park Project were received by the Manchester Laboratory on 12/01/97 in good condition.

HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration (CCV) standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards, except that for mercury, were within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting CLP calibration requirements. Mercury data is qualified J, as estimated, due to high (116-119% of actual) determinations on the CCV standard.

PROCEDURAL BLANKS

The procedural blanks associated with these samples show no analytically significant levels of analyte.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries are within the CLP acceptance limits of +/- 25%.

PRECISION DATA

The results of the spiked and duplicate spiked samples are used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes is within the 20% CLP acceptance window for duplicate analysis. Lead is an exception with a RPD of 27%. Lead data is not qualified.

SERIAL DILUTION

A five times serial dilution of sample was analyzed by ICP and the analytical results corrected for dilution compared to the original sample analysis. The RPD (relative % difference) for most analytes at levels 50X greater than the detection level was acceptable, within ±10%. The interference check standard, ICSA, showed detectable zinc. The analyst demonstrated that this was due to contamination of the standard and not interference. Data was not qualified.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses are within the windows established for each parameter.

Please call Randy Knox at SCAN 360-871-8811 or Jim Ross at SCAN 360-871-8808 to further discuss this project.

RLK:rlk

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN73530
Blank ID: M7346SB1
Project Officer: Dale Norton

Date Prepared: 12/12/97
Date Analyzed: 12/15/97

Method: EPA200.7
Matrix: Sediment/Soil
Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Silver	0.5	U

uthorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97.

Sample: LCS73531 **Method:** EPA200.7
Blank ID: M7346SL1 **Date Prepared:** 12/12/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/15/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Silver	93	%

Authorized By: Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN73463 **Method:** EPA200.7
Blank ID: M7342SB1 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	0.4	U
Chromium	0.5	U
Copper	0.5	U
Lead	2	U
Silver	0.5	U
Zinc	0.5	U

uthorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: LCS73464 **Method:** EPA200.7
Blank ID: M7342SL1 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	99	%
Chromium	92	%
Copper	94	%
Lead	102	%
Silver	94	%
Zinc	90	%

Authorized By: Randy F Kunz Release Date: 12/16/97

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488020
Field ID: BLVD1
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/08/97
Date Analyzed: 12/09/97

Method: EPA200.7
Matrix: Sediment/Soil
Units: mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	0.4	U
Chromium	**33.4**	
Copper	**25.6**	
Lead	**11**	
Silver	0.5	U
Zinc	**59.4**	

Authorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488021 **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD2 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	0.4	U
Chromium	**25.9**	
Copper	**22.5**	
Lead	**22.1**	
Silver	0.5	U
Zinc	**68.6**	

Authorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488022 **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD3 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	**0.69**	
Chromium	**29.9**	
Copper	**44.6**	
Lead	**37.8**	
Silver	0.5	U
Zinc	**92.2**	

Authorized By: Randy S Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: **Boulevard Park Sediments** **LIMS Project ID:** 1702-97

Sample: **97488023** **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD4 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	**0.47**	
Chromium	**28.5**	
Copper	**42.2**	
Lead	**36.0**	
Silver	0.5	U
Zinc	**89.8**	

Authorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD5 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	**0.48**	
Chromium	**30.0**	
Copper	**47.5**	
Lead	**40.3**	
Silver	0.5	U
Zinc	**92.3**	

uthorized By: Randy L Knox Release Date: 12/16/97 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Mercury

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Project Officer: Dale Norton
Date Reported: 26-DEC-97

Method: EPA245.5
Matrix: Sediment/Soil
Analyte: Mercury

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
97488020		BLVD1	0.0946	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488021		BLVD2	0.0744	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488022		BLVD3	0.0938	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488023		BLVD4	0.0729	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488023	Duplicate		0.0708	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488023	Matrix Spike		111 %			12/01/97	12/19/97
97488023	Matrix Spike		115 %			12/01/97	12/19/97
97488024		BLVD5	0.375	J	mg/Kg Dry Wt.	12/01/97	12/19/97
97488025		BLVD6	0.0838	J	mg/Kg Dry Wt.	12/01/97	12/19/97
41C73576		M7351SG1	102 %				12/19/97
41C73577		M7351SG2	104 %				12/19/97
BLN73574		M7351SH1	0.005	U	mg/Kg Dry Wt.		12/19/97
BLN73575		M7351SH2	0.005	U	mg/Kg Dry Wt.		12/19/97

Authorized By: Randy L Knox Release Date: 12/26/97

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488025 (Matrix Spike - LMX2) **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD6 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** % Recovery

Analyte	Result	Qualifier
Cadmium	91	
Chromium	76	
Copper	80	
Lead	76	
Silver	95	
Zinc	76	

horized By: Randy L. Knox Release Date: 12/16/97 Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488025 (Matrix Spike - LMX1) **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD6 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** % Recovery

Analyte	Result	Qualifier
Cadmium	88	
Chromium	83	
Copper	87	
Lead	110	
Silver	97	
Zinc	87	

Authorized By: Randy L Knox Release Date: 12/16/97

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: **Boulevard Park Sediments** **LIMS Project ID:** 1702-97

Sample: **97488025** **Date Received:** 12/01/97 **Method:** EPA200.7
Field ID: BLVD6 **Date Prepared:** 12/08/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 12/09/97 **Units:** mg/Kg Dry Wt.

Analyte	Result	Qualifier
Cadmium	0.4	U
Chromium	**29.9**	
Copper	**43.8**	
Lead	**35.0**	
Silver	0.5	U
Zinc	**91.2**	

Authorized By: Randy L Knox Release Date: 12/16/97 Page: 1

February 4, 1998

To: Dale Norton

From: Randy Knox, Metals Chemist

Subject: Boulevard Park Project.....Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project is generally good except that mercury continuing calibration verification standards gave a high result. No other significant quality assurance issues are noted with the data. This summary includes arsenic results. Arsenic was run and QA for it is good. I apologize for its being overlooked on the previous report.

SAMPLE INFORMATION

The samples from the Boulevard Park Project were received by the Manchester Laboratory on 12/01/97 in good condition.

HOLDING TIMES

All analyses were performed within the USEPA Contract Laboratory Program (CLP) holding times for metals analysis (28 days for mercury, 180 days for all other metals).

INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration (CCV) standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards, except that for mercury, are within the relevant USEPA (CLP) control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting CLP calibration requirements. Mercury data is qualified J, as estimated, due to high (116-119% of actual) determinations on the CCV standard.

PROCEDURAL BLANKS

The procedural blanks associated with these samples show no analytically significant levels of analyte.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries are within the CLP acceptance limits of +/- 25%.

PRECISION DATA

The results of the spiked and duplicate spiked samples are used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes is within the 20% CLP acceptance window for duplicate analysis. Lead is an exception with a RPD of 27%. Lead data is not qualified.

SERIAL DILUTION

A five times serial dilution of sample was analyzed by ICP and the analytical results corrected for dilution compared to the original sample analysis. The RPD (relative % difference) for most analytes at levels 50X greater than the detection level was acceptable, within ±10%. The interference check standard, ICSA, showed detectable zinc. The analyst demonstrated that this was due to contamination of the standard and not interference. Data was not qualified.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses are within the windows established for each parameter.

Please call Randy Knox at SCAN 360-871-8811 or Jim Ross at SCAN 360-871-8808 to further discuss this project.

RLK:rlk

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Arsenic

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Project Officer: Dale Norton **Method:** EPA206.2
Date Reported: 03-FEB-98 **Matrix:** Sediment/Soil
Analyte: Arsenic

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
97488020		BLVD1	5.01		mg/Kg Dry Wt.	12/01/97	01/30/98
97488021		BLVD2	4.01		mg/Kg Dry Wt.	12/01/97	01/30/98
97488022		BLVD3	5.54		mg/Kg Dry Wt.	12/01/97	01/30/98
97488023		BLVD4	3.67		mg/Kg Dry Wt.	12/01/97	01/30/98
97488024		BLVD5	5.64		mg/Kg Dry Wt.	12/01/97	01/30/98
97488025		BLVD6	3.28		mg/Kg Dry Wt.	12/01/97	02/03/98
97488025	Matrix Spike		91 %			12/01/97	02/03/98
97488025	Matrix Spike		94 %			12/01/97	02/03/98
BLN80281		M7342SB1	0.3	U	mg/Kg Dry Wt.		01/30/98
LCS80282		M7342SL1	101 %				01/30/98

Authorized By: Randy L Knox Release Date: 2/4/98 Page: 1

MANCHESTER ENVIRONMENTAL LABORATORY
7411 Beach Drive E, Port Orchard Washington 98366

January 23, 1998

Subject: Boulevard Park Sediments

Samples: 97488020 through 97488025

Case No. 1707-97

Officer: Dale Norton

By: Karin Feddersen KF

SEMIVOLATILE ORGANICS

ANALYTICAL METHODS:

The samples were extracted following the EPA CLP and SW 846 8270 procedure. The sediment extracts were cleaned up with Gel Permeation Chromatography (GPC) followed by silica gel chromatography. Analysis was by capillary GC/MS. Normal QA/QC procedures were performed with the analyses.

HOLDING TIMES:

The samples were stored at 4 degrees C until extraction. They were extracted and were analyzed within the recommended holding times.

BLANKS:

Low levels of some phthalates and TICs were detected in the laboratory blanks. An analyte is considered native to the sample when the concentration is at least ten times greater than in the associated method blanks.

SURROGATES:

The standard Manchester Laboratory surrogates were added to the sample prior to extraction. All surrogate recoveries were within acceptable limits with the exception of one of the matrix spike extracts (LMX1). This extract was spilled prior to analysis. The loss of part of the extract is most likely responsible for the low surrogate recoveries.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Sample 97488024 was spiked to evaluate recoveries in these samples. The LMX1 extract was spilled prior to analysis. The loss of part of the extract is most likely responsible for the low spike recoveries. Therefore, precision cannot be evaluated. Use only the other matrix spike (LMX2) for evaluating accuracy.

Analytes with recoveries below 50% in LMX2 have been qualified "J" in the corresponding source sample. (Aniline, Hexachloroethane, 4-Chloroaniline and 3-Nitroaniline.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488020 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD1 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	114	U	**Acenaphthene**	**258**	
Pyridine	570	U	2,4-Dinitrophenol	2280	U
Aniline	114	U	4-Nitrophenol	570	U
Phenol	121	U	**Dibenzofuran**	**284**	
Bis(2-Chloroethyl)Ether	114	U	2,4-Dinitrotoluene	1140	U
2-Chlorophenol	114	U	Diethylphthalate	114	U
1,3-Dichlorobenzene	114	U	**Fluorene**	**425**	
1,4-Dichlorobenzene	114	U	4-Chlorophenyl-Phenylether	114	U
1,2-Dichlorobenzene	114	U	4-Nitroaniline	570	U
Benzyl Alcohol	114	U	4,6-Dinitro-2-Methylphenol	1140	U
2-Methylphenol	**18**	**J**	N-Nitrosodiphenylamine	114	U
2,2'-Oxybis[1-chloropropane]	114	U	1,2-Diphenylhydrazine	114	U
N-Nitroso-Di-N-Propylamine	114	U	4-Bromophenyl-Phenylether	570	U
4-Methylphenol	**164**		Hexachlorobenzene	570	U
Hexachloroethane	114	U	Pentachlorophenol	570	U
Nitrobenzene	114	U	**Phenanthrene**	**1600**	
Isophorone	114	U	**Anthracene**	**1300**	
2-Nitrophenol	570	U	Caffeine	570	U
2,4-Dimethylphenol	114	U	**Carbazole**	**100**	**J**
Bis(2-Chloroethoxy)Methane	114	U	Di-N-Butylphthalate	228	U
Benzoic Acid	1140	U	**Fluoranthene**	**4790**	
2,4-Dichlorophenol	570	U	Benzidine	1140	U
1,2,4-Trichlorobenzene	114	U	**Pyrene**	**6530**	
Naphthalene	**1410**		**Retene**	**1190**	
4-Chloroaniline	114	U	Butylbenzylphthalate	228	U
Hexachlorobutadiene	570	U	**Benzo(a)anthracene**	**3270**	
4-Chloro-3-Methylphenol	228	U	3,3'-Dichlorobenzidine	456	U
2-Methylnaphthalene	**392**		**Chrysene**	**3650**	
1-Methylnaphthalene	**379**		Bis(2-Ethylhexyl) Phthalate	228	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	228	U
2,4,6-Trichlorophenol	570	U	**Benzo(b)fluoranthene**	**3200**	
2,4,5-Trichlorophenol	570	U	**Benzo(k)fluoranthene**	**1400**	
2-Chloronaphthalene	114	U	**Benzo(a)pyrene**	**3340**	
2-Nitroaniline	228	U	3B-Coprostanol	2280	U
Dimethylphthalate	114	U	**Indeno(1,2,3-cd)pyrene**	**1790**	
2,6-Dinitrotoluene	114	U	**Dibenzo(a,h)anthracene**	**608**	
Acenaphthylene	**796**		**Benzo(ghi)perylene**	**1600**	
3-Nitroaniline	570	U			

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Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488020
Field ID: BLVD1
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	101	%
D5-Phenol	110	%
D4-2-Chlorophenol	97	%
1,2-Dichlorobenzene-D4	40	%
D5-Nitrobenzene	64	%
2-Fluorobiphenyl	97	%
D10-Pyrene	99	%
D14-Terphenyl	101	%

Authorized By: _____ Release Date: 1/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488020 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD1 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
25155151	*Benzene, Methyl(1-Methylethyl)-*	310	NJ
121335	*Benzaldehyde, 4-Hydroxy-3-Methoxy-*	379	NJ
21150129	*Benzeneacetic acid, .alpha.-hydroxy-3-me*	647	NJ
*3008001	*Unknown 01*	1080	NJ
112378	*Undecanoic Acid*	1890	NJ
610480	*1-Methylanthracene*	543	NJ
613127	*2-Methylanthracene*	405	NJ
2531842	*2-Methylphenanthrene*	741	NJ
832644	*4-Methylphenanthrene*	1880	NJ
*3008002	*Unknown 02*	850	NJ
10544500	*Sulfur, Mol. (S8)*	3970	NJ
*3008003	*Unknown 03*	1970	NJ
243174	*11h-Benzo[B]Fluorene*	473	NJ
238846	*11h-Benzo[A]Fluorene*	426	NJ
381217	*Pyrene, 1-Methyl-*	356	NJ
353126	*Pyrene, 4-Methyl-*	207	NJ
442782	*Pyrene, 2-Methyl-*	309	NJ
3008004	*Unknown 04*	674	NJ
155704	*1-Phenanthrenecarboxylic Acid, 1,2,3,4,4a,9,10,10a-Oct*	416	NJ
2053	*7H-Benz[de]anthracen-7-one*	266	NJ
12856	*Docosanoic Acid*	1630	NJ
8281044	*Nonadecanoic acid, ethyl ester*	577	NJ
705846	*Triphenylene, 2-Methyl-*	217	NJ
498773	*Benz[A]Anthracene, 1-Methyl-*	90	NJ
3005001	*Unknown Hydrocarbon 01*	4220	NJ
7103	*Hexadecanoic Acid*	4630	NJ
92972	*Benzo(e)pyrene*	1550	NJ
476	*Gamma-Sitosterol*	18100	NJ
158613	*Stigmast-4-en-3-one*	4060	NJ

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488021 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD2 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	104	U	**Acenaphthene**	**158**	
Pyridine	522	U	2,4-Dinitrophenol	2090	U
Aniline	104	U	4-Nitrophenol	522	U
Phenol	109	U	**Dibenzofuran**	**167**	
Bis(2-Chloroethyl)Ether	104	U	2,4-Dinitrotoluene	1040	U
2-Chlorophenol	104	U	Diethylphthalate	104	U
1,3-Dichlorobenzene	104	U	**Fluorene**	**229**	
1,4-Dichlorobenzene	104	U	4-Chlorophenyl-Phenylether	104	U
1,2-Dichlorobenzene	104	U	4-Nitroaniline	522	U
Benzyl Alcohol	104	U	4,6-Dinitro-2-Methylphenol	1040	U
2-Methylphenol	104	U	N-Nitrosodiphenylamine	104	U
2,2'-Oxybis[1-chloropropane]	104	U	1,2-Diphenylhydrazine	104	U
N-Nitroso-Di-N-Propylamine	104	U	4-Bromophenyl-Phenylether	522	U
4-Methylphenol	**181**		Hexachlorobenzene	522	U
Hexachloroethane	104	U	Pentachlorophenol	522	U
Nitrobenzene	104	U	**Phenanthrene**	**977**	
Isophorone	104	U	**Anthracene**	**545**	
2-Nitrophenol	522	U	Caffeine	522	U
2,4-Dimethylphenol	104	U	**Carbazole**	**66**	**J**
Bis(2-Chloroethoxy)Methane	104	U	Di-N-Butylphthalate	209	U
Benzoic Acid	1050	U	**Fluoranthene**	**2220**	
2,4-Dichlorophenol	522	U	Benzidine	1040	U
1,2,4-Trichlorobenzene	104	U	**Pyrene**	**2650**	
Naphthalene	**1240**		**Retene**	**691**	
4-Chloroaniline	104	U	Butylbenzylphthalate	209	U
Hexachlorobutadiene	522	U	**Benzo(a)anthracene**	**1370**	
4-Chloro-3-Methylphenol	209	U	3,3'-Dichlorobenzidine	417	U
2-Methylnaphthalene	**255**		**Chrysene**	**1520**	
1-Methylnaphthalene	**256**		Bis(2-Ethylhexyl) Phthalate	321	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	209	U
2,4,6-Trichlorophenol	522	U	**Benzo(b)fluoranthene**	**1510**	
2,4,5-Trichlorophenol	522	U	**Benzo(k)fluoranthene**	**680**	
2-Chloronaphthalene	104	U	**Benzo(a)pyrene**	**1560**	
2-Nitroaniline	209	U	3B-Coprostanol	2090	U
Dimethylphthalate	104	U	**Indeno(1,2,3-cd)pyrene**	**974**	
2,6-Dinitrotoluene	104	U	**Dibenzo(a,h)anthracene**	**403**	**J**
Acenaphthylene	**441**		**Benzo(ghi)perylene**	**861**	
3-Nitroaniline	522	U			

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488021
Field ID: BLVD2
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	85	%
D5-Phenol	95	%
D4-2-Chlorophenol	79	%
1,2-Dichlorobenzene-D4	37	%
D5-Nitrobenzene	64	%
2-Fluorobiphenyl	77	%
D10-Pyrene	82	%
D14-Terphenyl	87	%

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488021 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD2 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
25155151	*Benzene, Methyl(1-Methylethyl)-*	900	NJ
121335	*Benzaldehyde, 4-Hydroxy-3-Methoxy-*	307	NJ
571619	*1,5-Dimethylnaphthalene*	142	NJ
575439	*1,6-Dimethylnaphthalene*	110	NJ
*3008001	*Unknown 01*	825	NJ
112378	*Undecanoic Acid*	853	NJ
4505480	*1h-Indene, 2-Phenyl- (9ci)*	364	NJ
613127	*2-Methylanthracene*	504	NJ
2091294	*9-Hexadecenoic Acid*	4430	NJ
832699	*1-Methylphenanthrene*	1130	NJ
10544500	*Sulfur, Mol. (S8)*	4290	NJ
*3008002	*Unknown 02*	1440	NJ
57114	*Octadecanoic Acid*	232	NJ
243174	*11h-Benzo[B]Fluorene*	131	NJ
2381217	*Pyrene, 1-Methyl-*	141	NJ
238846	*11h-Benzo[A]Fluorene*	97	NJ
1740198	*Dehydroabietic Acid*	537	NJ
112856	*Docosanoic Acid*	1460	NJ
18281044	*Nonadecanoic acid, ethyl ester*	1030	NJ
1705846	*Triphenylene, 2-Methyl-*	72	NJ
2381160	*Benz[A]Anthracene, 9-Methyl-*	42	NJ
*3008003	*Unknown 03*	3610	NJ
2363715	*Heneicosanoic acid*	5290	NJ
111615	*Octadecanoic Acid, Ethyl Ester*	1080	NJ
192972	*Benzo(e)pyrene*	656	NJ
*3008004	*Unknown 04*	2410	NJ
83476	*Gamma-Sitosterol*	13000	NJ
1058613	*Stigmast-4-en-3-one*	2660	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488022
Field ID: BLVD3
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	162	U	✓**Acenaphthene**	**1280**	
Pyridine	810	U	2,4-Dinitrophenol	3240	U
Aniline	162	U	4-Nitrophenol	810	U
Phenol	478	U	✓**Dibenzofuran**	**1740**	
Bis(2-Chloroethyl)Ether	162	U	2,4-Dinitrotoluene	1620	U
2-Chlorophenol	162	U	Diethylphthalate	162	U
1,3-Dichlorobenzene	162	U	✓**Fluorene**	**2050**	
1,4-Dichlorobenzene	162	U	4-Chlorophenyl-Phenylether	162	U
1,2-Dichlorobenzene	162	U	4-Nitroaniline	810	U
Benzyl Alcohol	162	U	4,6-Dinitro-2-Methylphenol	1620	U
2-Methylphenol	**131**	**J**	N-Nitrosodiphenylamine	162	U
2,2'-Oxybis[1-chloropropane]	162	U	1,2-Diphenylhydrazine	162	U
N-Nitroso-Di-N-Propylamine	162	U	4-Bromophenyl-Phenylether	810	U
4-Methylphenol	**1430**		Hexachlorobenzene	810	U
Hexachloroethane	162	U	Pentachlorophenol	810	U
Nitrobenzene	162	U	✓**Phenanthrene**	**14000**	
Isophorone	162	U	✓**Anthracene**	**4460**	
2-Nitrophenol	810	U	Caffeine	810	U
2,4-Dimethylphenol	**101**	**J**	✓**Carbazole**	**954**	
Bis(2-Chloroethoxy)Methane	162	U	Di-N-Butylphthalate	408	U
Benzoic Acid	1850	U	✓**Fluoranthene**	**20700**	
2,4-Dichlorophenol	810	U	Benzidine	1620	U
1,2,4-Trichlorobenzene	162	U	✓**Pyrene**	**23600**	
Naphthalene	**11500**		✓**Retene**	**5270**	
4-Chloroaniline	162	U	Butylbenzylphthalate	324	U
Hexachlorobutadiene	810	U	✓**Benzo(a)anthracene**	**10900**	
4-Chloro-3-Methylphenol	324	U	3,3'-Dichlorobenzidine	648	U
2-Methylnaphthalene	**2260**		✓**Chrysene**	**13300**	
1-Methylnaphthalene	**2060**		Bis(2-Ethylhexyl) Phthalate	763	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	324	U
2,4,6-Trichlorophenol	810	U	✓**Benzo(b)fluoranthene**	**11400**	
2,4,5-Trichlorophenol	810	U	✓**Benzo(k)fluoranthene**	**4920**	
2-Chloronaphthalene	162	U	✓**Benzo(a)pyrene**	**10400**	
2-Nitroaniline	324	U	3B-Coprostanol	3240	U
Dimethylphthalate	162	U	✓**Indeno(1,2,3-cd)pyrene**	**6330**	
2,6-Dinitrotoluene	162	U	✓**Dibenzo(a,h)anthracene**	**1790**	
Acenaphthylene	**3360**		✓**Benzo(ghi)perylene**	**6210**	
3-Nitroaniline	810	U			

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488022
Field ID: BLVD3
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	110	%
D5-Phenol	118	%
D4-2-Chlorophenol	104	%
1,2-Dichlorobenzene-D4	60	%
D5-Nitrobenzene	80	%
2-Fluorobiphenyl	101	%
D10-Pyrene	109	%
D14-Terphenyl	107	%

Authorized By: _____ Release Date: 1/23/98

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488022 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD3 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
100425	*Styrene*	1130	NJ
100801	*Benzene, 1-ethenyl-3-methyl*	1180	NJ
527844	*Benzene, 1-Methyl-2-(1-Methylethyl)-*	10500	NJ
98555	*3-Cyclohexene-1-Methanol, .Alpha.,.Alpha.4-Trimethyl-*	1680	NJ
*3008001	*Unknown 01*	1320	NJ
121335	*Benzaldehyde, 4-Hydroxy-3-Methoxy-*	1370	NJ
575417	*1,3-Dimethylnaphthalene*	1240	NJ
569415	*1,8-Dimethylnaphthalene*	1210	NJ
571619	*1,5-Dimethylnaphthalene*	729	NJ
827543	*Naphthalene, 2-Ethenyl-*	494	NJ
581408	*2,3-Dimethylnaphthalene*	615	NJ
*3008002	*Unknown 02*	2490	NJ
*3008003	*Unknown 03*	6830	NJ
613127	*2-Methylanthracene*	2040	NJ
832699	*1-Methylphenanthrene*	3410	NJ
2531842	*2-Methylphenanthrene*	4100	NJ
57103	*Hexadecanoic Acid*	11200	NJ
*3008004	*Unknown 04*	4010	NJ
5737133	*Cyclopenta(def)phenanthreno*	1970	NJ
13076294	*Anthracene, 1,4-dimethoxy-*	9550	NJ
243174	*11h-Benzo[B]Fluorene*	748	NJ
238846	*11h-Benzo[A]Fluorene*	608	NJ
3442782	*Pyrene, 2-Methyl-*	417	NJ
3353126	*Pyrene, 4-Methyl-*	408	NJ
506309	*Arachidic Acid, Ethyl Ester*	986	NJ
5155704	*1-Phenanthrenecarboxylic Acid, 1,2,3,4,4a,9,10,10a-Oct*	1510	NJ
12856	*Docosanoic Acid*	5190	NJ
1114005	*Pentadecanoic acid, ethyl ester*	2850	NJ
22264	*1-Docosanol, acetate*	8850	NJ
363715	*Heneicosanoic acid*	8190	NJ
4010232	*Heptadecanoic acid, ethyl es*	1890	NJ
92972	*Benzo(e)pyrene*	1470	NJ
98550	*Perylene*	581	NJ
3476	*Gamma-Sitosterol*	9950	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488023
Field ID: BLVD4
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	136	U	**Acenaphthene**	**481**	
Pyridine	682	U	2,4-Dinitrophenol	2730	U
Aniline	136	U	4-Nitrophenol	682	U
Phenol	241	U	**Dibenzofuran**	**617**	
Bis(2-Chloroethyl)Ether	136	U	2,4-Dinitrotoluene	1360	U
2-Chlorophenol	136	U	Diethylphthalate	136	U
1,3-Dichlorobenzene	136	U	**Fluorene**	**738**	
1,4-Dichlorobenzene	136	U	4-Chlorophenyl-Phenylether	136	U
1,2-Dichlorobenzene	136	U	4-Nitroaniline	682	U
Benzyl Alcohol	136	U	4,6-Dinitro-2-Methylphenol	1360	U
2-Methylphenol	**52**	**J**	N-Nitrosodiphenylamine	136	U
2,2'-Oxybis[1-chloropropane]	136	U	1,2-Diphenylhydrazine	136	U
N-Nitroso-Di-N-Propylamine	136	U	4-Bromophenyl-Phenylether	682	U
4-Methylphenol	**803**		Hexachlorobenzene	682	U
Hexachloroethane	136	U	Pentachlorophenol	682	U
Nitrobenzene	136	U	**Phenanthrene**	**4460**	
Isophorone	136	U	**Anthracene**	**1480**	
2-Nitrophenol	682	U	Caffeine	682	U
2,4-Dimethylphenol	136	U	**Carbazole**	**282**	
Bis(2-Chloroethoxy)Methane	136	U	Di-N-Butylphthalate	273	U
Benzoic Acid	**1690**	**J**	**Fluoranthene**	**6300**	
2,4-Dichlorophenol	682	U	Benzidine	1360	U
1,2,4-Trichlorobenzene	136	U	**Pyrene**	**6890**	
Naphthalene	**4630**		**Retene**	**1820**	
4-Chloroaniline	136	U	Butylbenzylphthalate	273	U
Hexachlorobutadiene	682	U	**Benzo(a)anthracene**	**2820**	
4-Chloro-3-Methylphenol	273	U	3,3'-Dichlorobenzidine	545	U
2-Methylnaphthalene	**773**		**Chrysene**	**3500**	
1-Methylnaphthalene	**638**		Bis(2-Ethylhexyl) Phthalate	398	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	273	U
2,4,6-Trichlorophenol	682	U	**Benzo(b)fluoranthene**	**2980**	
2,4,5-Trichlorophenol	682	U	**Benzo(k)fluoranthene**	**1380**	
2-Chloronaphthalene	136	U	**Benzo(a)pyrene**	**2790**	
2-Nitroaniline	273	U	**3B-Coprostanol**	**1900**	**J**
Dimethylphthalate	136	U	**Indeno(1,2,3-cd)pyrene**	**1770**	
2,6-Dinitrotoluene	136	U	**Dibenzo(a,h)anthracene**	**666**	**J**
Acenaphthylene	**1000**		**Benzo(ghi)perylene**	**1600**	
3-Nitroaniline	682	U			

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488023
Field ID: BLVD4
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	**97**	%
D5-Phenol	**111**	%
D4-2-Chlorophenol	**92**	%
1,2-Dichlorobenzene-D4	**43**	%
D5-Nitrobenzene	**64**	%
2-Fluorobiphenyl	**86**	%
D10-Pyrene	**96**	%
D14-Terphenyl	**102**	%

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488023 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD4 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
25155151	*Benzene, Methyl(1-Methylethyl)-*	6040	NJ
98555	*3-Cyclohexene-1-Methanol, .Alpha.,.Alpha.4-Trimethyl-*	842	NJ
*3008001	*Unknown 01*	1300	NJ
*3008002	*Unknown 02*	1000	NJ
*3008003	*Unknown 03*	3810	NJ
544638	*Decanoic Acid, Tetra-*	2900	NJ
112378	*Undecanoic Acid*	1530	NJ
*3008004	*Unknown 04*	1210	NJ
613127	*2-Methylanthracene*	629	NJ
832713	*3-Methylphenanthrene*	1420	NJ
*3008006	*Unknown 06*	11000	NJ
57103	*Hexadecanoic Acid*	8340	NJ
*3008007	*Unknown 07*	4940	NJ
*3008005	*Unknown 05*	1390	NJ
*3008008	*Unknown 08*	4520	NJ
10544500	*Sulfur, Mol. (S8)*	4970	NJ
13076294	*Anthracene, 1,4-dimethoxy-*	3910	NJ
57114	*Octadecanoic Acid*	590	NJ
243174	*11h-Benzo[B]Fluorene*	452	NJ
238846	*11h-Benzo[A]Fluorene*	298	NJ
2381217	*Pyrene, 1-Methyl-*	130	NJ
506309	*Arachidic Acid, Ethyl Ester*	515	NJ
5155704	*1-Phenanthrenecarboxylic Acid, 1,2,3,4,4a,9,10,10a-Oct*	981	NJ
112856	*Docosanoic Acid*	3440	NJ
41114005	*Pentadecanoic acid, ethyl ester*	1910	NJ
661198	*1-Docosanol*	6840	NJ
2363715	*Heneicosanoic acid*	4820	NJ
18281044	*Nonadecanoic acid, ethyl ester*	1140	NJ
192972	*Benzo(e)pyrene*	352	NJ
198550	*Perylene*	226	NJ
83476	*Gamma-Sitosterol*	8080	NJ
*3008009	*Unknown 09*	17100	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80184 **Method:** SW8270
Blank ID: BS7344A2 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
57556	*Propanediol, 1,2-*	279	NJ
108883	*Toluene*	73	NJ
123422	*4-Hydroxy-4-Methylpentan-2-one*	5710	NJ
286204	*7-Oxabicyclo[4.1.0]Heptane*	158	NJ
619998	*Hexane, 3-Ethyl-*	120	NJ
1072055	*Heptane, 2,6-Dimethyl-*	93	NJ
2216333	*Octane, 3-Methyl-*	252	NJ
111762	*Ethanol, 2-Butoxy-*	79	NJ
110134	*2,5-Hexanedione*	117	NJ
111773	*2/2/2 Methoxyethoxy Ethanol*	107	NJ
*3004301	*Aldol Condensate Unknown 01*	200	NJ
*3004302	*Aldol Condensate Unknown 02*	300	NJ
*3008001	*Unknown 01*	141	NJ
124072	*Octanoic Acid*	40	NJ
334485	*Decanoic Acid*	73	NJ
74367332	*Propanoic Acid, 2-Methyl-, 2,2-Dimethyl-1-(2-Hydroxy-1*	103	NJ
97870	*Propanoic acid, 2-methyl-, butyl ester*	147	NJ
6938949	*Hexanedioic acid, bis(1-methylethyl) ester*	86	NJ
112538	*1-Dodecanol (9ci)*	108	NJ
17312775	*Undecane, 2,3-Dimethyl-*	81	NJ
*3008002	*Unknown 02*	56	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80184
Blank ID: BS7344A2 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Method: SW8270

Surrogate Recoveries

2-Fluorophenol	**52**	%
D5-Phenol	**59**	%
D4-2-Chlorophenol	**50**	%
1,2-Dichlorobenzene-D4	**48**	%
D5-Nitrobenzene	**60**	%
2-Fluorobiphenyl	**60**	%
D10-Pyrene	**102**	%
D14-Terphenyl	**98**	%

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80184
Blank ID: BS7344A2
Project Officer: Dale Norton

Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	26	U	Acenaphthene	26	U
Pyridine	132	U	2,4-Dinitrophenol	527	U
Aniline	26	U	4-Nitrophenol	132	U
Phenol	**31**		Dibenzofuran	26	U
Bis(2-Chloroethyl)Ether	26	U	2,4-Dinitrotoluene	263	U
2-Chlorophenol	26	U	**Diethylphthalate**	**201**	
1,3-Dichlorobenzene	26	U	Fluorene	26	U
1,4-Dichlorobenzene	26	U	4-Chlorophenyl-Phenylether	26	U
1,2-Dichlorobenzene	26	U	4-Nitroaniline	132	U
Benzyl Alcohol	**3.8**	**J**	4,6-Dinitro-2-Methylphenol	263	U
2-Methylphenol	26	U	N-Nitrosodiphenylamine	26	U
2,2'-Oxybis[1-chloropropane]	26	U	1,2-Diphenylhydrazine	26	U
N-Nitroso-Di-N-Propylamine	26	U	4-Bromophenyl-Phenylether	132	U
4-Methylphenol	**3.4**	**J**	Hexachlorobenzene	132	U
Hexachloroethane	26	U	Pentachlorophenol	132	U
Nitrobenzene	26	U	**Phenanthrene**	**4**	**J**
Isophorone	26	U	**Anthracene**	**1.3**	**J**
2-Nitrophenol	132	U	Caffeine	132	U
2,4-Dimethylphenol	26	U	Carbazole	26	U
Bis(2-Chloroethoxy)Methane	26	U	**Di-N-Butylphthalate**	**283**	
Benzoic Acid	**50**	**J**	**Fluoranthene**	**75**	**J**
2,4-Dichlorophenol	132	U	Benzidine	263	U
1,2,4-Trichlorobenzene	26	U	**Pyrene**	**8.6**	**J**
Naphthalene	26	U	Retene	26	U
4-Chloroaniline	26	U	Butylbenzylphthalate	53	U
Hexachlorobutadiene	132	U	Benzo(a)anthracene	26	U
4-Chloro-3-Methylphenol	53	U	3,3'-Dichlorobenzidine	105	U
2-Methylnaphthalene	26	U	Chrysene	26	U
1-Methylnaphthalene	26	U	**Bis(2-Ethylhexyl) Phthalate**	**27**	**J**
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	53	U
2,4,6-Trichlorophenol	132	U	Benzo(b)fluoranthene	132	U
2,4,5-Trichlorophenol	132	U	Benzo(k)fluoranthene	132	U
2-Chloronaphthalene	26	U	Benzo(a)pyrene	132	U
2-Nitroaniline	53	U	3B-Coprostanol	527	U
Dimethylphthalate	26	U	Indeno(1,2,3-cd)pyrene	132	U
2,6-Dinitrotoluene	26	U	Dibenzo(a,h)anthracene	132	U
Acenaphthylene	**2.8**	**J**	Benzo(ghi)perylene	132	U
3-Nitroaniline	132	U			

Authorized By: _____ Release Date: 1/23/98

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80183 **Method:** SW8270
Blank ID: BS7344A1 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
108883	*Toluene*	214	NJ
26232984	*2-Pentene, 4,4-dimethyl-*	114	NJ
*3004301	*Aldol Condensate Unknown 01*	60	NJ
2216300	*Heptane, 2,5-Dimethyl-*	133	NJ
123422	*4-Hydroxy-4-Methylpentan-2-one*	8430	NJ
*3008001	*Unknown 01*	139	NJ
2216344	*Octane, 4-Methyl-*	240	NJ
1072055	*Heptane, 2,6-Dimethyl-*	163	NJ
7146603	*Octane, 2,3-Dimethyl-*	73	NJ
2216333	*Octane, 3-Methyl-*	465	NJ
111762	*Ethanol, 2-Butoxy-*	82	NJ
110134	*2,5-Hexanedione*	200	NJ
*3004302	*Aldol Condensate Unknown 02*	164	NJ
*3004303	*Aldol Condensate Unknown 03*	326	NJ
*3004304	*Aldol Condensate Unknown 04*	394	NJ
111900	*Ethanol, 2 (2-Ethoxyethoxy)-*	102	NJ
*3004305	*Aldol Condensate Unknown 05*	67	NJ
540976	*Cyclohexasiloxane, Dodecamethyl-*	49	NJ
*3001401	*Phthalate unknown 01*	54	NJ
*3008002	*Unknown 02*	124	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80183
Blank ID: BS7344A1 **Date Prepared:** 12/10/97 **Method:** SW8270 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	**72**	**%**
D5-Phenol	**83**	**%**
D4-2-Chlorophenol	**71**	**%**
1,2-Dichlorobenzene-D4	**68**	**%**
D5-Nitrobenzene	**84**	**%**
2-Fluorobiphenyl	**80**	**%**
D10-Pyrene	**98**	**%**
D14-Terphenyl	**97**	**%**

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: BLN80183
Blank ID: BS7344A1
Project Officer: Dale Norton

Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	26	U	Acenaphthene	26	U
Pyridine	132	U	2,4-Dinitrophenol	527	U
Aniline	26	U	4-Nitrophenol	132	U
Phenol	**37**		Dibenzofuran	26	U
Bis(2-Chloroethyl)Ether	26	U	2,4-Dinitrotoluene	263	U
2-Chlorophenol	26	U	**Diethylphthalate**	**5.5**	**J**
1,3-Dichlorobenzene	26	U	Fluorene	26	U
1,4-Dichlorobenzene	26	U	4-Chlorophenyl-Phenylether	26	U
1,2-Dichlorobenzene	26	U	4-Nitroaniline	132	U
Benzyl Alcohol	**4.1**	**J**	4,6-Dinitro-2-Methylphenol	263	U
2-Methylphenol	26	U	N-Nitrosodiphenylamine	26	U
2,2'-Oxybis[1-chloropropane]	26	U	1,2-Diphenylhydrazine	26	U
N-Nitroso-Di-N-Propylamine	26	U	4-Bromophenyl-Phenylether	132	U
4-Methylphenol	**2.2**	**J**	Hexachlorobenzene	132	U
Hexachloroethane	26	U	Pentachlorophenol	132	U
Nitrobenzene	26	U	Phenanthrene	26	U
Isophorone	26	U	Anthracene	26	U
2-Nitrophenol	132	U	Caffeine	132	U
2,4-Dimethylphenol	26	U	Carbazole	26	U
Bis(2-Chloroethoxy)Methane	26	U	**Di-N-Butylphthalate**	**117**	
Benzoic Acid	**54**	**J**	Fluoranthene	26	U
2,4-Dichlorophenol	132	U	Benzidine	263	U
1,2,4-Trichlorobenzene	26	U	Pyrene	26	U
Naphthalene	26	U	Retene	26	U
4-Chloroaniline	26	U	Butylbenzylphthalate	53	U
Hexachlorobutadiene	132	U	Benzo(a)anthracene	26	U
4-Chloro-3-Methylphenol	53	U	3,3'-Dichlorobenzidine	105	U
2-Methylnaphthalene	26	U	Chrysene	26	U
1-Methylnaphthalene	26	U	**Bis(2-Ethylhexyl) Phthalate**	**43**	**J**
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	53	U
2,4,6-Trichlorophenol	132	U	Benzo(b)fluoranthene	132	U
2,4,5-Trichlorophenol	132	U	Benzo(k)fluoranthene	132	U
2-Chloronaphthalene	26	U	Benzo(a)pyrene	132	U
2-Nitroaniline	53	U	3B-Coprostanol	527	U
Dimethylphthalate	26	U	Indeno(1,2,3-cd)pyrene	132	U
2,6-Dinitrotoluene	26	U	Dibenzo(a,h)anthracene	132	U
Acenaphthylene	26	U	Benzo(ghi)perylene	132	U
3-Nitroaniline	132	U			

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488025
Field ID: BLVD6
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
25155151	*Benzene, Methyl(1-Methylethyl)-*	5880	NJ
123080	*Benzaldehyde, 4-hydroxy-*	298	NJ
827543	*Naphthalene, 2-Ethenyl-*	282	NJ
121335	*Benzaldehyde, 4-Hydroxy-3-Methoxy-*	534	NJ
581408	*2,3-Dimethylnaphthalene*	447	NJ
581420	*2,6-Dimethylnaphthalene*	429	NJ
1010486	*Benzenepropanoic Acid, .Beta.,.Beta.-Dimethyl-*	1050	NJ
25080846	*Benzenepropanoic acid, .beta.,.beta.-dim*	4600	NJ
*3008001	*Unknown 01*	2970	NJ
544638	*Decanoic Acid, Tetra-*	2910	NJ
6053492	*Cyclopentaneundecanoic acid*	2330	NJ
*3008002	*Unknown 02*	1400	NJ
610480	*1-Methylanthracene*	534	NJ
2091294	*9-Hexadecenoic Acid*	11500	NJ
57103	*Hexadecanoic Acid*	9500	NJ
17904299	*Cyclohexanecarboxylic Acid, 4-(1,5-Dimethyl-3-Oxohexyl*	1660	NJ
10544500	*Sulfur, Mol. (S8)*	4270	NJ
*3008003	*Unknown 03*	4110	NJ
57114	*Octadecanoic Acid*	356	NJ
238846	*11h-Benzo[A]Fluorene*	182	NJ
243174	*11h-Benzo[B]Fluorene*	213	NJ
2381217	*Pyrene, 1-Methyl-*	116	NJ
52143632	*Benzo[c]cinnoline, 3,8-dimethyl-*	227	NJ
3442782	*Pyrene, 2-Methyl-*	86	NJ
506309	*Arachidic Acid, Ethyl Ester*	370	NJ
5155704	*1-Phenanthrenecarboxylic Acid, 1,2,3,4,4a,9,10,10a-Oct*	756	NJ
112856	*Docosanoic Acid*	2410	NJ
41114005	*Pentadecanoic acid, ethyl ester*	1480	NJ
*3008004	*Unknown 04*	5940	NJ
*3008005	*Unknown 05*	3100	NJ
14010232	*Heptadecanoic acid, ethyl es*	804	NJ
192972	*Benzo(e)pyrene*	340	NJ
198550	*Perylene*	203	NJ

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488025
Field ID: BLVD6
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	107	%
D5-Phenol	118	%
D4-2-Chlorophenol	100	%
1,2-Dichlorobenzene-D4	61	%
D5-Nitrobenzene	66	%
2-Fluorobiphenyl	92	%
D10-Pyrene	106	%
D14-Terphenyl	106	%

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488025 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD6 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	134	U	**Acenaphthene**	**381**	
Pyridine	671	U	2,4-Dinitrophenol	2680	U
Aniline	134	U	4-Nitrophenol	671	U
Phenol	240	U	**Dibenzofuran**	**502**	
Bis(2-Chloroethyl)Ether	134	U	2,4-Dinitrotoluene	1340	U
2-Chlorophenol	134	U	Diethylphthalate	134	U
1,3-Dichlorobenzene	134	U	**Fluorene**	**593**	
1,4-Dichlorobenzene	134	U	4-Chlorophenyl-Phenylether	134	U
1,2-Dichlorobenzene	134	U	4-Nitroaniline	671	U
Benzyl Alcohol	134	U	4,6-Dinitro-2-Methylphenol	1340	U
2-Methylphenol	**47**	**J**	N-Nitrosodiphenylamine	134	U
2,2'-Oxybis[1-chloropropane]	134	U	1,2-Diphenylhydrazine	134	U
N-Nitroso-Di-N-Propylamine	134	U	4-Bromophenyl-Phenylether	671	U
4-Methylphenol	**683**		Hexachlorobenzene	671	U
Hexachloroethane	134	U	Pentachlorophenol	671	U
Nitrobenzene	134	U	**Phenanthrene**	**3230**	
Isophorone	134	U	**Anthracene**	**1020**	
2-Nitrophenol	671	U	Caffeine	671	U
2,4-Dimethylphenol	134	U	**Carbazole**	**244**	
Bis(2-Chloroethoxy)Methane	134	U	Di-N-Butylphthalate	268	U
Benzoic Acid	1450	U	**Fluoranthene**	**5800**	
2,4-Dichlorophenol	671	U	Benzidine	1340	U
1,2,4-Trichlorobenzene	134	U	**Pyrene**	**6160**	
Naphthalene	**4020**		**Retene**	**1490**	
4-Chloroaniline	134	U	Butylbenzylphthalate	268	U
Hexachlorobutadiene	671	U	**Benzo(a)anthracene**	**2790**	
4-Chloro-3-Methylphenol	268	U	3,3'-Dichlorobenzidine	537	U
2-Methylnaphthalene	**655**		**Chrysene**	**3240**	
1-Methylnaphthalene	**600**		Bis(2-Ethylhexyl) Phthalate	388	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	268	U
2,4,6-Trichlorophenol	671	U	**Benzo(b)fluoranthene**	**2980**	
2,4,5-Trichlorophenol	671	U	**Benzo(k)fluoranthene**	**1210**	
2-Chloronaphthalene	134	U	**Benzo(a)pyrene**	**2610**	
2-Nitroaniline	268	U	3B-Coprostanol	2680	U
Dimethylphthalate	134	U	**Indeno(1,2,3-cd)pyrene**	**1670**	
2,6-Dinitrotoluene	134	U	**Dibenzo(a,h)anthracene**	**587**	**J**
Acenaphthylene	**952**		**Benzo(ghi)perylene**	**1510**	
3-Nitroaniline	671	U			

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 (Matrix Spike - LMX2) **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** % Recovery

Surrogate Recoveries

2-Fluorophenol	**94**	%
D5-Phenol	**105**	%
D4-2-Chlorophenol	**90**	%
1,2-Dichlorobenzene-D4	**61**	%
D5-Nitrobenzene	**86**	%
2-Fluorobiphenyl	**91**	%
D10-Pyrene	**98**	%
D14-Terphenyl	**100**	%

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 (Matrix Spike - LMX2) **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	82		Acenaphthene	95	
Pyridine		NAF	2,4-Dinitrophenol	166	
Aniline	14		4-Nitrophenol	96	
Phenol	92		Dibenzofuran	93	
Bis(2-Chloroethyl)Ether	92		2,4-Dinitrotoluene	102	
2-Chlorophenol	93		Diethylphthalate	105	
1,3-Dichlorobenzene	61		Fluorene	97	
1,4-Dichlorobenzene	63		4-Chlorophenyl-Phenylether	98	
1,2-Dichlorobenzene	68		4-Nitroaniline	65	
Benzyl Alcohol	99		4,6-Dinitro-2-Methylphenol	126	
2-Methylphenol	103		N-Nitrosodiphenylamine	117	
2,2'-Oxybis[1-chloropropane]	90		1,2-Diphenylhydrazine	104	
N-Nitroso-Di-N-Propylamine	106		4-Bromophenyl-Phenylether	95	
4-Methylphenol	117		Hexachlorobenzene	89	
Hexachloroethane	28		Pentachlorophenol	115	
Nitrobenzene	84		Phenanthrene	87	
Isophorone	104		Anthracene	101	
2-Nitrophenol	86		Caffeine		NAF
2,4-Dimethylphenol	129		Carbazole		NAF
Bis(2-Chloroethoxy)Methane	100		Di-N-Butylphthalate	108	
Benzoic Acid	106		Fluoranthene	80	
2,4-Dichlorophenol	93		Benzidine		NAF
1,2,4-Trichlorobenzene	78		Pyrene	89	
Naphthalene	107		Retene		NAF
4-Chloroaniline	15		Butylbenzylphthalate	123	
Hexachlorobutadiene	75		Benzo(a)anthracene	94	
4-Chloro-3-Methylphenol	97		3,3'-Dichlorobenzidine		NAF
2-Methylnaphthalene	88		Chrysene	89	
1-Methylnaphthalene		NAF	Bis(2-Ethylhexyl) Phthalate	129	
Hexachlorocyclopentadiene	0		Di-N-Octylphthalate	123	
2,4,6-Trichlorophenol	101		Benzo(b)fluoranthene	79	
2,4,5-Trichlorophenol	99		Benzo(k)fluoranthene	87	
2-Chloronaphthalene	95		Benzo(a)pyrene	83	
2-Nitroaniline	93		3B-Coprostanol		NAF
Dimethylphthalate	107		Indeno(1,2,3-cd)pyrene	78	
2,6-Dinitrotoluene	94		Dibenzo(a,h)anthracene	98	
Acenaphthylene	86		Benzo(ghi)perylene	77	
3-Nitroaniline	37				

Authorized By: _____ Release Date: 1/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 (Matrix Spike - LMX1) **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** % Recovery

Surrogate Recoveries

2-Fluorophenol	**31**	%
D5-Phenol	**36**	%
D4-2-Chlorophenol	**30**	%
1,2-Dichlorobenzene-D4	**20**	%
D5-Nitrobenzene	**24**	%
2-Fluorobiphenyl	**30**	%
D10-Pyrene	**33**	%
D14-Terphenyl	**46**	%

Manchester Environmental Laboratory

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 (Matrix Spike - LMX1) **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	26		Acenaphthene	18	
Pyridine		NAF	2,4-Dinitrophenol	139	
Aniline	5		4-Nitrophenol	48	
Phenol	23		Dibenzofuran	10	
Bis(2-Chloroethyl)Ether	30		2,4-Dinitrotoluene	60	
2-Chlorophenol	29		Diethylphthalate	34	
1,3-Dichlorobenzene	20		Fluorene	11	
1,4-Dichlorobenzene	20		4-Chlorophenyl-Phenylether	31	
1,2-Dichlorobenzene	21		4-Nitroaniline	35	
Benzyl Alcohol	31		4,6-Dinitro-2-Methylphenol	89	
2-Methylphenol	31		N-Nitrosodiphenylamine	38	
2,2'-Oxybis[1-chloropropane]	28		1,2-Diphenylhydrazine	33	
N-Nitroso-Di-N-Propylamine	35		4-Bromophenyl-Phenylether	39	
4-Methylphenol	18		Hexachlorobenzene	38	
Hexachloroethane	7		Pentachlorophenol	57	
Nitrobenzene	28		Phenanthrene	0	
Isophorone	35		Anthracene	2	
2-Nitrophenol	41		Caffeine		NAF
2,4-Dimethylphenol	43		Carbazole		NAF
Bis(2-Chloroethoxy)Methane	31		Di-N-Butylphthalate	34	
Benzoic Acid	23		Fluoranthene	0	
2,4-Dichlorophenol	38		Benzidine		NAF
1,2,4-Trichlorobenzene	25		Pyrene	0	
Naphthalene	0		Retene		NAF
4-Chloroaniline	6		Butylbenzylphthalate	42	
Hexachlorobutadiene	36		Benzo(a)anthracene	0	
4-Chloro-3-Methylphenol	36		3,3'-Dichlorobenzidine		NAF
2-Methylnaphthalene	9		Chrysene	0	
1-Methylnaphthalene		NAF	Bis(2-Ethylhexyl) Phthalate	39	
Hexachlorocyclopentadiene	0		Di-N-Octylphthalate	47	
2,4,6-Trichlorophenol	44		Benzo(b)fluoranthene	0	
2,4,5-Trichlorophenol	43		Benzo(k)fluoranthene	11	
2-Chloronaphthalene	30		Benzo(a)pyrene	0	
2-Nitroaniline	35		3B-Coprostanol		NAF
Dimethylphthalate	36		Indeno(1,2,3-cd)pyrene	4	
2,6-Dinitrotoluene	47		Dibenzo(a,h)anthracene	46	
Acenaphthylene	5		Benzo(ghi)perylene	5	
3-Nitroaniline	26				

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
25155151	*Benzene, Methyl(1-Methylethyl)-*	4790	NJ
98555	*3-Cyclohexene-1-Methanol, .Alpha.,.Alpha.4-Trimethyl-*	800	NJ
*3008001	*Unknown 01*	900	NJ
527537	*Benzene, 1,2,3,5-Tetramethyl-*	1220	NJ
*3008002	*Unknown 02*	2770	NJ
544638	*Decanoic Acid, Tetra-*	2980	NJ
1002842	*Decanoic Acid, Penta-*	2440	NJ
*3008003	*Unknown 03*	1390	NJ
2091294	*9-Hexadecenoic Acid*	12800	NJ
57103	*Hexadecanoic Acid*	9280	NJ
*3008004	*Unknown 04*	1760	NJ
10544500	*Sulfur, Mol. (S8)*	4440	NJ
13076294	*Anthracene, 1,4-dimethoxy-*	3940	NJ
243174	*11h-Benzo[B]Fluorene*	218	NJ
3442782	*Pyrene, 2-Methyl-*	103	NJ
3353126	*Pyrene, 4-Methyl-*	78	NJ
5155704	*1-Phenanthrenecarboxylic Acid, 1,2,3,4,4a,9,10,10a-Oct*	1110	NJ
112856	*Docosanoic Acid*	2460	NJ
41114005	*Pentadecanoic acid, ethyl ester*	2420	NJ
*3008005	*Unknown 05*	7410	NJ
*3008006	*Unknown 06*	3550	NJ
*3008007	*Unknown 07*	1380	NJ
192972	*Benzo(e)pyrene*	121	NJ
198550	*Perylene*	121	NJ

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Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024
Field ID: BLVD5
Project Officer: Dale Norton

Date Received: 12/01/97
Date Prepared: 12/10/97
Date Analyzed: 01/08/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg Dry Wt.

Surrogate Recoveries

2-Fluorophenol	90	%
D5-Phenol	100	%
D4-2-Chlorophenol	85	%
1,2-Dichlorobenzene-D4	46	%
D5-Nitrobenzene	60	%
2-Fluorobiphenyl	81	%
D10-Pyrene	92	%
D14-Terphenyl	95	%

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Boulevard Park Sediments **LIMS Project ID:** 1702-97

Sample: 97488024 **Date Received:** 12/01/97 **Method:** SW8270
Field ID: BLVD5 **Date Prepared:** 12/10/97 **Matrix:** Sediment/Soil
Project Officer: Dale Norton **Date Analyzed:** 01/08/98 **Units:** ug/Kg Dry Wt.

Analyte	Result	Qualifier	Analyte	Result	Qualifier
N-Nitrosodimethylamine	156	U	**Acenaphthene**	**343**	
Pyridine	782	U	2,4-Dinitrophenol	3130	U
Aniline	156	UJ	4-Nitrophenol	782	U
Phenol	211	U	**Dibenzofuran**	**530**	
Bis(2-Chloroethyl)Ether	156	U	2,4-Dinitrotoluene	1560	U
2-Chlorophenol	156	U	Diethylphthalate	156	U
1,3-Dichlorobenzene	156	U	**Fluorene**	**598**	
1,4-Dichlorobenzene	156	U	4-Chlorophenyl-Phenylether	156	U
1,2-Dichlorobenzene	156	U	4-Nitroaniline	782	U
Benzyl Alcohol	156	U	4,6-Dinitro-2-Methylphenol	1560	U
2-Methylphenol	**49**	**J**	N-Nitrosodiphenylamine	156	U
2,2'-Oxybis[1-chloropropane]	156	U	1,2-Diphenylhydrazine	156	U
N-Nitroso-Di-N-Propylamine	156	U	4-Bromophenyl-Phenylether	782	U
4-Methylphenol	**528**		Hexachlorobenzene	782	U
Hexachloroethane	156	UJ	Pentachlorophenol	782	U
Nitrobenzene	156	U	**Phenanthrene**	**2920**	
Isophorone	156	U	**Anthracene**	**776**	
2-Nitrophenol	782	U	Caffeine	782	U
2,4-Dimethylphenol	156	U	**Carbazole**	**261**	
Bis(2-Chloroethoxy)Methane	156	U	Di-N-Butylphthalate	313	U
Benzoic Acid	1560	U	**Fluoranthene**	**3520**	
2,4-Dichlorophenol	782	U	Benzidine	1560	U
1,2,4-Trichlorobenzene	156	U	**Pyrene**	**3220**	
Naphthalene	**3500**		**Retene**	**1510**	**J**
4-Chloroaniline	156	U	Butylbenzylphthalate	313	U
Hexachlorobutadiene	782	U	**Benzo(a)anthracene**	**1140**	
4-Chloro-3-Methylphenol	313	U	3,3'-Dichlorobenzidine	626	U
2-Methylnaphthalene	**535**		**Chrysene**	**1330**	
1-Methylnaphthalene	**477**		Bis(2-Ethylhexyl) Phthalate	313	U
Hexachlorocyclopentadiene		**REJ**	Di-N-Octylphthalate	313	U
2,4,6-Trichlorophenol	782	U	**Benzo(b)fluoranthene**	**1440**	
2,4,5-Trichlorophenol	782	U	**Benzo(k)fluoranthene**	**694**	**J**
2-Chloronaphthalene	156	U	**Benzo(a)pyrene**	**1330**	
2-Nitroaniline	313	U	3B-Coprostanol	3130	U
Dimethylphthalate	156	U	**Indeno(1,2,3-cd)pyrene**	**939**	
2,6-Dinitrotoluene	156	U	Dibenzo(a,h)anthracene	782	U
Acenaphthylene	**678**		**Benzo(ghi)perylene**	**807**	
3-Nitroaniline	782	UJ			

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