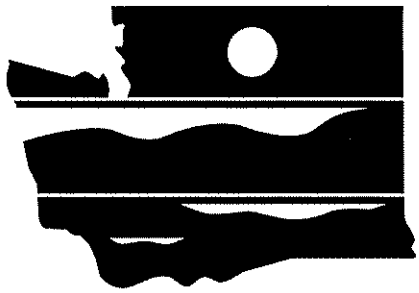

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Data Appendix
(Appendix G)

Investigation of Chemical Contamination at Whitmarsh Landfill and Padilla Bay Lagoon

February 1999
Publication No. 99-307

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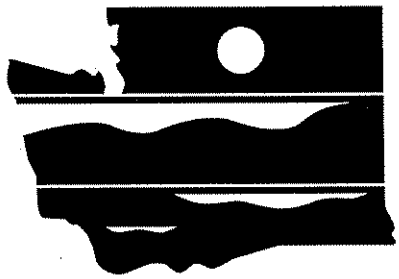

Data Appendix (Appendix G)

Investigation of Chemical Contamination at Whitmarsh Landfill and Padilla Bay Lagoon

by
Art Johnson

Washington State Department of Ecology
Environmental Assessment Program
Watershed Ecology Section
PO Box 47600
Olympia, WA 98504-7600

Water Body No. WA-03-0020

February 1999
Publication No. 99-307

Washington State Department of Ecology
Manchester Laboratory

July 13, 1998

TO: Art Johnson

FROM: Becky Bogaczyk, Chemist

SUBJECT: General Chemistry Quality Assurance memo for Whitmarsh Landfill week 24

SUMMARY

The data generated by the analysis of these samples can be used noting the qualifications discussed in this memo. Total suspended solids (TSS) duplicate sample result is qualified as an estimate. The relative percent difference (RPD) is greater than the 20% acceptance window due to the sample tin being dropped and analyte was lost during analysis. Soil total organic carbon (TOC) results will be sent at a later date due to the matrix six month holding time. All analyses requested were evaluated by established regulatory quality assurance guidelines.

SAMPLE INFORMATION

Samples for Whitmarsh Landfill week 24 project were received by Manchester Laboratory on 06/12/98 in good condition. However, the blue sample seal could be peeled without breaking.

HOLDING TIMES

All analyses were performed within established EPA holding times.

ANALYSIS PERFORMANCE

Instrument Calibration

Instrument calibration was checked by initial calibration verification standards and blanks. All initial and continuing calibration verification standards were within control limits. A correlation coefficient of 0.995 or greater was met. Balances are professional calibrated yearly and calibrated in-house daily. Turbidimeter is calibrated quarterly and verified before each analysis batch. Oven temperature is recorded before and after each analysis batch.

Procedural Blanks

The procedural blanks associated with these samples showed no significant analytical levels of analytes.

Spiked Sample Analysis

Spike samples were performed where applicable with all spike recoveries within acceptance limits of ± 25%.

Precision Data

Spike sample results and duplicate sample results were used to evaluate precision on this sample set. Relative Percent Differences (RPD) for general chemistry parameters were within the 20% acceptance window for duplicate analysis, except TSS. The sample tin was dropped during analysis, analyte was lost, and the duplicate result was qualified as an estimate, "J". Laboratory duplication is performed at a frequency of at least 10%.

Laboratory Control Sample (LCS) Analyses

LCS analyses were within the windows established for each parameter.

Other Quality Assurance Measures and Issues

The "U" qualification indicates the analyte was not detected at or above the reported result.

The "J" qualification signifies the sample result is an estimate (see Precision Data).

Soil TOC results will be sent at a later date due to the matrix six month holding time.

Please call Becky Bogaczyk at (360) 871-8830 to further discuss this project.

cc: Project File

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Suspended Solids

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 07-JUL-98

Method: EPA160.2
Matrix: Water
Analyte: Total Suspended Solids

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**25**		mg/L	06/12/98	06/15/98
98248005	Duplicate		**9**	**J**	mg/L	06/12/98	06/15/98
98248006		S SEEP	**30**		mg/L	06/12/98	06/15/98

Authorized By: Rebecca R. Boggs Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Conductivity of a water solution

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 22-JUN-98

Method: EPA120.1
Matrix: Water
Analyte: Conductivity

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**1240**		umhos/cm	06/12/98	06/12/98
98248006		S SEEP	**1020**		umhos/cm	06/12/98	06/12/98
98248006	Duplicate		**1020**		umhos/cm	06/12/98	06/12/98

Authorized By: Rebecca R Boggs

Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Turbidity of water

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 23-JUN-98

Method: SM2130
Matrix: Water
Analyte: Turbidity

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**25**		NTU	06/12/98	06/12/98
98248005	Duplicate		**26**		NTU	06/12/98	06/12/98
98248006		S SEEP	**190**		NTU	06/12/98	06/12/98

Authorized By: Rebecca R. Boggs jr Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrite/Nitrate

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 18-JUN-98

Method: EPA353.2
Matrix: Water
Analyte: Nitrite-Nitrate

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	0.010	U	mg/L	06/12/98	06/15/98
98248005	Duplicate		0.010	U	mg/L	06/12/98	06/15/98
98248006		S SEEP	0.010	U	mg/L	06/12/98	06/15/98
98248006	Matrix Spike		**85.7 %**			06/12/98	06/15/98
GB8166NNC			0.010	U	mg/L		06/15/98
GB8166NND			0.010	U	mg/L		06/15/98

Authorized By: Rebecca R. Boggs Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

pH

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 12-JUN-98

Method: EPA150.1
Matrix: Water
Analyte: pH

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**8.0**		pH	06/12/98	06/12/98
98248005	Duplicate		**7.9**		pH	06/12/98	06/12/98
98248006		S SEEP	**8.0**		pH	06/12/98	06/12/98

Authorized By: Rebecca R. Boyajk

Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Ammonia

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 22-JUN-98

Method: EPA350.1
Matrix: Water
Analyte: Ammonia

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**3.19**		mg/L	06/12/98	06/15/98
98248005	Duplicate		**3.31**		mg/L	06/12/98	06/15/98
98248006		S SEEP	**6.78**		mg/L	06/12/98	06/15/98
GB8166NH3C			0.010	U	mg/L		06/15/98
GB8166NH3D			0.010	U	mg/L		06/15/98
GB8167NH3A			0.010	U	mg/L		06/16/98
GB8167NH3B			0.010	U	mg/L		06/16/98

Authorized By: Rebecca R. Boyack Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 29-JUN-98

Method: EPA415.1
Matrix: Water
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**11.7**		mg/L	06/12/98	06/25/98
98248005	Duplicate		**11.6**		mg/L	06/12/98	06/25/98
98248006		S SEEP	**9.3**		mg/L	06/12/98	06/25/98
98248006	Matrix Spike		**114 %**			06/12/98	06/25/98

Authorized By: Rebecca R. Boggs

Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Salinity

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 23-JUN-98

Method: SM2520
Matrix: Water
Analyte: Salinity

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**0.0**		g/Kg ww	06/12/98	06/18/98
98248005	Duplicate		**0.0**		g/Kg ww	06/12/98	06/18/98
98248006		S SEEP	**0.0**		g/Kg ww	06/12/98	06/18/98

Authorized By: Rebecca R. Boyack Release Date: 7/13/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Phosphorus

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 29-JUN-98

Method: EPA365.3
Matrix: Water
Analyte: Phosphorus

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	**0.177**		mg/L	06/12/98	06/24/98
98248005	Duplicate		**0.168**		mg/L	06/12/98	06/24/98
98248006		S SEEP	**0.247**		mg/L	06/12/98	06/24/98
GB8175TPA			0.010	U	mg/L		06/24/98
GB8175TPB			0.010	U	mg/L		06/24/98

Authorized By: Carey Mayer Release Date: 07/02/99

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Cyanide

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 01-JUL-98

Method: SM4500CNC
Matrix: Water
Analyte: Cyanide

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	0.005	U	mg/L	06/12/98	06/18/98
98248005	Duplicate		0.005	U	mg/L	06/12/98	06/18/98
98248006		S SEEP	0.005	U	mg/L	06/12/98	06/18/98
98248006	Matrix Spike		**88.8 %**			06/12/98	06/18/98
GB9169CNA			0.005	U	mg/L		06/18/98
GB9169CNB			0.005	U	mg/L		06/18/98
GB9169CNC			0.005	U	mg/L		06/18/98
GB9169CND			0.005	U	mg/L		06/18/98

Authorized By: Casey Moyer

Release Date: 07/02/98

Washington State Department of Ecology
Manchester Laboratory

August 13, 1998

TO: Art Johnson

FROM: Debbie Lacroix, Chemist

SUBJECT: General Chemistry Quality Assurance memo for the Whitmarsh Landfill Project

SUMMARY

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

SAMPLE INFORMATION

Samples 98248007-08 from the Whitmarsh Landfill project were received by the Manchester Laboratory on 6/12/98 in good condition. Analysis for percent solids was performed immediately after sample arrival. The samples were then stored in the freezer until TOC analysis could be performed.

HOLDING TIMES

All analyses were performed within applicable EPA holding times.

ANALYSIS PERFORMANCE

Instrument Calibration

Where applicable, instrument calibration was performed before each analysis and verified by initial and verification standards and blanks. All initial and continuing calibration verification standards were within the relevant EPA control limits. All balances are calibrated yearly with calibration verification occurring monthly.

Procedural Blanks

All procedural blanks were within acceptable limits.

Precision Data

The results of the duplicate and triplicate analysis of samples were used to evaluate the precision on this sample set. Relative percent differences (RPD) were within their acceptance windows of +/- 20 %. The relative standard deviations (RSD) were within their acceptance windows of +/- 20 %. No triplicate analysis is reported at 104°C. Different samples were mistakenly prepped for % solids analysis at 104°C and 70°C. The sample that was analyzed for TOC was re-prepped at 104°C. Unfortunately, the results differed so much from the original results, that the calculation for TOC at 104°C would be extremely questionable. There was insufficient sample to perform % solids analysis again. Therefore, the triplicate results have been rejected as unusable.

Laboratory Control Sample (LCS) Analyses

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

Please call Debbie Lacroix at 871-8812 with any questions or concerns about this project.

cc: Project File

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (70 C)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 23-JUL-98

Method: PSEP-TOC
Matrix: Frozen Sediment/soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248007		N SED	**3.53**		%	06/12/98	07/17/98
98248008		S SED	**3.41**		%	06/12/98	07/17/98
98248008	Duplicate		**3.50**		%	06/12/98	07/17/98
98248008	Replicate		**3.50**		%	06/12/98	07/17/98

Authorized By: Debbie Pierson Release Date: 8-13-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (104 C)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 24-JUL-98

Method: PSEP-TOCM
Matrix: Frozen Sediment/soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248007		N SED	**3.78**		%	06/12/98	07/17/98
98248008		S SED	**3.62**		%	06/12/98	07/17/98

Authorized By: Debbie Lacroix Release Date: 8-13-98

July 14, 1998

To: Art Johnson

From: Randy Knox, Metals Chemist

Subject: Whitmarsh Landfill Project.....Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project met all quality assurance and quality control criteria with the exception that recovery of antimony was low from the spiked samples and the LCS sample and recovery of strontium was low from the spiked sample but not the duplicate spiked sample. No other significant quality assurance issues were noted with the data.

SAMPLE INFORMATION

The samples from the Whitmarsh Landfill Project were received by the Manchester Laboratory on 6/12/98 in good condition.

HOLDING TIMES

All analyses were performed within the specified method 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 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 were within the relevant method control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting method calibration requirements.

PROCEDURAL BLANKS

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

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries, except those for antimony and that of strontium from the spiked sample but not the duplicate spiked sample, were within the acceptance limits of +/- 25%. Antimony data was qualified UJ, as undetected at estimated detection level due to low, 8% and 17%, spike recoveries. Strontium data was qualified J, as estimated, due to low, 68%, recovery from the spiked sample. Aluminum, calcium, iron, magnesium, potassium, sodium, and titanium recoveries were reported NC, as not calculated, since sample levels were greater than four times the spike level.

PRECISION DATA

The results of the spiked and duplicate spiked samples were used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes, except antimony, was within the 20% acceptance window for duplicate analysis. Antimony data was qualified UJ, as undetected at estimated detection level.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses were within the windows established for each parameter, except antimony. Antimony data was qualified UJ, as undetected at estimated detection level, due to low recovery, 68%, from the LCS sample.

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: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: N SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**19900**	
Antimony	15	UJ
Arsenic	25	U
Barium	**50.0**	
Beryllium	**0.6**	
Cadmium	2.5	U
Calcium	**6680**	
Chromium	**64.8**	
Cobalt	**8.8**	
Copper	**44.4**	
Iron	**47000**	
Lead	10	U
Magnesium	**13900**	
Manganese	**311**	
Molybdenum	**3.1**	
Nickel	**51.3**	
Potassium	**3380**	
Selenium	25	U
Silver	2.5	U
Sodium	**20800**	
Strontium	**78.9**	**J**
Thallium	25	U
Titanium	**1120**	
Vanadium	**68.3**	
Zinc	**97.7**	

Authorized By: Randy L Knox Release Date: 7/9/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: S SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**19200**	
Antimony	15	UJ
Arsenic	25	U
Barium	**49.8**	
Beryllium	0.5	U
Cadmium	2.5	U
Calcium	**7240**	
Chromium	**58.7**	
Cobalt	**9.1**	
Copper	**38.9**	
Iron	**47500**	
Lead	10	U
Magnesium	**14000**	
Manganese	**296**	
Molybdenum	**3.1**	
Nickel	**42.1**	
Potassium	**3400**	
Selenium	25	U
Silver	2.5	U
Sodium	**21300**	
Strontium	**94.1**	**J**
Thallium	25	U
Titanium	**1170**	
Vanadium	**65.7**	
Zinc	**92.7**	

Authorized By: Randy L Knox Release Date: 7/9/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: M8168SB1 **Method:** EPA200.7

Project Officer: Art Johnson **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil

Date Analyzed: 06/18/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	2	U
Antimony	3	U
Arsenic	5	U
Barium	0.2	U
Beryllium	0.1	U
Cadmium	0.5	U
Calcium	5	U
Chromium	1	U
Cobalt	0.5	U
Copper	0.5	U
Iron	2	U
Lead	2	U
Magnesium	5	U
Manganese	0.2	U
Molybdenum	0.5	U
Nickel	1	U
Potassium	50	U
Selenium	5	U
Silver	0.5	U
Sodium	5	U
Strontium	0.1	U
Thallium	5	U
Titanium	0.5	U
Vanadium	0.5	U
Zinc	0.5	U

Authorized By: Randy L Knox Release Date: 7/9/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: M8168SL1
Method: EPA200.7

Date Prepared: 06/17/98
Matrix: Sediment/Soil

Project Officer: Art Johnson
Date Analyzed: 06/18/98
Units: mg/Kg dw

Analyte	Result	Qualifier
Aluminum	121	%
Antimony	68	%
Arsenic	107	%
Barium	97	%
Beryllium	99	%
Cadmium	101	%
Calcium	99	%
Chromium	101	%
Cobalt	100	%
Copper	105	%
Iron	123	%
Lead	100	%
Magnesium	106	%
Manganese	104	%
Molybdenum	99	%
Nickel	101	%
Potassium	109	%
Selenium	104	%
Silver	103	%
Sodium	93	%
Strontium	102	%
Thallium	106	%
Titanium	114	%
Vanadium	108	%
Zinc	97	%

Authorized By: Randy L Knox Release Date: 7/9/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 (Matrix Spike - LMX1) **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: S SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum		NC
Antimony	17	J
Arsenic	94	
Barium	92	
Beryllium	92	
Cadmium	94	
Calcium		NC
Chromium	83	
Cobalt	90	
Copper	94	
Iron		NC
Lead	94	
Magnesium		NC
Manganese	76	
Molybdenum	94	
Nickel	89	
Potassium		NC
Selenium	88	
Silver	87	
Sodium		NAF
Strontium	68	
Thallium	94	
Titanium		NC
Vanadium	87	
Zinc	84	

Authorized By: Randy L Knox Release Date: 7/9/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 (Matrix Spike - LMX2) **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: S SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum		NC
Antimony	8	J
Arsenic	100	
Barium	97	
Beryllium	96	
Cadmium	90	
Calcium		NC
Chromium	93	
Cobalt	92	
Copper	98	
Iron		NC
Lead	97	
Magnesium		NC
Manganese	90	
Molybdenum	92	
Nickel	95	
Potassium		NC
Selenium	93	
Silver	86	
Sodium		NAF
Strontium	85	
Thallium	95	
Titanium		NC
Vanadium	94	
Zinc	90	

Authorized By: Randy L Knox Release Date: 7/9/98 Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Mercury

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 18-JUN-98

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

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248007		N SED	**0.082**		mg/Kg dw	06/12/98	06/17/98
98248008		S SED	**0.083**		mg/Kg dw	06/12/98	06/17/98
98248008	Duplicate		**0.070**		mg/Kg dw	06/12/98	06/17/98
98248008	Matrix Spike		**88 %**			06/12/98	06/17/98
98248008	Matrix Spike		**95 %**			06/12/98	06/17/98
M8167SG1			**105**		mg/Kg dw		06/17/98
M8167SH1			0.005	U	mg/Kg dw		06/17/98

Authorized By: Randy L Knox Release Date: 7/9/98

July 14, 1998

To: Art Johnson

From: Randy Knox, Metals Chemist RBK

Subject: Whitmarsh Landfill Project.....Water

QUALITY ASSURANCE SUMMARY

Data quality for this project met all quality assurance and quality control criteria with the exception that nickel and zinc were detected in the procedure blank. Since samples were determined to have no detectable nickel and zinc, it is unlikely that reported nickel and zinc were affected by sample contamination. No other significant quality assurance issues were noted with the data.

SAMPLE INFORMATION

The samples from the Whitmarsh Landfill Project were received by the Manchester Laboratory on 6/12/98 in good condition.

HOLDING TIMES

All analyses were performed within the specified method 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 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 were within the relevant method control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting method calibration requirements. The interference check standard, ICSA, showed detectable chromium, nickel and manganese. Since the interference check standard ICSAB did not show raised levels of these elements and blanks are acceptable, the result appears due to contamination of the ICSA standard and not to interference.

PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analyte, except nickel and zinc. Since samples were determined to have no detectable nickel and zinc, it is unlikely that reported nickel and zinc were affected by sample contamination. Nickel and zinc levels are qualified UJ, as undetected at estimated detection level, due to nickel and zinc being detected in the procedure blank.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries were within the acceptance limits of +/- 25%. Calcium, magnesium and sodium recoveries were reported NC, as not calculated, since sample levels were greater than four times the spike level.

PRECISION DATA

The results of the spiked and duplicate spiked samples were used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes was within the 20% acceptance window for duplicate analysis.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses were 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, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: M8169WB1 **Method:** EPA200.7

Project Officer: Art Johnson **Date Prepared:** 06/18/98 **Matrix:** Water

Date Analyzed: 06/24/98 **Units:** ug/L

Analyte	Result	Qualifier
Aluminum	20	U
Antimony	30	U
Arsenic	30	U
Barium	1	U
Beryllium	1	U
Cadmium	4	U
Calcium	50	U
Chromium	5	U
Cobalt	5	U
Copper	5	U
Iron	20	U
Lead	20	U
Magnesium	50	U
Manganese	2	U
Molybdenum	5	U
Nickel	**26**	
Potassium	500	U
Selenium	40	U
Silver	4	U
Sodium	50	U
Strontium	2	U
Thallium	50	U
Titanium	5	U
Vanadium	5	U
Zinc	**13**	

Authorized By: Randy L Knox Release Date: 7/8/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: M8169WL1 **Method:** EPA200.7

Project Officer: Art Johnson **Date Prepared:** 06/18/98 **Matrix:** Water

Date Analyzed: 06/24/98 **Units:** ug/L

Analyte	Result	Qualifier
Aluminum	98	%
Antimony	96	%
Arsenic	98	%
Barium	96	%
Beryllium	93	%
Cadmium	99	%
Calcium	103	%
Chromium	97	%
Cobalt	94	%
Copper	98	%
Iron	98	%
Lead	95	%
Magnesium	103	%
Manganese	96	%
Molybdenum	101	%
Nickel	101	%
Potassium	113	%
Selenium	98	%
Silver	93	%
Sodium	104	%
Strontium	94	%
Thallium	98	%
Titanium	101	%
Vanadium	95	%
Zinc	98	%

Authorized By: Randy L Knox Release Date: 7/8/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: N SEEP **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/24/98 **Units:** ug/L

Analyte	Result	Qualifier
Aluminum	**106**	
Antimony	30	U
Arsenic	30	U
Barium	**103**	
Beryllium	1	U
Cadmium	4	U
Calcium	**43400**	
Chromium	5	U
Cobalt	5	U
Copper	5	U
Iron	**5660**	
Lead	20	U
Magnesium	**37300**	
Manganese	**127**	
Molybdenum	**7.4**	
Nickel	15	UJ
Potassium	**17400**	
Selenium	40	U
Silver	4	U
Sodium	**137000**	
Strontium	**402**	
Thallium	50	U
Titanium	5	U
Vanadium	5	U
Zinc	5	UJ

Authorized By: Randy L Knox Release Date: 7/8/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 (Matrix Spike - LMX1) **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: N SEEP **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/24/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum	**99**	
Antimony	**92**	
Arsenic	**95**	
Barium	**93**	
Beryllium	**90**	
Cadmium	**96**	
Calcium		NC
Chromium	**91**	
Cobalt	**89**	
Copper	**94**	
Iron	**103**	
Lead	**91**	
Magnesium		NC
Manganese	**90**	
Molybdenum	**96**	
Nickel	**89**	
Potassium	**96**	
Selenium	**95**	
Silver	**89**	
Sodium		NC
Strontium	**88**	
Thallium	**92**	
Titanium	**105**	
Vanadium	**91**	
Zinc	**90**	

Authorized By: Randy S Knox Release Date: 7/8/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 (Matrix Spike - LMX2) **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: N SEEP **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/24/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum	**100**	
Antimony	**93**	
Arsenic	**97**	
Barium	**95**	
Beryllium	**91**	
Cadmium	**90**	
Calcium		NC
Chromium	**93**	
Cobalt	**89**	
Copper	**96**	
Iron	**113**	
Lead	**92**	
Magnesium		NC
Manganese	**91**	
Molybdenum	**98**	
Nickel	**90**	
Potassium	**106**	
Selenium	**95**	
Silver	**89**	
Sodium		NC
Strontium	**92**	
Thallium	**94**	
Titanium	**104**	
Vanadium	**92**	
Zinc	**90**	

Authorized By: Randy L Knox Release Date: 7/8/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma, Total Recoverable

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** EPA200.7
Field ID: S SEEP **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/24/98 **Units:** ug/L

Analyte	Result	Qualifier
Aluminum	**39**	
Antimony	30	U
Arsenic	30	U
Barium	**162**	
Beryllium	1	U
Cadmium	4	U
Calcium	**54500**	
Chromium	5	U
Cobalt	5	U
Copper	5	U
Iron	**16200**	
Lead	20	U
Magnesium	**31400**	
Manganese	**234**	
Molybdenum	5	U
Nickel	15	UJ
Potassium	**15500**	
Selenium	40	U
Silver	4	U
Sodium	**86200**	
Strontium	**369**	
Thallium	50	U
Titanium	5	U
Vanadium	5	U
Zinc	5	UJ

Authorized By: Randy L Knox Release Date: 7/8/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Mercury

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 13-JUL-98

Method: EPA245.1
Matrix: Water
Analyte: Mercury

Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
98248005		N SEEP	0.05	U	ug/L	06/12/98	07/09/98
98248006		S SEEP	0.05	U	ug/L	06/12/98	07/09/98
98248006	Matrix Spike		**99 %**			06/12/98	07/09/98
98248006	Matrix Spike		**100 %**			06/12/98	07/09/98
M8191WG			**99 %**				07/09/98
M8191WH			0.05	U	ug/L		07/09/98

Authorized By: Susan Davis Release Date: 7-14-98

December 23, 1998

To: Art Johnson

From: Randy Knox, Metals Chemist

Subject: Whitmarsh Landfill Project reanalysis.....Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project met all quality assurance and quality control criteria with the exception that recovery of antimony was low from the spiked samples and the LCS sample and thallium was low from the spiked samples. Also the precision of antimony data was low and zinc was detected in blanks. No other significant quality assurance issues were noted with the data.

SAMPLE INFORMATION

The samples from the Whitmarsh Landfill Project were received by the Manchester Laboratory in good condition.

HOLDING TIMES

All analyses were performed within the specified method 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 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 were within the relevant method control limits. Zinc carryover up to 11 mg/Kg was detected in some calibration verification blanks. Zinc sample levels were greater than 8X that seen in the highest verification blank so zinc data were not qualified. The concluding continuing calibration verification blank sample sheet was lost. Since the low level standard following samples was within acceptable limits for all analytes except zinc and only the spiked samples were

analyzed after documented blanks, data were not qualified for blank problems. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting method calibration requirements.

PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analyte, except zinc. Zinc levels in samples were greater than ten times that in the blank, so data was not qualified.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries, except those for antimony and thallium were within the acceptance limits of +/- 25%. Antimony and thallium data were qualified UJ, as undetected at estimated detection level due to low spike recoveries.

PRECISION DATA

The results of the spiked and duplicate spiked samples were used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes, except antimony, was within the 20% acceptance window for duplicate analysis. Antimony data was qualified UJ, as undetected at estimated detection level.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses were within the windows established for each parameter, except antimony. Antimony data was qualified UJ, as undetected at estimated detection level, due to low recovery, 37%, from the LCS sample.

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: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Lab ID: M8324SB1 **Method:** SW6010
QC Type: Laboratory Method Blank **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Antimony	3	U
Beryllium	0.2	U
Cadmium	0.5	U
Chromium	1	U
Copper	0.5	U
Nickel	1.5	U
Silver	0.4	U
Zinc	**5.3**	

Authorized By: Randy L Knox Release Date: 12/23/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Lab ID: M8324SL1 **Method:** SW6010
QC Type: ERA Solid Reference Material **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Antimony	37	%
Beryllium	97	%
Cadmium	99	%
Chromium	97	%
Copper	102	%
Nickel	100	%
Silver	99	%
Zinc	95	%

Authorized By: Randy L Knox Release Date: 12/23/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Sample: 98468007 **Date Collected:** 06/11/98 **Method:** SW6010
Field ID: N.SED **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	**0.39**	
Cadmium	0.5	U
Chromium	**48.9**	
Copper	**38.8**	
Nickel	**41.7**	
Silver	0.4	U
Zinc	**86.0**	

Authorized By: Randy L Knox Release Date: 12/23/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Sample: 98468007 (Matrix Spike - LMX1) **Date Collected:** 06/11/98 **Method:** SW6010
Field ID: N.SED **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** % Recovery

Analyte	Result	Qualifier
Antimony	11	
Beryllium	101	
Cadmium	94	
Chromium	99	
Copper	99	
Nickel	95	
Silver	88	
Zinc	90	

Authorized By: Randy S Knox Release Date: 12/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Sample: 98468007 (Matrix Spike - LMX2) **Date Collected:** 06/11/98 **Method:** SW6010
Field ID: N.SED **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** % Recovery

Analyte	Result	Qualifier
Antimony	8	
Beryllium	98	
Cadmium	94	
Chromium	96	
Copper	96	
Nickel	93	
Silver	89	
Zinc	86	

Authorized By: Randy L Knox Release Date: 12/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Sample: 98468008 **Date Collected:** 06/11/98 **Method:** SW6010
Field ID: S. SED **Date Prepared:** 11/20/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 11/25/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Antimony	3	UJ
Beryllium	**0.40**	
Cadmium	0.5	U
Chromium	**49.1**	
Copper	**36.7**	
Nickel	**42.5**	
Silver	0.4	U
Zinc	**81.8**	

Authorized By: Randy L Knox Release Date: 12/23/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Arsenic

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Project Officer: Art Johnson
Date Reported: 17-DEC-98

Method: EPA206.2
Matrix: Sediment/Soil
Analyte: Arsenic

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98468007		N.SED	**11.2**		mg/Kg dw	06/11/98	12/16/98
98468007	Matrix Spike		**85 %**			06/11/98	12/16/98
98468007	Matrix Spike		**82 %**			06/11/98	12/16/98
98468008		S. SED	**11.6**		mg/Kg dw	06/11/98	12/16/98
M8324SB1			0.3	U	mg/Kg dw		12/16/98
M8324SL1			**105 %**				12/16/98

Authorized By: _____ Release Date: 12/17/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Lead

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Project Officer: Art Johnson
Date Reported: 30-NOV-98

Method: EPA239.2
Matrix: Sediment/Soil
Analyte: Lead

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98468007		N.SED	**12.7**		mg/Kg dw	06/11/98	11/30/98
98468007	Matrix Spike		**91 %**			06/11/98	11/30/98
98468007	Matrix Spike		**94 %**			06/11/98	11/30/98
98468008		S. SED	**13.0**		mg/Kg dw	06/11/98	11/30/98
M8324SB1			0.2	U	mg/Kg dw		11/30/98
M8324SL1			**98 %**				11/30/98

Authorized By: _____ Release Date: 12/17/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Selenium

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Project Officer: Art Johnson
Date Reported: 17-DEC-98

Method: EPA270.2
Matrix: Sediment/Soil
Analyte: Selenium

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98468007		N.SED	**0.50**		mg/Kg dw	06/11/98	12/01/98
98468007	Matrix Spike		**80 %**			06/11/98	12/01/98
98468007	Matrix Spike		**82 %**			06/11/98	12/01/98
98468008		S. SED	**0.42**		mg/Kg dw	06/11/98	12/01/98
M8324SB1			0.3	U	mg/Kg dw		12/01/98
M8324SL1			**105 %**				12/10/98

Authorized By: _____ Release Date: 12/17/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Thallium

Project Name: Whitmarsh Landfill - re-analysis **LIMS Project ID:** 3782-98

Project Officer: Art Johnson
Date Reported: 17-DEC-98

Method: EPA279.2
Matrix: Sediment/Soil
Analyte: Thallium

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98468007		N.SED	0.3	UJ	mg/Kg dw	06/11/98	12/14/98
98468007	Matrix Spike		**3 %**			06/11/98	12/14/98
98468007	Matrix Spike		**1 %**			06/11/98	12/14/98
98468008		S. SED	0.3	UJ	mg/Kg dw	06/11/98	12/14/98
M8324SB1			0.3	U	mg/Kg dw		12/14/98
M8324SL1			**102 %**				12/14/98

Authorized By: _____ Release Date: 12/17/98

Manchester Environmental Laboratory

7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

June 30, 1998

Subject: Whitmarsh Water Samples

Samples: 98248005 - 98248006

Case No. 183198

Officer: Art Johnson

By: M. Mandjikov

WTPH-Dx Analysis of the Whitmarsh Water Samples

SUMMARY:

Samples 98248005 – 98248006 were analyzed for diesel and extended diesel range hydrocarbons.

Petroleum hydrocarbons eluting in the diesel range of the gas chromatogram were detected in both samples. These hydrocarbons were collectively quantitated against a #2 diesel standard. The patterns show substantial weathering.

All data are usable as reported. For any additional information concerning the TPH analysis portion of this project please call Myrna Mandjikov 360-871-8814. For sampling information please call Pam Covey 360-871-8827.

METHODS:

These samples were analyzed using purge and trap GC-FID. This method is a modification of EPA SW- 846 methods 8000, 8015, and 5030.

BLANKS:

No analytes of interest are detected in the blanks.

SURROGATES:

All surrogate recoveries are within the acceptable recovery range (50 – 150 % of the reference value) for WTPH-Dx analysis.

DUPLICATE SAMPLES:

No request for duplicate or spiked sample analysis was included with this project.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

DATA QUALIFIERS:

Code	Definition
E	Reported result is an estimate because it exceeds the calibration.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	There is evidence the analyte is present in this sample.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
REJ	The data are unusable for all purposes.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** WTPH-D
Field ID: N SEEP **Date Prepared:** 06/17/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** mg/L

Analyte	Result	Qualifier
#2 Diesel	0.85	
Lube Oil	0.076	U

Surrogate Recoveries

Pentacosane	91	%

Authorized By: _____ Release Date: 6/30/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** WTPH-D
Field ID: S SEEP **Date Prepared:** 06/17/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** mg/L

Analyte	Result	Qualifier
#2 Diesel	**0.47**	
Lube Oil	0.079	U

Surrogate Recoveries

Pentacosane	**92**	%

Authorized By: _____ Release Date: 6/30/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8168A1

Project Officer: Art Johnson

Date Prepared: 06/17/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Water
Units: mg/L

Analyte	Result	Qualifier
#2 Diesel	0.10	U
Lube Oil	0.25	U

Surrogate Recoveries

Pentacosane	**92**	**%**

Authorized By: _____ Release Date: 6/30/98

Manchester Environmental Laboratory

7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

June 23, 1998

Subject: Whitmarsh Sediment Samples

Samples: 98248007- 98248008

Case No. 183198

Officer: Art Johnson

By: M. Mandjikov

WTPH-G Analysis of the Whitmarsh Sediment Samples

SUMMARY:

Samples 98248007- 98248008 were analyzed for gasoline range petroleum hydrocarbons.

All data are usable as reported. For any additional information concerning the TPH analysis portion of this project please call Myrna Mandjikov 360-871-8814. For sampling information please call Pam Covey 360-871-8827.

METHODS:

These samples were analyzed using purge and trap GC-FID. This method is a modification of EPA SW- 846 methods 8000, 8015, and 5030.

BLANKS:

No analytes of interest are detected in the blanks.

SURROGATES:

Each sample, QA sample and blank was spiked prior to extraction with the surrogate compound, 1,4-difluorobenzene to evaluate the efficiency of the extraction. After extraction, each sample, QA sample, and blank was spiked with the surrogate compound, 1,4-dibromo, -2-methyl benzene to evaluate the efficiency of the purge and trap GC system. All surrogate recoveries are within the acceptable recovery range of 50 – 150 % for WTPH-G analysis.

DUPLICATE SAMPLES:

Sample 98248008 and a laboratory control sample were prepared in duplicate to provide a measure of the precision of this method. Since no gasoline was found in the sample, the data from the duplicate LCS is used. The relative percent difference between these duplicates is 7%, which is acceptable for WTPH-G analysis.

LABORATORY CONTROL SAMPLES (LCS)

Duplicate LCS were prepared to assess the accuracy of this method. These LCS are labeled OXS8168A1 and OXS8168A2. The recoveries of both LCS were within 15 % of the reference value. The acceptable limits for gasoline analysis are ± 30 % of the reference value.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

DATA QUALIFIERS:

Code	Definition
E	Reported result is an estimate because it exceeds the calibration.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	There is evidence the analyte is present in this sample.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
REJ	The data are unusable for all purposes.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007
Field ID: N SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/17/98
Date Analyzed: 06/18/98

Method: NWTPH-GX
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
Gasoline	34	U

Surrogate Recoveries

1,4-Difluorobenzene	**101**	**%**
Benzene, 1,4-dibromo-2-methyl-	**93**	**%**

Authorized By: _____ Release Date: 6/29/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** NWTPH-GX
Field ID: S SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Gasoline	38	U

Surrogate Recoveries

1,4-Difluorobenzene	**86**	**%**
Benzene, 1,4-dibromo-2-methyl-	**95**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 (Duplicate - LDP1)
Field ID: S SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/17/98
Date Analyzed: 06/18/98

Method: NWTPH-GX
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
Gasoline	40	U

Surrogate Recoveries

1,4-Difluorobenzene	**83**	**%**
Benzene, 1,4-dibromo-2-methyl-	**91**	**%**

Authorized By: _____ Release Date: 6/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OBS8168A1
Project Officer: Art Johnson

Date Prepared: 06/17/98
Date Analyzed: 06/18/98

Method: NWTPH-GX
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
Gasoline	37	U

Surrogate Recoveries

1,4-Difluorobenzene	**106**	**%**
Benzene, 1,4-dibromo-2-methyl-	**96**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OXS8168A1
Method: NWTPH-GX

Project Officer: Art Johnson
Date Prepared: 06/17/98
Date Analyzed: 06/18/98
Matrix: Sediment/Soil
Units: %

Analyte	Result	Qualifier
Gasoline	94	%
Surrogate Recoveries		
1,4-Difluorobenzene	106	%
Benzene, 1,4-dibromo-2-methyl-	92	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OXS8168A2
Method: NWTPH-GX

Project Officer: Art Johnson
Date Prepared: 06/17/98
Date Analyzed: 06/18/98
Matrix: Sediment/Soil
Units: %

Analyte	Result	Qualifier
Gasoline	87	%
Surrogate Recoveries		
1,4-Difluorobenzene	102	%
Benzene, 1,4-dibromo-2-methyl-	100	%

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Manchester Environmental Laboratory

7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

June 25, 1998

Subject: Whitmarsh Water Samples

Samples: 98248005 - 98248006

Case No. 183198

Officer: Art Johnson

By: M. Mandjikov

WTPH-G Analysis of the Whitmarsh Water Samples

SUMMARY:

Samples 98248005 – 98248006 were analyzed for gasoline.

All data are usable as reported. For any additional information concerning the TPH analysis portion of this project please call Myrna Mandjikov 360-871-8814. For sampling information please call Pam Covey 360-871-8827.

METHODS:

These samples were analyzed using purge and trap GC-FID. This method is a modification of EPA SW- 846 methods 8000, 8015, and 5030.

BLANKS:

No analytes of interest are detected in the blanks.

SURROGATES:

All surrogate recoveries are within 20 % of the reference value. The acceptable recovery range for gasoline analysis is 50 – 150 %.

DUPLICATE SAMPLES:

Sample 98248006 was prepared in duplicate to provide a measure of the precision of this method. Since gasoline was not detected above the reporting limit, no relative percent difference is reported.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

DATA QUALIFIERS:

Code	Definition
E	Reported result is an estimate because it exceeds the calibration.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	There is evidence the analyte is present in this sample.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
REJ	The data are unusable for all purposes.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** NWTPH-GX
Field ID: N SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/L

Analyte	Result	Qualifier
Gasoline	0.12	U

Surrogate Recoveries

Benzene, 1,4-dibromo-2-methyl-	**100**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** NWTPH-GX
Field ID: S SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/L

Analyte	Result	Qualifier
Gasoline	0.12	U

Surrogate Recoveries

Benzene, 1,4-dibromo-2-methyl-	**119**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 (Duplicate - LDP1) **Date Received:** 06/12/98 **Method:** NWTPH-GX
Field ID: S SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/18/98 **Units:** mg/L

Analyte	Result	Qualifier
Gasoline	0.12	U

Surrogate Recoveries

Benzene, 1,4-dibromo-2-methyl-	**104**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBW8169A1 **Method:** NWTPH-GX

Project Officer: Art Johnson **Date Prepared:** 06/17/98 **Matrix:** Water

Date Analyzed: 06/18/98 **Units:** mg/L

Analyte	Result	Qualifier
Gasoline	0.12	U
Surrogate Recoveries		
Benzene, 1,4-dibromo-2-methyl-	**106**	**%**

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Manchester Environmental Laboratory

7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

June 30, 1998

Subject: Whitmarsh Sediment Samples

Samples: 98248007 - 98248008

Case No. 183198

Officer: Art Johnson

By: M. Mandjikov

WTPH-Dx Analysis of the Whitmarsh Sediment Samples

SUMMARY:

Samples 98248007 – 98248008 were analyzed for diesel and extended diesel range hydrocarbons.

Petroleum hydrocarbons eluting in the lubricating oil range of the gas chromatogram were detected in sample 98248008. These hydrocarbons were collectively quantitated against a 30 weight motor oil standard.

All data are usable as reported. For any additional information concerning the TPH analysis portion of this project please call Myrna Mandjikov 360-871-8814. For sampling information please call Pam Covey 360-871-8827.

METHODS:

These samples were prepared by Soxhlet extraction into methylene chloride. After extraction they were put through a sulfuric acid and silica gel clean up process and concentrated to 2 mL. They were then analyzed using GC-FID. The methods used are modifications of EPA SW- 846 methods 3540, 3630, 3665, 8000, and 8015.

BLANKS:

No analytes of interest are detected in the blanks.

SURROGATES:

All surrogate recoveries are within the acceptable recovery range (50 – 150 % of the reference value) for WTPH-Dx analysis.

DUPLICATE SAMPLES:

Sample 98248008 was prepared in duplicate. The level of lubricating oils detected in one of the duplicates was below the reporting limit whereas the level of the other was detected slightly above. Therefore, the relative percent difference (RPD) between the duplicates is not calculated.

LABORATORY CONTROL SAMPLES:

A laboratory control sample was prepared in duplicate by spiking a #2 diesel standard into clean beach sand. The beach sand had been prepared with DI water to contain approximately 90% solids. The recoveries of the #2 diesel were within 10% of the theoretical value with a precision of 8% RPD. The accuracy and precision of the LCS are acceptable for this analysis.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

DATA QUALIFIERS:

Code	Definition
E	Reported result is an estimate because it exceeds the calibration.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	There is evidence the analyte is present in this sample.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
REJ	The data are unusable for all purposes.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** WTPH-D
Field ID: N SED **Date Prepared:** 06/16/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/26/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	70	U
Lube Oil	180	U

Surrogate Recoveries

Pentacosane	**106**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** WTPH-D
Field ID: S SED **Date Prepared:** 06/16/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/26/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	44	U
Lube Oil	**190**	

Surrogate Recoveries

Pentacosane	**111**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 (Duplicate - LDP1)
Field ID: S SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/16/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	62	U
Lube Oil	160	U

Surrogate Recoveries

Pentacosane	**103**	**%**

Authorized By: _____ Release Date: 7/16/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OBS8167A1-A
Project Officer: Art Johnson

Date Prepared: 06/16/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	56	U
Lube Oil	140	U

Surrogate Recoveries

Pentacosane	**112**	%

Authorized By: _____ Release Date: 7/10/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OBS8167A2-A
Project Officer: Art Johnson

Date Prepared: 06/16/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	56	U
Lube Oil	140	U

Surrogate Recoveries

Pentacosane	**108**	%

Authorized By: _____ Release Date: 7/16/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OXS8167A1-A

Project Officer: Art Johnson

Date Prepared: 06/16/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	93	%
Lube Oil		NAF

Surrogate Recoveries

Pentacosane	106	%

Authorized By: _____ Release Date: 7/10/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

TPH as Diesel

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OXS8167A2-A

Project Officer: Art Johnson

Date Prepared: 06/16/98
Date Analyzed: 06/26/98

Method: WTPH-D
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	101	%
Lube Oil		NAF

Surrogate Recoveries

Pentacosane	118	%

Authorized By: _____ Release Date: 7/10/98

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

June 18, 1998

Subject: Whitmarsh Landfill Project

Sample(s): 98248005-08

Officer(s): Art Johnson

By: Bob Carrell
Organics Analysis Unit

HYDROCARBON IDENTIFICATION ANALYSIS

ANALYTICAL METHOD(S):

Each of the water samples (98248005-06) and a portion of each of the sediment samples (98248007-08) were extracted with methylene chloride and analyzed, along with various petroleum product, by capillary Gas Chromatography and Flame Ionization Detection (GC/FID). Those samples (98248007-08) containing suspected biogenic interferences were reanalyzed after receiving the standard concentrated acid/silica gel cleanup technique.

BLANKS:

No target compounds were detected in the laboratory blanks. Hence, the blanks demonstrate the system was free from contamination.

HOLDING TIMES:

All samples were extracted and analyzed within the method holding times.

COMMENTS:

Samples 98248005-06 did not display any recognizable petroleum product patterns however certain gasoline range aromatic hydrocarbons were identified. These will be confirmed and quantitated during the VOA analyses. Whether these compounds resulted from the presence of highly weathered gasoline or from some other light petroleum fraction is not able to be ascertained. Samples 98248007-08 did not contain any recognizable pattern of petroleum products either. They did contain what appears to be biogenic compounds eluting in the second half of the diesel range between nC17 and nC22.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Hydrocarbon Identification

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 18-JUN-98

Method: HYDRO-ID
Matrix: Water
Analyte: Hydrocarbon identification

	Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
*	98248005		N SEEP		NC	mg/L	06/12/98	06/17/98
*	98248006		S SEEP		NC	mg/L	06/12/98	06/17/98
	OBS8163				NC	mg/L		06/17/98
	OBW8168HC				NC	mg/L		06/17/98

Comments:

98248005 - No recognizable petroleum product patterns seen, however gasoline range aromatics observed, e.g. toluene, m+p-xylene, 1,2,4 trimethylbenzene.

98248006 - No recognizable petroleum product patterns seen, however gasoline range aromatics were observed, e.g. toluene, m+p-xylene, 1,2,4-trimethylbenzene.

* See comments

Authorized By: Barrett Release Date: 6-18-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Hydrocarbon Identification

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Project Officer: Art Johnson
Date Reported: 18-JUN-98

Method: HYDRO-ID
Matrix: Sediment/Soil
Analyte: Hydrocarbon identification

	Sample	QC	Field ID	Result	Qualifier	Units	Received	Analyzed
*	98248007		N SED		NC	mg/Kg ww	06/12/98	06/12/98
*	98248008		S SED		NC	mg/Kg ww	06/12/98	06/12/98

Comments:

98248007 - No recognizable petroleum products or compounds present. Small amounts of biogenic material in the C17-C22 range was observed.

98248008 - No recognizable petroleum products or compounds present. Small amounts of biogenic material in the C17-C22 range observed.

* See comments

Authorized By: Randall Release Date: 6-18-98

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

July 21, 1998

Subject: Whitmarsh Landfill
Samples: 98248005 - 006
Case No. 183198
Officer: Art Johnson
By: Greg Perez
Organics Analysis Unit

VOLATILE ORGANIC ANALYSIS

SUMMARY:

No difficulties were encountered in the analysis of these samples. The data is usable as qualified.

ANALYTICAL METHODS:

Volatile organic compounds were analyzed using EPA Method 8260 purge-trap procedure with capillary GC/MS analysis. Normal QA/QC procedures were performed on the sample.

BLANKS:

Low levels of certain target compounds were detected in the laboratory blanks. If the concentrations of the compounds in the sample are greater than or equal to five times the concentrations of the compounds in the associated method blank, they are considered native to the sample.

SURROGATES:

Surrogate recoveries were within acceptable limits for these samples.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Matrix spikes were not requested for this project.

DATA QUALIFIER CODES:

U - The analyte was not detected at or above the reported value.

J - The analyte was positively identified. The associated numerical value is an estimate.

UJ - The analyte was not detected at or above the reported estimated result.

REJ - The data are unusable for all purposes.

NAF - Not analyzed for.

N - For organic analytes there is evidence the analyte is present in this sample.

NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.

E - This qualifier is used when the concentration of the associated value exceeds the known calibration range.

bold - The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: N SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	1	U	Cis-1,3-Dichloropropene	1.1	U
Chloromethane	1	U	4-Methyl-2-Pentanone	2	U
Vinyl Chloride	1	U	1,1-Dichloropropanone	1	U
Bromomethane	1	U	**Toluene**	**.86**	**J**
Chloroethane	1	U	Trans-1,3-Dichloropropene	.94	U
Trichlorofluoromethane	1	UJ	Ethylmethacrylate	1	U
1,1,2 Trichlorotrifluoroethane	1	U	1,1,2-Trichloroethane	1	U
Ethyl Ether	1	U	Tetrachloroethene	1	U
1,1-Dichloroethene	1	U	1,3-Dichloropropane	1	U
Methyl Iodide	1	U	2-Hexanone	2	U
Acetone	2	U	Dibromochloromethane	1	U
Carbon Disulfide	2	U	1,2-Dibromoethane (EDB)	1	U
Allyl Chloride	1	U	**Chlorobenzene**	**5.5**	
Methylene Chloride	2	U	1,1,1,2-Tetrachloroethane	1	U
Trans-1,2-Dichloroethene	1	U	**Ethylbenzene**	**.1**	**J**
Acrylonitrile	1	U	**m & p-Xylene**	**1.2**	**J**
2-Methyoxy-2-Methylpropane	1	U	**o-Xylene**	**1.3**	
1,1-Dichloroethane	1	U	Styrene	1	U
2,2-Dichloropropane	1	U	Bromoform	1	U
Cis-1,2-Dichloroethene	1	U	**Isopropylbenzene (Cumene)**	**.15**	**J**
2-Butanone	2	U	Bromobenzene	1	U
Methyl acrylate	1	U	1,1,2,2-Tetrachloroethane	1	U
Bromochloromethane	1	U	1,2,3-Trichloropropane	1	U
Methyacrilonitrile	1	U	Trans-1,4-Dichloro-2-butene	1	U
Tetrahydrofuran	1	UJ	n-Propylbenzene	1	U
Chloroform	1	U	2-Chlorotoluene	1	U
1,1,1-Trichloroethane	1	U	**1,3,5-Trimethylbenzene**	**.14**	**J**
1-Chlorobutane	1	U	4-Chlorotoluene	1	U
Carbon Tetrachloride	1	U	Tert-Butylbenzene	1	U
1,1-Dichloropropene	1	U	Pentachloroethane	1	U
Benzene	**2.5**		**1,2,4-Trimethylbenzene**	**.79**	**J**
1,2-Dichloroethane	1	U	Sec-Butylbenzene	1	U
Trichloroethene	1	U	1,3-Dichlorobenzene	1	U
1,2-Dichloropropane	1	U	p-Isopropyltoluene	1	U
Methyl Methacrylate	1	U	**1,4-Dichlorobenzene**	**.52**	**J**
Dibromomethane	1	U	n-Butylbenzene	1	U
Bromodichloromethane	1	U	**1,2-Dichlorobenzene**	**.33**	**J**
2-Nitropropane	1	U	Hexachloroethane	1	U

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: N SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	1	U
1,2,4-Trichlorobenzene	1	U
Hexachlorobutadiene	1	UJ
Naphthalene	**2.1**	
1,2,3-Trichlorobenzene	1	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**104**	**%**
1,4-Difluorobenzene	**103**	**%**
Toluene-D8	**104**	**%**
p-Bromofluorobenzene	**96**	**%**
1,2-Dichlorobenzene-D4	**105**	**%**

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: N SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
622968	*Benzene, 1-ethyl-4-methyl-*	.6	NJ
767588	*Indan, 1-methyl-*	.35	NJ
27133933	*2,3-Dihydro-1-methylindene*	.3	NJ
1879169	*Benzene, 1-methoxy-4-(methylthio)-*	.94	NJ

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: S SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	1	U	Cis-1,3-Dichloropropene	1.1	U
Chloromethane	1	U	4-Methyl-2-Pentanone	2	U
Vinyl Chloride	1	U	1,1-Dichloropropanone	1	U
Bromomethane	1	U	**Toluene**	**.15**	**J**
Chloroethane	1	U	Trans-1,3-Dichloropropene	.94	U
Trichlorofluoromethane	1	UJ	Ethylmethacrylate	1	U
1,1,2 Trichlorotrifluoroethane	1	U	1,1,2-Trichloroethane	1	U
Ethyl Ether	**.51**	**J**	Tetrachloroethene	1	U
1,1-Dichloroethene	1	U	1,3-Dichloropropane	1	U
Methyl Iodide	1	U	2-Hexanone	2	U
Acetone	2	U	Dibromochloromethane	1	U
Carbon Disulfide	2	U	1,2-Dibromoethane (EDB)	1	U
Allyl Chloride	1	U	**Chlorobenzene**	**.92**	**J**
Methylene Chloride	2	U	1,1,1,2-Tetrachloroethane	1	U
Trans-1,2-Dichloroethene	1	U	Ethylbenzene	1	U
Acrylonitrile	1	U	**m & p-Xylene**	**.41**	**J**
2-Methyoxy-2-Methylpropane	1	U	**o-Xylene**	**.14**	**J**
1,1-Dichloroethane	1	U	Styrene	1	U
2,2-Dichloropropane	1	U	Bromoform	1	U
Cis-1,2-Dichloroethene	1	U	**Isopropylbenzene (Cumene)**	**.29**	**J**
2-Butanone	2	U	Bromobenzene	1	U
Methyl acrylate	1	U	1,1,2,2-Tetrachloroethane	1	U
Bromochloromethane	1	U	1,2,3-Trichloropropane	1	U
Methyacrilonitrile	1	U	Trans-1,4-Dichloro-2-butene	1	U
Tetrahydrofuran	1	UJ	n-Propylbenzene	1	U
Chloroform	1	U	2-Chlorotoluene	1	U
1,1,1-Trichloroethane	1	U	1,3,5-Trimethylbenzene	1	U
1-Chlorobutane	1	U	4-Chlorotoluene	1	U
Carbon Tetrachloride	1	U	Tert-Butylbenzene	1	U
1,1-Dichloropropene	1	U	Pentachloroethane	1	U
Benzene	**1.6**		1,2,4-Trimethylbenzene	1	U
1,2-Dichloroethane	1	U	Sec-Butylbenzene	1	U
Trichloroethene	1	U	1,3-Dichlorobenzene	1	U
1,2-Dichloropropane	1	U	p-Isopropyltoluene	1	U
Methyl Methacrylate	1	U	**1,4-Dichlorobenzene**	**.42**	**J**
Dibromomethane	1	U	n-Butylbenzene	1	U
Bromodichloromethane	1	U	**1,2-Dichlorobenzene**	**.28**	**J**
2-Nitropropane	1	U	Hexachloroethane	1	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: S SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	1	U
1,2,4-Trichlorobenzene	1	U
Hexachlorobutadiene	1	UJ
Naphthalene	1	U
1,2,3-Trichlorobenzene	1	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**101**	**%**
1,4-Difluorobenzene	**100**	**%**
Toluene-D8	**105**	**%**
p-Bromofluorobenzene	**98**	**%**
1,2-Dichlorobenzene-D4	**107**	**%**

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8260
Field ID: S SEEP **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
4127473	*Cyclopropane, 1,1,2,2-tetramethyl-*	.46	NJ
625809	*Diisopropyl sulfide*	1.8	NJ
611143	*Benzene, 1-ethyl-2-methyl-*	.8	NJ
93538	*Benzeneacetaldehyde, .alpha.-methyl-*	.58	NJ
25155151	*Benzene, methyl(1-methylethyl)-*	.69	NJ
27133933	*2,3-Dihydro-1-methylindene*	.75	NJ
934805	*Benzene, 4-ethyl-1,2-dimethyl-*	.74	NJ
1587048	*Benzene, 1-methyl-2-(2-propenyl)-*	1	NJ

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: ODBW8166 **Method:** SW8260
Blank ID: BLNK **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** mg/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	1	U	Chloroacetonitrile	1	U
Chloromethane	1	U	Cis-1,3-Dichloropropene	1.1	U
Vinyl Chloride	1	U	4-Methyl-2-Pentanone	2	U
Bromomethane	1	U	1,1-Dichloropropanone	1	U
Chloroethane	1	U	Toluene	1	U
Trichlorofluoromethane	1	UJ	Trans-1,3-Dichloropropene	.94	U
1,1,2 Trichlorotrifluoroethane	1	U	Ethylmethacrylate	1	U
Ethyl Ether	1	U	1,1,2-Trichloroethane	1	U
1,1-Dichloroethene	1	U	Tetrachloroethene	1	U
Methyl Iodide	1	U	1,3-Dichloropropane	1	U
Acetone	2	U	2-Hexanone	2	U
Carbon Disulfide	2	U	Dibromochloromethane	1	U
Allyl Chloride	1	U	1,2-Dibromoethane (EDB)	1	U
Methylene Chloride	**.59**	**J**	Chlorobenzene	1	U
Trans-1,2-Dichloroethene	1	U	1,1,1,2-Tetrachloroethane	1	U
Acrylonitrile	1	U	Ethylbenzene	1	U
2-Methyoxy-2-Methylpropane	1	U	m & p-Xylene	2	U
1,1-Dichloroethane	1	U	o-Xylene	1	U
2,2-Dichloropropane	1	U	Styrene	1	U
Cis-1,2-Dichloroethene	1	U	Bromoform	1	U
2-Butanone	2	U	Isopropylbenzene (Cumene)	1	U
Methyl acrylate	1	U	Bromobenzene	1	U
Bromochloromethane	1	U	1,1,2,2-Tetrachloroethane	1	U
Methyacrilonitrile	1	U	1,2,3-Trichloropropane	1	U
Tetrahydrofuran	1	UJ	Trans-1,4-Dichloro-2-butene	1	U
Chloroform	1	U	n-Propylbenzene	1	U
1,1,1-Trichloroethane	1	U	2-Chlorotoluene	1	U
1-Chlorobutane	1	U	1,3,5-Trimethylbenzene	1	U
Carbon Tetrachloride	1	U	4-Chlorotoluene	1	U
1,1-Dichloropropene	1	U	Tert-Butylbenzene	1	U
Benzene	1	U	Pentachloroethane	1	U
1,2-Dichloroethane	1	U	1,2,4-Trimethylbenzene	1	U
Trichloroethene	1	U	Sec-Butylbenzene	1	U
1,2-Dichloropropane	1	U	1,3-Dichlorobenzene	1	U
Methyl Methacrylate	1	U	p-Isopropyltoluene	1	U
Dibromomethane	1	U	1,4-Dichlorobenzene	1	U
Bromodichloromethane	1	U	n-Butylbenzene	1	U
2-Nitropropane	1	U	1,2-Dichlorobenzene	1	U

Authorized By: _____ Release Date: 7/21/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + all TIC's

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: ODBW8166 **Method:** SW8260
Blank ID: BLNK **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/15/98 **Units:** mg/L

Analyte	Result	Qualifier
Hexachloroethane	1	U
1,2-Dibromo-3-Chloropropane	1	U
1,2,4-Trichlorobenzene	1	U
Hexachlorobutadiene	1	UJ
Naphthalene	1	U
1,2,3-Trichlorobenzene	1	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**102**	**%**
1,4-Difluorobenzene	**102**	**%**
Toluene-D8	**104**	**%**
p-Bromofluorobenzene	**93**	**%**
1,2-Dichlorobenzene-D4	**105**	**%**

Authorized By: _____ Release Date: 7/21/98

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

July 27, 1998

Subject: Whitmarsh Landfill
Samples: 98248005 through 98248008
Case No. 1831-98
Officer: Art Johnson
By: Karin Feddersen KF

SEMIVOLATILE ORGANICS

ANALYTICAL METHODS:

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

HOLDING TIMES:

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

BLANKS:

Low levels of some analytes and Tentatively Identified Compounds (TIC) were detected in the laboratory blanks. An analyte is considered native to the sample when the on-column concentration is at least five times greater than in the associated method blanks. A phthalate or TIC 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.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

No spikes were requested for these samples.

ANALYTICAL COMMENTS:

The data is acceptable for use as reported.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
NC	-	Not Calculated.
N	-	There is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	.62	U	Acenaphthylene	.12	U
N-Nitrosodimethylamine	.62	U	3-Nitroaniline	.25	U
Aniline	.12	U	**Acenaphthene**	**.42**	
Phenol	**.078**	**J**	2,4-Dinitrophenol	2.5	U
Bis(2-Chloroethyl)Ether	.25	U	4-Nitrophenol	.62	U
2-Chlorophenol	.25	U	1,6,7-Trimethylnaphthalene	.12	U
1,3-Dichlorobenzene	**.013**	**J**	**Dibenzofuran**	**.16**	
1,4-Dichlorobenzene	**.34**		2,4-Dinitrotoluene	.12	U
1,2-Dichlorobenzene	**.18**		**Diethylphthalate**	**.19**	**J**
Benzyl Alcohol	.12	U	**Fluorene**	**.26**	
2-Methylphenol	**.16**		4-Chlorophenyl-Phenylether	.12	U
2,2'-Oxybis[1-chloropropane]	.12	U	4-Nitroaniline	.12	U
N-Nitroso-Di-N-Propylamine	.12	U	4,6-Dinitro-2-Methylphenol	1.2	U
4-Methylphenol	**.3**		**N-Nitrosodiphenylamine**	**.41**	
Hexachloroethane	.12	U	1,2-Diphenylhydrazine	.12	U
Nitrobenzene	.12	U	4-Bromophenyl-Phenylether	.12	U
Isophorone	.12	U	Hexachlorobenzene	.12	U
2-Nitrophenol	.62	U	Pentachlorophenol	.62	U
2,4-Dimethylphenol	.12	U	Dibenzothiophene	.12	U
Bis(2-Chloroethoxy)Methane	.12	U	**Phenanthrene**	**.24**	
Benzoic Acid	2.5	U	**Anthracene**	**.041**	**J**
2,4-Dichlorophenol	.12	U	Caffeine	.12	U
1,2,4-Trichlorobenzene	.12	U	**Carbazole**	**.18**	
Naphthalene	**.84**		Phenol, 4-Nonyl-	.12	U
4-Chloroaniline	.12	U	**2-Methylphenanthrene**	**.038**	**J**
Hexachlorobutadiene	.12	U	1-Methylphenanthrene	.12	U
4-Chloro-3-Methylphenol	**.52**		Di-N-Butylphthalate	.12	U
2-Methylnaphthalene	**.39**		**Fluoranthene**	**.067**	**J**
1-Methylnaphthalene	**.49**		Benzidine	5	U
Hexachlorocyclopentadiene	.12	U	**Pyrene**	**.044**	**J**
2,4,6-Trichlorophenol	.62	U	Retene	.12	U
2,4,5-Trichlorophenol	.12	U	Butylbenzylphthalate	.62	U
1,1'-Biphenyl	.12	U	**Benzo(a)anthracene**	**.03**	**J**
2-Chloronaphthalene	.12	U	3,3'-Dichlorobenzidine	2.5	UJ
2,6-Dimethylnaphthalene	**.096**	**J**	Chrysene	.12	U
2-Nitroaniline	.62	U	Bis(2-Ethylhexyl) Phthalate	.12	U
Dimethylphthalate	.12	U	Di-N-Octyl Phthalate	.25	U
2,6-Dinitrotoluene	.25	U	Benzo(b)fluoranthene	.12	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Analyte	Result	Qualifier
Benzo(k)fluoranthene	.12	U
Benzo[e]pyrene	.12	U
Benzo(a)pyrene	.12	U
Perylene	.12	U
3B-Coprostanol	.62	U
Indeno(1,2,3-cd)pyrene	.62	U
Dibenzo(a,h)anthracene	.25	U
Benzo(ghi)perylene	.12	U

Surrogate Recoveries

2-Fluorophenol	**36**	**%**
D5-Phenol	**22**	**%**
D4-2-Chlorophenol	**67**	**%**
1,2-Dichlorobenzene-D4	**47**	**%**
D5-Nitrobenzene	**87**	**%**
2-Fluorobiphenyl	**60**	**%**
D10-Pyrene	**78**	**%**
D14-Terphenyl	**75**	**%**

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
108985	*Benzenethiol*	1.2	NJ
526738	*Benzene, 1,2,3-trimethyl-*	.83	NJ
108678	*1,3,5-Trimethylbenzene*	.83	NJ
95363	*1,2,4-Trimethylbenzene*	.86	NJ
496117	*Indane*	.76	NJ
576261	*Phenol, 2,6-dimethyl-*	7.8	NJ
95658	*Phenol, 3,4-dimethyl-*	.43	NJ
95874	*Phenol, 2,5-dimethyl-*	1	NJ
2416946	*Phenol, 2,3,6-trimethyl-*	4.8	NJ
1687645	*Phenol, 2-ethyl-6-methyl-*	4.3	NJ
1123940	*Phenol, 4-ethyl-3-methyl-*	12	NJ
585342	*Phenol, m-tert-butyl-*	3.6	NJ
527548	*Phenol, 3,4,5-trimethyl-*	14	NJ
1197348	*Phenol, 3,5-diethyl-*	5.5	NJ
2219785	*Phenol, 2-ethyl-4,5-dimethyl-*	2.4	NJ
937304	*Ethanone, 1-(4-ethylphenyl)-*	2.5	NJ
20294320	*6-Methyl-4-indanol*	.86	NJ
527559	*1,3-Benzenediol, 4,5-dimethyl-*	2.6	NJ
4076408	*Benzo[c]phenanthrene, 4-methyl-*	4.4	NJ
90153	*1-Naphthol*	4.8	NJ
2498773	*Benz[a]anthracene, 1-methyl-*	7.4	NJ
2498751	*Benz[a]anthracene, 3-methyl-*	5.6	NJ
6325684	*Benzoic acid, o-(o-tolyloxy)-*	12	NJ
137177	*Benzenamine, 2,4,5-trimethyl-*	5.1	NJ
*3001950	*C1-Naphthalenes*	0.91	NJ
*3001951	*C2 -Naphthalenes*	0.92	NJ
*3001954	*C1-Fluorenes*	0.12	NJ
*3001955	*C2-Fluorenes*	0.12	NJ
*3001952	*C3 -Naphthalenes*	.62	NJ
*3001956	*C3-Fluorenes*	.12	U
*3001953	*C4 -Naphthalenes*	.12	U
*3001957	*C1-Dibenzothiophenes*	.11	NJ
*3001960	*C1-Phenanthrenes/Anthracenes*	.18	NJ
*3001961	*C2-Phenanthrenes/Anthracenes*	.12	U
*3001958	*C2-Dibenzothiophenes*	1090	NJ

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Tentatively Identified Compounds (continued)

CAS Number	Analyte Description	Result	Qualifier
*3001959	*C3-Dibenzothiophenes*	.12	U
*3001962	*C3-Phenanthrenes/Anthracenes*	.12	U
*3001963	*C4-Phenanthrenes/Anthracenes*	.12	U
*3001964	*C1-Fluoranthene/Pyrene*	28	NJ
*3001965	*C1-Chrysenes*	.12	U
*3001966	*C2-Chrysenes*	.12	U
*3001967	*C3-Chrysenes*	.12	U
*3001968	*C4-Chrysenes*	.12	U

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	.62	U	Acenaphthylene	.12	U
N-Nitrosodimethylamine	.62	U	3-Nitroaniline	.25	U
Aniline	.12	U	**Acenaphthene**	**.24**	
Phenol	.12	U	2,4-Dinitrophenol	2.5	U
Bis(2-Chloroethyl)Ether	.25	U	4-Nitrophenol	.62	U
2-Chlorophenol	.25	U	**1,6,7-Trimethylnaphthalene**	**.024**	**J**
1,3-Dichlorobenzene	.25	U	**Dibenzofuran**	**.082**	**J**
1,4-Dichlorobenzene	**.24**		2,4-Dinitrotoluene	.12	U
1,2-Dichlorobenzene	**.13**		**Diethylphthalate**	**.14**	**J**
Benzyl Alcohol	.12	U	**Fluorene**	**.16**	
2-Methylphenol	.12	U	4-Chlorophenyl-Phenylether	.12	U
2,2'-Oxybis[1-chloropropane]	.12	U	4-Nitroaniline	.12	U
N-Nitroso-Di-N-Propylamine	.12	U	4,6-Dinitro-2-Methylphenol	1.2	U
4-Methylphenol	**.1**	**J**	**N-Nitrosodiphenylamine**	**1.5**	
Hexachloroethane	.12	U	1,2-Diphenylhydrazine	.12	U
Nitrobenzene	.12	U	4-Bromophenyl-Phenylether	.12	U
Isophorone	.12	U	Hexachlorobenzene	.12	U
2-Nitrophenol	.62	U	Pentachlorophenol	.62	U
2,4-Dimethylphenol	.12	U	**Dibenzothiophene**	**.048**	**J**
Bis(2-Chloroethoxy)Methane	.12	U	**Phenanthrene**	**.065**	**J**
Benzoic Acid	2.5	U	**Anthracene**	**.028**	**J**
2,4-Dichlorophenol	.12	U	Caffeine	.12	U
1,2,4-Trichlorobenzene	.12	U	**Carbazole**	**.18**	
Naphthalene	**.093**	**J**	Phenol, 4-Nonyl-	.12	U
4-Chloroaniline	.12	U	**2-Methylphenanthrene**	**.02**	**J**
Hexachlorobutadiene	.12	U	**1-Methylphenanthrene**	**.024**	**J**
4-Chloro-3-Methylphenol	.12	U	Di-N-Butylphthalate	.12	U
2-Methylnaphthalene	**.28**		**Fluoranthene**	**.022**	**J**
1-Methylnaphthalene	**.52**		Benzidine	5	U
Hexachlorocyclopentadiene	.12	U	**Pyrene**	**.036**	**J**
2,4,6-Trichlorophenol	.62	U	Retene	.12	U
2,4,5-Trichlorophenol	.12	U	Butylbenzylphthalate	.62	U
1,1'-Biphenyl	.12	U	Benzo(a)anthracene	.12	U
2-Chloronaphthalene	.12	U	3,3'-Dichlorobenzidine	2.5	UJ
2,6-Dimethylnaphthalene	**.15**		Chrysene	.12	U
2-Nitroaniline	.62	U	Bis(2-Ethylhexyl) Phthalate	.25	U
Dimethylphthalate	.12	U	Di-N-Octyl Phthalate	.25	U
2,6-Dinitrotoluene	.25	U	Benzo(b)fluoranthene	.12	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Analyte	Result	Qualifier
Benzo(k)fluoranthene	.12	U
Benzo[e]pyrene	.12	U
Benzo(a)pyrene	.12	U
Perylene	.12	U
3B-Coprostanol	.62	U
Indeno(1,2,3-cd)pyrene	.62	U
Dibenzo(a,h)anthracene	.25	U
Benzo(ghi)perylene	.12	U

Surrogate Recoveries

2-Fluorophenol	**38**	**%**
D5-Phenol	**25**	**%**
D4-2-Chlorophenol	**66**	**%**
1,2-Dichlorobenzene-D4	**43**	**%**
D5-Nitrobenzene	**81**	**%**
2-Fluorobiphenyl	**51**	**%**
D10-Pyrene	**75**	**%**
D14-Terphenyl	**74**	**%**

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
625809	*Diisopropyl sulfide*	.59	NJ
108907	*Chlorobenzene*	.29	NJ
108383	*Benzene, 1,3-dimethyl-*	.24	NJ
95476	*o-Xylene*	.18	NJ
95147	*1H-Benzotriazole*	.17	NJ
108985	*Benzenethiol*	.1	NJ
74630914	*Hexane, 3-methoxy-3-methyl-*	.75	NJ
496117	*Indane*	1.1	NJ
1074175	*Benzene, 1-methyl-2-propyl-*	.21	NJ
99876	*p-Isopropyltoluene*	.73	NJ
767588	*Indan, 1-methyl-*	.91	NJ
27133933	*2,3-Dihydro-1-methylindene*	.91	NJ
539800	*2,4,6-Cycloheptatrien-1-one*	4.6	NJ
697825	*Phenol, 2,3,5-trimethyl-*	.65	NJ
527606	*Phenol, 2,4,6-trimethyl-*	.31	NJ
507700	*Borneol*	.88	NJ
88186	*Phenol, 2-(1,1-dimethylethyl)-*	.5	NJ
585342	*Phenol, m-tert-butyl-*	8.8	NJ
527548	*Phenol, 3,4,5-trimethyl-*	1.1	NJ
719222	*2,5-Cyclohexadiene-1,4-dione, 2,6-bis(1,1-dimethyle*	.67	NJ
934349	*2(3H)-Benzothiazolone*	7.6	NJ
1421494	*Benzoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-*	.94	NJ
80057	*Phenol, 4,4'-(1-methylethylidene)bis-*	1.4	NJ
*3001950	*C1-Naphthalenes*	.83	NJ
*3001951	*C2 -Naphthalenes*	.95	NJ
*3001954	*C1-Fluorenes*	.12	U
*3001955	*C2-Fluorenes*	.12	U
*3001952	*C3 -Naphthalenes*	.51	NJ
*3001956	*C3-Fluorenes*	.12	U
*3001953	*C4 -Naphthalenes*	.12	U
*3001957	*C1-Dibenzothiophenes*	.12	U
*3001960	*C1-Phenanthrenes/Anthracenes*	.099	NJ
*3001961	*C2-Phenanthrenes/Anthracenes*	.12	U
*3001958	*C2-Dibenzothiophenes*	.12	U
*3001959	*C3-Dibenzothiophenes*	.12	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Tentatively Identified Compounds (continued)

CAS Number	Analyte Description	Result	Qualifier
*3001962	*C3-Phenanthrenes/Anthracenes*	.12	NJ
*3001963	*C4-Phenanthrenes/Anthracenes*	.12	U
*3001964	*C1-Fluoranthene/Pyrene*	.12	U
*3001965	*C1-Chrysenes*	.12	U
*3001966	*C2-Chrysenes*	.12	U
*3001967	*C3-Chrysenes*	.12	U
*3001968	*C4-Chrysenes*	.12	U

Authorized By: _____ Release Date: 7/23/98

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	897	U	Acenaphthylene	179	U
N-Nitrosodimethylamine	897	U	3-Nitroaniline	359	U
Aniline	179	U	**Acenaphthene**	**35**	**J**
Phenol	**178**	**J**	2,4-Dinitrophenol	3590	UJ
Bis(2-Chloroethyl)Ether	359	U	4-Nitrophenol	897	U
2-Chlorophenol	359	U	1,6,7-Trimethylnaphthalene	179	U
1,3-Dichlorobenzene	359	U	**Dibenzofuran**	**53**	**J**
1,4-Dichlorobenzene	179	U	2,4-Dinitrotoluene	179	U
1,2-Dichlorobenzene	179	U	**Diethylphthalate**	**25**	**J**
Benzyl Alcohol	179	U	**Fluorene**	**52**	**J**
2-Methylphenol	**180**		4-Chlorophenyl-Phenylether	179	U
2,2'-Oxybis[1-chloropropane]	179	U	4-Nitroaniline	179	U
N-Nitroso-Di-N-Propylamine	179	U	4,6-Dinitro-2-Methylphenol	1790	U
4-Methylphenol	**545**		N-Nitrosodiphenylamine	179	UJ
Hexachloroethane	179	U	1,2-Diphenylhydrazine	179	U
Nitrobenzene	179	U	4-Bromophenyl-Phenylether	179	U
Isophorone	179	U	Hexachlorobenzene	179	U
2-Nitrophenol	897	U	Pentachlorophenol	897	U
2,4-Dimethylphenol	**288**		Dibenzothiophene	179	U
Bis(2-Chloroethoxy)Methane	179	U	**Phenanthrene**	**198**	
Benzoic Acid	3590	U	**Anthracene**	**64**	**J**
2,4-Dichlorophenol	179	U	Caffeine	179	U
1,2,4-Trichlorobenzene	179	U	Carbazole	179	U
Naphthalene	**66**	**J**	Phenol, 4-Nonyl-	179	U
4-Chloroaniline	179	U	**2-Methylphenanthrene**	**61**	**J**
Hexachlorobutadiene	179	U	**1-Methylphenanthrene**	**287**	
4-Chloro-3-Methylphenol	179	U	**Di-N-Butylphthalate**	**1380**	
2-Methylnaphthalene	**87**	**J**	**Fluoranthene**	**332**	
1-Methylnaphthalene	**50**	**J**	Benzidine	7180	UJ
Hexachlorocyclopentadiene	179	U	**Pyrene**	**311**	
2,4,6-Trichlorophenol	897	U	**Retene**	**184**	
2,4,5-Trichlorophenol	179	U	Butylbenzylphthalate	897	U
1,1'-Biphenyl	179	U	**Benzo(a)anthracene**	**123**	**J**
2-Chloronaphthalene	179	U	3,3'-Dichlorobenzidine	3590	UJ
2,6-Dimethylnaphthalene	**352**		**Chrysene**	**240**	
2-Nitroaniline	897	U	**Bis(2-Ethylhexyl) Phthalate**	**1630**	
Dimethylphthalate	179	U	Di-N-Octyl Phthalate	359	U
2,6-Dinitrotoluene	359	U	**Benzo(b)fluoranthene**	**283**	

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	79	J
Benzo[e]pyrene	127	J
Benzo(a)pyrene	103	J
Perylene	263	
3B-Coprostanol	3370	
Indeno(1,2,3-cd)pyrene	229	J
Dibenzo(a,h)anthracene	359	U
Benzo(ghi)perylene	192	

Surrogate Recoveries

2-Fluorophenol	78	%
D5-Phenol	94	%
D4-2-Chlorophenol	75	%
1,2-Dichlorobenzene-D4	51	%
D5-Nitrobenzene	59	%
2-Fluorobiphenyl	81	%
D10-Pyrene	93	%
D14-Terphenyl	100	%

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
107868	*2-Butenal, 3-methyl-*	3770	NJ
141797	*3-Penten-2-one, 4-methyl-*	42600	NJ
100527	*Benzaldehyde*	487	NJ
108985	*Benzenethiol*	1290	NJ
98862	*Acetophenone*	338	NJ
100538	*Benzenemethanethiol*	8280	NJ
118729	*2,6-Dimethylthiophenol*	520	NJ
18800538	*3,4-Dimethylthiophenol*	576	NJ
69727	*Salicylic Acid*	517	NJ
1574409	*3-Penten-1-yne, (Z)-*	602	NJ
112050	*Nonanoic acid*	602	NJ
2004695	*3-Penten-1-yne, (E)-*	602	NJ
98920	*Niacinamide*	1940	NJ
1759280	*Thiazole, 5-ethenyl-4-methyl-*	767	NJ
638539	*Tridecanoic acid*	1420	NJ
629970	*Docosane*	21100	NJ
544638	*Tetradecanoic acid*	2720	NJ
150867	*Phytol*	24800	NJ
297030	*Cyclotetracosane*	3810	NJ
80977	*Cholestanol*	4560	NJ
55514971	*Ergosta-14,22-dien-3-ol, (3.beta.,5.alpha.,22E)-*	4560	NJ
17472785	*Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S*	6120	NJ
26047314	*Ergost-7-en-3-ol, (3.beta.)-*	3710	NJ
83476	*.gamma.-Sitosterol*	8990	NJ
*3001950	*C1-Naphthalenes*	174	NJ
*3001951	*C2 -Naphthalenes*	503	NJ
*3001954	*C1-Fluorenes*	179	U
*3001955	*C2-Fluorenes*	179	U
*3001952	*C3 -Naphthalenes*	179	U
*3001956	*C3-Fluorenes*	179	U
*3001953	*C4 -Naphthalenes*	179	U
*3001957	*C1-Dibenzothiophenes*	179	U
*3001960	*C1-Phenanthrenes/Anthracenes*	671	NJ
*3001961	*C2-Phenanthrenes/Anthracenes*	179	U
*3001958	*C2-Dibenzothiophenes*	179	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Tentatively Identified Compounds (continued)

CAS Number	Analyte Description	Result	Qualifier
*3001959	*C3-Dibenzothiophenes*	179	U
*3001962	*C3-Phenanthrenes/Anthracenes*	179	U
*3001963	*C4-Phenanthrenes/Anthracenes*	179	U
*3001964	*C1-Fluoranthene/Pyrene*	143	NJ
*3001965	*C1-Chrysenes*	131	NJ
*3001966	*C2-Chrysenes*	179	U
*3001967	*C3-Chrysenes*	179	U
*3001968	*C4-Chrysenes*	179	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	576	U	Acenaphthylene	115	U
N-Nitrosodimethylamine	576	U	3-Nitroaniline	231	U
Aniline	115	U	Acenaphthene	115	U
Phenol	**271**		2,4-Dinitrophenol	2310	UJ
Bis(2-Chloroethyl)Ether	231	U	4-Nitrophenol	576	U
2-Chlorophenol	231	U	**1,6,7-Trimethylnaphthalene**	**37**	**J**
1,3-Dichlorobenzene	231	U	**Dibenzofuran**	**30**	**J**
1,4-Dichlorobenzene	115	U	2,4-Dinitrotoluene	115	U
1,2-Dichlorobenzene	115	U	Diethylphthalate	576	U
Benzyl Alcohol	115	U	**Fluorene**	**29**	**J**
2-Methylphenol	**121**		4-Chlorophenyl-Phenylether	115	U
2,2'-Oxybis[1-chloropropane]	115	U	4-Nitroaniline	115	U
N-Nitroso-Di-N-Propylamine	115	U	4,6-Dinitro-2-Methylphenol	1150	U
4-Methylphenol	**238**		N-Nitrosodiphenylamine	115	UJ
Hexachloroethane	115	U	1,2-Diphenylhydrazine	115	U
Nitrobenzene	115	U	4-Bromophenyl-Phenylether	115	U
Isophorone	115	U	Hexachlorobenzene	115	U
2-Nitrophenol	576	U	Pentachlorophenol	576	U
2,4-Dimethylphenol	**118**		Dibenzothiophene	115	U
Bis(2-Chloroethoxy)Methane	115	U	**Phenanthrene**	**112**	**J**
Benzoic Acid	**4010**		**Anthracene**	**27**	**J**
2,4-Dichlorophenol	115	U	Caffeine	115	U
1,2,4-Trichlorobenzene	115	U	Carbazole	115	U
Naphthalene	**44**	**J**	Phenol, 4-Nonyl-	115	U
4-Chloroaniline	115	U	**2-Methylphenanthrene**	**26**	**J**
Hexachlorobutadiene	115	U	**1-Methylphenanthrene**	**234**	
4-Chloro-3-Methylphenol	115	U	**Di-N-Butylphthalate**	**698**	
2-Methylnaphthalene	**60**	**J**	**Fluoranthene**	**161**	
1-Methylnaphthalene	**32**	**J**	Benzidine	4610	UJ
Hexachlorocyclopentadiene	115	U	**Pyrene**	**146**	
2,4,6-Trichlorophenol	576	U	**Retene**	**75**	**J**
2,4,5-Trichlorophenol	115	U	Butylbenzylphthalate	576	U
1,1'-Biphenyl	115	U	**Benzo(a)anthracene**	**66**	**J**
2-Chloronaphthalene	115	U	3,3'-Dichlorobenzidine	2310	UJ
2,6-Dimethylnaphthalene	**219**		**Chrysene**	**112**	**J**
2-Nitroaniline	576	U	**Bis(2-Ethylhexyl) Phthalate**	**421**	**J**
Dimethylphthalate	115	U	Di-N-Octyl Phthalate	231	U
2,6-Dinitrotoluene	231	U	**Benzo(b)fluoranthene**	**138**	

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008
Field ID: S SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/18/98
Date Analyzed: 07/15/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	**40**	**J**
Benzo[e]pyrene	**72**	**J**
Benzo(a)pyrene	**35**	**J**
Perylene	**123**	
3B-Coprostanol	**2530**	
Indeno(1,2,3-cd)pyrene	576	U
Dibenzo(a,h)anthracene	231	U
Benzo(ghi)perylene	**116**	

Surrogate Recoveries

2-Fluorophenol	**84**	**%**
D5-Phenol	**94**	**%**
D4-2-Chlorophenol	**80**	**%**
1,2-Dichlorobenzene-D4	**62**	**%**
D5-Nitrobenzene	**39**	**%**
2-Fluorobiphenyl	**80**	**%**
D10-Pyrene	**84**	**%**
D14-Terphenyl	**92**	**%**

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** SW8270
Field ID: S SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
1123097	*2-Cyclohexen-1-one, 3,5-dimethyl-*	3750	NJ
768490	*Benzene, (2-methyl-1-propenyl)-*	143	NJ
13616825	*2,4-Dimethylthiophenol*	233	NJ
18800538	*3,4-Dimethylthiophenol*	183	NJ
529204	*Benzaldehyde, 2-methyl-*	336	NJ
103822	*Benzeneacetic acid*	377	NJ
2004695	*3-Penten-1-yne, (E)-*	414	NJ
98920	*Niacinamide*	1750	NJ
638539	*Tridecanoic acid*	1670	NJ
506514	*1-Tetracosanol*	1050	NJ
544638	*Tetradecanoic acid*	12400	NJ
1454848	*1-Nonadecanol*	2770	NJ
1120258	*9-Hexadecenoic acid, methyl ester, (Z)-*	2970	NJ
57103	*Hexadecanoic acid*	33200	NJ
150867	*Phytol*	17400	NJ
23470000	*Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl*	1660	NJ
1599673	*1-Docosene*	2130	NJ
516916	*Cholest-5-ene, 3-bromo-, (3.beta.)-*	257	NJ
297030	*Cyclotetracosane*	3230	NJ
80977	*Cholestanol*	3560	NJ
17472785	*Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S*	4100	NJ
20780410	*Ergosta-5,24-dien-3-ol, (3.beta.)-*	3720	NJ
26047314	*Ergost-7-en-3-ol, (3.beta.)-*	3250	NJ
83476	*.gamma.-Sitosterol*	4580	NJ
*3001950	*C1-Naphthalenes*	159	NJ
*3001951	*C2 -Naphthalenes*	319	NJ
*3001954	*C1-Fluorenes*	115	U
*3001955	*C2-Fluorenes*	115	U
*3001952	*C3 -Naphthalenes*	115	U
*3001956	*C3-Fluorenes*	115	U
*3001953	*C4 -Naphthalenes*	115	U
*3001957	*C1-Dibenzothiophenes*	115	U
*3001960	*C1-Phenanthrenes/Anthracenes*	494	NJ
*3001961	*C2-Phenanthrenes/Anthracenes*	115	U
*3001958	*C2-Dibenzothiophenes*	115	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008
Field ID: S SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/18/98
Date Analyzed: 07/15/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg dw

Tentatively Identified Compounds (continued)

CAS Number	Analyte Description	Result	Qualifier
*3001959	*C3-Dibenzothiophenes*	115	U
*3001962	*C3-Phenanthrenes/Anthracenes*	115	U
*3001963	*C4-Phenanthrenes/Anthracenes*	115	U
*3001964	*C1-Fluoranthene/Pyrene*	115	U
*3001965	*C1-Chrysenes*	115	U
*3001966	*C2-Chrysenes*	115	U
*3001967	*C3-Chrysenes*	115	U
*3001968	*C4-Chrysenes*	115	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBS8169A1 **Method:** SW8270
Blank ID: BLNK **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	259	U	Acenaphthylene	52	U
N-Nitrosodimethylamine	259	U	3-Nitroaniline	103	U
Aniline	52	U	Acenaphthene	52	U
Phenol	**15**	**J**	2,4-Dinitrophenol	1030	UJ
Bis(2-Chloroethyl)Ether	103	U	4-Nitrophenol	259	U
2-Chlorophenol	103	U	1,6,7-Trimethylnaphthalene	52	U
1,3-Dichlorobenzene	103	U	Dibenzofuran	52	U
1,4-Dichlorobenzene	52	U	2,4-Dinitrotoluene	52	U
1,2-Dichlorobenzene	52	U	Diethylphthalate	259	U
Benzyl Alcohol	52	U	Fluorene	52	U
2-Methylphenol	52	U	4-Chlorophenyl-Phenylether	52	U
2,2'-Oxybis[1-chloropropane]	52	U	4-Nitroaniline	52	U
N-Nitroso-Di-N-Propylamine	52	U	4,6-Dinitro-2-Methylphenol	517	U
4-Methylphenol	52	U	N-Nitrosodiphenylamine	52	UJ
Hexachloroethane	52	U	1,2-Diphenylhydrazine	52	U
Nitrobenzene	52	U	4-Bromophenyl-Phenylether	52	U
Isophorone	52	U	Hexachlorobenzene	52	U
2-Nitrophenol	259	U	Pentachlorophenol	259	U
2,4-Dimethylphenol	52	U	Dibenzothiophene	52	U
Bis(2-Chloroethoxy)Methane	52	U	Phenanthrene	52	U
Benzoic Acid	1030	U	Anthracene	52	U
2,4-Dichlorophenol	52	U	Caffeine	52	U
1,2,4-Trichlorobenzene	52	U	Carbazole	52	U
Naphthalene	52	U	Phenol, 4-Nonyl-	52	U
4-Chloroaniline	52	U	2-Methylphenanthrene	52	U
Hexachlorobutadiene	52	U	1-Methylphenanthrene	52	U
4-Chloro-3-Methylphenol	52	U	Di-N-Butylphthalate	52	U
2-Methylnaphthalene	52	U	Fluoranthene	52	U
1-Methylnaphthalene	52	U	Benzidine	2070	UJ
Hexachlorocyclopentadiene	52	U	Pyrene	52	U
2,4,6-Trichlorophenol	259	U	Retene	52	U
2,4,5-Trichlorophenol	52	U	Butylbenzylphthalate	259	U
1,1'-Biphenyl	**5.3**	**J**	Benzo(a)anthracene	52	U
2-Chloronaphthalene	52	U	3,3'-Dichlorobenzidine	1030	UJ
2,6-Dimethylnaphthalene	52	U	Chrysene	52	U
2-Nitroaniline	259	U	**Bis(2-Ethylhexyl) Phthalate**	**133**	**J**
Dimethylphthalate	52	U	Di-N-Octyl Phthalate	103	U
2,6-Dinitrotoluene	103	U	Benzo(b)fluoranthene	52	U

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBS8169A1 **Method:** SW8270
Blank ID: BLNK **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	52	U
Benzo[e]pyrene	52	U
Benzo(a)pyrene	52	U
Perylene	52	U
3B-Coprostanol	259	U
Indeno(1,2,3-cd)pyrene	259	U
Dibenzo(a,h)anthracene	103	U
Benzo(ghi)perylene	52	U

Surrogate Recoveries

2-Fluorophenol	**54**	%
D5-Phenol	**65**	%
D4-2-Chlorophenol	**54**	%
1,2-Dichlorobenzene-D4	**51**	%
D5-Nitrobenzene	**68**	%
2-Fluorobiphenyl	**63**	%
D10-Pyrene	**87**	%
D14-Terphenyl	**87**	%

Authorized By: _____ Release Date: 7/23/98

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OBS8169A1
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/15/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
108883	*Toluene*	1050	NJ
25414226	*Furan, 2-methoxy-*	199	NJ
123422	*2-Pentanone, 4-hydroxy-4-methyl-*	10500	NJ
10570408	*4H-1,2,4-Triazole, 4-methyl-*	326	NJ
13609591	*Cycloheptanone, 4-methyl-, (R)-*	184	NJ
1069530	*Hexane, 2,3,5-trimethyl-*	342	NJ
3221612	*Octane, 2-methyl-*	299	NJ
2216333	*Octane, 3-methyl-*	930	NJ
822673	*2-Cyclohexen-1-ol*	196	NJ
930687	*2-Cyclohexen-1-one*	181	NJ
20019641	*2(5H)-Furanone, 5,5-dimethyl-*	1380	NJ
*3001950	*C1-Naphthalenes*	52	U
*3001951	*C2 -Naphthalenes*	52	U
*3001954	*C1-Fluorenes*	52	U
*3001955	*C2-Fluorenes*	52	U
*3001952	*C3 -Naphthalenes*	52	U
*3001956	*C3-Fluorenes*	52	U
*3001953	*C4 -Naphthalenes*	52	U
*3001957	*C1-Dibenzothiophenes*	52	U
*3001960	*C1-Phenanthrenes/Anthracenes*	52	U
*3001961	*C2-Phenanthrenes/Anthracenes*	52	U
*3001958	*C2-Dibenzothiophenes*	52	U
*3001959	*C3-Dibenzothiophenes*	52	U
*3001962	*C3-Phenanthrenes/Anthracenes*	52	U
*3001963	*C4-Phenanthrenes/Anthracenes*	52	U
*3001964	*C1-Fluoranthene/Pyrene*	52	U
*3001965	*C1-Chrysenes*	52	U
*3001966	*C2-Chrysenes*	52	U
*3001967	*C3-Chrysenes*	52	U
*3001968	*C4-Chrysenes*	52	U

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBS8169A2 **Method:** SW8270
Blank ID: BLNK **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/15/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	259	U	Acenaphthylene	52	U
N-Nitrosodimethylamine	259	U	3-Nitroaniline	103	U
Aniline	52	U	Acenaphthene	52	U
Phenol	**8.4**	**J**	2,4-Dinitrophenol	1030	UJ
Bis(2-Chloroethyl)Ether	103	U	4-Nitrophenol	259	U
2-Chlorophenol	103	U	1,6,7-Trimethylnaphthalene	52	U
1,3-Dichlorobenzene	103	U	Dibenzofuran	52	U
1,4-Dichlorobenzene	52	U	2,4-Dinitrotoluene	52	U
1,2-Dichlorobenzene	52	U	Diethylphthalate	259	U
Benzyl Alcohol	52	U	Fluorene	52	U
2-Methylphenol	52	U	4-Chlorophenyl-Phenylether	52	U
2,2'-Oxybis[1-chloropropane]	52	U	4-Nitroaniline	52	U
N-Nitroso-Di-N-Propylamine	52	U	4,6-Dinitro-2-Methylphenol	517	U
4-Methylphenol	52	U	N-Nitrosodiphenylamine	52	UJ
Hexachloroethane	52	U	1,2-Diphenylhydrazine	52	U
Nitrobenzene	52	U	4-Bromophenyl-Phenylether	52	U
Isophorone	52	U	Hexachlorobenzene	52	U
2-Nitrophenol	259	U	Pentachlorophenol	259	U
2,4-Dimethylphenol	52	U	Dibenzothiophene	52	U
Bis(2-Chloroethoxy)Methane	52	U	Phenanthrene	52	U
Benzoic Acid	1030	U	Anthracene	52	U
2,4-Dichlorophenol	52	U	Caffeine	52	U
1,2,4-Trichlorobenzene	52	U	Carbazole	52	U
Naphthalene	52	U	Phenol, 4-Nonyl-	52	U
4-Chloroaniline	52	U	2-Methylphenanthrene	52	U
Hexachlorobutadiene	52	U	1-Methylphenanthrene	52	U
4-Chloro-3-Methylphenol	52	U	**Di-N-Butylphthalate**	**20**	**J**
2-Methylnaphthalene	52	U	Fluoranthene	52	U
1-Methylnaphthalene	52	U	Benzidine	2070	UJ
Hexachlorocyclopentadiene	52	U	Pyrene	52	U
2,4,6-Trichlorophenol	259	U	Retene	52	U
2,4,5-Trichlorophenol	52	U	Butylbenzylphthalate	259	U
1,1'-Biphenyl	**7.9**	**J**	Benzo(a)anthracene	52	U
2-Chloronaphthalene	52	U	3,3'-Dichlorobenzidine	1030	UJ
2,6-Dimethylnaphthalene	52	U	Chrysene	52	U
2-Nitroaniline	259	U	**Bis(2-Ethylhexyl) Phthalate**	**327**	
Dimethylphthalate	52	U	Di-N-Octyl Phthalate	103	U
2,6-Dinitrotoluene	103	U	Benzo(b)fluoranthene	52	U

Authorized By: _____ Release Date: 7/23/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBS8169A2
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/15/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	52	U
Benzo[e]pyrene	52	U
Benzo(a)pyrene	52	U
Perylene	52	U
3B-Coprostanol	259	U
Indeno(1,2,3-cd)pyrene	259	U
Dibenzo(a,h)anthracene	103	U
Benzo(ghi)perylene	52	U

Surrogate Recoveries

2-Fluorophenol	**80**	%
D5-Phenol	**88**	%
D4-2-Chlorophenol	**79**	%
1,2-Dichlorobenzene-D4	**80**	%
D5-Nitrobenzene	**96**	%
2-Fluorobiphenyl	**79**	%
D10-Pyrene	**83**	%
D14-Terphenyl	**85**	%

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill
LIMS Project ID: 1831-98

Sample: OBS8169A2
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/15/98

Method: SW8270
Matrix: Sediment/Soil
Units: ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
108883	*Toluene*	1570	NJ
141797	*3-Penten-2-one, 4-methyl-*	323	NJ
2213232	*Heptane, 2,4-dimethyl-*	174	NJ
2216300	*Heptane, 2,5-dimethyl-*	449	NJ
123422	*2-Pentanone, 4-hydroxy-4-methyl-*	16600	NJ
56312528	*2-Pentene, 5-bromo-2,3-dimethyl-*	933	NJ
619998	*Hexane, 3-ethyl-*	592	NJ
3221612	*Octane, 2-methyl-*	522	NJ
2216333	*Octane, 3-methyl-*	1590	NJ
822673	*2-Cyclohexen-1-ol*	263	NJ
110134	*2,5-Hexanedione*	152	NJ
930687	*2-Cyclohexen-1-one*	256	NJ
20019641	*2(5H)-Furanone, 5,5-dimethyl-*	1360	NJ
*3001950	*C1-Naphthalenes*	52	U
*3001951	*C2 -Naphthalenes*	52	U
*3001954	*C1-Fluorenes*	52	U
*3001955	*C2-Fluorenes*	52	U
*3001952	*C3 -Naphthalenes*	52	U
*3001956	*C3-Fluorenes*	52	U
*3001953	*C4 -Naphthalenes*	52	U
*3001957	*C1-Dibenzothiophenes*	52	U
*3001960	*C1-Phenanthrenes/Anthracenes*	52	U
*3001961	*C2-Phenanthrenes/Anthracenes*	52	U
*3001958	*C2-Dibenzothiophenes*	52	U
*3001959	*C3-Dibenzothiophenes*	52	U
*3001962	*C3-Phenanthrenes/Anthracenes*	52	U
*3001963	*C4-Phenanthrenes/Anthracenes*	52	U
*3001964	*C1-Fluoranthene/Pyrene*	52	U
*3001965	*C1-Chrysenes*	52	U
*3001966	*C2-Chrysenes*	52	U
*3001967	*C3-Chrysenes*	52	U
*3001968	*C4-Chrysenes*	52	U

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8167D1
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/14/98

Method: SW8270
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	2	U	Acenaphthylene	.4	U
N-Nitrosodimethylamine	2	U	3-Nitroaniline	.8	U
Aniline	.4	U	Acenaphthene	.4	U
Phenol	.4	U	2,4-Dinitrophenol	8	U
Bis(2-Chloroethyl)Ether	.8	U	4-Nitrophenol	2	U
2-Chlorophenol	.8	U	1,6,7-Trimethylnaphthalene	.4	U
1,3-Dichlorobenzene	.8	U	Dibenzofuran	.4	U
1,4-Dichlorobenzene	.4	U	2,4-Dinitrotoluene	.4	U
1,2-Dichlorobenzene	.4	U	Diethylphthalate	2	U
Benzyl Alcohol	.4	U	Fluorene	.4	U
2-Methylphenol	.4	U	4-Chlorophenyl-Phenylether	.4	U
2,2'-Oxybis[1-chloropropane]	.4	U	4-Nitroaniline	.4	U
N-Nitroso-Di-N-Propylamine	.4	U	4,6-Dinitro-2-Methylphenol	4	U
4-Methylphenol	.4	U	N-Nitrosodiphenylamine	.4	U
Hexachloroethane	.4	U	1,2-Diphenylhydrazine	.4	U
Nitrobenzene	.4	U	4-Bromophenyl-Phenylether	.4	U
Isophorone	.4	U	Hexachlorobenzene	.4	U
2-Nitrophenol	2	U	Pentachlorophenol	2	U
2,4-Dimethylphenol	.4	U	Dibenzothiophene	.4	U
Bis(2-Chloroethoxy)Methane	.4	U	Phenanthrene	.4	U
Benzoic Acid	8	U	Anthracene	.4	U
2,4-Dichlorophenol	.4	U	Caffeine	.4	U
1,2,4-Trichlorobenzene	.4	U	Carbazole	.4	U
Naphthalene	.4	U	Phenol, 4-Nonyl-	.4	U
4-Chloroaniline	.4	U	2-Methylphenanthrene	.4	U
Hexachlorobutadiene	.4	U	1-Methylphenanthrene	.4	U
4-Chloro-3-Methylphenol	.4	U	Di-N-Butylphthalate	.4	U
2-Methylnaphthalene	.4	U	Fluoranthene	.4	U
1-Methylnaphthalene	.4	U	Benzidine	16	U
Hexachlorocyclopentadiene	.4	U	Pyrene	.4	U
2,4,6-Trichlorophenol	2	U	Retene	.4	U
2,4,5-Trichlorophenol	.4	U	Butylbenzylphthalate	2	U
1,1'-Biphenyl	.4	U	Benzo(a)anthracene	.4	U
2-Chloronaphthalene	.4	U	3,3'-Dichlorobenzidine	8	U
2,6-Dimethylnaphthalene	.4	U	Chrysene	.4	U
2-Nitroaniline	2	U	Bis(2-Ethylhexyl) Phthalate	2	U
Dimethylphthalate	.4	U	Di-N-Octyl Phthalate	.8	U
2,6-Dinitrotoluene	.8	U	Benzo(b)fluoranthene	.4	U

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8167D1
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/14/98

Method: SW8270
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Benzo(k)fluoranthene	.4	U
Benzo[e]pyrene	.4	U
Benzo(a)pyrene	.4	U
Perylene	.4	U
3B-Coprostanol	2	U
Indeno(1,2,3-cd)pyrene	2	U
Dibenzo(a,h)anthracene	.8	U
Benzo(ghi)perylene	.4	U

Surrogate Recoveries

2-Fluorophenol	**59**	**%**
D5-Phenol	**49**	**%**
D4-2-Chlorophenol	**65**	**%**
1,2-Dichlorobenzene-D4	**37**	**%**
D5-Nitrobenzene	**74**	**%**
2-Fluorobiphenyl	**51**	**%**
D10-Pyrene	**77**	**%**
D14-Terphenyl	**78**	**%**

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8167D1
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/14/98

Method: SW8270
Matrix: Water
Units: ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
922656	*1,4-Pentadien-3-ol*	1.1	NJ
822673	*2-Cyclohexen-1-ol*	.51	NJ
930687	*2-Cyclohexen-1-one*	.42	NJ
238846	*11H-Benzo[a]fluorene*	.34	NJ
*3001950	*C1-Naphthalenes*	.4	U
*3001951	*C2 -Naphthalenes*	.4	U
*3001954	*C1-Fluorenes*	.4	U
*3001955	*C2-Fluorenes*	.4	U
*3001952	*C3 -Naphthalenes*	.4	U
*3001956	*C3-Fluorenes*	.4	U
*3001953	*C4 -Naphthalenes*	.4	U
*3001957	*C1-Dibenzothiophenes*	.4	U
*3001960	*C1-Phenanthrenes/Anthracenes*	.4	U
*3001961	*C2-Phenanthrenes/Anthracenes*	.4	U
*3001958	*C2-Dibenzothiophenes*	.4	U
*3001959	*C3-Dibenzothiophenes*	.4	U
*3001962	*C3-Phenanthrenes/Anthracenes*	.4	U
*3001963	*C4-Phenanthrenes/Anthracenes*	.4	U
*3001964	*C1-Fluoranthene/Pyrene*	.4	U
*3001965	*C1-Chrysenes*	.4	U
*3001966	*C2-Chrysenes*	.4	U
*3001967	*C3-Chrysenes*	.4	U
*3001968	*C4-Chrysenes*	.4	U

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBW8167D2 **Method:** SW8270
Blank ID: BLNK **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	2	U	Acenaphthylene	.4	U
N-Nitrosodimethylamine	2	U	3-Nitroaniline	.8	U
Aniline	.4	U	Acenaphthene	.4	U
Phenol	.4	U	2,4-Dinitrophenol	8	U
Bis(2-Chloroethyl)Ether	.8	U	4-Nitrophenol	2	U
2-Chlorophenol	.8	U	1,6,7-Trimethylnaphthalene	.4	U
1,3-Dichlorobenzene	.8	U	Dibenzofuran	.4	U
1,4-Dichlorobenzene	.4	U	2,4-Dinitrotoluene	.4	U
1,2-Dichlorobenzene	.4	U	Diethylphthalate	2	U
Benzyl Alcohol	.4	U	Fluorene	.4	U
2-Methylphenol	.4	U	4-Chlorophenyl-Phenylether	.4	U
2,2'-Oxybis[1-chloropropane]	.4	U	4-Nitroaniline	.4	U
N-Nitroso-Di-N-Propylamine	.4	U	4,6-Dinitro-2-Methylphenol	4	U
4-Methylphenol	.4	U	N-Nitrosodiphenylamine	.4	U
Hexachloroethane	.4	U	1,2-Diphenylhydrazine	.4	U
Nitrobenzene	.4	U	4-Bromophenyl-Phenylether	.4	U
Isophorone	.4	U	Hexachlorobenzene	.4	U
2-Nitrophenol	2	U	Pentachlorophenol	2	U
2,4-Dimethylphenol	.4	U	Dibenzothiophene	.4	U
Bis(2-Chloroethoxy)Methane	.4	U	Phenanthrene	.4	U
Benzoic Acid	8	U	Anthracene	.4	U
2,4-Dichlorophenol	.4	U	Caffeine	.4	U
1,2,4-Trichlorobenzene	.4	U	Carbazole	.4	U
Naphthalene	.4	U	Phenol, 4-Nonyl-	.4	U
4-Chloroaniline	.4	U	2-Methylphenanthrene	.4	U
Hexachlorobutadiene	.4	U	1-Methylphenanthrene	.4	U
4-Chloro-3-Methylphenol	.4	U	**Di-N-Butylphthalate**	**.16**	**J**
2-Methylnaphthalene	.4	U	Fluoranthene	.4	U
1-Methylnaphthalene	.4	U	Benzidine	16	U
Hexachlorocyclopentadiene	.4	U	Pyrene	.4	U
2,4,6-Trichlorophenol	2	U	Retene	.4	U
2,4,5-Trichlorophenol	.4	U	Butylbenzylphthalate	2	U
1,1'-Biphenyl	**.07**	**J**	Benzo(a)anthracene	.4	U
2-Chloronaphthalene	.4	U	3,3'-Dichlorobenzidine	8	U
2,6-Dimethylnaphthalene	.4	U	Chrysene	.4	U
2-Nitroaniline	2	U	**Bis(2-Ethylhexyl) Phthalate**	**.22**	**J**
Dimethylphthalate	.4	U	Di-N-Octyl Phthalate	.8	U
2,6-Dinitrotoluene	.8	U	Benzo(b)fluoranthene	.4	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8167D2
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/14/98

Method: SW8270
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Benzo(k)fluoranthene	.4	U
Benzo[e]pyrene	.4	U
Benzo(a)pyrene	.4	U
Perylene	.4	U
3B-Coprostanol	2	U
Indeno(1,2,3-cd)pyrene	2	U
Dibenzo(a,h)anthracene	.8	U
Benzo(ghi)perylene	.4	U

Surrogate Recoveries

2-Fluorophenol	**72**	**%**
D5-Phenol	**60**	**%**
D4-2-Chlorophenol	**79**	**%**
1,2-Dichlorobenzene-D4	**43**	**%**
D5-Nitrobenzene	**92**	**%**
2-Fluorobiphenyl	**65**	**%**
D10-Pyrene	**88**	**%**
D14-Terphenyl	**87**	**%**

Authorized By: _____ Release Date: 7/23/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBW8167D2 **Method:** SW8270
Blank ID: BLNK **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/14/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
822662	*3-Cyclohexen-1-ol*	.47	NJ
930687	*2-Cyclohexen-1-one*	.52	NJ
*3001950	*C1-Naphthalenes*	.4	U
*3001951	*C2 -Naphthalenes*	.4	U
*3001954	*C1-Fluorenes*	.4	U
*3001955	*C2-Fluorenes*	.4	U
*3001952	*C3 -Naphthalenes*	.4	U
*3001956	*C3-Fluorenes*	.4	U
*3001953	*C4 -Naphthalenes*	.4	U
*3001957	*C1-Dibenzothiophenes*	.4	U
*3001960	*C1-Phenanthrenes/Anthracenes*	.4	U
*3001961	*C2-Phenanthrenes/Anthracenes*	.4	U
*3001958	*C2-Dibenzothiophenes*	.4	U
*3001959	*C3-Dibenzothiophenes*	.4	U
*3001962	*C3-Phenanthrenes/Anthracenes*	.4	U
*3001963	*C4-Phenanthrenes/Anthracenes*	.4	U
*3001964	*C1-Fluoranthene/Pyrene*	.4	U
*3001965	*C1-Chrysenes*	.4	U
*3001966	*C2-Chrysenes*	.4	U
*3001967	*C3-Chrysenes*	.4	U
*3001968	*C4-Chrysenes*	.4	U
84695	*1,2-Benzenedicarboxylic acid, bis(2-meth*	.32	NJ

Authorized By: _____ Release Date: 7/23/98

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

August 10, 1998

Subject: **Whitmarsh Landfill**

Samples: 98248007, 98248008

Case No. 1831-98

Officer: Art Johnson

By: Karin Feddersen KF
Analytical Management Unit

Organotins

ANALYTICAL METHODS:

The samples were extracted following the methods given in Puget Sound Estuary Program (PSEP) "Recommended Guidelines for Measuring Organic Compounds in Puget Sound Sediment and Tissue Samples" Recommended Methods for Organotin Compounds.

The samples were extracted by tumbling with sodium sulfate and methylene chloride/10% methanol and 0.1% by weight tropolone. After extraction the samples were solvent exchanged to hexane. The organotin compounds were hexylated using the Grignard reaction given in Krone et al (1989) including the silica gel/alumina cleanup.

Analysis was by capillary Gas Chromatography using Single Ion Monitoring (SIM) mode GC/MS. All samples are reported on a dry weight basis.

HOLDING TIMES:

The samples were stored frozen following PSEP Guidelines until extraction. All samples were analyzed within the recommended 40 days from extraction.

BLANKS:

Monobutyltin was detected in the laboratory blanks.

SURROGATES:

No surrogate recovery QC limits have been established for this method.
Recoveries of tripentyl tin ranged from 65% to 144%.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Aliquots of samples 98248095 from Budd Inlet, and 98148253 from Gray's Harbor were used for matrix spikes and analyzed with these samples.

Recoveries for Terabutyltin were below 5% in all spikes. Non-detect results for this analyte have been rejected ("REJ"). Detected results may be biased low and have been qualified as estimates.

Tributyltin and Dibutyltin were detected at a higher native concentration in the sample 98248095 than in the spikes of this sample. Recoveries of these analytes in one of the spikes could not be calculated (NC).

Monobutyltin was detected at a higher native concentration in the sample 98148253 than in the spikes of this sample. Recoveries of this analyte in one of the spikes could not be calculated (NC).

Therefore, all results are qualified as estimates.

ANALYTICAL COMMENTS:

Sequim Bay Reference Sediments were analyzed with the samples. These are samples which presumably were spiked with 100 ng/gm (100ug/Kg) wet weight of Tributyltin. No value for Tributyltin has been established for the Sequim Bay Reference Sediment so the accuracy of the analysis cannot be precisely determined. However, the values appear to be fairly closely associated with the surrogate recoveries. These samples are identified as OCS8175A1 and OCS8175A2.

OCS8175A1	83	ug/Kg	Tributyltin Chloride
	82	%	Tripentyltin surrogate recovery
OCS8175A2	89	ug/Kg	Tributyltin Chloride
	90	%	Tripentyltin surrogate recovery

(Note that the data sheets report these values as dry weight. The percent solids has been determined to be 60.4% for this material.)

Duplicate samples of PACS-2 were also analyzed with the samples. The value for PACS-2 has been certified as 0.98 +/- 0.13 mg/Kg Tributyltin, and 1.09 +\- 0.15 mg\Kg Dibutyltin, as elemental Tin. These values are approximately equivalent to 2800 ug/Kg as chloride. The values obtained for these samples appear to be fairly closely associated with the surrogate recoveries. These samples are identified as OCS8175A3 and OCS8175A4.

OCS8175A3	2090	ug/Kg	Tributyltin Chloride
	2000	ug/Kg	Dibutyltin Chloride
	72	%	Tripentyltin surrogate recovery
OCS8175A4	1850	ug/Kg	Tributyltin Chloride
	2010	ug/Kg	Dibutyltin Chloride
	65	%	Tripentyltin surrogate recovery

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Certified Reference Material

National Research Council Canada | Conseil national de recherches Canada

HISS-1, MESS-2, PACS-2

Marine Sediment Reference Materials for Trace Metals and other Constituents

The following tables show those constituents for which certified and information values have been established. Certified values are based on the results of determinations by at least two independent methods of analysis. The uncertainties represent 95% confidence limits for an individual sub-sample of 250 mg or greater.

Trace Metals
(milligrams per kilogram)

	HISS-1	MESS-2	PACS-2
Antimony	(0.13)*	1.09 ± 0.13	11.3 ± 2.6
Arsenic	0.801 ± 0.099	20.7 ± 0.8	26.2 ± 1.5
Beryllium	0.129 ± 0.023	2.32 ± 0.12	1.0 ± 0.2
Cadmium	0.024 ± 0.009	0.24 ± 0.01	2.11 ± 0.15
Chromium	30.0 ± 6.8†	106 ± 8	90.7 ± 4.6
Cobalt	(0.65)*	13.8 ± 1.4	11.5 ± 0.3
Copper	2.29 ± 0.37	39.3 ± 2.0	310 ± 12
Lead	3.13 ± 0.40	21.9 ± 1.2	183 ± 8
Lithium	2.83 ± 0.54	73.9 ± 0.7	32.2 ± 2.0
Manganese	66.1 ± 4.2	365 ± 21	440 ± 19
Mercury	(0.01)*	0.092 ± 0.009	3.04 ± 0.20
Molybdenum	(0.13)*	2.85 ± 0.12	5.43 ± 0.28
Nickel	2.16 ± 0.29	49.3 ± 1.8	39.5 ± 2.3
Selenium	0.050 ± 0.007	0.72 ± 0.09	0.92 ± 0.22
Silver	0.016 ± 0.002	0.18 ± 0.02	1.22 ± 0.14
Strontium	96.9 ± 11.2	125 ± 10	276 ± 30
Thallium	(0.06)*	(0.98)*	(0.6)*
Tin	(0.11)*	2.27 ± 0.42	19.8 ± 2.5
Uranium	(0.26)*	---	(3.)*
Vanadium	6.80 ± 0.78	252 ± 10	133 ± 5
Zinc	4.94 ± 0.79	172 ± 16	364 ± 23
Tributyltin (as Sn)	---	---	0.98 ± 0.13
Dibutyltin "	---	---	1.09 ± 0.15
Monobutyltin "	---	---	(0.3)*

*information value only
† see page 3

NRC · CNRC

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007
Field ID: N SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**3.8**	**J**
Dibutyltin Chloride	**3.9**	**J**
Monobutyltin Chloride	**55**	**J**

Surrogate Recoveries

Tripentyltin Chloride	**144**	**%**

Authorized By: _____ Release Date: 8/10/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: 98248008
Field ID: S SED
Project Officer: Art Johnson

Date Received: 06/12/98
Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**3.6**	**J**
Dibutyltin Chloride	**3.9**	**J**
Monobutyltin Chloride	**44**	**J**

Surrogate Recoveries

Tripentyltin Chloride	**142**	**%**

Authorized By: _____ Release Date: 8/10/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBS8175A1
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/22/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride	7	U
Tributyltin Chloride	7	U
Dibutyltin Chloride	7.2	U
Monobutyltin Chloride	**17**	

Surrogate Recoveries

Tripentyltin Chloride	**94**	**%**

Authorized By: _____ Release Date: 8/10/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBS8175A2
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/22/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride	7	U
Tributyltin Chloride	7	U
Dibutyltin Chloride	7.2	U
Monobutyltin Chloride	**12**	**J**

Surrogate Recoveries

Tripentyltin Chloride	**109**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OCS8175A1
Blank ID: SBRM
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**137**	**J**
Dibutyltin Chloride	**5.7**	**J**
Monobutyltin Chloride	**51**	**J**

Surrogate Recoveries

Tripentyltin Chloride	**82**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OCS8175A2
Blank ID: SBRM
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**147**	**J**
Dibutyltin Chloride	**5**	**J**
Monobutyltin Chloride	**50**	**J**
Surrogate Recoveries		
Tripentyltin Chloride	**90**	**%**

Authorized By: _____ Release Date: 8/10/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OCS8175A3
Blank ID: PCS2
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**2090**	**J**
Dibutyltin Chloride	**2000**	**J**
Monobutyltin Chloride	**1700**	**J**

Surrogate Recoveries

Tripentyltin Chloride	72	%

Authorized By: _____ Release Date: 8/10/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Tri-butyl Tin

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OCS8175A4
Blank ID: PCS2
Project Officer: Art Johnson

Date Prepared: 06/24/98
Date Analyzed: 07/23/98

Method: NOAA-TBT
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Tetrabutyltin Chloride		REJ
Tributyltin Chloride	**1850**	**J**
Dibutyltin Chloride	**2010**	**J**
Monobutyltin Chloride	**2300**	**J**

Surrogate Recoveries

Tripentyltin Chloride	**65**	**%**

Authorized By: _____ Release Date: 8/10/98

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

August 18, 1998

Subject: Whitmarsh Landfill

Samples: 98248005 thru 248008

Officer(s): Art Johnson

By: Norman Olson NO
Organics Analysis Unit

NEUTRAL PESTICIDE ANALYSIS

ANALYTICAL METHODS: (EPA SW846 Method 8085 (proposed status)) All water and soil samples were analyzed for nitrogen-containing, chlorinated and organophosphorous pesticides. In addition, the samples were screened for non-target compounds containing nitrogen, sulfur, halogens and/or phosphorous. A stir-bar extraction with methylene chloride followed by solvent exchange to iso-octane for the water samples and a soxhlet extraction with acetone followed by solvent exchange to iso-octane for the soil samples are the Manchester Laboratory's standard operating procedures that were used for the extraction of the pesticides. Extract analyses by capillary Gas Chromatography and Atomic Emission Detection (GC/AED) was performed for compound detection and quantitation. Confirmation of detected pesticides was performed by Gas Chromatography and Ion-Trap mass spectrometry (GC/ITD) or comparisons of elemental ratios of hetero-atoms to empirical formulas.

Analytes have a respective practical quantitation limit (PQL) that is higher than the corresponding method detection level (MDL). If a target analyte is detected and confirmed at a concentration below its PQL, the reported concentration is qualified as an estimate, ' J' qualifier. This procedure also applies to the method blanks.

NITROGEN-CONTAINING PESTICIDE ANALYSIS

BLANKS: No nitrogen-containing target compounds were detected in the laboratory blanks at or above the associated reporting level. Hence, the blanks demonstrate the system was free from this type of contamination.

HOLDING TIMES: All samples were extracted within 7 days of sampling for the waters and 14 days for the soils and were analyzed within 40 days of extraction.

SURROGATES: All 1,3-Dimethyl-2-nitrobenzene (DMNB) recoveries were acceptable ranging from 47% to 108%, except for DMNB from sample 98248005 that were not calculated. The DMNB recovery from this sample was not obtained due to interferences present. However, the nitrogen-containing target compounds associated with this surrogate were not qualified due to the acceptable surrogate recoveries obtained for the other parameters analyzed for this sample.

MATRIX SPIKING: No target compound spiking was performed.

COMMENTS: Nitrogen and sulfur containing compounds associated with rubber/plastic products were detected in the water samples at relatively large concentrations.

Data is useable as qualified.

ORGANOPHOSPHOROUS PESTICIDE ANALYSIS

BLANKS: No organophosphorous target compounds were detected in the laboratory blanks at or above the associated reporting level. Hence, the blanks demonstrate the system was free from this type of contamination.

HOLDING TIMES: All samples were extracted within 7 days of sampling for the waters and 14 days for the soils and were analyzed within 40 days of extraction.

SURROGATES: Triphenylphosphate recoveries were acceptable ranging from 51% to 110%.

MATRIX SPIKING: No target compound spiking was performed.

COMMENTS: Relatively large concentrations of phosphorous containing plasticizers/fire retardants were present in the water samples. Compounds such as tributylphosphate and tri-(chloroethyl)phosphate were detected.

The data is useable as qualified

ORGANOCHLORINE PESTICIDE ANALYSIS

BLANKS: No organochlorine target compounds were detected in the laboratory blanks at or above the associated reporting level. Hence, the blanks demonstrate the system was free from this type of contamination.

HOLDING TIMES: All samples were extracted within 7 days of sampling for the waters and 14 days for the soils and were analyzed within 40 days of extraction.

SURROGATES: Decachlorobiphenyl recoveries were acceptable ranging from 60% to 99%.

MATRIX SPIKING: No target compound spiking was performed.

COMMENTS: The data is useable as qualified.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported result.
J	-	The analyte was positively identified. The associated numerical result is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
N	-	For organic analytes there is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
NC	-	Not calculated.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005
Field ID: N SEEP
Project Officer: Art Johnson

Date Collected: 06/11/98
Date Prepared: 06/16/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Dichlobenil	0.040	U
Tebuthiuron	0.030	UJ
Propachlor (Ramrod)	0.048	U
Ethalfluralin (Sonalan)	0.32	UJ
Treflan (Trifluralin)	0.32	UJ
Simazine	0.020	U
Atrazine	0.020	U
Pronamide (Kerb)	0.081	U
Terbacil	0.060	U
Metribuzin	0.020	U
Alachlor	0.073	U
Prometryn	0.020	U
Bromacil	0.081	U
Metolachlor	0.081	U
Diphenamid	0.060	U
Pendimethalin	0.030	U
Napropamide	0.060	U
Oxyfluorfen	0.081	U
Norflurazon	0.040	U
Fluridone	0.12	UJ
Eptam	0.040	U
Butylate	0.040	U
Vernolate	0.040	U
Cycloate	0.040	U
Benefin	0.32	UJ
Prometon (Pramitol 5p)	0.020	U
Propazine	0.020	U
Chlorothalonil (Daconil)	0.048	U
Triallate	0.060	U
Ametryn	0.020	U
Terbutryn (Igran)	0.020	U
Hexazinone	0.030	UJ
Pebulate	0.040	U
Molinate	0.040	U
Chlorpropham	0.16	UJ
Atraton	0.030	U
Triadimefon	0.052	U
MGK264	0.16	U
Butachlor	0.12	U
Carboxin	0.12	UJ
Fenarimol	0.060	U
Diuron	0.12	U
Di-allate (Avadex)	0.14	U
Profluralin	0.048	U
Metalaxyl	0.12	U
Cyanazine	0.030	U
Carbaryl	**4.5**	**J**

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	NC

Authorized By: _____ Release Date: 8/19/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005
Field ID: N SEEP
Project Officer: Art Johnson

Date Collected: 06/11/98
Date Prepared: 06/16/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
122394	*Diphenylamine*	0.32	NJ

Authorized By: _____ Release Date: 8/19/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Dichlobenil	0.040	U
Tebuthiuron	0.030	UJ
Propachlor (Ramrod)	0.048	U
Ethalfluralin (Sonalan)	0.32	UJ
Treflan (Trifluralin)	0.32	UJ
Simazine	0.020	U
Atrazine	0.020	U
Pronamide (Kerb)	0.079	U
Terbacil	0.060	U
Metribuzin	0.020	U
Alachlor	0.071	U
Prometryn	0.020	U
Bromacil	0.079	U
Metolachlor	0.079	U
Diphenamid	0.16	UJ
Pendimethalin	0.030	U
Napropamide	0.060	U
Oxyfluorfen	0.079	U
Norflurazon	0.040	U
Fluridone	0.12	UJ
Eptam	0.040	U
Butylate	0.040	U
Vernolate	0.040	U
Cycloate	0.040	U
Benefin	0.32	UJ
Prometon (Pramitol 5p)	0.020	U
Propazine	0.020	U
Chlorothalonil (Daconil)	0.048	U
Triallate	0.060	U
Ametryn	0.020	U
Terbutryn (Igran)	0.020	U
Hexazinone	0.030	UJ
Pebulate	0.040	U
Molinate	0.040	U
Chlorpropham	0.079	U
Atraton	0.030	U
Triadimefon	0.052	U
MGK264	0.16	U
Butachlor	0.12	U
Carboxin	0.12	UJ
Fenarimol	0.060	U
Diuron	0.12	U
Di-allate (Avadex)	0.14	U
Profluralin	0.048	U
Metalaxyl	0.12	U
Cyanazine	0.030	U
Carbaryl	**0.13**	**J**

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	83	%

Authorized By: _____ Release Date: 8/19/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
122394	*Diphenylamine*	1.0	NJ

Authorized By: _____ Release Date: 8/19/98 Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Dichlobenil	150	U
Tebuthiuron	110	UJ
Propachlor (Ramrod)	180	U
Ethalfluralin (Sonalan)	110	U
Treflan (Trifluralin)	110	U
Simazine	74	U
Atrazine	74	U
Pronamide (Kerb)	300	U
Terbacil	220	U
Metribuzin	74	U
Alachlor	270	U
Prometryn	74	U
Bromacil	300	U
Metolachlor	300	U
Diphenamid	220	U
Pendimethalin	110	U
Napropamide	220	U
Oxyfluorfen	300	U
Norflurazon	150	U
Fluridone	450	UJ
Eptam	150	U
Butylate	150	U
Vernolate	150	U
Cycloate	150	U
Benefin	110	U
Prometon (Pramitol 5p)	74	U
Propazine	74	U
Chlorothalonil (Daconil)	180	UJ
Triallate	220	U
Ametryn	74	U
Terbutryn (Igran)	74	U
Hexazinone	110	UJ
Pebulate	150	U
Molinate	150	U
Chlorpropham	300	U
Atraton	110	U
Triadimefon	190	U
MGK264	600	U
Butachlor	450	U
Carboxin	450	UJ
Fenarimol	220	U
Diuron	450	U
Di-allate (Avadex)	520	U
Profluralin	180	U
Metalaxyl	450	U
Cyanazine	110	U

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	75	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Dichlobenil	150	U
Tebuthiuron	110	U
Propachlor (Ramrod)	180	UJ
Ethalfluralin (Sonalan)	110	U
Treflan (Trifluralin)	110	U
Simazine	74	U
Atrazine	74	U
Pronamide (Kerb)	300	U
Terbacil	220	U
Metribuzin	74	U
Alachlor	270	U
Prometryn	74	U
Bromacil	300	U
Metolachlor	300	U
Diphenamid	220	U
Pendimethalin	110	U
Napropamide	220	U
Oxyfluorfen	300	U
Norflurazon	150	U
Fluridone	440	UJ
Eptam	150	U
Butylate	150	U
Vernolate	150	U
Cycloate	150	U
Benefin	110	U
Prometon (Pramitol 5p)	74	U
Propazine	74	U
Chlorothalonil (Daconil)	180	UJ
Triallate	220	U
Ametryn	74	U
Terbutryn (Igran)	74	U
Hexazinone	110	UJ
Pebulate	150	U
Molinate	150	U
Chlorpropham	300	U
Atraton	110	U
Triadimefon	190	U
MGK264	590	U
Butachlor	440	U
Carboxin	440	UJ
Fenarimol	220	U
Diuron	440	U
Di-allate (Avadex)	520	U
Profluralin	180	U
Metalaxyl	440	U
Cyanazine	110	U

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	57	%

Authorized By: _____ Release Date: 8/19/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBW8167B1
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Dichlobenil	0.040	U
Tebuthiuron	0.030	UJ
Propachlor (Ramrod)	0.048	U
Ethalfluralin (Sonalan)	0.030	U
Treflan (Trifluralin)	0.030	U
Simazine	0.020	U
Atrazine	0.020	U
Pronamide (Kerb)	0.081	U
Terbacil	0.060	U
Metribuzin	0.020	U
Alachlor	0.073	U
Prometryn	0.020	U
Bromacil	0.081	U
Metolachlor	0.081	U
Diphenamid	0.060	U
Pendimethalin	0.030	U
Napropamide	0.060	U
Oxyfluorfen	0.081	U
Norflurazon	0.040	U
Fluridone	0.12	UJ
Eptam	0.040	U
Butylate	0.040	U
Vernolate	0.040	U
Cycloate	0.040	U
Benefin	0.030	U
Prometon (Pramitol 5p)	0.020	U
Propazine	0.020	U
Chlorothalonil (Daconil)	0.048	U
Triallate	0.060	U
Ametryn	0.020	U
Terbutryn (Igran)	0.020	U
Hexazinone	0.030	UJ
Pebulate	0.040	U
Molinate	0.040	U
Chlorpropham	0.081	U
Atraton	0.030	U
Triadimefon	0.052	U
MGK264	0.16	U
Butachlor	0.12	U
Carboxin	0.12	UJ
Fenarimol	0.060	U
Diuron	0.12	U
Di-allate (Avadex)	0.14	U
Profluralin	0.048	U
Metalaxyl	0.12	U
Cyanazine	0.030	U

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	93	%

Authorized By: _____ Release Date: 8/19/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBW8167B2
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Dichlobenil	0.040	U
Tebuthiuron	0.030	UJ
Propachlor (Ramrod)	0.048	U
Ethalfluralin (Sonalan)	0.030	U
Treflan (Trifluralin)	0.030	U
Simazine	0.020	U
Atrazine	0.020	U
Pronamide (Kerb)	0.081	U
Terbacil	0.060	U
Metribuzin	0.020	U
Alachlor	0.073	U
Prometryn	0.020	U
Bromacil	0.081	U
Metolachlor	0.081	U
Diphenamid	0.060	U
Pendimethalin	0.030	U
Napropamide	0.060	U
Oxyfluorfen	0.081	U
Norflurazon	0.040	U
Fluridone	0.12	UJ
Eptam	0.040	U
Butylate	0.040	U
Vernolate	0.040	U
Cycloate	0.040	U
Benefin	0.030	U
Prometon (Pramitol 5p)	0.020	U
Propazine	0.020	U
Chlorothalonil (Daconil)	0.048	U
Triallate	0.060	U
Ametryn	0.020	U
Terbutryn (Igran)	0.020	U
Hexazinone	0.030	UJ
Pebulate	0.040	U
Molinate	0.040	U
Chlorpropham	0.081	U
Atraton	0.030	U
Triadimefon	0.052	U
MGK264	0.16	U
Butachlor	0.12	U
Carboxin	0.12	UJ
Fenarimol	0.060	U
Diuron	0.12	U
Di-allate (Avadex)	0.14	U
Profluralin	0.048	U
Metalaxyl	0.12	U
Cyanazine	0.030	U

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	108	%

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Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBS8169B1
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Dichlobenil	150	U
Tebuthiuron	110	UJ
Propachlor (Ramrod)	180	U
Ethalfluralin (Sonalan)	110	U
Treflan (Trifluralin)	110	U
Simazine	74	U
Atrazine	74	U
Pronamide (Kerb)	300	U
Terbacil	220	U
Metribuzin	74	U
Alachlor	270	U
Prometryn	74	U
Bromacil	300	U
Metolachlor	300	U
Diphenamid	220	U
Pendimethalin	110	U
Napropamide	220	U
Oxyfluorfen	300	U
Norflurazon	150	U
Fluridone	450	UJ
Eptam	150	U
Butylate	150	U
Vernolate	150	U
Cycloate	150	U
Benefin	110	U
Prometon (Pramitol 5p)	74	U
Propazine	74	U
Chlorothalonil (Daconil)	180	UJ
Triallate	220	U
Ametryn	74	U
Terbutryn (Igran)	74	U
Hexazinone	110	UJ
Pebulate	150	U
Molinate	150	U
Chlorpropham	300	U
Atraton	110	U
Triadimefon	190	U
MGK264	590	U
Butachlor	450	U
Carboxin	450	UJ
Fenarimol	220	U
Diuron	450	U
Di-allate (Avadex)	520	U
Profluralin	180	U
Metalaxyl	450	U
Cyanazine	110	U

Surrogate Recoveries

1,3-Dimethyl-2-nitrobenzene	82	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Nitrogen Containing Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBS8169B2 **Method:** SW8085
QC Type: Laboratory Method Blank **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlobenil	150	U	Butachlor	440	U
Tebuthiuron	110	U	Carboxin	440	UJ
Propachlor (Ramrod)	180	UJ	Fenarimol	220	U
Ethalfluralin (Sonalan)	110	U	Diuron	440	U
Treflan (Trifluralin)	110	U	Di-allate (Avadex)	520	U
Simazine	74	U	Profluralin	180	U
Atrazine	74	U	Metalaxyl	440	U
Pronamide (Kerb)	300	U	Cyanazine	110	U
Terbacil	220	U			
Metribuzin	74	U	**Surrogate Recoveries**		
Alachlor	270	U			
Prometryn	74	U	1,3-Dimethyl-2-nitrobenzene	47	%
Bromacil	300	U			
Metolachlor	300	U			
Diphenamid	220	U			
Pendimethalin	110	U			
Napropamide	220	U			
Oxyfluorfen	300	U			
Norflurazon	150	U			
Fluridone	440	UJ			
Eptam	150	U			
Butylate	150	U			
Vernolate	150	U			
Cycloate	150	U			
Benefin	110	U			
Prometon (Pramitol 5p)	74	U			
Propazine	74	U			
Chlorothalonil (Daconil)	180	UJ			
Triallate	220	U			
Ametryn	74	U			
Terbutryn (Igran)	74	U			
Hexazinone	110	UJ			
Pebulate	150	U			
Molinate	150	U			
Chlorpropham	300	U			
Atraton	110	U			
Triadimefon	190	U			
MGK264	590	U			

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Alpha-BHC	0.011	U
Beta-BHC	0.011	U
Gamma-BHC (Lindane)	0.011	U
Delta-BHC	0.011	U
Heptachlor	0.011	U
Aldrin	0.011	U
Heptachlor Epoxide	0.011	U
Trans-Chlordane (Gamma)	0.011	U
Endosulfan I	0.011	U
Dieldrin	0.011	U
4,4'-DDE	0.011	U
Endrin	0.011	U
Endosulfan II	0.011	U
4,4'-DDD	0.011	U
Endrin Aldehyde	0.011	U
Endosulfan Sulfate	0.011	U
4,4'-DDT	0.011	U
Endrin Ketone	0.011	U
Methoxychlor	0.011	U
Alpha-Chlordene	0.011	U
Gamma-Chlordene	0.011	U
Oxychlordane	0.011	U
DDMU	0.011	U
Cis-Chlordane (Alpha-Chlordane	0.011	U
Cis-Nonachlor	0.011	U
Kelthane	0.045	UJ
Captan	0.030	UJ
2,4'-DDE	0.011	U
Trans-Nonachlor	0.011	U
2,4'-DDD	0.011	U
2,4'-DDT	0.011	U
Captafol	0.056	UJ
Mirex	0.011	U
Toxaphene	0.34	U

Surrogate Recoveries

Decachlorobiphenyl	79	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Alpha-BHC	0.011	U
Beta-BHC	0.011	U
Gamma-BHC (Lindane)	0.011	U
Delta-BHC	0.011	U
Heptachlor	0.011	U
Aldrin	0.011	U
Heptachlor Epoxide	0.011	U
Trans-Chlordane (Gamma)	0.011	U
Endosulfan I	0.011	U
Dieldrin	0.011	U
4,4'-DDE	0.011	U
Endrin	0.011	U
Endosulfan II	0.011	U
4,4'-DDD	0.011	U
Endrin Aldehyde	0.011	U
Endosulfan Sulfate	0.011	U
4,4'-DDT	0.011	U
Endrin Ketone	0.011	U
Methoxychlor	0.011	U
Alpha-Chlordene	0.011	U
Gamma-Chlordene	0.011	U
Oxychlordane	0.011	U
DDMU	0.011	U
Cis-Chlordane (Alpha-Chlordane	0.011	U
Cis-Nonachlor	0.011	U
Kelthane	0.044	UJ
Captan	0.030	UJ
2,4'-DDE	0.011	U
Trans-Nonachlor	0.011	U
2,4'-DDD	0.011	U
2,4'-DDT	0.011	U
Captafol	0.056	UJ
Mirex	0.011	U
Toxaphene	0.33	U

Surrogate Recoveries

Decachlorobiphenyl	61	%

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Alpha-BHC	42	U
Beta-BHC	42	U
Gamma-BHC (Lindane)	42	U
Delta-BHC	42	U
Heptachlor	42	U
Aldrin	42	U
Heptachlor Epoxide	42	U
Trans-Chlordane (Gamma)	42	U
Endosulfan I	42	U
Dieldrin	42	U
4,4'-DDE	42	U
Endrin	42	U
Endosulfan II	42	U
4,4'-DDD	42	U
Endrin Aldehyde	42	U
Endosulfan Sulfate	42	U
4,4'-DDT	42	UJ
Endrin Ketone	42	U
Methoxychlor	42	U
Alpha-Chlordene	42	U
Gamma-Chlordene	42	U
Oxychlordane	42	U
DDMU	42	U
Cis-Chlordane (Alpha-Chlordane	42	U
Cis-Nonachlor	42	U
Kelthane	170	UJ
Captan	110	UJ
2,4'-DDE	42	U
Trans-Nonachlor	42	U
2,4'-DDD	42	U
2,4'-DDT	42	UJ
Captafol	210	UJ
Mirex	42	U
Toxaphene	600	U

Surrogate Recoveries

Decachlorobiphenyl	73	%

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008
Field ID: S SED
Project Officer: Art Johnson

Date Collected: 06/11/98
Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Alpha-BHC	41	U
Beta-BHC	41	U
Gamma-BHC (Lindane)	41	U
Delta-BHC	41	U
Heptachlor	41	U
Aldrin	41	U
Heptachlor Epoxide	41	U
Trans-Chlordane (Gamma)	41	U
Endosulfan I	41	U
Dieldrin	41	U
4,4'-DDE	41	U
Endrin	41	U
Endosulfan II	41	U
4,4'-DDD	41	U
Endrin Aldehyde	41	U
Endosulfan Sulfate	41	U
4,4'-DDT	41	UJ
Endrin Ketone	41	U
Methoxychlor	41	U
Alpha-Chlordene	41	U
Gamma-Chlordene	41	U
Oxychlordane	41	U
DDMU	41	U
Cis-Chlordane (Alpha-Chlordane	41	U
Cis-Nonachlor	41	U
Kelthane	170	UJ
Captan	110	UJ
2,4'-DDE	41	U
Trans-Nonachlor	41	U
2,4'-DDD	41	U
2,4'-DDT	41	UJ
Captafol	210	UJ
Mirex	41	U
Toxaphene	590	U

Surrogate Recoveries

Decachlorobiphenyl	71	%

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBW8167B1
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Alpha-BHC	0.011	U
Beta-BHC	0.011	U
Gamma-BHC (Lindane)	0.011	U
Delta-BHC	0.011	U
Heptachlor	0.011	U
Aldrin	0.011	U
Heptachlor Epoxide	0.011	U
Trans-Chlordane (Gamma)	0.011	U
Endosulfan I	0.011	U
Dieldrin	0.011	U
4,4'-DDE	0.011	U
Endrin	0.011	U
Endosulfan II	0.011	U
4,4'-DDD	0.011	U
Endrin Aldehyde	0.011	U
Endosulfan Sulfate	0.011	U
4,4'-DDT	0.011	U
Endrin Ketone	0.011	U
Methoxychlor	0.011	U
Alpha-Chlordene	0.011	U
Gamma-Chlordene	0.011	U
Oxychlordane	0.011	U
DDMU	0.011	U
Cis-Chlordane (Alpha-Chlordane	0.011	U
Cis-Nonachlor	0.011	U
Kelthane	0.045	UJ
Captan	0.030	UJ
2,4'-DDE	0.011	U
Trans-Nonachlor	0.011	U
2,4'-DDD	0.011	U
2,4'-DDT	0.011	U
Captafol	0.056	UJ
Mirex	0.011	U
Toxaphene	0.34	U

Surrogate Recoveries

Decachlorobiphenyl	99	%

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Department of Ecology

Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBW8167B2
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
Alpha-BHC	0.011	U
Beta-BHC	0.011	U
Gamma-BHC (Lindane)	0.011	U
Delta-BHC	0.011	U
Heptachlor	0.011	U
Aldrin	0.011	U
Heptachlor Epoxide	0.011	U
Trans-Chlordane (Gamma)	0.011	U
Endosulfan I	0.011	U
Dieldrin	0.011	U
4,4'-DDE	0.011	U
Endrin	0.011	U
Endosulfan II	0.011	U
4,4'-DDD	0.011	U
Endrin Aldehyde	0.011	U
Endosulfan Sulfate	0.011	U
4,4'-DDT	0.011	U
Endrin Ketone	0.011	U
Methoxychlor	0.011	U
Alpha-Chlordene	0.011	U
Gamma-Chlordene	0.011	U
Oxychlordane	0.011	U
DDMU	0.011	U
Cis-Chlordane (Alpha-Chlordane	0.011	U
Cis-Nonachlor	0.011	U
Kelthane	0.045	UJ
Captan	0.030	UJ
2,4'-DDE	0.011	U
Trans-Nonachlor	0.011	U
2,4'-DDD	0.011	U
2,4'-DDT	0.011	U
Captafol	0.056	UJ
Mirex	0.011	U
Toxaphene	0.34	U

Surrogate Recoveries

Decachlorobiphenyl	114	%

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBS8169B1
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Alpha-BHC	42	U
Beta-BHC	42	U
Gamma-BHC (Lindane)	42	U
Delta-BHC	42	U
Heptachlor	42	U
Aldrin	42	U
Heptachlor Epoxide	42	U
Trans-Chlordane (Gamma)	42	U
Endosulfan I	42	U
Dieldrin	42	U
4,4'-DDE	42	U
Endrin	42	U
Endosulfan II	42	U
4,4'-DDD	42	U
Endrin Aldehyde	42	U
Endosulfan Sulfate	42	U
4,4'-DDT	42	UJ
Endrin Ketone	42	U
Methoxychlor	42	U
Alpha-Chlordene	42	U
Gamma-Chlordene	42	U
Oxychlordane	42	U
DDMU	42	U
Cis-Chlordane (Alpha-Chlordane	42	U
Cis-Nonachlor	42	U
Kelthane	170	UJ
Captan	110	UJ
2,4'-DDE	42	U
Trans-Nonachlor	42	U
2,4'-DDD	42	U
2,4'-DDT	42	UJ
Captafol	210	UJ
Mirex	42	U
Toxaphene	590	U

Surrogate Recoveries

Decachlorobiphenyl	97	%

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Analysis Report for

Chlorinated Pesticides (GC/AED)

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Lab ID: OBS8169B2
QC Type: Laboratory Method Blank
Project Officer: Art Johnson

Date Prepared: 06/18/98
Date Analyzed: 07/17/98

Method: SW8085
Matrix: Sediment/Soil
Units: ug/Kg dw

Analyte	Result	Qualifier
Alpha-BHC	41	U
Beta-BHC	41	U
Gamma-BHC (Lindane)	41	U
Delta-BHC	41	U
Heptachlor	41	U
Aldrin	41	U
Heptachlor Epoxide	41	U
Trans-Chlordane (Gamma)	41	U
Endosulfan I	41	U
Dieldrin	41	U
4,4'-DDE	41	U
Endrin	41	U
Endosulfan II	41	U
4,4'-DDD	41	U
Endrin Aldehyde	41	U
Endosulfan Sulfate	41	U
4,4'-DDT	41	UJ
Endrin Ketone	41	U
Methoxychlor	41	U
Alpha-Chlordene	41	U
Gamma-Chlordene	41	U
Oxychlordane	41	U
DDMU	41	U
Cis-Chlordane (Alpha-Chlordane	41	U
Cis-Nonachlor	41	U
Kelthane	170	UJ
Captan	110	UJ
2,4'-DDE	41	U
Trans-Nonachlor	41	U
2,4'-DDD	41	U
2,4'-DDT	41	UJ
Captafol	210	UJ
Mirex	41	U
Toxaphene	590	U

Surrogate Recoveries

Decachlorobiphenyl	60	%

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Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Demeton-O	0.014	U
Sulfotepp	0.012	U
Demeton-S	0.014	UJ
Fonofos	0.012	U
Disulfoton (Di-Syston)	0.012	U
Methyl Chlorpyrifos	0.016	U
Fenitrothion	0.014	U
Malathion	0.016	U
Chlorpyriphos	0.016	U
Merphos (1 & 2)	0.024	U
Ethion	0.014	U
Carbophenothion	0.020	U
EPN	0.020	U
Azinphos Ethyl	0.032	U
Ethoprop	0.16	UJ
Phorate	0.014	U
Dimethoate	0.016	U
Diazinon	0.016	U
Methyl Parathion	0.014	U
Ronnel	0.014	U
Fenthion	0.014	U
Parathion	0.016	U
Fensulfothion	0.020	U
Bolstar (Sulprofos)	0.014	U
Imidan	0.022	U
Azinphos (Guthion)	0.032	U
Coumaphos	0.024	U
Dichlorvos (DDVP)	0.016	U
Mevinphos	0.020	U
Dioxathion	0.034	U
Propetamphos	0.040	UJ
Methyl Paraoxon	0.036	U
Phosphamidan	0.048	UJ
Tetrachlorvinphos (Gardona)	0.040	U
Fenamiphos	0.030	UJ
Butifos (DEF)	0.028	U
Abate (Temephos)	0.12	U

Surrogate Recoveries

Triphenyl Phosphate	108	%

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Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Demeton-O	0.014	U
Sulfotepp	0.012	U
Demeton-S	0.014	UJ
Fonofos	0.012	U
Disulfoton (Di-Syston)	0.012	UJ
Methyl Chlorpyrifos	0.016	U
Fenitrothion	0.014	U
Malathion	0.016	U
Chlorpyriphos	0.016	U
Merphos (1 & 2)	0.024	U
Ethion	0.014	U
Carbophenothion	0.020	U
EPN	0.020	U
Azinphos Ethyl	0.032	U
Ethoprop	0.16	UJ
Phorate	0.014	U
Dimethoate	0.016	U
Diazinon	0.016	UJ
Methyl Parathion	0.014	U
Ronnel	0.014	U
Fenthion	0.014	U
Parathion	0.016	U
Fensulfothion	0.020	U
Bolstar (Sulprofos)	0.014	U
Imidan	0.022	U
Azinphos (Guthion)	0.032	U
Coumaphos	0.024	U
Dichlorvos (DDVP)	0.016	U
Mevinphos	0.020	U
Dioxathion	0.034	U
Propetamphos	0.16	UJ
Methyl Paraoxon	0.036	U
Phosphamidan	0.048	UJ
Tetrachlorvinphos (Gardona)	0.040	U
Fenamiphos	0.030	UJ
Butifos (DEF)	0.028	U
Abate (Temephos)	0.12	U

Surrogate Recoveries

Triphenyl Phosphate	110	%

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Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Demeton-O	52	U
Sulfotepp	45	U
Demeton-S	52	UJ
Fonofos	45	U
Disulfoton (Di-Syston)	45	U
Methyl Chlorpyrifos	60	U
Fenitrothion	52	U
Malathion	60	U
Chlorpyriphos	60	U
Merphos (1 & 2)	89	U
Ethion	52	U
Carbophenothion	74	U
EPN	74	U
Azinphos Ethyl	120	U
Ethoprop	60	U
Phorate	52	U
Dimethoate	60	U
Diazinon	60	U
Methyl Parathion	52	U
Ronnel	52	U
Fenthion	52	U
Parathion	60	U
Fensulfothion	74	U
Bolstar (Sulprofos)	52	U
Imidan	82	U
Azinphos (Guthion)	120	U
Coumaphos	89	U
Dichlorvos (DDVP)	60	U
Mevinphos	74	U
Dioxathion	130	U
Propetamphos	150	U
Methyl Paraoxon	130	U
Phosphamidan	180	UJ
Tetrachlorvinphos (Gardona)	150	U
Fenamiphos	110	UJ
Butifos (DEF)	100	U
Abate (Temephos)	450	U

Surrogate Recoveries

Triphenyl Phosphate	79	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Collected:** 06/11/98 **Method:** SW8085
Field ID: S SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Demeton-O	52	U
Sulfotepp	44	U
Demeton-S	52	UJ
Fonofos	44	U
Disulfoton (Di-Syston)	44	U
Methyl Chlorpyrifos	59	U
Fenitrothion	52	U
Malathion	59	U
Chlorpyriphos	59	U
Merphos (1 & 2)	89	U
Ethion	52	U
Carbophenothion	74	U
EPN	74	U
Azinphos Ethyl	120	U
Ethoprop	59	U
Phorate	52	U
Dimethoate	59	U
Diazinon	59	U
Methyl Parathion	52	U
Ronnel	52	U
Fenthion	52	U
Parathion	59	U
Fensulfothion	74	U
Bolstar (Sulprofos)	52	U
Imidan	81	U
Azinphos (Guthion)	120	U
Coumaphos	89	U
Dichlorvos (DDVP)	59	U
Mevinphos	74	U
Dioxathion	130	U
Propetamphos	150	U
Methyl Paraoxon	130	U
Phosphamidan	180	UJ
Tetrachlorvinphos (Gardona)	150	U
Fenamiphos	110	UJ
Butifos (DEF)	100	U
Abate (Temephos)	440	U

Surrogate Recoveries

Triphenyl Phosphate	77	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBW8167B1 **Method:** SW8085
QC Type: Laboratory Method Blank **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Demeton-O	0.014	U
Sulfotepp	0.012	U
Demeton-S	0.014	UJ
Fonofos	0.012	U
Disulfoton (Di-Syston)	0.012	U
Methyl Chlorpyrifos	0.016	U
Fenitrothion	0.014	U
Malathion	0.016	U
Chlorpyriphos	0.016	U
Merphos (1 & 2)	0.024	U
Ethion	0.014	U
Carbophenothion	0.020	U
EPN	0.020	U
Azinphos Ethyl	0.032	U
Ethoprop	0.016	U
Phorate	0.014	U
Dimethoate	0.016	U
Diazinon	0.016	U
Methyl Parathion	0.014	U
Ronnel	0.014	U
Fenthion	0.014	U
Parathion	0.016	U
Fensulfothion	0.020	U
Bolstar (Sulprofos)	0.014	U
Imidan	0.022	U
Azinphos (Guthion)	0.032	U
Coumaphos	0.024	U
Dichlorvos (DDVP)	0.016	U
Mevinphos	0.020	U
Dioxathion	0.034	U
Propetamphos	0.040	U
Methyl Paraoxon	0.036	U
Phosphamidan	0.048	UJ
Tetrachlorvinphos (Gardona)	0.040	U
Fenamiphos	0.030	UJ
Butifos (DEF)	0.028	U
Abate (Temephos)	0.12	U

Surrogate Recoveries

Triphenyl Phosphate	98	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBW8167B2 **Method:** SW8085
QC Type: Laboratory Method Blank **Date Prepared:** 06/18/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/L

Analyte	Result	Qualifier
Demeton-O	0.014	U
Sulfotepp	0.012	U
Demeton-S	0.014	UJ
Fonofos	0.012	U
Disulfoton (Di-Syston)	0.012	U
Methyl Chlorpyrifos	0.016	U
Fenitrothion	0.014	U
Malathion	0.016	U
Chlorpyriphos	0.016	U
Merphos (1 & 2)	0.024	U
Ethion	0.014	U
Carbophenothion	0.020	U
EPN	0.020	U
Azinphos Ethyl	0.032	U
Ethoprop	0.016	U
Phorate	0.014	U
Dimethoate	0.016	U
Diazinon	0.016	U
Methyl Parathion	0.014	U
Ronnel	0.014	U
Fenthion	0.014	U
Parathion	0.016	U
Fensulfothion	0.020	U
Bolstar (Sulprofos)	0.014	U
Imidan	0.022	U
Azinphos (Guthion)	0.032	U
Coumaphos	0.024	U
Dichlorvos (DDVP)	0.016	U
Mevinphos	0.020	U
Dioxathion	0.034	U
Propetamphos	0.040	U
Methyl Paraoxon	0.036	U
Phosphamidan	0.048	UJ
Tetrachlorvinphos (Gardona)	0.040	U
Fenamiphos	0.030	UJ
Butifos (DEF)	0.028	U
Abate (Temephos)	0.12	U

Surrogate Recoveries

Triphenyl Phosphate	59	%

Authorized By: _____ Release Date: 8/19/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBS8169B1 **Method:** SW8085
QC Type: Laboratory Method Blank **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Demeton-O	52	U
Sulfotepp	45	U
Demeton-S	52	UJ
Fonofos	45	U
Disulfoton (Di-Syston)	45	U
Methyl Chlorpyrifos	59	U
Fenitrothion	52	U
Malathion	59	U
Chlorpyriphos	59	U
Merphos (1 & 2)	89	U
Ethion	52	U
Carbophenothion	74	U
EPN	74	U
Azinphos Ethyl	120	U
Ethoprop	59	U
Phorate	52	U
Dimethoate	59	U
Diazinon	59	U
Methyl Parathion	52	U
Ronnel	52	U
Fenthion	52	U
Parathion	59	U
Fensulfothion	74	U
Bolstar (Sulprofos)	52	U
Imidan	82	U
Azinphos (Guthion)	120	U
Coumaphos	89	U
Dichlorvos (DDVP)	59	U
Mevinphos	74	U
Dioxathion	130	U
Propetamphos	150	U
Methyl Paraoxon	130	U
Phosphamidan	180	UJ
Tetrachlorvinphos (Gardona)	150	U
Fenamiphos	110	UJ
Butifos (DEF)	100	U
Abate (Temephos)	450	U

Surrogate Recoveries

Triphenyl Phosphate	69	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Organophosphorous Pesticides (GC/AED)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBS8169B2 **Method:** SW8085
QC Type: Laboratory Method Blank **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/17/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Demeton-O	52	U
Sulfotepp	44	U
Demeton-S	52	UJ
Fonofos	44	U
Disulfoton (Di-Syston)	44	U
Methyl Chlorpyrifos	59	U
Fenitrothion	52	U
Malathion	59	U
Chlorpyriphos	59	U
Merphos (1 & 2)	89	U
Ethion	52	U
Carbophenothion	74	U
EPN	74	U
Azinphos Ethyl	120	U
Ethoprop	59	U
Phorate	52	U
Dimethoate	59	U
Diazinon	59	U
Methyl Parathion	52	U
Ronnel	52	U
Fenthion	52	U
Parathion	59	U
Fensulfothion	74	U
Bolstar (Sulprofos)	52	U
Imidan	81	U
Azinphos (Guthion)	120	U
Coumaphos	89	U
Dichlorvos (DDVP)	59	U
Mevinphos	74	U
Dioxathion	130	U
Propetamphos	150	U
Methyl Paraoxon	130	U
Phosphamidan	180	UJ
Tetrachlorvinphos (Gardona)	150	U
Fenamiphos	110	UJ
Butifos (DEF)	100	U
Abate (Temephos)	440	U

Surrogate Recoveries

Triphenyl Phosphate	51	%

Authorized By: _____ Release Date: 8/19/98 Page: 1

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

July 28, 1998

Subject: Whitmarsh Landfill Project

Sample(s): 98248005-08

Officer(s): Art Johnson

By: Bob Carrell
Organics Analysis Unit

ACID HERBICIDE ANALYSIS

ANALYTICAL METHOD(S): (Draft EPA Method 8085)

The soil and water samples for acid herbicides was extracted following Manchester Laboratory's standard operating procedure for the extraction of herbicides in these matrices. The herbicide samples were hydrolyzed at pH > 12, extracted with diethyl ether (soil) or methylene chloride (water) at pH < 2, solvent exchanged and derivatized along with two method blanks. These extracts were analyzed by capillary Gas Chromatography and Atomic Emission Detection (GC/AED). Confirmation of herbicides is performed by Gas Chromatography and Ion-Trap mass spectrometry (GC/ITD) or comparisons of elemental ratios of hetero-atoms to empirical formulas.

The method utilizes compound independent calibration (CIC) for quantitation of detected compounds. A calibration validation is performed each time CIC is used for target compounds. This is done by comparison of CIC to a single point calibration (SPC) of the target analyte being quantitated.

All analytes have a respective practical quantitation limit (PQL) that is higher than the corresponding method detection limit (MDL). If a target analyte is detected and its identification is unambiguously confirmed at a concentration below its PQL, the reported concentration is qualified as an estimate, ' J' qualifier.

BLANKS:

No target compounds were detected in the laboratory blanks. Hence, the blanks demonstrate the system was free from contamination.

HOLDING TIMES:

All samples were extracted and analyzed within the method holding times.

SURROGATES:

The 2,4,6-tribromophenol surrogate recoveries were acceptable, ranging from 63% to 117%.

MATRIX SPIKING:

None requested.

COMMENTS:

Since picloram has traditionally experienced variable recoveries, this analyte has received the 'UJ' qualifier.

The data is useable as qualified.

DATA QUALIFIER CODES

U	-	The analyte was not detected at or above the reported result.
J	-	The analyte was positively identified. The associated numerical result is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
N	-	For organic analytes there is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
NC	-	Not Calculated
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill

LIMS Project ID: 1831-98

Sample: OBW8168B2H
Blank ID: BLNK
Project Officer: Art Johnson

Date Prepared: 06/17/98
Date Analyzed: 06/23/98

Method: SW8085
Matrix: Water
Units: ug/L

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	0.050	U
3,5-Dichlorobenzoic Acid	0.083	U
4-Nitrophenol	0.15	U
2,4,5-Trichlorophenol	0.050	U
Dicamba I	0.083	U
2,3,4,6-Tetrachlorophenol	0.046	U
MCPP (Mecoprop)	0.17	U
MCPA	0.17	U
Dichlorprop	0.092	U
Bromoxynil	0.083	U
2,4-D	0.083	U
2,3,4,5-Tetrachlorophenol	0.046	U
Trichlopyr	0.070	U
Pentachlorophenol	0.042	U
2,4,5-TP (Silvex)	0.067	U
2,4,5-T	0.067	U
2,4-DB	0.10	U
Dinoseb	0.13	U
Bentazon	0.13	U
Ioxynil	0.083	U
Picloram	0.083	UJ
Dacthal (DCPA)	0.067	U
2,4,5-TB	0.075	U
Acifluorfen (Blazer)	0.33	U
Diclofop-Methyl	0.13	U

Surrogate Recoveries

2,4,6-Tribromophenol	**67**	**%**

Authorized By: Barrell Release Date: 7-30-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Received:** 06/12/98 **Method:** SW8085
Field ID: N SEEP **Date Prepared:** 06/17/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** ug/L

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	0.097	U
3,5-Dichlorobenzoic Acid	0.16	U
4-Nitrophenol	0.28	U
2,4,5-Trichlorophenol	0.097	U
Dicamba I	0.16	U
2,3,4,6-Tetrachlorophenol	0.089	U
MCPP (Mecoprop)	0.32	U
MCPA	0.32	U
Dichlorprop	0.18	U
Bromoxynil	0.16	U
2,4-D	0.16	U
2,3,4,5-Tetrachlorophenol	0.089	U
Trichlopyr	0.14	U
Pentachlorophenol	0.081	U
2,4,5-TP (Silvex)	0.13	U
2,4,5-T	0.13	U
2,4-DB	0.19	U
Dinoseb	0.24	U
Bentazon	0.24	U
Ioxynil	0.16	U
Picloram	0.16	UJ
Dacthal (DCPA)	0.13	U
2,4,5-TB	0.15	U
Acifluorfen (Blazer)	0.65	U
Diclofop-Methyl	0.24	U

Surrogate Recoveries

2,4,6-Tribromophenol	**99**	**%**

Authorized By: Barnell Release Date: 7-30-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Received:** 06/12/98 **Method:** SW8085
Field ID: S SEEP **Date Prepared:** 06/17/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** ug/L

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	0.047	U
3,5-Dichlorobenzoic Acid	0.079	U
4-Nitrophenol	0.14	U
2,4,5-Trichlorophenol	0.047	U
Dicamba I	0.079	U
2,3,4,6-Tetrachlorophenol	0.043	U
MCPP (Mecoprop)	0.16	U
MCPA	0.16	U
Dichlorprop	0.087	U
Bromoxynil	0.079	U
2,4-D	0.079	U
2,3,4,5-Tetrachlorophenol	0.043	U
Trichlopyr	0.066	U
Pentachlorophenol	0.040	U
2,4,5-TP (Silvex)	0.063	U
2,4,5-T	0.063	U
2,4-DB	0.094	U
Dinoseb	0.12	U
Bentazon	0.12	U
Ioxynil	0.079	U
Picloram	0.079	U
Dacthal (DCPA)	0.063	U
2,4,5-TB	0.071	U
Acifluorfen (Blazer)	0.31	U
Diclofop-Methyl	0.12	U

Surrogate Recoveries

2,4,6-Tribromophenol	**91**	**%**

Authorized By: Barnell Release Date: 7-30-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: OBS8168B2H **Method:** SW8085
Blank ID: BLNK **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:**

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	45	U
3,5-Dichlorobenzoic Acid	74	U
4-Nitrophenol	130	U
2,4,5-Trichlorophenol	45	U
Dicamba I	74	U
2,3,4,6-Tetrachlorophenol	41	U
MCPP (Mecoprop)	150	U
MCPA	150	U
Dichlorprop	81	U
Bromoxynil	74	U
2,4-D	74	U
2,3,4,5-Tetrachlorophenol	41	U
Trichlopyr	62	U
Pentachlorophenol	37	U
2,4,5-TP (Silvex)	59	U
2,4,5-T	59	U
2,4-DB	89	U
Dinoseb	110	U
Bentazon	110	U
Ioxynil	74	U
Picloram	74	UJ
Dacthal (DCPA)	59	U
2,4,5-TB	67	U
Acifluorfen (Blazer)	300	U
Diclofop-Methyl	110	U

Surrogate Recoveries

2,4,6-Tribromophenol	**63**	**%**

Authorized By: Barrell Release Date: 7-30-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Received:** 06/12/98 **Method:** SW8085
Field ID: N SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	45	U
3,5-Dichlorobenzoic Acid	74	U
4-Nitrophenol	130	U
2,4,5-Trichlorophenol	45	U
Dicamba I	74	U
2,3,4,6-Tetrachlorophenol	41	U
MCPP (Mecoprop)	150	U
MCPA	150	U
Dichlorprop	81	U
Bromoxynil	74	U
2,4-D	74	U
2,3,4,5-Tetrachlorophenol	41	U
Trichlopyr	62	U
Pentachlorophenol	37	U
2,4,5-TP (Silvex)	59	U
2,4,5-T	59	U
2,4-DB	89	U
Dinoseb	110	U
Bentazon	110	U
Ioxynil	74	U
Picloram	74	UJ
Dacthal (DCPA)	59	U
2,4,5-TB	67	U
Acifluorfen (Blazer)	300	U
Diclofop-Methyl	110	U

Surrogate Recoveries

2,4,6-Tribromophenol	**117**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Chlorophenoxy Herbicides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Received:** 06/12/98 **Method:** SW8085
Field ID: S SED **Date Prepared:** 06/17/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 06/23/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
2,4,6-Trichlorophenol	45	U
3,5-Dichlorobenzoic Acid	74	U
4-Nitrophenol	130	U
2,4,5-Trichlorophenol	45	U
Dicamba I	74	U
2,3,4,6-Tetrachlorophenol	41	U
MCPP (Mecoprop)	150	U
MCPA	150	U
Dichlorprop	81	U
Bromoxynil	74	U
2,4-D	74	U
2,3,4,5-Tetrachlorophenol	41	U
Trichlopyr	62	U
Pentachlorophenol	37	U
2,4,5-TP (Silvex)	59	U
2,4,5-T	59	U
2,4-DB	89	U
Dinoseb	110	U
Bentazon	110	U
Ioxynil	74	U
Picloram	74	UJ
Dacthal (DCPA)	59	U
2,4,5-TB	67	U
Acifluorfen (Blazer)	300	U
Diclofop-Methyl	110	U

Surrogate Recoveries

2,4,6-Tribromophenol	**90**	%

Authorized By: Barnell Release Date: 7-30-98 Page: 1

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

Carbamates Data Review
November 30, 1998

Project: **Whitmarsh Landfill**

Samples: 98248005 - 06

By: Stuart Magoon

Case Summary

Data from these analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness. These samples were prepared and analyzed according to EPA method 531.1.

Results have been reported in ug/L; parts per billion.

Holding times:

Sample no.	Collect date	Analysis Date	#days from collection to Analysis
98248005	06/11/98	09/30/98	111
98248006	06/11/98	09/30/98	111

These samples were analyzed after the method specified 28 day holding time had expired. Steve Reimer has been conducting a holding time study for carbamates. Although his data is limited, it does show that during the first six months no significant degradation occurs to a sample that has been properly preserved and stored. (See the August 1996 and February 1997 holding time study data accompanying this report). The holding time study data coupled with the good agreement between the Carbaryl results from the NPEST (method 8085) analysis of these samples suggests that analysis 85 days beyond the method holding time did not have a measurable detrimental effect on the results.

Method Blank:

No analytes were detected in the method blank; demonstrating that the system was free from widespread contamination.

Calibration:

With the exception of Aldicarb and 1-naphthol, all the target compounds meet the +/- 20% RSD linearity criteria. No native Aldicarb or 1-Naphthol was not detected in the samples.

Matrix Spikes:

Recovery and precision data for the spikes was reasonable and acceptable, with a few exceptions. Aldicarb and 1-Naphthol recoveries were about twice as high as expected. A control check standard analyzed during the same sequence indicated that degradation of Aldicarb may have occurred in the standard. The control check did not contain 1-Naphthol, but the same degradation is suspected. Aldicarb sulfone recoveries were also slightly high at 138% and 146%.

Summary:

Aldicarb and 1-Naphthol results have been qualified with a "UJ" based on the high matrix spike recoveries attributed to degradation in the standard used for quantitation.
This data is acceptable for use as qualified.

Manchester Environmental Laboratory Data Qualifier Definitions:

J The analyte was positively identified. The associated numerical result is an estimate.

U the analyte was not detected at or above the reported result.

UJ The analyte was not detected at or above the reported estimated result.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Carbamate Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Collected:** 06/11/98 **Method:** EPA531.1
Field ID: N SEEP **Date Prepared:** 09/30/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 09/30/98 **Units:** ug/L

Analyte	Result	Qualifier
Aldicarb Sulfone	0.5	U
Aldicarb Sulfoxide	0.5	U
Oxamyl (Vydate)	0.5	U
Methomyl	0.5	U
3-Hydroxycarbofuran	0.5	U
Aldicarb	1	UJ
Baygon (Propoxur)	0.5	U
Carbofuran	0.5	U
Carbaryl	**5.8**	**J**
1-Naphthol	5	UJ
Methiocarb	0.5	U

Authorized By: _____ Release Date: 11/30/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Carbamate Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 (Matrix Spike - LMX1) **Date Collected:** 06/11/98 **Method:** EPA531.1
Field ID: N SEEP **Date Prepared:** 09/30/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 09/30/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aldicarb Sulfone	138	
Aldicarb Sulfoxide	110	
Oxamyl (Vydate)	96.9	
Methomyl	113	
3-Hydroxycarbofuran	108	
Aldicarb	231	
Baygon (Propoxur)	103	
Carbofuran	101	
Carbaryl	109	
1-Naphthol	198	
Methiocarb	82	

Authorized By: _____ Release Date: 11/3.198

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Carbamate Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 (Matrix Spike - LMX2) **Date Collected:** 06/11/98 **Method:** EPA531.1
Field ID: N SEEP **Date Prepared:** 09/30/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 09/30/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aldicarb Sulfone	146	
Aldicarb Sulfoxide	116	
Oxamyl (Vydate)	100	
Methomyl	111	
3-Hydroxycarbofuran	127	
Aldicarb	242	
Baygon (Propoxur)	105	
Carbofuran	105	
Carbaryl	108	
1-Naphthol	145	
Methiocarb	83	

Authorized By: _____ Release Date: 11/30/98 Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Carbamate Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** EPA531.1
Field ID: S SEEP **Date Prepared:** 09/30/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 09/30/98 **Units:** ug/L

Analyte	Result	Qualifier
Aldicarb Sulfone	0.5	U
Aldicarb Sulfoxide	0.5	U
Oxamyl (Vydate)	0.5	U
Methomyl	0.5	U
3-Hydroxycarbofuran	0.5	U
Aldicarb	1	UJ
Baygon (Propoxur)	0.5	U
Carbofuran	0.5	U
Carbaryl	**0.12**	**J**
1-Naphthol	5	UJ
Methiocarb	0.5	U

Authorized By: _____ Release Date: 11/30/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Carbamate Pesticides

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

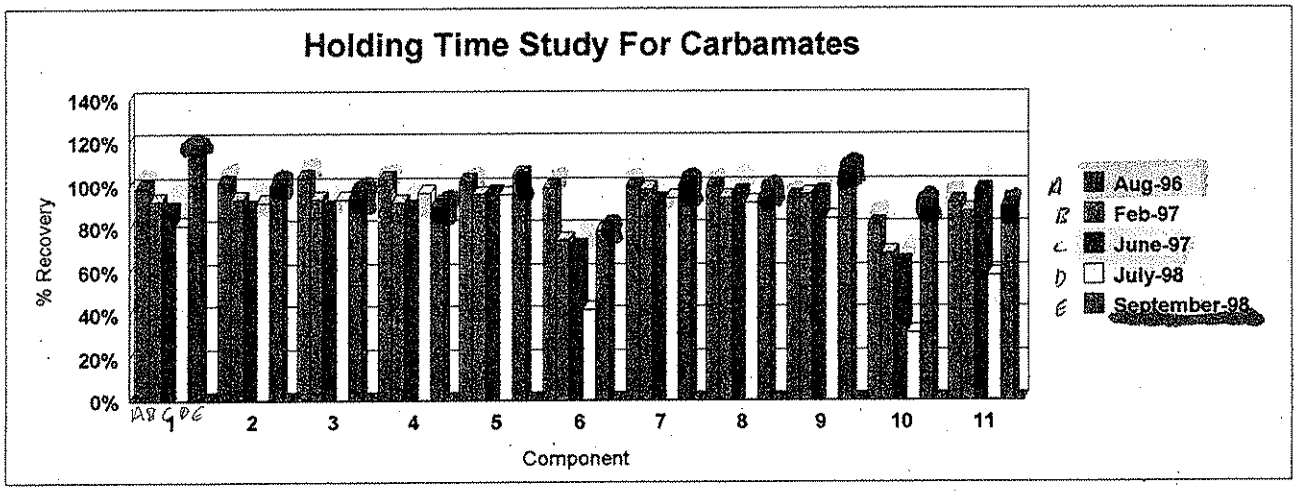
Lab ID: OBC8272A1 **Method:** EPA531.1
QC Type: Laboratory Method Blank **Date Prepared:** 09/30/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 09/30/98 **Units:** ug/L

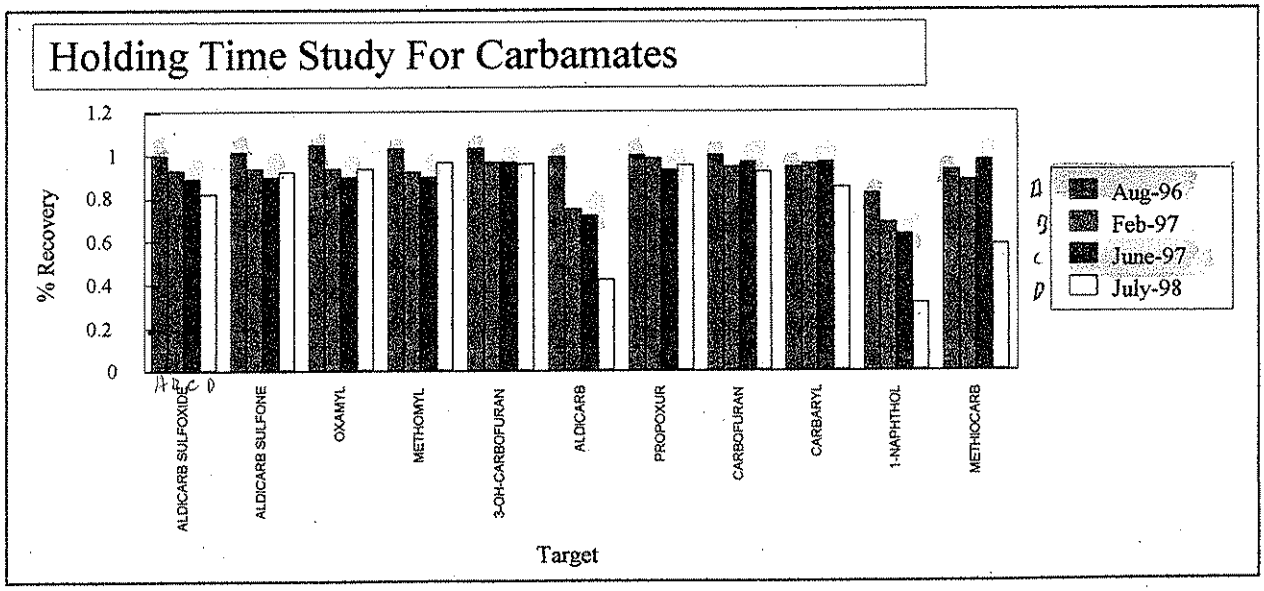
Analyte	Result	Qualifier
Aldicarb Sulfone	0.5	U
Aldicarb Sulfoxide	0.5	U
Oxamyl (Vydate)	0.5	U
Methomyl	0.5	U
3-Hydroxycarbofuran	0.5	U
Aldicarb	1	UJ
Baygon (Propoxur)	0.5	U
Carbofuran	0.5	U
Carbaryl	0.5	U
1-Naphthol	5	UJ
Methiocarb	0.5	U

Authorized By: _____ Release Date: 11/30/98 Page: 1

Holding Time Study

To examine the effects of time on ground water I spiked a sample (96248078) from the Idaho project in hexuplicate with the complete target list at 10 ng/mL or 4 ng on column. The six replicates were spiked on 31 July 96 and analyzed for the first time in August of that year. They were reanalyzed in February and June of 97 as well as July and September of 98. Throughout the period they were stored in a refrigerator, preserved as they came from field sampling.



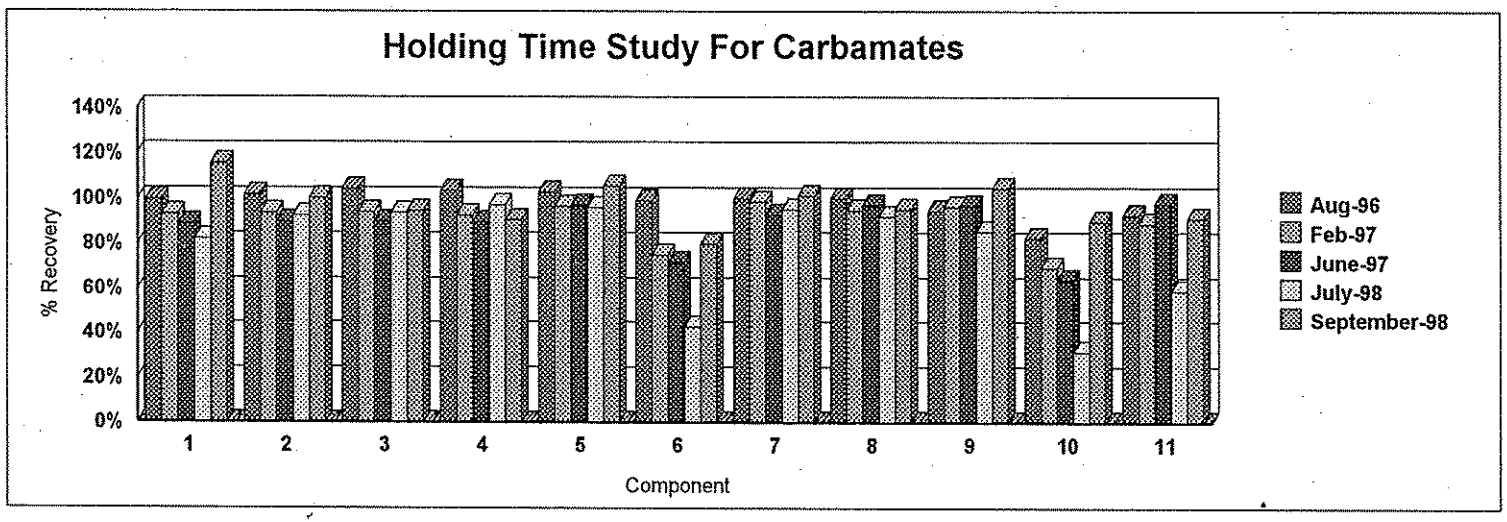


As shown in the accompanying figure, the compounds that show more than a 20% loss for the first two years are aldicarb, aldicarb sulfoxide, 1-naphthol and methiocarb. The final analysis in September 98 used standards that were themselves showing signs of decomposition in the first three of the compounds mentioned. The remaining seven compounds showed no sign of loss. Also included is a figure showing all but the final analysis results. The % rsd is given in the third figure and shows an increase in scatter with time.

% RPD	Aug 96	Feb 97	~~July~~ June & July 97	July 98	Sept 98
ALDICARB SULFOXIDE	7%	4%	16%	16%	23%
ALDICARB SULFONE	8%	5%	17%	17%	13%
OXAMYL	9%	4%	15%	15%	6%
METHOMYL	8%	5%	17%	17%	1%
3-OH-CARBOFURAN	8%	4%	16%	16%	12%
ALDICARB	8%	4%	13%	13%	7%
PROPOXUR	6%	7%	26%	26%	3%
CARBOFURAN	6%	6%	23%	23%	2%
CARBARYL	9%	6%	21%	21%	2%
1-NAPHTHOL	12%	5%	19%	19%	10%
METHIOCARB	10%	3%	11%	11%	9%

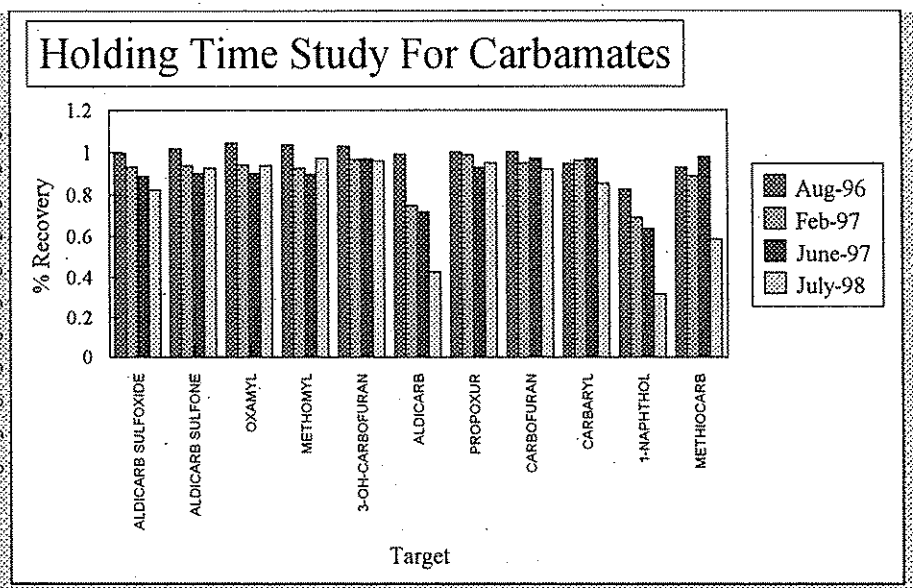
Holding Time Study

		Avg Aug-96	Feb-97	June-97	July-98	September-98
ALDICARB SULFOXIDE	1646873	100%	93%	89%	82%	116%
ALDICARB SULFONE	1646884	102%	94%	90%	93%	101%
OXAMYL	23135220	105%	94%	90%	94%	95%
METHOMYL	16752775	104%	93%	90%	97%	91%
3-OH-CARBOFURAN	16655826	103%	97%	97%	96%	106%
ALDICARB	116063	99%	75%	72%	43%	80%
PROPOXUR	114261	100%	99%	93%	95%	101%
CARBOFURAN	1563662	100%	95%	97%	92%	95%
CARBARYL	63252	95%	96%	97%	85%	105%
1-NAPHTHOL	90153	83%	69%	64%	32%	90%
METHIOCARB	2032657	93%	89%	98%	59%	91%



Holding Time Study

	Aug-96	Feb-97	June-97	Avg
ALDICARB SULFOXIDE	100%	93%	89%	
ALDICARB SULFONE	102%	94%	90%	
OXAMYL	105%	94%	90%	
METHOMYL	104%	93%	90%	
3-OH-CARBOFURAN	103%	97%	97%	
ALDICARB	99%	75%	72%	
PROPOXUR	100%	93%	93%	
CARBOFURAN	100%	95%	97%	
CARBARYL	95%	96%	97%	
1-NAPHTHOL	83%	69%	64%	
METHIOCARB	93%	89%	98%	



Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

August 25, 1998

Subject: Whitmarsh Landfill
Samples: 98248005 - 008
Case No. 183198
Officer: Art Johnson
By: Greg Perez
Organics Analysis Unit

POLYCHLORINATED BIPHENYLS

SUMMARY:

Low levels of PCB were found in the two water samples. These were detected below the practical quantitation limit and have been qualified as estimates.

ANALYTICAL METHODS:

The solid samples were Soxhlet extracted using acetone as the solvent. The water samples were extracted using methylene chloride. The samples were treated with mercury to remove sulfur and then treated with sulfuric acid to remove interferences. Analysis was done by Method 8080 using dual column capillary GC analysis with Electron Capture Detectors (ECD).

BLANKS:

No target compounds were detected in the laboratory blanks.

SURROGATES:

Surrogate recoveries for the water samples were low. This may indicate a low bias for the analyte concentrations. Surrogate recoveries for the sediment samples were acceptable.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

No matrix spikes were analyzed with these samples.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
N	-	For organic analytes there is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248005 **Date Collected:** 06/11/98 **Method:** SW8080
Field ID: N SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/L

Analyte	Result	Qualifier
PCB - 1016	0.033	UJ
PCB - 1221	0.033	UJ
PCB - 1232	0.033	UJ
PCB - 1242	**0.028**	**J**
PCB - 1248	0.033	UJ
PCB - 1254	0.033	UJ
PCB - 1260	0.033	UJ

Surrogate Recoveries

Decachlorobiphenyl	**40**	%
Tetrachloro-m-xylene	**36**	%

Authorized By: _____ Release Date: 8/25/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248006 **Date Collected:** 06/11/98 **Method:** SW8080
Field ID: S SEEP **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/L

Analyte	Result	Qualifier
PCB - 1016	0.034	UJ
PCB - 1221	0.034	UJ
PCB - 1232	0.034	UJ
PCB - 1242	**0.011**	**J**
PCB - 1248	0.034	UJ
PCB - 1254	0.034	UJ
PCB - 1260	0.034	UJ

Surrogate Recoveries

Decachlorobiphenyl	**28**	**%**
Tetrachloro-m-xylene	**35**	**%**

Authorized By: _____ Release Date: 8/25/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248007 **Date Collected:** 06/11/98 **Method:** SW8080
Field ID: N SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	59	U
PCB - 1221	59	U
PCB - 1232	59	U
PCB - 1242	59	U
PCB - 1248	59	U
PCB - 1254	59	U
PCB - 1260	59	U

Surrogate Recoveries

Decachlorobiphenyl	**69**	**%**
Tetrachloro-m-xylene	**50**	**%**

Authorized By: _____ Release Date: 9/1/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Sample: 98248008 **Date Collected:** 06/11/98 **Method:** SW8080
Field ID: S SED **Date Prepared:** 06/18/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	12	U
PCB - 1221	12	U
PCB - 1232	12	U
PCB - 1242	12	U
PCB - 1248	12	U
PCB - 1254	12	U
PCB - 1260	12	U

Surrogate Recoveries

Decachlorobiphenyl	**66**	**%**
Tetrachloro-m-xylene	**70**	**%**

Authorized By: _____ Release Date: 8/25/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBS8182A1 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 07/01/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/30/98 **Units:**

Analyte	Result	Qualifier
PCB - 1016	39	U
PCB - 1221	39	U
PCB - 1232	39	U
PCB - 1242	39	U
PCB - 1248	39	U
PCB - 1254	39	U
PCB - 1260	39	U

Surrogate Recoveries

Decachlorobiphenyl	**97**	**%**
Tetrachloro-m-xylene	**100**	**%**

Authorized By: _____ Release Date: 8/20/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBS8182A2 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 07/01/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 07/30/98 **Units:**

Analyte	Result	Qualifier
PCB - 1016	39	U
PCB - 1221	39	U
PCB - 1232	39	U
PCB - 1242	39	U
PCB - 1248	39	U
PCB - 1254	39	U
PCB - 1260	39	U

Surrogate Recoveries

Decachlorobiphenyl	**94**	**%**
Tetrachloro-m-xylene	**89**	**%**

Authorized By: _____ Release Date: 8/25/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBW8167C1 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/L

Analyte	Result	Qualifier
PCB - 1016	0.032	U
PCB - 1221	0.032	U
PCB - 1232	0.032	U
PCB - 1242	0.016	U
PCB - 1248	0.032	U
PCB - 1254	0.032	U
PCB - 1260	0.016	U

Surrogate Recoveries

Tetrachloro-m-xylene	**53**	**%**
Decachlorobiphenyl	**68**	**%**

Authorized By: _____ Release Date: 9/1/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 1831-98

Lab ID: OBW8167C2 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 06/16/98 **Matrix:** Water
Project Officer: Art Johnson **Date Analyzed:** 07/24/98 **Units:** ug/L

Analyte	Result	Qualifier
PCB - 1016	0.032	U
PCB - 1221	0.032	U
PCB - 1232	0.032	U
PCB - 1242	0.016	U
PCB - 1248	0.032	U
PCB - 1254	0.032	U
PCB - 1260	0.016	U

Surrogate Recoveries

Tetrachloro-m-xylene	**50**	**%**
Decachlorobiphenyl	**76**	**%**

Authorized By: _____ Release Date: 9/1/98 Page: 1

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

Data Review
July 27, 1998

Project: Whitmarsh Landfill

Samples: 98248007 & 98248008

Laboratory: Triangle Laboratories Inc.

By: Stuart Magoon

Data Review for Polychlorodibenzo-p-dioxin and furan
(2,3,7,8 substituted tetra - octa PCDD/PCDF)

Data from these analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness, following the National Functional Guidelines for Organic Data Review adapted for high resolution dioxin analysis.

This sample was prepared and analyzed according to EPA method 1613b.

These samples have been reported in nanograms per kilogram (ng/Kg); parts per trillion dry weight.

Triangle Laboratories Inc.has developed their own data "flags". Definitions of the "flags" and qualifiers have been included in the report.

Flags are added by the laboratory performing the analysis, usually the analyst. Qualifiers are added by the data reviewer as part of addressing the usability of the data. Generally the flags signal the reviewer to access the results and determine what to do about the fact that flags were added. For your reporting purposes the "flags" should not be considered part of the final result. The qualifiers, however, are to be considered part of the final result.

There is a number reported for each analyte that appears in one or two columns. If the number appears in the column labeled "CONC" then this analyte has been detected at the concentration reported. The number in the column labeled "DL", is the estimated detection limit as defined in EPA method 8290, at or above which the analyte was not

detected. There is an "ND", short for not detected, that appears in the "CONC" column whenever an analyte is not detected. In order to be consistent with Manchester Environmental Laboratory's reporting convention, a result reported as ND with an associated number in the Detection Limit column, e.g. 4.6, should be considered synonymous with 4.6 U, where "U" is a qualifier.

PCDD/PCDF Analysis

Holding times:

EPA method 1613b specifies a holding time of one year from the date of collection to the date of extraction; and forty (40) days from extraction to analysis.

Sample no.	Collect date	Extraction date	#days from collection to Extraction	Analysis date	#days from Extraction to Analysis
98248007	06/11/98	06/26/98	15	06/29/98	3
98248008	06/11/98	06/26/98	15	06/29/98	3

These samples were extracted and analyzed within holding times.

Method Blank:

OCDD was detected in the method blank at a level below the lowest calibration standard. According to the method re-analysis is not required when a target congener is detected below the lowest calibration standard. OCDD was also detected in both samples; but at a level far above that of the method blank. The OCDD detected in the method blank is considered insignificant relative to the concentrations detected in the samples, therefore any OCDD contribution possibly attributed from lab contamination should be considered insignificant.

Calibration:

The calibration standards were within 20% relative standard deviations (RSD) for all target analytes and 30% for all the reference compounds. All the ion abundance ratios were within +/- 15% of the theoretical value.

Internal Standard Recoveries:

Internal standard recoveries for the all of the internal standards were within the QC limits established for each congener.

Isotopic abundance ratios:

Each dioxin and furan isomer reported as detected met the isotopic abundance ratio and retention time criteria for positive identification.

Summary:

This data is acceptable for use as amended. A number of congeners were qualified with a "J" because the concentration detected was below the lowest calibration standard; results derived from responses outside the calibration range are considered estimates. 2,3,7,8-TCDD in sample 248007 was qualified as not detected at or above the reported estimated result (UJ). The UJ qualifier was applied because there was a peak in the retention time window for this analyte matching the expected masses, but the ion ratios were not within specification needed for positive identification. While there is some evidence 2,3,7,8-TCDD may be present in this sample, positive identification could not be established in accordance to the method. Using the procedure from Section 7.9.5.2.1 of method 8290 the estimated maximum possible concentration for 2,3,7,8-TCDD in this sample is 0.23 ng/Kg. When calculating toxic equivalents I recommend using 0.23 ng/Kg for the 2,3,7,8-TCDD non-detected value instead of 0.3 ng/Kg.
Use the 2,3,7,8-TCDF results from the DB-225 GC column for both samples rather than the results from the DB-5 GC column.

TRIANGLE LABS

CASE NARRATIVE

Analysis of Samples for the Presence of

Polychlorinated Dibenzo-*p*-Dioxins and Dibenzofurans by

High-Resolution Chromatography / High-Resolution Mass Spectrometry

Method 1613B (9/97)

Date:	June 29, 1998
Revised:	August 6, 1998
Client ID:	Washington State Department of Ecology
P.O. Number:	
TLI Project Number:	46000r1

Triangle Laboratories, Inc.
801 Capitola Drive
Durham, NC 27713-4411
919-544-5729
P.O. Box 13485
Research Triangle Park, NC 27709-3485
Fax # 919-544-5491

Overview

The sample(s) and associated QC samples were extracted and analyzed according to procedures described in EPA Method 1613B (September 1997). Any particular difficulties encountered during the sample handling by Triangle Laboratories will be discussed in the QC Remarks section below. This report contains results from only the 1613 dioxin/furan analyses of the solid sample(s).

Quality Control Samples

A laboratory method blank and an ongoing precision and recovery (OPR) sample are extracted and analyzed with each batch of samples.

Quality Control Remarks

This analytical data has been released after being subjected to a series of inspections. General deviations from acceptable QC requirements are identified below. Specific QC issues associated with this particular project are:

Sample receipt: Two solid sample(s) were received from Washington State Department of Ecology in good condition on June 16, 1998 at 6.0 °C and stored in a refrigerator at 4 °C.

Sample Preparation Laboratory: None

Mass Spectrometry: None

Data Review: The TCDF internal standards in all the samples (including the QC samples) are affected by a severe quantitative interference. The total TCDF concentrations may be considered overestimated.

General Comments: No 2,3,7,8-substituted target analytes were detected in the method blank above the target detection limit (TDL).

The analytical data presented in this report are consistent with the guidelines of Method 1613B. Any exceptions have been discussed in the QC Remarks section of this case narrative with emphasis on their effect on the data. Should Washington State Department of Ecology have any questions or comments regarding this data package, please feel free to contact Project Scientist, Rose West, at 919/544-5729 ext. 270.

Addendum: The wording of the data review comment was changed at client's request and the method was changed in the last paragraph to reflect the actual method used.

For Triangle Laboratories, Inc.,

Released by,

William D. Hill
Report Preparation Chemist

The total number of pages in the data package is: 361 .

Revised Page 3

Method 1613 Sample Calculations:

Analyte Concentration

The concentration or amount of any analyte is calculated using the following expression.

$$C_{(\sigma)} = \frac{A_\sigma * Q_\beta}{A_\beta * RRF_{(\sigma)} * W}$$

Where:

$C_{(\sigma)}$	=	concentration or amount of a given analyte
A_σ	=	integrated current for the characteristic ions of the analyte
A_β	=	integrated current of the characteristic ions of the corresponding internal standard
Q_β	=	amount of internal standard added to the sample before extraction
$RRF_{(\sigma)}$	=	mean analyte relative response factor from the initial calibration
W	=	sample weight or volume

Detection Limits

The detection limit reported for a target analyte that is not detected or presents an analyte response that is less than 2.5 times the background level is calculated by using the following expression. The area of the analyte is replaced by the noise level measured in a region of the chromatogram clear of genuine GC signals multiplied by an empirically determined factor. The detection limits represent the maximum possible concentration of a target analyte that could be present without being detected.

$$DL_{(\sigma)} = \frac{2 * 2.5 * (F * H) * Q_\beta}{A_\beta * RRF_{(\sigma)} * W}$$

Where:

$DL_{(\sigma)}$	=	estimated detection limit for a target analyte,
2.5	=	minimum response required for a GC signal,
F	=	an empirical number that approximates the area to height ratio for a GC signal. (F = 3.7 for all dioxin/furan analyses)
H	=	height of the noise
A_β	=	integrated current of the characteristic ions of the corresponding internal standard
Q_β	=	amount of internal standard added to the sample before extraction
$RRF_{(\sigma)}$	=	mean analyte relative response factor from the initial calibration
W	=	sample weight or volume

Data Flags

In order to assist with data interpretation, data qualifier flags are used on the final reports. Please note that all data qualifier flags are subjective and are applied as consistently as possible. Each flag has been reviewed by two independent Chemists and the impact of the data qualifier flag on the quality of the data discussed above. The most commonly used flags are:

A **'B'** flag is used to indicate that an analyte has been detected in the laboratory method blank as well as in an associated field sample. The 'B' flag is used only when the concentration of analyte found in the sample is less than 20 times that found in the associated blank. This flag denotes possible contribution of background laboratory contamination to the concentration or amount of that analyte detected in the field sample.

An **'E'** flag is used to indicate a concentration based on an analyte to internal standard ratio which exceeds the range of the calibration curve. Values which are outside the calibration curve are estimates only.

An **'I'** flag is used to indicate labeled standards have been interfered with on the GC column by coeluting, interferent peaks. The interference may have caused the standard's area to be overestimated. All quantitations relative to this standard, therefore, may be underestimated.

A **'J'** flag is used to indicate a concentration based on an analyte to internal standard ratio which is below the calibration curve. Values which are outside the calibration curve are estimates only.

A **'PR'** flag is used to indicate that a GC peak is poorly resolved. This resolution problem may be seen as two closely eluting peaks without a reasonable valley between the peak tops, overly broad peaks, or peaks whose shapes vary greatly from a normal distribution. The concentrations or amounts reported for such peaks are most likely overestimated.

A **'Q'** flag is used to indicate the presence of QC ion instabilities caused by quantitative interferences.

An **'RO'** flag is used to indicate that a labeled standard has an ion abundance ratio that is outside of the acceptable QC limits, most likely due to a coeluting interference. This may have caused the percent recovery of the standard to be overestimated. All quantitations versus this standard, therefore, may be underestimated.

An **'S'** flag indicates that the response of a specific PCDD/PCDF isomer has exceeded the normal dynamic range of the mass spectrometer detection system. The corresponding signal is saturated and the reported analyte concentration is a 'minimum estimate'. When

the 'S' qualifier is used in the reporting of 'totals', there is saturation of one (not necessarily from a specific isomer) or more saturated signals for a given class of compounds. Results for saturated analytes are reported as greater than the upper calibration limit.

A **'U'** flag is used to indicate that a specific isomer cannot be resolved from a large, co-eluting interferent GC peak. The specific isomer is reported as not detected as a valid concentration cannot be determined. The calculated detection limit, therefore, should be considered an underestimated value.

A **'V'** flag is used to indicate that, although the percent recovery of a labeled standard may be below a specific QC limit, the signal-to-noise ratio of the peak is greater than ten-to-one. The standard is considered reliably quantifiable. All quantitations derived from the standard are considered valid as well.

An **'X'** flag is used to indicate that a polychlorodibenzofuran (PCDF) peak has eluted at the same time as the associated diphenyl ether (DPE) and that the DPE peak intensity is at least ten percent of the total PCDF peak intensity. Total PCDF values are flagged 'X' if the total DPE contribution to the total PCDF value is greater than ten percent. All PCDF peaks that are significantly influenced by the presence of DPE peaks are either reported as "estimated maximum possible concentration (EMPC) values without regard to the isotopic abundance ratio, or are included in the detection limit value depending on the analytical method.

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TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **TLI Blank** Analysis File: **U981302**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	/ /	Spike File:	**SP161B2S**
TLI ID:	**TLI Blank**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**10.008 g**	Dilution Factor:	**n/a**	% Moisture:	**n/a**
Dry Weight:	**n/a**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**n/a**

Analytes	Conc. (ng/kg)	DL	Ratio	RT	RRT	Flags
2,3,7,8-TCDD	ND	0.1				
1,2,3,7,8-PeCDD	ND	0.2				
1,2,3,4,7,8-HxCDD	ND	0.2				
1,2,3,6,7,8-HxCDD	ND	0.3				
1,2,3,7,8,9-HxCDD	ND	0.3				
1,2,3,4,6,7,8-HpCDD	ND	0.2				
1,2,3,4,6,7,8,9-OCDD	0.65 J &		0.97	39:58	1.000	J
2,3,7,8-TCDF	ND	0.2				
1,2,3,7,8-PeCDF	ND	0.2				
2,3,4,7,8-PeCDF	ND	0.2				
1,2,3,4,7,8-HxCDF	ND	0.2 U5 &				J
1,2,3,6,7,8-HxCDF	ND	0.1				
2,3,4,6,7,8-HxCDF	ND	0.2				
1,2,3,7,8,9-HxCDF	ND	0.2				
1,2,3,4,6,7,8-HpCDF	ND	0.2				
1,2,3,4,7,8,9-HpCDF	ND	0.2				
1,2,3,4,6,7,8,9-OCDF	ND	0.3 U5 &				J

Totals	Conc. (ng/kg)	Number DL	Flags
Total TCDD	ND	0.1	
Total PeCDD	ND	0.2	
Total HxCDD	ND	0.3	
Total HpCDD	ND	0.2	
Total TCDF	ND	0.2	
Total PeCDF	ND	0.2	
Total HxCDF	ND	0.2	
Total HpCDF	ND	0.2	

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TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **TLI Blank** Analysis File: **U981302**

Internal Standards	Conc. (ng/kg)	% Recovery	QC Limits	Ratio	RT	RRT	Flags
$^{13}C_{12}$-2,3,7,8-TCDD	104	52.0	31%-137%	0.80	25:52	1.006	
$^{13}C_{12}$-1,2,3,7,8-PeCDD	137	68.5	25%-181%	1.45	30:09	1.173	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	127	63.5	32%-141%	1.22	33:19	0.989	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	106	52.8	28%-130%	1.21	33:24	0.991	
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	168	84.1	23%-140%	1.02	36:33	1.085	
$^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD	370	92.5	17%-157%	0.87	39:57	1.185	
$^{13}C_{12}$-2,3,7,8-TCDF	63.9	32.0	29%-140%	0.76	25:03	0.975	Q
$^{13}C_{12}$-1,2,3,7,8-PeCDF	111	55.3	24%-185%	1.49	29:06	1.132	
$^{13}C_{12}$-2,3,4,7,8-PeCDF	105	52.6	21%-178%	1.50	29:49	1.160	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	111	55.8	26%-152%	0.52	32:38	0.968	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	113	56.7	26%-123%	0.52	32:43	0.971	
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	109	54.6	28%-136%	0.51	33:13	0.986	Q
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	91.5	45.8	29%-147%	0.52	33:57	1.007	Q
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	129	64.5	28%-143%	0.44	35:33	1.055	
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	153	76.6	26%-138%	0.43	37:01	1.098	

Cleanup Standard	Conc. (ng/kg)	% Recovery	QC Limits	RT	RRT	Flags
$^{37}Cl_4$-2,3,7,8-TCDD	10.4	51.9	42%-164%	25:53	1.007	

Recovery Standards	Ratio	RT	Flags
$^{13}C_{12}$-1,2,3,4-TCDD	0.81	25:42	
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.22	33:42	

Data Reviewer: _____ 06/28/98

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TLI Project: **46000r1**
Client Sample: **TLI Blank**

Toxicity Equivalents Report
Analysis File: **U981302**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SP161B2S**
TLI ID:	**TLI Blank**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**10.008 g**	Dilution Factor:	**1**	% Moisture:	**n/a**
Dry Weight:	**n/a**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**n/a**

Analytes	Conc. (ng/kg)		TEF		Equivalent
2,3,7,8-TCDD	{0.1}	x	1.	=	0.1
1,2,3,7,8-PeCDD	{0.2}	x	0.5	=	0.1
1,2,3,4,7,8-HxCDD	{0.2}	x	0.1	=	0.02
1,2,3,6,7,8-HxCDD	{0.3}	x	0.1	=	0.03
1,2,3,7,8,9-HxCDD	{0.3}	x	0.1	=	0.03
1,2,3,4,6,7,8-HpCDD	{0.2}	x	0.01	=	0.002
1,2,3,4,6,7,8,9-OCDD	0.65	x	0.001	=	0.00065
TOTAL PCDD					0.3
2,3,7,8-TCDF	{0.2}	x	0.1	=	0.02
1,2,3,7,8-PeCDF	{0.2}	x	0.05	=	0.01
2,3,4,7,8-PeCDF	{0.2}	x	0.5	=	0.1
1,2,3,4,7,8-HxCDF	{0.2}	x	0.1	=	0.02
1,2,3,6,7,8-HxCDF	{0.1}	x	0.1	=	0.01
2,3,4,6,7,8-HxCDF	{0.2}	x	0.1	=	0.02
1,2,3,7,8,9-HxCDF	{0.2}	x	0.1	=	0.02
1,2,3,4,6,7,8-HpCDF	{0.2}	x	0.01	=	0.002
1,2,3,4,7,8,9-HpCDF	{0.2}	x	0.01	=	0.002
1,2,3,4,6,7,8,9-OCDF	{0.3}	x	0.001	=	0.0003
TOTAL PCDF					0.2

Total EPA TEFs, 1989a: 0.5 ng/kg

{...} indicates that the value is that of a Detection Limit.

GRY_TEF v1.03, MILES 4.16.08

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TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **248007** Analysis File: **U981303**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SP161B2S**
TLI ID:	**211-1-1**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**32.155 g**	Dilution Factor:	**n/a**	% Moisture:	**68.9**
Dry Weight:	**10.000 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**31.1**

Analytes	Conc. (ng/kg)	DL	Ratio	RT	RRT	Flags
2,3,7,8-TCDD	ND	0.3				J__
1,2,3,7,8-PeCDD	1.2 J		1.37	30:10	1.001	J__
1,2,3,4,7,8-HxCDD	2.0 J		1.18	33:20	1.001	J__
1,2,3,6,7,8-HxCDD	6.0		1.20	33:24	1.000	___
1,2,3,7,8,9-HxCDD	5.8		1.16	33:42	1.009	PRJ
1,2,3,4,6,7,8-HpCDD	75.3		1.03	36:33	1.000	___
1,2,3,4,6,7,8,9-OCDD	579		0.85	39:59	1.000	___
2,3,7,8-TCDF	2.6 J		0.76	25:05	1.002	___
1,2,3,7,8-PeCDF	0.79 J		1.42	29:06	1.000	J__
2,3,4,7,8-PeCDF	1.3 J		1.62	29:49	1.000	J__
1,2,3,4,7,8-HxCDF	2.1 J		1.27	32:38	1.001	J__
1,2,3,6,7,8-HxCDF	1.1 J		1.17	32:44	1.001	J__
2,3,4,6,7,8-HxCDF	1.6 J		1.37	33:14	1.001	J__
1,2,3,7,8,9-HxCDF	ND	0.2				___
1,2,3,4,6,7,8-HpCDF	14.0		1.01	35:33	1.000	___
1,2,3,4,7,8,9-HpCDF	1.0 J		1.02	37:01	1.000	J__
1,2,3,4,6,7,8,9-OCDF	35.4		0.87	40:09	1.005	___

Totals	Conc. (ng/kg)	Number	DL	Flags
Total TCDD	8.5	6		___
Total PeCDD	12.5	8		___
Total HxCDD	59.3	7		___
Total HpCDD	174	2		___
Total TCDF	24.8 J	12		Q__
Total PeCDF	15.6	9		___
Total HxCDF	21.3	9		___
Total HpCDF	34.8	3		___

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TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **248007** Analysis File: **U981303**

Internal Standards	Conc. (ng/kg)	% Recovery	QC Limits	Ratio	RT	RRT	Flags
$^{13}C_{12}$-2,3,7,8-TCDD	109	54.3	31%-137%	0.79	25:50	1.005	
$^{13}C_{12}$-1,2,3,7,8-PeCDD	129	64.5	25%-181%	1.47	30:09	1.173	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	129	64.6	32%-141%	1.23	33:19	0.989	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	112	55.8	28%-130%	1.23	33:23	0.991	
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	166	83.2	23%-140%	1.02	36:32	1.084	
$^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD	321	80.3	17%-157%	0.86	39:58	1.186	
$^{13}C_{12}$-2,3,7,8-TCDF	80.3	40.2	29%-140%	0.75	25:02	0.974	Q
$^{13}C_{12}$-1,2,3,7,8-PeCDF	113	56.5	24%-185%	1.51	29:06	1.132	
$^{13}C_{12}$-2,3,4,7,8-PeCDF	114	56.8	21%-178%	1.51	29:49	1.160	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	131	65.3	26%-152%	0.52	32:37	0.968	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	126	63.0	26%-123%	0.50	32:43	0.971	
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	122	61.0	28%-136%	0.51	33:13	0.986	
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	112	55.8	29%-147%	0.52	33:56	1.007	Q
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	127	63.4	28%-143%	0.43	35:33	1.055	
$^{13}C_{12}$-1.2,3,4,7,8,9-HpCDF	157	78.7	26%-138%	0.43	37:01	1.098	

Cleanup Standard	Conc. (ng/kg)	% Recovery	QC Limits	RT	RRT	Flags
$^{37}Cl_4$-2,3,7,8-TCDD	10.5	52.4	42%-164%	25:51	1.006	

Recovery Standards	Ratio	RT	Flags
$^{13}C_{12}$-1,2,3,4-TCDD	0.81	25:42	
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.21	33:42	

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161B_PSR v2.02, LARS 6.11.06

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TLI Project: **46000r1** — Toxicity Equivalents Report
Client Sample: **248007** — Analysis File: **U981303**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SP161B2S**
TLI ID:	**211-1-1**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**32.155 g**	Dilution Factor:	**1**	% Moisture:	**68.9**
Dry Weight:	**10.000 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**31.1**

Analytes	Conc. (ng/kg)		TEF		Equivalent
2,3,7,8-TCDD	{0.3}	x	1.	=	0.3
1,2,3,7,8-PeCDD	1.2	x	0.5	=	0.60
1,2,3,4,7,8-HxCDD	2.0	x	0.1	=	0.20
1,2,3,6,7,8-HxCDD	6.0	x	0.1	=	0.60
1,2,3,7,8,9-HxCDD	5.8	x	0.1	=	0.58
1,2,3,4,6,7,8-HpCDD	75.3	x	0.01	=	0.753
1,2,3,4,6,7,8,9-OCDD	579	x	0.001	=	0.579
TOTAL PCDD					3.6
2,3,7,8-TCDF	1.8	x	0.1	=	0.18
1,2,3,7,8-PeCDF	0.79	x	0.05	=	0.040
2,3,4,7,8-PeCDF	1.3	x	0.5	=	0.65
1,2,3,4,7,8-HxCDF	2.1	x	0.1	=	0.21
1,2,3,6,7,8-HxCDF	1.1	x	0.1	=	0.11
2,3,4,6,7,8-HxCDF	1.6	x	0.1	=	0.16
1,2,3,7,8,9-HxCDF	{0.2}	x	0.1	=	0.02
1,2,3,4,6,7,8-HpCDF	14.0	x	0.01	=	0.140
1,2,3,4,7,8,9-HpCDF	1.0	x	0.01	=	0.010
1,2,3,4,6,7,8,9-OCDF	35.4	x	0.001	=	0.0354
TOTAL PCDF					1.56

Total EPA TEFs, 1989a: 5.2 ng/kg

{...} indicates that the value is that of a Detection Limit.

GRY_TEF v1.03, MILES 4.16.08

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TLI Project: **46000r1** 1613, Revision B, Tetra Only PCDD/PCDF Analysis (b)
Client Sample: **248007** Analysis File: **P982387**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SPCONB2S**
TLI ID:	**211-1-1**	Date Extracted:	**06/18/98**	ICal:	**PF25088**
		Date Analyzed:	**06/29/98**	ConCal:	**P982380**
Sample Size:	**32.155 g**	Dilution Factor:	**n/a**	% Moisture:	**68.9**
Dry Weight:	**10.000 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-225**	Analyst:	**KH**	% Solids:	**31.1**

Analytes	Conc. (ng/kg)	DL	Ratio	RT	RRT	Flags
2,3,7,8-TCDF	1.8		0.69	22:36	1.000	___

Internal Standard	Conc. (ng/kg)	% Recovery	QC Limits	Ratio	RT	RRT	Flags
$^{13}C_{12}$-2,3,7,8-TCDF	90.1	45.0	29%-140%	0.74	22:36	1.053	___

Recovery Standard	Ratio	RT	Flags
$^{13}C_{12}$-1,2,3,4-TCDD	0.82	21:28	___

Data Reviewer: _____ 06/29/98

CONB_PSR v1.00, LARS 6.11.06

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

September 10, 1998

Project: Whitmarsh Landfill

Samples: 32-8000-04

Laboratory: Rosa Environmental

By: Pam Covey

Case Summary

These samples required five (5) Grain Size analyses on sediment using Puget Sound Estuary Protocol (PSEP) method for gravel, sand, silt and clay fractions only. The samples were received at the Manchester Environmental Laboratory on August 10, 1998 and transported to the contract lab on August 12, 1998 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	REGL Project No.: 1004-011
Client Project: Whitmarsh L. F.	Sample Batch No.: 1004-011-01

Case Narrative

1. Five samples were received on August 12, 1998, and were in good condition.
2. Testing began on the samples on August 12, and continued through August 15, 1998.
3. The samples were tested for grain size distribution according to PSEP methods, with modifications for only the major components.
4. Sample 328004 contained some petroleum products. After drying, some solids were baked onto the side of the pan and could not be removed for the sieve portion of the analysis. This material was later removed using solvents and steel wool. The QA (before/after) ratio was effected in that the after weight (material on the #23-0 sieve plus the 20 second pipette reading) is understated.

Approved by: Harold Bamy Date: 8/24/98
Title: Laboratory Manager

Rosa Environmental and Geotechnical Laboratory, LLC

Manchester Laboratory

Whitmarsh L. F.

Major Components of Apparent Grain Size Distribution by PSEP Methodology

Sample Number	Gravel (>2,000)	Sand (2,000< x <62.5)	Silt (62.5< x <4)	Clay (<4)
328000	0.2	64.4	22.2	13.2
328001	1.0	23.9	53.3	21.8
328002	0.1	77.9	14.6	7.3
328003	4.3	6.2	58.7	30.8
328004	6.2	21.2	49.5	23.1

1. Testing performed according to PSEP "Apparent Grain Size Distribution" protocol, with modifications for determination of only the major components

Washington State Department of Ecology
Manchester Laboratory

October 7, 1998

TO: Art Johnson

FROM: Debbie Lacroix, Chemist DL

SUBJECT: General Chemistry Quality Assurance memo for the Whitmarsh Landfill Project

SUMMARY

The data generated by the analysis of these samples can be used with the qualifications discussed in this memo. TOC results are reported at 70°C and 104°C.

SAMPLE INFORMATION

Samples 98328000-04 from the Whitmarsh Landfill project were received by the Manchester Laboratory on 8/7/98 in good condition. Analysis for percent solids was performed immediately after sample arrival. The samples were not stored in the freezer until TOC analysis could be performed.

HOLDING TIMES

Soil TOC analysis was not performed within laboratory accepted holding times.The TOC method in the Conventional Sediment Variables of the Puget Sound Protocols of March 1986 recommends that the samples should be stored frozen and can be held for up to 6 months. There is no known established regulatory holding time for TOC sediment for samples that are stored at 4°C. A holding time study is now in progress.

ANALYSIS PERFORMANCE

Instrument Calibration

Where applicable, instrument calibration was performed before each analysis and verified by initial and verification standards and blanks. All initial and continuing calibration verification standards were within the relevant EPA control limits. All balances are calibrated yearly with calibration verification occurring monthly.

Procedural Blanks

All procedural blanks were within acceptable limits.

Precision Data

The results of the duplicate and triplicate analysis of samples were used to evaluate the precision on this sample set. Relative percent differences (RPD) were within their acceptance windows of +/- 20 %. The relative standard deviations (RSD) were within their acceptance windows of +/- 20 %.

Laboratory Control Sample (LCS) Analyses

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

Please call Debbie Lacroix at 871-8812 with any questions or concerns about this project.

cc: Project File

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (104 C)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 01-OCT-98

Method: PSEP-TOCM
Matrix: Sediment/Soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	**0.91**		%	08/07/98	09/20/98
98328000	Duplicate		**1.00**		%	08/07/98	09/20/98
98328000	Replicate		**1.06**		%	08/07/98	09/20/98
98328001		PADILLA	**2.66**		%	08/07/98	09/20/98
98328002		LAGOON E	**1.33**		%	08/07/98	09/20/98
98328003		LAGOON MID	**3.68**		%	08/07/98	09/20/98
98328004		LAGOON W	**9.81**		%	08/07/98	09/20/98

Authorized By: Debbi Harvey Release Date: 10-7-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Total Organic Carbon (70 C)

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 25-SEP-98

Method: PSEP-TOC
Matrix: Sediment/Soil
Analyte: Total Organic Carbon

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	**0.77**		%	08/07/98	09/20/98
98328000	Duplicate		**0.87**		%	08/07/98	09/20/98
98328000	Replicate		**0.92**		%	08/07/98	09/20/98
98328001		PADILLA	**2.24**		%	08/07/98	09/20/98
98328002		LAGOON E	**1.17**		%	08/07/98	09/20/98
98328003		LAGOON MID	**3.19**		%	08/07/98	09/20/98
98328004		LAGOON W	**8.77**		%	08/07/98	09/20/98

Authorized By: P Carey Release Date: 10/7/98

October 14, 1998

To: Art Johnson

From: Randy Knox, Metals Chemist

Subject: Whitmarsh Landfill Project.....Sediment

QUALITY ASSURANCE SUMMARY

Data quality for this project met all quality assurance and quality control criteria, with the exceptions that recoveries of antimony and thallium was low from spiked samples, silver and antimony recoveries were low from the LCS sample, and mercury was analyzed at a time exceeding the holding limit. No other significant quality assurance issues were noted with the data.

SAMPLE INFORMATION

The samples from the Whitmarsh Landfill Project were received by the Manchester Laboratory on 8/07/98 in good condition.

HOLDING TIMES

All analyses, except those for mercury, were performed within the specified method holding times for metals analysis (28 days for mercury, 180 days for all other metals). Mercury was initially missed, due to a laboratory communication problem. Mercury data was qualified J, as estimated, since mercury was analyzed at a time about a week in excess of the holding time. We are working to improve communication. I apologize for this oversight.

INSTRUMENT CALIBRATION

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration 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 were within the relevant method control limits. AA calibration gave a correlation coefficient (r) of 0.995 or greater, also meeting method calibration requirements.

PROCEDURAL BLANKS

The procedural blanks associated with these samples showed no analytically significant levels of analyte, except iron and zinc. Sample levels of iron and zinc were greater than ten times the procedure blank level, so data for these elements were not qualified.

SPIKED SAMPLES ANALYSIS

Spiked and duplicate spiked sample analyses were performed on this data set. All spike recoveries, except those for antimony and thallium, were within the acceptance limits of +/- 25%. Antimony and thallium data were qualified UJ, as undetected at estimated detection level, due to - 15% and 19% recovery of antimony - and 57% and 59% recovery of thallium. Recoveries of iron and aluminum were reported NC, as not calculated, since sample levels were greater than four times the spike level.

PRECISION DATA

The results of the spiked and duplicate spiked samples were used to evaluate precision on this sample set. The relative percent difference (RPD) for all analytes was within the 20% acceptance window for duplicate analysis.

SERIAL DILUTION

A five times serial dilution of one sample was analyzed by ICP and the analytical results, corrected for dilution, compared to the original sample analysis. The RPD (relative % difference) for analytes at levels 50X greater than the detection level was acceptable, within ±10%. Chromium was an exception. The RPD for chromium was 32%. This may have resulted from suppression in the more concentrated sample, but it might also have indicated contamination of the diluting solution. Since spike recovery was acceptable, chromium data was not qualified based on the serial dilution RPD.

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

LCS analyses, except those for antimony and silver, were within the windows established for each parameter. Antimony data was qualified UJ, as undetected at estimated detection level, due to low – 49% - recovery from the LCS sample. Silver data was qualified UJ, as undetected at estimated detection level - or J, as estimated, if the level detected was above the detection level. This was based on 58% recovery of LCS silver.

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: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: M8233SB1 **Method:** EPA200.7
QC Type: Laboratory Method Blank **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	5	U
Antimony	3	U
Beryllium	0.1	U
Cadmium	0.4	U
Chromium	0.5	U
Copper	0.5	U
Iron	**5.8**	
Nickel	1	U
Silver	0.4	U
Zinc	**0.97**	

Authorized By: Randy L Kerry Release Date: 9/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill
LIMS Project ID: 2552-98

Lab ID: M8233SL1
QC Type: Laboratory Control Sample
Project Officer: Art Johnson
Date Prepared: 08/21/98
Date Analyzed: 09/09/98
Method: EPA200.7
Matrix: Sediment/Soil
Units: mg/Kg dw

Analyte	Result	Qualifier
Aluminum	97	%
Antimony	49	%
Beryllium	90	%
Cadmium	96	%
Chromium	94	%
Copper	96	%
Iron	91	%
Nickel	96	%
Silver	58	%
Zinc	90	%

Authorized By: Randy L. Knox Release Date: 9/30/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: SAMISH **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**8930**	
Antimony	3	UJ
Beryllium	**0.25**	
Cadmium	0.4	U
Chromium	**22.3**	
Copper	**12.4**	
Iron	**15100**	
Nickel	**25.9**	
Silver	0.4	UJ
Zinc	**42.2**	

Authorized By: Randy L Knox Release Date: 9/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: SAMISH **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum		NC
Antimony	**19**	
Beryllium	**94**	
Cadmium	**94**	
Chromium	**98**	
Copper	**94**	
Iron		NC
Nickel	**93**	
Silver	**97**	
Zinc	**91**	

Authorized By: Randy L Knox Release Date: 9/29/98 Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: SAMISH **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** % Recovery

Analyte	Result	Qualifier
Aluminum		NC
Antimony	**15**	
Beryllium	**92**	
Cadmium	**93**	
Chromium	**92**	
Copper	**92**	
Iron		NC
Nickel	**90**	
Silver	**96**	
Zinc	**89**	

Authorized By: Randy L Knox Release Date: 9/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: PADILLA **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**14100**	
Antimony	3	UJ
Beryllium	**3.0**	
Cadmium	0.4	U
Chromium	**46.4**	
Copper	**32.8**	
Iron	**25200**	
Nickel	**41.0**	
Silver	**0.56**	J
Zinc	**67.5**	

Authorized By: Randy L Knox Release Date: 9/29/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: LAGOON E **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**10800**	
Antimony	3	UJ
Beryllium	**0.23**	
Cadmium	0.4	U
Chromium	**34.6**	
Copper	**21.2**	
Iron	**19500**	
Nickel	**30.8**	
Silver	**0.47**	J
Zinc	**48.1**	

Authorized By: Randy L Knox Release Date: 9/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: LAGOON MID **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**17600**	
Antimony	3	UJ
Beryllium	**0.38**	
Cadmium	0.4	U
Chromium	**54.0**	
Copper	**37.7**	
Iron	**26400**	
Nickel	**45.7**	
Silver	**0.54**	J
Zinc	**80.1**	

Authorized By: Randy L Knox Release Date: 9/29/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Inductively Coupled Plasma

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** EPA200.7
Field ID: LAGOON W **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/09/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
Aluminum	**14200**	
Antimony	3	UJ
Beryllium	**0.30**	
Cadmium	**0.48**	
Chromium	**44.3**	
Copper	**35.0**	
Iron	**28300**	
Nickel	**40.4**	
Silver	**0.70**	J
Zinc	**111**	

Authorized By: Randy L Knox Release Date: 9/30/98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Arsenic

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 16-SEP-98

Method: EPA206.2
Matrix: Sediment/Soil
Analyte: Arsenic

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	**4.82**		mg/Kg dw	08/07/98	09/16/98
98328000	Matrix Spike		**94 %**			08/07/98	09/16/98
98328000	Matrix Spike		**92 %**			08/07/98	09/16/98
98328001		PADILLA	**8.92**		mg/Kg dw	08/07/98	09/16/98
98328002		LAGOON E	**6.71**		mg/Kg dw	08/07/98	09/16/98
98328003		LAGOON MID	**11.2**		mg/Kg dw	08/07/98	09/16/98
98328004		LAGOON W	**9.78**		mg/Kg dw	08/07/98	09/16/98
M8233SB1			0.3	U	mg/Kg dw		09/16/98
M8233SL1			**96**		%		09/16/98

Authorized By: Randy L Knox Release Date: 9/17/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Lead

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 25-SEP-98

Method: EPA239.2
Matrix: Sediment/Soil
Analyte: Lead

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	**5.76**		mg/Kg dw	08/07/98	09/11/98
98328000	Matrix Spike		**93 %**			08/07/98	09/11/98
98328000	Matrix Spike		**102 %**			08/07/98	09/11/98
98328001		PADILLA	**49.6**		mg/Kg dw	08/07/98	09/20/98
98328002		LAGOON E	**6.64**		mg/Kg dw	08/07/98	09/11/98
98328003		LAGOON MID	**12.0**		mg/Kg dw	08/07/98	09/11/98
98328004		LAGOON W	**34.1**		mg/Kg dw	08/07/98	09/20/98
M8233SB1			0.2	U	mg/Kg dw		09/11/98
M8233SL1			**91 %**				09/11/98

Authorized By: Sally M Cull Release Date: 9-25-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Selenium

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 17-SEP-98

Method: SW7740
Matrix: Sediment/Soil
Analyte: Selenium

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	0.3	U	mg/Kg dw	08/07/98	09/17/98
98328000	Matrix Spike		**103 %**			08/07/98	09/17/98
98328000	Matrix Spike		**102 %**			08/07/98	09/17/98
98328001		PADILLA	0.3	U	mg/Kg dw	08/07/98	09/17/98
98328002		LAGOON E	**0.33**		mg/Kg dw	08/07/98	09/17/98
98328003		LAGOON MID	**0.35**		mg/Kg dw	08/07/98	09/17/98
98328004		LAGOON W	**0.40**		mg/Kg dw	08/07/98	09/17/98
M8233SB1			0.3	U	mg/Kg dw		09/17/98
M8233SL1			**102 %**				09/17/98

Authorized By: Kathy Gill Release Date: 9-24-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Thallium

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 21-SEP-98

Method: EPA279.2
Matrix: Sediment/Soil
Analyte: Thallium

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	0.3	UJ	mg/Kg dw	08/07/98	09/20/98
98328000	Matrix Spike		**57 %**			08/07/98	09/20/98
98328000	Matrix Spike		**59 %**			08/07/98	09/20/98
98328001		PADILLA	0.3	UJ	mg/Kg dw	08/07/98	09/20/98
98328002		LAGOON E	0.3	UJ	mg/Kg dw	08/07/98	09/20/98
98328003		LAGOON MID	0.3	UJ	mg/Kg dw	08/07/98	09/20/98
98328004		LAGOON W	0.3	UJ	mg/Kg dw	08/07/98	09/20/98
M8233SB1			0.3	U	mg/Kg dw		09/20/98
M8233SL1			**97 %**				09/20/98

Authorized By: Sally Cull Release Date: 9-24-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Mercury

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Project Officer: Art Johnson
Date Reported: 24-SEP-98

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

Sample	QC	Field ID	Result	Qualifier	Units	Collected	Analyzed
98328000		SAMISH	**0.050**	**J**	mg/Kg dw	08/07/98	09/15/98
98328000	Duplicate		**0.047**	**J**	mg/Kg dw	08/07/98	09/15/98
98328000	Matrix Spike		**95 %**	**J**		08/07/98	09/15/98
98328000	Matrix Spike		**98 %**	**J**		08/07/98	09/15/98
98328001		PADILLA	**0.078**	**J**	mg/Kg dw	08/07/98	09/15/98
98328002		LAGOON E	**0.047**	**J**	mg/Kg dw	08/07/98	09/15/98
98328003		LAGOON MID	**0.081**	**J**	mg/Kg dw	08/07/98	09/15/98
98328004		LAGOON W	**0.095**	**J**	mg/Kg dw	08/07/98	09/15/98
M8257SG			**100**		%		09/15/98
M8257SH			0.005	U	mg/Kg dw		09/15/98

Authorized By: Randy S Knox Release Date: 9/24/98

Manchester Environmental Laboratory

7411 Beach DR E, Port Orchard Washington 98366

CASE NARRATIVE

August 26, 1998

Subject:	Whitmarsh Sediment Samples
Samples:	98328000 - 98328004
Case No.	255298
Officer:	Art Johnson
By:	M. Mandjikov

WTPH-Dx Analysis of the Whitmarsh Sediment Samples

SUMMARY:

Samples 98328000 – 98328004 were analyzed for diesel and extended diesel range hydrocarbons.

Petroleum hydrocarbons eluting in the diesel and lubricating oil range of the gas chromatogram were detected in sample 98328004. The chromatographic pattern did not match any common petroleum products the lab is familiar with. Therefore the diesel range hydrocarbons are collectively calculated against a #2 diesel standard and the lubricating oil range hydrocarbons are calculated against a composite motor oil standard. Detected results for these compounds are qualified as estimates, "J" because there is no pattern match to the standards.

The majority of petroleum hydrocarbons detected in this sample elute between the retention times of octadecane (C18) and tricosane (C23).

There is no evidence of a pattern of aliphatic hydrocarbons after tricosane as would be present if this was a weathered heavy fuel oil such as Bunker C. Because there appears to be a trace amount of petroleum hydrocarbons between decane and octadecane and no evidence of any aliphatics after tricosane it is possible that this sample is a mixture of extremely weathered diesel fuel contaminated with a small amount of lubricating oil such as motor oil.

All data are usable as reported. For any additional information concerning the TPH analysis portion of this project please call Myrna Mandjikov 360-871-8814. For sampling information please call Pam Covey 360-871-8827.

METHODS:

These samples were prepared by Soxhlet extraction into methylene chloride. After extraction they were put through a sulfuric acid and silica gel clean up process and concentrated to 2 mL. They were then analyzed using GC-FID. The methods used are modifications of EPA SW- 846 methods 3540, 3630, 3665, 8000, and 8015.

BLANKS:

No analytes of interest are detected in the blanks.

SURROGATES:

All surrogate recoveries are within 25 % of the reference value. Acceptable recoveries for semi-volatile analysis are 50 – 150 %.

DUPLICATE SAMPLES:

Sample 98328001 was prepared in duplicate. No petroleum hydrocarbons were detected in either sample. Therefore, the relative percent difference (RPD) between the duplicates is not calculated.

LABORATORY CONTROL SAMPLES:

A laboratory control sample was prepared in duplicate by spiking a #2 diesel standard into clean beach sand. The beach sand had been prepared with DI water to contain approximately 80% solids. The recoveries of the #2 diesel were within 10% of the theoretical value with a precision of 6% RPD. The accuracy and precision of the LCS are acceptable for this analysis.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

DATA QUALIFIERS:

Code	Definition
E	Reported result is an estimate because it exceeds the calibration.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	There is evidence the analyte is present in this sample.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
REJ	The data are unusable for all purposes.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
Bold Type	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	31	U
Lube Oil	77	U

Surrogate Recoveries

Pentacosane	**88**	**%**

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	73	U
Lube Oil	180	U

Surrogate Recoveries

Pentacosane	**82**	**%**

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 (Duplicate - LDP1) **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	81	U
Lube Oil	200	U

Surrogate Recoveries

Pentacosane	**93**	**%**

Authorized By: M. Mandjikov Release Date: 9-1-98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: LAGOON E **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	25	U
Lube Oil	63	U

Surrogate Recoveries

Pentacosane	**93**	**%**

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: LAGOON MID **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	56	U
Lube Oil	140	U

Surrogate Recoveries

Pentacosane	**91**	**%**

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** NWTPH-DX
Field ID: LAGOON W **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	5300	J
Lube Oil	4000	J

Surrogate Recoveries

Pentacosane	123	%

Authorized By: M. Mandjikoo Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225B1 **Method:** NWTPH-DX
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** mg/Kg dw

Analyte	Result	Qualifier
#2 Diesel	47	U
Lube Oil	120	U

Surrogate Recoveries

Pentacosane	**100**	%

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OXS8225B2 **Method:** NWTPH-DX
QC Type: Laboratory Control Sample **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** %

Analyte	Result	Qualifier
#2 Diesel	**93**	
Lube Oil		NAF
Surrogate Recoveries		
Pentacosane	**103**	%

Authorized By: M. Mandjikov Release Date: 9-1-98 Page: 1

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Semi-volatile petroleum products

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OXS8225B3 **Method:** NWTPH-DX
QC Type: Laboratory Control Sample **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/19/98 **Units:** %

Analyte	Result	Qualifier
#2 Diesel	**99**	
Lube Oil		NAF

Surrogate Recoveries

Pentacosane	**109**	%

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Manchester Environmental Laboratory

7411 Beach Drive E, Port Orchard Washington 98366

CASE NARRATIVE

August 27, 1998

Subject:	Whitmarsh Landfill
Samples:	98328000 through 98328004
Project ID:	2552-98
Project Officer:	Art Johnson
By:	Karin Feddersen KF

VOLATILE ORGANIC ANALYSIS

SUMMARY:

Sample 98328004 required a dilution for several analytes. The dilution results demonstrate linearity with the original results.

The data is usable as reported.

ANALYTICAL METHODS:

Volatile organic compounds were analyzed using the Manchester modification of the EPA Method 8260 purge-trap procedure with capillary GC/MS analysis. Routine QA/QC procedures were performed.

BLANKS:

Low levels of certain target compounds were detected in the laboratory blanks. If the on-column concentrations of the compounds in a sample are at least five times greater than the on-column concentrations of the same compounds detected in the associated method blank, they are considered native to the sample.

Methylene Chloride and Acetone are commonly used laboratory solvents. These compounds are considered native to the sample if their concentration is at least ten times greater than the amount detected in the associated blank.

SURROGATES:

Surrogate recoveries were within acceptable limits for all samples.

HOLDING TIMES:

The samples were analyzed within the recommended 14 day holding time with one exception. The dilution for sample 98328004 was analyzed 4 days after the holding time. Linearity was demonstrated between the results for the dilution and the original sample. Therefore, no qualification of the data was warranted for this condition.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Aliquots of sample 98328000 were spiked and analyzed with the samples. Recoveries for several analytes are below 50%. Results for these analytes are qualified as estimates in the samples.

All other matrix spike recoveries were within acceptable limits.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
N	-	There is evidence the analyte is present in the sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range. The associated numerical result is an estimate.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compounds on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	12	U	Cis-1,3-Dichloropropene	2.6	UJ
Chloromethane	12	U	4-Methyl-2-Pentanone	5	U
Vinyl Chloride	12	U	1,1-Dichloropropanone	25	UJ
Bromomethane	12	U	**Toluene**	**1.1**	**J**
Chloroethane	12	U	Trans-1,3-Dichloropropene	2.3	U
Trichlorofluoromethane	50	UJ	Ethylmethacrylate	2.5	U
1,1,2 Trichlorotrifluoroethane	50	U	1,1,2-Trichloroethane	2.5	U
Ethyl Ether	5	U	Tetrachloroethene	2.5	U
1,1-Dichloroethene	5	U	1,3-Dichloropropane	2.5	U
Methyl Iodide	2.5	UJ	2-Hexanone	5	U
Acetone	99	U	Dibromochloromethane	5	UJ
Carbon Disulfide	5	UJ	1,2-Dibromoethane (EDB)	2.5	U
Allyl Chloride	2.5	UJ	Chlorobenzene	2.5	U
Methylene Chloride	12	U	1,1,1,2-Tetrachloroethane	2.5	UJ
Trans-1,2-Dichloroethene	2.5	U	Ethylbenzene	2.5	U
Acrylonitrile	12	U	m & p-Xylene	5	U
2-Methyoxy-2-Methylpropane	5	U	o-Xylene	2.5	U
1,1-Dichloroethane	2.5	U	Styrene	2.5	U
2,2-Dichloropropane	2.5	U	Bromoform	5	UJ
Cis-1,2-Dichloroethene	2.5	U	Isopropylbenzene (Cumene)	2.5	U
2-Butanone	5	U	Bromobenzene	2.5	U
Methyl acrylate	5	U	1,1,2,2-Tetrachloroethane	2.5	U
Bromochloromethane	2.5	U	1,2,3-Trichloropropane	12	U
Methyacrylonitrile	5	U	Trans-1,4-Dichloro-2-butene	12	UJ
Tetrahydrofuran	12	U	n-Propylbenzene	2.5	U
Chloroform	2.5	U	2-Chlorotoluene	2.5	U
1,1,1-Trichloroethane	2.5	U	1,3,5-Trimethylbenzene	2.5	U
1-Chlorobutane	2.5	U	4-Chlorotoluene	2.5	U
Carbon Tetrachloride	2.5	UJ	Tert-Butylbenzene	2.5	U
1,1-Dichloropropene	2.5	U	Pentachloroethane	5	UJ
Benzene	2.5	U	1,2,4-Trimethylbenzene	2.5	U
1,2-Dichloroethane	2.5	U	Sec-Butylbenzene	2.5	U
Trichloroethene	2.5	U	1,3-Dichlorobenzene	2.5	U
1,2-Dichloropropane	2.5	U	p-Isopropyltoluene	2.5	U
Methyl Methacrylate	2.5	U	1,4-Dichlorobenzene	2.5	U
Dibromomethane	2.5	U	n-Butylbenzene	2.5	U
Bromodichloromethane	2.5	UJ	1,2-Dichlorobenzene	2.5	U
2-Nitropropane	12	U	Hexachloroethane	2.5	UJ

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	5	UJ
1,2,4-Trichlorobenzene	2.5	U
Hexachlorobutadiene	2.5	U
Naphthalene	2.5	U
1,2,3-Trichlorobenzene	2.5	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**106**	**%**
1,4-Difluorobenzene	**101**	**%**
Toluene-D8	**100**	**%**
p-Bromofluorobenzene	**92**	**%**
1,2-Dichlorobenzene-D4	**104**	**%**

Authorized By: _____ Release Date: 9/22/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/14/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	178		Cis-1,3-Dichloropropene	37	
Chloromethane	123		4-Methyl-2-Pentanone	71	
Vinyl Chloride	99		1,1-Dichloropropanone	27	
Bromomethane	51		Toluene	82	
Chloroethane	105		Trans-1,3-Dichloropropene	34	
Trichlorofluoromethane	30		Ethylmethacrylate	40	
1,1,2 Trichlorotrifluoroethane	92		1,1,2-Trichloroethane	92	
Ethyl Ether	97		Tetrachloroethene	123	
1,1-Dichloroethene	104		1,3-Dichloropropane	81	
Methyl Iodide	37		2-Hexanone	57	
Acetone	58		Dibromochloromethane	28	
Carbon Disulfide	41		1,2-Dibromoethane (EDB)	61	
Allyl Chloride	48		Chlorobenzene	79	
Methylene Chloride	93		1,1,1,2-Tetrachloroethane	40	
Trans-1,2-Dichloroethene	83		Ethylbenzene	91	
Acrylonitrile	68		m & p-Xylene	86	
2-Methyoxy-2-Methylpropane	100		o-Xylene	91	
1,1-Dichloroethane	110		Styrene	72	
2,2-Dichloropropane	98		Bromoform	24	
Cis-1,2-Dichloroethene	93		Isopropylbenzene (Cumene)	116	
2-Butanone	61		Bromobenzene	88	
Methyl acrylate	51		1,1,2,2-Tetrachloroethane	70	
Bromochloromethane	108		1,2,3-Trichloropropane	85	
Methyacrylonitrile	77		Trans-1,4-Dichloro-2-butene	30	
Tetrahydrofuran	78		n-Propylbenzene	105	
Chloroform	94		2-Chlorotoluene	105	
1,1,1-Trichloroethane	88		1,3,5-Trimethylbenzene	109	
1-Chlorobutane	93		4-Chlorotoluene	84	
Carbon Tetrachloride	39		Tert-Butylbenzene	114	
1,1-Dichloropropene	87		Pentachloroethane	34	
Benzene	97		1,2,4-Trimethylbenzene	104	
1,2-Dichloroethane	88		Sec-Butylbenzene	106	
Trichloroethene	102		1,3-Dichlorobenzene	82	
1,2-Dichloropropane	99		p-Isopropyltoluene	104	
Methyl Methacrylate	93		1,4-Dichlorobenzene	75	
Dibromomethane	100		n-Butylbenzene	89	
Bromodichloromethane	34		1,2-Dichlorobenzene	85	
2-Nitropropane	55		Hexachloroethane	32	

Authorized By: _____ Release Date: 9/22/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/14/98 **Units:** % Recovery

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	42	
1,2,4-Trichlorobenzene	63	
Hexachlorobutadiene	64	
Naphthalene	60	
1,2,3-Trichlorobenzene	56	

Surrogate Recoveries

1,2-Dichloroethane-D4	94	%
1,4-Difluorobenzene	101	%
Toluene-D8	101	%
p-Bromofluorobenzene	92	%
1,2-Dichlorobenzene-D4	95	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/14/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	183		Cis-1,3-Dichloropropene	39	
Chloromethane	140		4-Methyl-2-Pentanone	83	
Vinyl Chloride	110		1,1-Dichloropropanone	0	
Bromomethane	68		Toluene	87	
Chloroethane	109		Trans-1,3-Dichloropropene	39	
Trichlorofluoromethane	49		Ethylmethacrylate	41	
1,1,2 Trichlorotrifluoroethane	79		1,1,2-Trichloroethane	102	
Ethyl Ether	86		Tetrachloroethene	129	
1,1-Dichloroethene	106		1,3-Dichloropropane	87	
Methyl Iodide	43		2-Hexanone	66	
Acetone	81		Dibromochloromethane	25	
Carbon Disulfide	35		1,2-Dibromoethane (EDB)	71	
Allyl Chloride	51		Chlorobenzene	84	
Methylene Chloride	96		1,1,1,2-Tetrachloroethane	47	
Trans-1,2-Dichloroethene	90		Ethylbenzene	93	
Acrylonitrile	75		m & p-Xylene	87	
2-Methyoxy-2-Methylpropane	108		o-Xylene	97	
1,1-Dichloroethane	114		Styrene	73	
2,2-Dichloropropane	100		Bromoform	22	
Cis-1,2-Dichloroethene	100		Isopropylbenzene (Cumene)	112	
2-Butanone	82		Bromobenzene	89	
Methyl acrylate	60		1,1,2,2-Tetrachloroethane	83	
Bromochloromethane	124		1,2,3-Trichloropropane	106	
Methyacrylonitrile	71		Trans-1,4-Dichloro-2-butene	19	
Tetrahydrofuran	92		n-Propylbenzene	101	
Chloroform	105		2-Chlorotoluene	102	
1,1,1-Trichloroethane	96		1,3,5-Trimethylbenzene	108	
1-Chlorobutane	95		4-Chlorotoluene	85	
Carbon Tetrachloride	33		Tert-Butylbenzene	113	
1,1-Dichloropropene	90		Pentachloroethane	29	
Benzene	100		1,2,4-Trimethylbenzene	103	
1,2-Dichloroethane	95		Sec-Butylbenzene	104	
Trichloroethene	107		1,3-Dichlorobenzene	78	
1,2-Dichloropropane	103		p-Isopropyltoluene	102	
Methyl Methacrylate	105		1,4-Dichlorobenzene	73	
Dibromomethane	117		n-Butylbenzene	83	
Bromodichloromethane	32		1,2-Dichlorobenzene	84	
2-Nitropropane	71		Hexachloroethane	25	

Authorized By: _____ Release Date: 9/22/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: SAMISH **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/14/98 **Units:** % Recovery

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	52	
1,2,4-Trichlorobenzene	61	
Hexachlorobutadiene	62	
Naphthalene	63	
1,2,3-Trichlorobenzene	57	

Surrogate Recoveries

1,2-Dichloroethane-D4	99	%
1,4-Difluorobenzene	102	%
Toluene-D8	99	%
p-Bromofluorobenzene	96	%
1,2-Dichlorobenzene-D4	97	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: PADILLA **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	17	U	Cis-1,3-Dichloropropene	3.5	UJ
Chloromethane	17	U	4-Methyl-2-Pentanone	6.7	U
Vinyl Chloride	17	U	1,1-Dichloropropanone	33	UJ
Bromomethane	17	U	Toluene	3.3	U
Chloroethane	17	U	Trans-1,3-Dichloropropene	3.1	U
Trichlorofluoromethane	67	UJ	Ethylmethacrylate	3.3	U
1,1,2 Trichlorotrifluoroethane	67	U	1,1,2-Trichloroethane	3.3	U
Ethyl Ether	6.7	U	Tetrachloroethene	3.3	U
1,1-Dichloroethene	6.7	U	1,3-Dichloropropane	3.3	U
Methyl Iodide	3.3	UJ	2-Hexanone	6.7	U
Acetone	134	U	Dibromochloromethane	6.7	UJ
Carbon Disulfide	**7.8**	**J**	1,2-Dibromoethane (EDB)	3.3	U
Allyl Chloride	3.3	UJ	Chlorobenzene	3.3	U
Methylene Chloride	17	U	1,1,1,2-Tetrachloroethane	3.3	UJ
Trans-1,2-Dichloroethene	3.3	U	Ethylbenzene	3.3	U
Acrylonitrile	17	U	m & p-Xylene	6.7	U
2-Methyoxy-2-Methylpropane	6.7	U	o-Xylene	3.3	U
1,1-Dichloroethane	3.3	U	Styrene	3.3	U
2,2-Dichloropropane	3.3	U	Bromoform	6.7	UJ
Cis-1,2-Dichloroethene	3.3	U	Isopropylbenzene (Cumene)	3.3	U
2-Butanone	**28**		Bromobenzene	3.3	U
Methyl acrylate	6.7	U	1,1,2,2-Tetrachloroethane	3.3	U
Bromochloromethane	3.3	U	1,2,3-Trichloropropane	17	U
Methyacrylonitrile	6.7	U	Trans-1,4-Dichloro-2-butene	17	UJ
Tetrahydrofuran	17	U	n-Propylbenzene	3.3	U
Chloroform	3.3	U	2-Chlorotoluene	3.3	U
1,1,1-Trichloroethane	3.3	U	1,3,5-Trimethylbenzene	3.3	U
1-Chlorobutane	3.3	U	4-Chlorotoluene	3.3	U
Carbon Tetrachloride	3.3	UJ	Tert-Butylbenzene	3.3	U
1,1-Dichloropropene	3.3	U	Pentachloroethane	6.7	UJ
Benzene	3.3	U	1,2,4-Trimethylbenzene	3.3	U
1,2-Dichloroethane	3.3	U	Sec-Butylbenzene	3.3	U
Trichloroethene	3.3	U	1,3-Dichlorobenzene	3.3	U
1,2-Dichloropropane	3.3	U	p-Isopropyltoluene	3.3	U
Methyl Methacrylate	3.3	U	1,4-Dichlorobenzene	3.3	U
Dibromomethane	3.3	U	n-Butylbenzene	3.3	U
Bromodichloromethane	3.3	UJ	1,2-Dichlorobenzene	3.3	U
2-Nitropropane	17	U	Hexachloroethane	3.3	UJ

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: PADILLA **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	6.7	UJ
1,2,4-Trichlorobenzene	3.3	U
Hexachlorobutadiene	3.3	U
Naphthalene	3.3	U
1,2,3-Trichlorobenzene	3.3	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**99**	**%**
1,4-Difluorobenzene	**100**	**%**
Toluene-D8	**98**	**%**
p-Bromofluorobenzene	**91**	**%**
1,2-Dichlorobenzene-D4	**101**	**%**

Authorized By: _____ Release Date: 9/22/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: PADILLA **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
75183	*Dimethyl sulfide*	14	NJ

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON E **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	15	U	Cis-1,3-Dichloropropene	3.2	UJ
Chloromethane	15	U	4-Methyl-2-Pentanone	6	U
Vinyl Chloride	15	U	1,1-Dichloropropanone	30	UJ
Bromomethane	15	U	**Toluene**	**.61**	**J**
Chloroethane	15	U	Trans-1,3-Dichloropropene	2.8	U
Trichlorofluoromethane	60	UJ	Ethylmethacrylate	3	U
1,1,2 Trichlorotrifluoroethane	60	U	1,1,2-Trichloroethane	3	U
Ethyl Ether	6	U	Tetrachloroethene	3	U
1,1-Dichloroethene	6	U	1,3-Dichloropropane	3	U
Methyl Iodide	3	UJ	2-Hexanone	6	U
Acetone	120	U	Dibromochloromethane	6	UJ
Carbon Disulfide	**2.4**	**J**	1,2-Dibromoethane (EDB)	3	U
Allyl Chloride	3	UJ	Chlorobenzene	3	U
Methylene Chloride	15	U	1,1,1,2-Tetrachloroethane	3	UJ
Trans-1,2-Dichloroethene	3	U	Ethylbenzene	3	U
Acrylonitrile	15	U	m & p-Xylene	6	U
2-Methyoxy-2-Methylpropane	6	U	o-Xylene	3	U
1,1-Dichloroethane	3	U	Styrene	3	U
2,2-Dichloropropane	3	U	Bromoform	6	UJ
Cis-1,2-Dichloroethene	3	U	Isopropylbenzene (Cumene)	3	U
2-Butanone	6	U	Bromobenzene	3	U
Methyl acrylate	6	U	1,1,2,2-Tetrachloroethane	3	U
Bromochloromethane	3	U	1,2,3-Trichloropropane	15	U
Methyacrylonitrile	6	U	Trans-1,4-Dichloro-2-butene	15	UJ
Tetrahydrofuran	15	U	n-Propylbenzene	3	U
Chloroform	3	U	2-Chlorotoluene	3	U
1,1,1-Trichloroethane	3	U	1,3,5-Trimethylbenzene	3	U
1-Chlorobutane	3	U	4-Chlorotoluene	3	U
Carbon Tetrachloride	3	UJ	Tert-Butylbenzene	3	U
1,1-Dichloropropene	3	U	Pentachloroethane	6	UJ
Benzene	3	U	1,2,4-Trimethylbenzene	3	U
1,2-Dichloroethane	3	U	Sec-Butylbenzene	3	U
Trichloroethene	3	U	1,3-Dichlorobenzene	3	U
1,2-Dichloropropane	3	U	p-Isopropyltoluene	3	U
Methyl Methacrylate	3	U	1,4-Dichlorobenzene	3	U
Dibromomethane	3	U	n-Butylbenzene	3	U
Bromodichloromethane	3	UJ	1,2-Dichlorobenzene	3	U
2-Nitropropane	15	U	Hexachloroethane	3	UJ

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON E **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	6	UJ
1,2,4-Trichlorobenzene	3	U
Hexachlorobutadiene	3	U
Naphthalene	3	UJ
1,2,3-Trichlorobenzene	3	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**105**	**%**
1,4-Difluorobenzene	**99**	**%**
Toluene-D8	**100**	**%**
p-Bromofluorobenzene	**94**	**%**
1,2-Dichlorobenzene-D4	**98**	**%**

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Analysis Report for

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON E **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
75183	*Dimethyl sulfide*	208	NJ
589811	*Heptane, 3-methyl-*	1.1	NJ

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON MID **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	19	U	Cis-1,3-Dichloropropene	4.1	UJ
Chloromethane	19	U	4-Methyl-2-Pentanone	7.7	U
Vinyl Chloride	19	U	1,1-Dichloropropanone	39	UJ
Bromomethane	19	U	**Toluene**	**61**	
Chloroethane	19	U	Trans-1,3-Dichloropropene	3.6	U
Trichlorofluoromethane	77	UJ	Ethylmethacrylate	3.8	U
1,1,2 Trichlorotrifluoroethane	77	U	1,1,2-Trichloroethane	3.8	U
Ethyl Ether	7.7	U	Tetrachloroethene	3.8	U
1,1-Dichloroethene	7.7	U	1,3-Dichloropropane	3.8	U
Methyl Iodide	3.8	UJ	2-Hexanone	7.7	U
Acetone	154	U	Dibromochloromethane	7.7	UJ
Carbon Disulfide	**5.6**	J	1,2-Dibromoethane (EDB)	3.8	U
Allyl Chloride	3.8	UJ	Chlorobenzene	3.8	U
Methylene Chloride	19	U	1,1,1,2-Tetrachloroethane	3.8	UJ
Trans-1,2-Dichloroethene	3.8	U	Ethylbenzene	3.8	U
Acrylonitrile	19	U	m & p-Xylene	7.7	U
2-Methyoxy-2-Methylpropane	7.7	U	o-Xylene	3.8	U
1,1-Dichloroethane	3.8	U	Styrene	3.8	U
2,2-Dichloropropane	3.8	U	Bromoform	7.7	UJ
Cis-1,2-Dichloroethene	3.8	U	Isopropylbenzene (Cumene)	3.8	U
2-Butanone	7.7	U	Bromobenzene	3.8	U
Methyl acrylate	7.7	U	1,1,2,2-Tetrachloroethane	3.8	U
Bromochloromethane	3.8	U	1,2,3-Trichloropropane	19	U
Methyacrylonitrile	7.7	U	Trans-1,4-Dichloro-2-butene	19	UJ
Tetrahydrofuran	19	U	n-Propylbenzene	3.8	U
Chloroform	3.8	U	2-Chlorotoluene	3.8	U
1,1,1-Trichloroethane	3.8	U	1,3,5-Trimethylbenzene	3.8	U
1-Chlorobutane	3.8	U	4-Chlorotoluene	3.8	U
Carbon Tetrachloride	3.8	UJ	Tert-Butylbenzene	3.8	U
1,1-Dichloropropene	3.8	U	Pentachloroethane	7.7	UJ
Benzene	3.8	U	1,2,4-Trimethylbenzene	3.8	U
1,2-Dichloroethane	3.8	U	Sec-Butylbenzene	3.8	U
Trichloroethene	3.8	U	1,3-Dichlorobenzene	3.8	U
1,2-Dichloropropane	3.8	U	p-Isopropyltoluene	3.8	U
Methyl Methacrylate	3.8	U	1,4-Dichlorobenzene	3.8	U
Dibromomethane	3.8	UJ	n-Butylbenzene	3.8	U
Bromodichloromethane	3.8	U	1,2-Dichlorobenzene	3.8	U
2-Nitropropane	19	U	Hexachloroethane	3.8	UJ

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Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON MID **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	7.7	UJ
1,2,4-Trichlorobenzene	3.8	U
Hexachlorobutadiene	3.8	U
Naphthalene	3.8	U
1,2,3-Trichlorobenzene	3.8	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**104**	**%**
1,4-Difluorobenzene	**100**	**%**
Toluene-D8	**101**	**%**
p-Bromofluorobenzene	**92**	**%**
1,2-Dichlorobenzene-D4	**100**	**%**

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Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON MID **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
75183	*Dimethyl sulfide*	306	NJ

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON W **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	17	U	Cis-1,3-Dichloropropene	3.5	UJ
Chloromethane	17	U	4-Methyl-2-Pentanone	6.6	U
Vinyl Chloride	17	U	1,1-Dichloropropanone	33	UJ
Bromomethane	17	U	**Toluene**	**160**	
Chloroethane	17	U	Trans-1,3-Dichloropropene	3.1	U
Trichlorofluoromethane	66	UJ	Ethylmethacrylate	3.3	U
1,1,2 Trichlorotrifluoroethane	66	U	1,1,2-Trichloroethane	3.3	U
Ethyl Ether	6.6	U	Tetrachloroethene	3.3	U
1,1-Dichloroethene	6.6	U	1,3-Dichloropropane	3.3	U
Methyl Iodide	3.3	UJ	2-Hexanone	6.6	U
Acetone	132	U	Dibromochloromethane	6.6	UJ
Carbon Disulfide	**16**	J	1,2-Dibromoethane (EDB)	3.3	U
Allyl Chloride	3.3	UJ	Chlorobenzene	3.3	U
Methylene Chloride	17	U	1,1,1,2-Tetrachloroethane	3.3	UJ
Trans-1,2-Dichloroethene	3.3	U	**Ethylbenzene**	**292**	E
Acrylonitrile	17	U	**m & p-Xylene**	**1770**	E
2-Methyoxy-2-Methylpropane	6.6	U	**o-Xylene**	**383**	E
1,1-Dichloroethane	3.3	U	Styrene	3.3	U
2,2-Dichloropropane	3.3	U	Bromoform	6.6	UJ
Cis-1,2-Dichloroethene	3.3	U	**Isopropylbenzene (Cumene)**	**34**	
2-Butanone	**31**		Bromobenzene	3.3	U
Methyl acrylate	6.6	U	1,1,2,2-Tetrachloroethane	3.3	U
Bromochloromethane	3.3	U	1,2,3-Trichloropropane	17	U
Methyacrylonitrile	6.6	U	Trans-1,4-Dichloro-2-butene	17	UJ
Tetrahydrofuran	17	U	**n-Propylbenzene**	**218**	E
Chloroform	3.3	U	2-Chlorotoluene	3.3	U
1,1,1-Trichloroethane	3.3	U	**1,3,5-Trimethylbenzene**	**121**	
1-Chlorobutane	3.3	U	4-Chlorotoluene	3.3	U
Carbon Tetrachloride	3.3	UJ	Tert-Butylbenzene	3.3	U
1,1-Dichloropropene	3.3	U	Pentachloroethane	6.6	UJ
Benzene	**10**		**1,2,4-Trimethylbenzene**	**458**	E
1,2-Dichloroethane	3.3	U	**Sec-Butylbenzene**	**46**	
Trichloroethene	3.3	U	1,3-Dichlorobenzene	3.3	U
1,2-Dichloropropane	3.3	U	**p-Isopropyltoluene**	**78**	
Methyl Methacrylate	3.3	U	1,4-Dichlorobenzene	3.3	U
Dibromomethane	3.3	U	**n-Butylbenzene**	**123**	
Bromodichloromethane	3.3	UJ	1,2-Dichlorobenzene	16.5	U
2-Nitropropane	3.3	U	Hexachloroethane	3.3	UJ

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON W **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	6.6	UJ
1,2,4-Trichlorobenzene	3.3	U
Hexachlorobutadiene	3.3	U
Naphthalene	**131**	
1,2,3-Trichlorobenzene	3.3	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**107**	%
1,4-Difluorobenzene	**102**	%
Toluene-D8	**105**	%
p-Bromofluorobenzene	**105**	%
1,2-Dichlorobenzene-D4	**122**	%

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON W **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
75183	*Dimethyl sulfide*	174	NJ
5911046	*Nonane, 3-methyl-*	224	NJ
7146603	*Octane, 2,3-dimethyl-*	244	NJ
17301949	*Nonane, 4-methyl-*	560	NJ
17302282	*Nonane, 2,6-dimethyl-*	1170	NJ
17302328	*Nonane, 3,7-dimethyl-*	263	NJ
2114423	*Cyclohexane, 2-propenyl-*	343	NJ
74630301	*2-Decene, 4-methyl-, (Z)-*	261	NJ
1758889	*Benzene, 2-ethyl-1,4-dimethyl-*	415	NJ
535773	*Benzene, 1-methyl-3-(1-methylethyl)-*	707	NJ
933982	*Benzene, 1-ethyl-2,3-dimethyl-*	715	NJ
4176049	*Bicyclo[4.1.0]heptan-3-one, 4,7,7-trimethyl-, [1R-(*	1000	NJ
95932	*Benzene, 1,2,4,5-tetramethyl-*	211	NJ
527537	*Benzene, 1,2,3,5-tetramethyl-*	240	NJ
*3008002	*Unknown 02*	518	NJ
*3008001	*Unknown 01*	422	NJ

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 (Dilution - DIL1) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON W **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	468	U	Cis-1,3-Dichloropropene	496	U
Chloromethane	468	U	4-Methyl-2-Pentanone	935	U
Vinyl Chloride	468	U	1,1-Dichloropropanone	468	U
Bromomethane	468	U	**Toluene**	**127**	**J**
Chloroethane	468	U	Trans-1,3-Dichloropropene	440	U
Trichlorofluoromethane	468	U	Ethylmethacrylate	468	U
1,1,2 Trichlorotrifluoroethane	468	U	1,1,2-Trichloroethane	468	U
Ethyl Ether	468	U	Tetrachloroethene	468	U
1,1-Dichloroethene	468	U	1,3-Dichloropropane	468	U
Methyl Iodide	468	U	2-Hexanone	935	U
Acetone	935	U	Dibromochloromethane	468	U
Carbon Disulfide	935	U	1,2-Dibromoethane (EDB)	468	U
Allyl Chloride	468	U	Chlorobenzene	468	U
Methylene Chloride	935	U	1,1,1,2-Tetrachloroethane	468	U
Trans-1,2-Dichloroethene	468	U	**Ethylbenzene**	**260**	**J**
Acrylonitrile	468	U	**m & p-Xylene**	**2070**	
2-Methyoxy-2-Methylpropane	468	U	**o-Xylene**	**350**	**J**
1,1-Dichloroethane	468	U	Styrene	468	U
2,2-Dichloropropane	468	U	Bromoform	468	U
Cis-1,2-Dichloroethene	468	U	Isopropylbenzene (Cumene)	468	U
2-Butanone	935	U	Bromobenzene	468	U
Methyl acrylate	468	U	1,1,2,2-Tetrachloroethane	468	U
Bromochloromethane	468	U	1,2,3-Trichloropropane	468	U
Methyacrylonitrile	468	U	Trans-1,4-Dichloro-2-butene	468	U
Tetrahydrofuran	468	U	**n-Propylbenzene**	**223**	**J**
Chloroform	468	U	2-Chlorotoluene	468	U
1,1,1-Trichloroethane	468	U	**1,3,5-Trimethylbenzene**	**130**	**J**
1-Chlorobutane	468	U	4-Chlorotoluene	468	U
Carbon Tetrachloride	468	U	Tert-Butylbenzene	468	U
1,1-Dichloropropene	468	U	Pentachloroethane	468	U
Benzene	468	U	**1,2,4-Trimethylbenzene**	**506**	
1,2-Dichloroethane	468	U	Sec-Butylbenzene	468	U
Trichloroethene	468	U	1,3-Dichlorobenzene	468	U
1,2-Dichloropropane	468	U	**p-Isopropyltoluene**	**120**	**J**
Methyl Methacrylate	468	U	1,4-Dichlorobenzene	468	U
Dibromomethane	468	U	**n-Butylbenzene**	**241**	**J**
Bromodichloromethane	468	U	1,2-Dichlorobenzene	468	U
2-Nitropropane	468	U	Hexachloroethane	468	U

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 (Dilution - DIL1) **Date Collected:** 08/07/98 **Method:** SW8260
Field ID: LAGOON W **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	468	U
1,2,4-Trichlorobenzene	468	U
Hexachlorobutadiene	468	U
Naphthalene	**899**	**J**
1,2,3-Trichlorobenzene	468	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**95**	%
1,4-Difluorobenzene	**101**	%
Toluene-D8	**97**	%
p-Bromofluorobenzene	**97**	%
1,2-Dichlorobenzene-D4	**102**	%

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OKBS8224 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	10	U	Cis-1,3-Dichloropropene	2.1	U
Chloromethane	10	U	4-Methyl-2-Pentanone	4	U
Vinyl Chloride	10	U	1,1-Dichloropropanone	20	U
Bromomethane	10	U	Toluene	2	U
Chloroethane	10	U	Trans-1,3-Dichloropropene	1.9	U
Trichlorofluoromethane	40	U	Ethylmethacrylate	2	U
1,1,2 Trichlorotrifluoroethane	40	U	1,1,2-Trichloroethane	2	U
Ethyl Ether	4	U	Tetrachloroethene	2	U
1,1-Dichloroethene	4	U	1,3-Dichloropropane	2	U
Methyl Iodide	2	U	2-Hexanone	4	U
Acetone	**14**	**J**	Dibromochloromethane	4	U
Carbon Disulfide	**.32**	**J**	1,2-Dibromoethane (EDB)	2	U
Allyl Chloride	2	U	Chlorobenzene	2	U
Methylene Chloride	**4.2**	**J**	1,1,1,2-Tetrachloroethane	2	U
Trans-1,2-Dichloroethene	2	U	Ethylbenzene	2	U
Acrylonitrile	10	U	m & p-Xylene	4	U
2-Methyoxy-2-Methylpropane	4	U	o-Xylene	2	U
1,1-Dichloroethane	2	U	Styrene	2	U
2,2-Dichloropropane	2	U	Bromoform	4	U
Cis-1,2-Dichloroethene	2	U	Isopropylbenzene (Cumene)	2	U
2-Butanone	4	U	Bromobenzene	2	U
Methyl acrylate	4	U	1,1,2,2-Tetrachloroethane	2	U
Bromochloromethane	2	U	1,2,3-Trichloropropane	10	U
Methyacrylonitrile	4	U	Trans-1,4-Dichloro-2-butene	10	U
Tetrahydrofuran	10	U	n-Propylbenzene	2	U
Chloroform	2	U	2-Chlorotoluene	2	U
1,1,1-Trichloroethane	2	U	1,3,5-Trimethylbenzene	2	U
1-Chlorobutane	2	U	4-Chlorotoluene	2	U
Carbon Tetrachloride	2	U	Tert-Butylbenzene	2	U
1,1-Dichloropropene	2	U	Pentachloroethane	4	U
Benzene	2	U	1,2,4-Trimethylbenzene	2	U
1,2-Dichloroethane	2	U	Sec-Butylbenzene	2	U
Trichloroethene	2	U	1,3-Dichlorobenzene	2	U
1,2-Dichloropropane	2	U	p-Isopropyltoluene	2	U
Methyl Methacrylate	2	U	1,4-Dichlorobenzene	2	U
Dibromomethane	2	U	n-Butylbenzene	2	U
Bromodichloromethane	2	U	1,2-Dichlorobenzene	2	U
2-Nitropropane	10	U	Hexachloroethane	2	U

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OKBS8224 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	4	U
1,2,4-Trichlorobenzene	**.5**	**J**
Hexachlorobutadiene	2	U
Naphthalene	**.64**	**J**
1,2,3-Trichlorobenzene	**.53**	**J**

Surrogate Recoveries

1,2-Dichloroethane-D4	**92**	**%**
1,4-Difluorobenzene	**101**	**%**
Toluene-D8	**100**	**%**
p-Bromofluorobenzene	**95**	**%**
1,2-Dichlorobenzene-D4	**102**	**%**

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OKBS8226 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	10	U	Cis-1,3-Dichloropropene	2.1	U
Chloromethane	10	U	4-Methyl-2-Pentanone	4	U
Vinyl Chloride	10	U	1,1-Dichloropropanone	20	U
Bromomethane	10	U	Toluene	2	U
Chloroethane	10	U	Trans-1,3-Dichloropropene	1.9	U
Trichlorofluoromethane	40	U	Ethylmethacrylate	2	U
1,1,2 Trichlorotrifluoroethane	40	U	1,1,2-Trichloroethane	2	U
Ethyl Ether	4	U	Tetrachloroethene	2	U
1,1-Dichloroethene	4	U	1,3-Dichloropropane	2	U
Methyl Iodide	2	U	2-Hexanone	4	U
Acetone	80	U	Dibromochloromethane	4	U
Carbon Disulfide	**.34**	**J**	1,2-Dibromoethane (EDB)	2	U
Allyl Chloride	2	U	Chlorobenzene	2	U
Methylene Chloride	10	U	1,1,1,2-Tetrachloroethane	2	U
Trans-1,2-Dichloroethene	2	U	Ethylbenzene	2	U
Acrylonitrile	10	U	m & p-Xylene	4	U
2-Methyoxy-2-Methylpropane	4	U	o-Xylene	2	U
1,1-Dichloroethane	2	U	Styrene	2	U
2,2-Dichloropropane	2	U	Bromoform	4	U
Cis-1,2-Dichloroethene	2	U	Isopropylbenzene (Cumene)	2	U
2-Butanone	4	U	Bromobenzene	2	U
Methyl acrylate	4	U	1,1,2,2-Tetrachloroethane	2	U
Bromochloromethane	2	U	1,2,3-Trichloropropane	10	U
Methyacrylonitrile	4	U	Trans-1,4-Dichloro-2-butene	10	U
Tetrahydrofuran	10	U	n-Propylbenzene	2	U
Chloroform	2	U	2-Chlorotoluene	2	U
1,1,1-Trichloroethane	2	U	1,3,5-Trimethylbenzene	2	U
1-Chlorobutane	2	U	4-Chlorotoluene	2	U
Carbon Tetrachloride	2	U	Tert-Butylbenzene	2	U
1,1-Dichloropropene	2	U	Pentachloroethane	4	U
Benzene	2	U	1,2,4-Trimethylbenzene	2	U
1,2-Dichloroethane	2	U	Sec-Butylbenzene	2	U
Trichloroethene	2	U	1,3-Dichlorobenzene	2	U
1,2-Dichloropropane	2	U	p-Isopropyltoluene	2	U
Methyl Methacrylate	2	U	1,4-Dichlorobenzene	2	U
Dibromomethane	2	U	n-Butylbenzene	2	U
Bromodichloromethane	2	U	1,2-Dichlorobenzene	2	U
2-Nitropropane	10	U	Hexachloroethane	2	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OKBS8226 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	4	U
1,2,4-Trichlorobenzene	2	U
Hexachlorobutadiene	2	U
Naphthalene	**.33**	**J**
1,2,3-Trichlorobenzene	2	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**101**	**%**
1,4-Difluorobenzene	**101**	**%**
Toluene-D8	**99**	**%**
p-Bromofluorobenzene	**97**	**%**
1,2-Dichlorobenzene-D4	**106**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OKBS8226 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/12/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
55334435	*Undecane, 1,2-dibromo-2-methyl-*	.79	NJ

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Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: ODBS8237 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Dichlorodifluoromethane	.47	U	Cis-1,3-Dichloropropene	.5	U
Chloromethane	.47	U	4-Methyl-2-Pentanone	.94	U
Vinyl Chloride	.47	U	1,1-Dichloropropanone	.47	U
Bromomethane	.47	U	**Toluene**	**.0049**	**J**
Chloroethane	.47	U	Trans-1,3-Dichloropropene	.44	U
Trichlorofluoromethane	.47	U	Ethylmethacrylate	.47	U
1,1,2 Trichlorotrifluoroethane	.47	U	1,1,2-Trichloroethane	.47	U
Ethyl Ether	.47	U	Tetrachloroethene	.47	U
1,1-Dichloroethene	.47	U	1,3-Dichloropropane	.47	U
Methyl Iodide	.47	U	2-Hexanone	.94	U
Acetone	.94	U	Dibromochloromethane	.47	U
Carbon Disulfide	.94	U	1,2-Dibromoethane (EDB)	.47	U
Allyl Chloride	.47	U	Chlorobenzene	.47	U
Methylene Chloride	**.36**	**J**	1,1,1,2-Tetrachloroethane	.47	U
Trans-1,2-Dichloroethene	.47	U	Ethylbenzene	.47	U
Acrylonitrile	.47	U	m & p-Xylene	.94	U
2-Methyoxy-2-Methylpropane	.47	U	o-Xylene	.47	U
1,1-Dichloroethane	.47	U	Styrene	.47	U
2,2-Dichloropropane	.47	U	Bromoform	.47	U
Cis-1,2-Dichloroethene	.47	U	Isopropylbenzene (Cumene)	.47	U
2-Butanone	.94	U	Bromobenzene	.47	U
Methyl acrylate	.47	U	1,1,2,2-Tetrachloroethane	.47	U
Bromochloromethane	.47	U	1,2,3-Trichloropropane	.47	U
Methyacrylonitrile	.47	U	Trans-1,4-Dichloro-2-butene	.47	U
Tetrahydrofuran	.47	U	n-Propylbenzene	.47	U
Chloroform	.47	U	2-Chlorotoluene	.47	U
1,1,1-Trichloroethane	.47	U	1,3,5-Trimethylbenzene	.47	U
1-Chlorobutane	.47	U	4-Chlorotoluene	.47	U
Carbon Tetrachloride	.47	U	Tert-Butylbenzene	.47	U
1,1-Dichloropropene	.47	U	Pentachloroethane	.47	U
Benzene	.47	U	1,2,4-Trimethylbenzene	.47	U
1,2-Dichloroethane	.47	U	Sec-Butylbenzene	.47	U
Trichloroethene	.47	U	1,3-Dichlorobenzene	.47	U
1,2-Dichloropropane	.47	U	p-Isopropyltoluene	.47	U
Methyl Methacrylate	.47	U	1,4-Dichlorobenzene	.47	U
Dibromomethane	.47	U	n-Butylbenzene	.47	U
Bromodichloromethane	.47	U	1,2-Dichlorobenzene	.47	U
2-Nitropropane	.47	U	Hexachloroethane	.47	U

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Department of Ecology

Analysis Report for

Volatile Organic Analysis + top 10 TIC's CLP

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: ODBS8237 **Method:** SW8260
QC Type: Laboratory Method Blank **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
1,2-Dibromo-3-Chloropropane	.47	U
1,2,4-Trichlorobenzene	.47	U
Hexachlorobutadiene	.47	U
Naphthalene	.47	U
1,2,3-Trichlorobenzene	.47	U

Surrogate Recoveries

1,2-Dichloroethane-D4	**96**	**%**
1,4-Difluorobenzene	**100**	**%**
Toluene-D8	**98**	**%**
p-Bromofluorobenzene	**93**	**%**
1,2-Dichlorobenzene-D4	**101**	**%**

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

November 4, 1998

Subject: Whitmarsh Landfill

Samples: 98328000 through 98328004

Case No. 2552-98

Officer: Art Johnson

By: Karin Feddersen KF

SEMIVOLATILE ORGANICS

ANALYTICAL METHODS:

The samples were extracted following the EPA CLP and SW 846 8270 procedure. The extracts were cleaned up with Gel Permeation Chromatography (GPC). Analysis was by capillary gas chromatography with mass spectrometry (GC/MS). Routine QA/QC procedures were performed with the analyses. These samples were also analyzed for BNA NOAA compounds.

HOLDING TIMES:

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

BLANKS:

Low levels of some analytes were detected in the laboratory blanks. An analyte is considered native to the sample when the on-column concentration is at least five times greater than in the associated method blanks. A phthalate 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.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

Sample 98328000 was used for matrix spikes.

Results for analytes with recoveries below 50% in one or both spikes have been qualified "J" in the corresponding samples.

Results for analytes with recoveries below 10% in one or both spikes have been rejected (qualifier "REJ") in the corresponding samples.

COMMENTS:

The data is acceptable for use as reported.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
NC	-	Not calculated.
N	-	There is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	70	U	**Acenaphthylene**	**7.1**	**J**
N-Nitrosodimethylamine	174	UJ	3-Nitroaniline	174	UJ
Aniline		REJ	**Acenaphthene**	**4.4**	**J**
Phenol	35	U	2,4-Dinitrophenol	698	U
Bis(2-Chloroethyl)Ether	35	UJ	4-Nitrophenol	349	U
2-Chlorophenol	35	U	**1,6,7-Trimethylnaphthalene**	**5.7**	**J**
1,3-Dichlorobenzene	35	UJ	**Dibenzofuran**	**6.4**	**J**
1,4-Dichlorobenzene	35	U	2,4-Dinitrotoluene	174	U
1,2-Dichlorobenzene	35	UJ	Diethylphthalate	174	U
Benzyl Alcohol	35	U	**Fluorene**	**14**	**J**
2-Methylphenol	35	U	4-Chlorophenyl-Phenylether	35	U
2,2'-Oxybis[1-chloropropane]	35	UJ	4-Nitroaniline	349	UJ
N-Nitroso-Di-N-Propylamine	35	U	4,6-Dinitro-2-Methylphenol	349	U
4-Methylphenol	**5.9**	**J**	N-Nitrosodiphenylamine	35	UJ
Hexachloroethane	35	UJ	1,2-Diphenylhydrazine	35	U
Nitrobenzene	35	UJ	4-Bromophenyl-Phenylether	35	U
Isophorone	35	U	Hexachlorobenzene	35	U
2-Nitrophenol	174	U	Pentachlorophenol	174	U
2,4-Dimethylphenol	35	U	Dibenzothiophene	35	U
Bis(2-Chloroethoxy)Methane	35	U	**Phenanthrene**	**101**	
Benzoic Acid	1396	UJ	**Anthracene**	**25**	**J**
2,4-Dichlorophenol	35	U	Caffeine	35	U
1,2,4-Trichlorobenzene	35	U	**Carbazole**	**9.8**	**J**
Naphthalene	**8.4**	**J**	Phenol, 4-Nonyl-	349	U
4-Chloroaniline		REJ	**2-Methylphenanthrene**	**53**	
Hexachlorobutadiene	35	UJ	**1-Methylphenanthrene**	**65**	
4-Chloro-3-Methylphenol	70	U	Di-N-Butylphthalate	71	U
2-Methylnaphthalene	**8.6**	**J**	**Fluoranthene**	**125**	
1-Methylnaphthalene	**7.1**	**J**	Benzidine	698	U
Hexachlorocyclopentadiene		REJ	**Pyrene**	**110**	
2,4,6-Trichlorophenol	174	U	**Retene**	**13**	**J**
2,4,5-Trichlorophenol	70	U	Butylbenzylphthalate	174	U
1,1'-Biphenyl	**6.5**	**J**	**Benzo(a)anthracene**	**45**	
2-Chloronaphthalene	35	U	3,3'-Dichlorobenzidine	698	U
2,6-Dimethylnaphthalene	**6.1**	**J**	**Chrysene**	**40**	
2-Nitroaniline	349	UJ	Bis(2-Ethylhexyl) Phthalate	70	U
Dimethylphthalate	35	U	Di-N-Octyl Phthalate	174	U
2,6-Dinitrotoluene	35	U	**Benzo(b)fluoranthene**	**54**	**J**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	17	J
Benzo[e]pyrene	20	J
Benzo(a)pyrene	43	
Perylene	32	J
3B-Coprostanol	188	J
Indeno(1,2,3-cd)pyrene	27	J
Dibenzo(a,h)anthracene	22	J
Benzo(ghi)perylene	25	J

Surrogate Recoveries

2-Fluorophenol	57	%
D5-Phenol	59	%
D4-2-Chlorophenol	60	%
1,2-Dichlorobenzene-D4	36	%
D5-Nitrobenzene	41	%
2-Fluorobiphenyl	59	%
D10-Pyrene	71	%
D14-Terphenyl	74	%

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
112801	*Oleic Acid*	357	NJ
57114	*Octadecanoic acid*	215	NJ
57885	*Cholesterol*	718	NJ

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine		NAF	**Acenaphthylene**	**60**	
N-Nitrosodimethylamine	**42**		**3-Nitroaniline**	**29**	
Aniline	**4**		**Acenaphthene**	**54**	
Phenol	**56**		**2,4-Dinitrophenol**	**77**	
Bis(2-Chloroethyl)Ether	**48**		**4-Nitrophenol**	**70**	
2-Chlorophenol	**58**		1,6,7-Trimethylnaphthalene		NAF
1,3-Dichlorobenzene	**41**		**Dibenzofuran**	**59**	
1,4-Dichlorobenzene	**38**		**2,4-Dinitrotoluene**	**56**	
1,2-Dichlorobenzene	**43**		**Diethylphthalate**	**65**	
Benzyl Alcohol	**71**		**Fluorene**	**61**	
2-Methylphenol	**60**		**4-Chlorophenyl-Phenylether**	**63**	
2,2'-Oxybis[1-chloropropane]	**41**		**4-Nitroaniline**	**36**	
N-Nitroso-Di-N-Propylamine	**56**		**4,6-Dinitro-2-Methylphenol**	**73**	
4-Methylphenol	**64**		**N-Nitrosodiphenylamine**	**56**	
Hexachloroethane	**25**		**1,2-Diphenylhydrazine**	**52**	
Nitrobenzene	**54**		**4-Bromophenyl-Phenylether**	**68**	
Isophorone	**57**		**Hexachlorobenzene**	**67**	
2-Nitrophenol	**54**		**Pentachlorophenol**	**71**	
2,4-Dimethylphenol	**77**		Dibenzothiophene		NAF
Bis(2-Chloroethoxy)Methane	**54**		**Phenanthrene**	**57**	
Benzoic Acid	**60**		**Anthracene**	**59**	
2,4-Dichlorophenol	**65**		Caffeine		NAF
1,2,4-Trichlorobenzene	**53**		Carbazole		NAF
Naphthalene	**50**		Phenol, 4-Nonyl-		NAF
4-Chloroaniline	**9**		2-Methylphenanthrene		NAF
Hexachlorobutadiene	**49**		1-Methylphenanthrene		NAF
4-Chloro-3-Methylphenol	**64**		**Di-N-Butylphthalate**	**60**	
2-Methylnaphthalene	**55**		**Fluoranthene**	**61**	
1-Methylnaphthalene		NAF	Benzidine		NAF
Hexachlorocyclopentadiene	**0**		**Pyrene**	**69**	
2,4,6-Trichlorophenol	**65**		Retene		NAF
2,4,5-Trichlorophenol	**67**		**Butylbenzylphthalate**	**73**	
1,1'-Biphenyl		NAF	**Benzo(a)anthracene**	**66**	
2-Chloronaphthalene	**60**		3,3'-Dichlorobenzidine		NAF
2,6-Dimethylnaphthalene		NAF	**Chrysene**	**74**	
2-Nitroaniline	**53**		**Bis(2-Ethylhexyl) Phthalate**	**65**	
Dimethylphthalate	**63**		**Di-N-Octyl Phthalate**	**59**	
2,6-Dinitrotoluene	**58**		**Benzo(b)fluoranthene**	**59**	

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Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** % Recovery

Analyte	Result	Qualifier
Benzo(k)fluoranthene	**68**	
Benzo[e]pyrene		NAF
Benzo(a)pyrene	**69**	
Perylene		NAF
3B-Coprostanol		NAF
Indeno(1,2,3-cd)pyrene	**64**	
Dibenzo(a,h)anthracene	**66**	
Benzo(ghi)perylene	**62**	

Surrogate Recoveries

2-Fluorophenol	**62**	**%**
D5-Phenol	**61**	**%**
D4-2-Chlorophenol	**58**	**%**
1,2-Dichlorobenzene-D4	**33**	**%**
D5-Nitrobenzene	**54**	**%**
2-Fluorobiphenyl	**57**	**%**
D10-Pyrene	**77**	**%**
D14-Terphenyl	**81**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** % Recovery

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine		NAF	**Acenaphthylene**	**55**	
N-Nitrosodimethylamine	**45**		**3-Nitroaniline**	**20**	
Aniline	**3**		**Acenaphthene**	**52**	
Phenol	**54**		**2,4-Dinitrophenol**	**75**	
Bis(2-Chloroethyl)Ether	**45**		**4-Nitrophenol**	**60**	
2-Chlorophenol	**55**		1,6,7-Trimethylnaphthalene		NAF
1,3-Dichlorobenzene	**41**		**Dibenzofuran**	**56**	
1,4-Dichlorobenzene	**43**		**2,4-Dinitrotoluene**	**53**	
1,2-Dichlorobenzene	**45**		**Diethylphthalate**	**61**	
Benzyl Alcohol	**64**		**Fluorene**	**57**	
2-Methylphenol	**56**		**4-Chlorophenyl-Phenylether**	**58**	
2,2'-Oxybis[1-chloropropane]	**39**		**4-Nitroaniline**	**30**	
N-Nitroso-Di-N-Propylamine	**50**		**4,6-Dinitro-2-Methylphenol**	**66**	
4-Methylphenol	**60**		**N-Nitrosodiphenylamine**	**48**	
Hexachloroethane	**25**		**1,2-Diphenylhydrazine**	**50**	
Nitrobenzene	**49**		**4-Bromophenyl-Phenylether**	**61**	
Isophorone	**51**		**Hexachlorobenzene**	**59**	
2-Nitrophenol	**51**		**Pentachlorophenol**	**65**	
2,4-Dimethylphenol	**71**		Dibenzothiophene		NAF
Bis(2-Chloroethoxy)Methane	**52**		**Phenanthrene**	**51**	
Benzoic Acid	**62**		**Anthracene**	**56**	
2,4-Dichlorophenol	**61**		Caffeine		NAF
1,2,4-Trichlorobenzene	**51**		Carbazole		NAF
Naphthalene	**51**		Phenol, 4-Nonyl-		NAF
4-Chloroaniline	**7**		2-Methylphenanthrene		NAF
Hexachlorobutadiene	**49**		1-Methylphenanthrene		NAF
4-Chloro-3-Methylphenol	**58**		**Di-N-Butylphthalate**	**57**	
2-Methylnaphthalene	**55**		**Fluoranthene**	**56**	
1-Methylnaphthalene		NAF	Benzidine		NAF
Hexachlorocyclopentadiene	**0**		**Pyrene**	**65**	
2,4,6-Trichlorophenol	**61**		Retene		NAF
2,4,5-Trichlorophenol	**60**		**Butylbenzylphthalate**	**72**	
1,1'-Biphenyl		NAF	**Benzo(a)anthracene**	**61**	
2-Chloronaphthalene	**56**		3,3'-Dichlorobenzidine		NAF
2,6-Dimethylnaphthalene		NAF	**Chrysene**	**60**	
2-Nitroaniline	**47**		**Bis(2-Ethylhexyl) Phthalate**	**65**	
Dimethylphthalate	**57**		**Di-N-Octyl Phthalate**	**63**	
2,6-Dinitrotoluene	**54**		**Benzo(b)fluoranthene**	**59**	

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** % Recovery

Analyte	Result	Qualifier
Benzo(k)fluoranthene	**64**	
Benzo[e]pyrene		NAF
Benzo(a)pyrene	**65**	
Perylene		NAF
3B-Coprostanol		NAF
Indeno(1,2,3-cd)pyrene	**58**	
Dibenzo(a,h)anthracene	**61**	
Benzo(ghi)perylene	**59**	

Surrogate Recoveries

2-Fluorophenol	**59**	%
D5-Phenol	**57**	%
D4-2-Chlorophenol	**54**	%
1,2-Dichlorobenzene-D4	**37**	%
D5-Nitrobenzene	**49**	%
2-Fluorobiphenyl	**57**	%
D10-Pyrene	**71**	%
D14-Terphenyl	**72**	%

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	103	U	**Acenaphthylene**	**3.9**	**J**
N-Nitrosodimethylamine	258	UJ	3-Nitroaniline	258	UJ
Aniline		REJ	**Acenaphthene**	**3.1**	**J**
Phenol	52	U	2,4-Dinitrophenol	1030	U
Bis(2-Chloroethyl)Ether	**2.5**	**J**	4-Nitrophenol	516	U
2-Chlorophenol	52	U	1,6,7-Trimethylnaphthalene	52	U
1,3-Dichlorobenzene	52	UJ	**Dibenzofuran**	**6.2**	**J**
1,4-Dichlorobenzene	52	U	2,4-Dinitrotoluene	258	U
1,2-Dichlorobenzene	52	UJ	Diethylphthalate	258	U
Benzyl Alcohol	52	U	**Fluorene**	**7.1**	**J**
2-Methylphenol	52	U	4-Chlorophenyl-Phenylether	52	U
2,2'-Oxybis[1-chloropropane]	52	UJ	4-Nitroaniline	516	UJ
N-Nitroso-Di-N-Propylamine	52	U	4,6-Dinitro-2-Methylphenol	516	U
4-Methylphenol	**17**	**J**	N-Nitrosodiphenylamine	52	UJ
Hexachloroethane	52	UJ	1,2-Diphenylhydrazine	52	U
Nitrobenzene	52	UJ	4-Bromophenyl-Phenylether	52	U
Isophorone	52	U	Hexachlorobenzene	52	U
2-Nitrophenol	258	U	Pentachlorophenol	258	U
2,4-Dimethylphenol	52	U	Dibenzothiophene	52	U
Bis(2-Chloroethoxy)Methane	52	U	**Phenanthrene**	**40**	**J**
Benzoic Acid	2060	UJ	**Anthracene**	**11**	**J**
2,4-Dichlorophenol	52	U	Caffeine	52	U
1,2,4-Trichlorobenzene	52	U	Carbazole	52	U
Naphthalene	**7.4**	**J**	Phenol, 4-Nonyl-	516	U
4-Chloroaniline		REJ	2-Methylphenanthrene	52	U
Hexachlorobutadiene	52	UJ	1-Methylphenanthrene	52	U
4-Chloro-3-Methylphenol	103	U	Di-N-Butylphthalate	52	U
2-Methylnaphthalene	**6.7**	**J**	**Fluoranthene**	**119**	
1-Methylnaphthalene	**4.6**	**J**	Benzidine	1030	U
Hexachlorocyclopentadiene		REJ	**Pyrene**	**94**	
2,4,6-Trichlorophenol	258	U	**Retene**	**18**	**J**
2,4,5-Trichlorophenol	103	U	Butylbenzylphthalate	258	U
1,1'-Biphenyl	52	U	**Benzo(a)anthracene**	**32**	**J**
2-Chloronaphthalene	52	U	3,3'-Dichlorobenzidine	1030	U
2,6-Dimethylnaphthalene	**29**	**J**	**Chrysene**	**49**	**J**
2-Nitroaniline	516	UJ	**Bis(2-Ethylhexyl) Phthalate**	**63**	**J**
Dimethylphthalate	52	U	Di-N-Octyl Phthalate	258	U
2,6-Dinitrotoluene	52	U	**Benzo(b)fluoranthene**	**52**	**J**

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	14	J
Benzo[e]pyrene	20	J
Benzo(a)pyrene	18	J
Perylene	42	J
3B-Coprostanol	297	J
Indeno(1,2,3-cd)pyrene	11	J
Dibenzo(a,h)anthracene	28	J
Benzo(ghi)perylene	6.9	J

Surrogate Recoveries

2-Fluorophenol	56	%
D5-Phenol	58	%
D4-2-Chlorophenol	57	%
1,2-Dichlorobenzene-D4	31	%
D5-Nitrobenzene	38	%
2-Fluorobiphenyl	54	%
D10-Pyrene	68	%
D14-Terphenyl	71	%

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
544638	*Tetradecanoic acid*	522	NJ
334485	*Decanoic acid*	1000	NJ
2091294	*9-Hexadecenoic acid*	4620	NJ
57103	*Hexadecanoic acid*	5860	NJ
57114	*Octadecanoic acid*	659	NJ
506309	*Eicosanoic acid*	188	NJ
112856	*Docosanoic acid*	610	NJ
77899037	*1-Heneicosyl formate*	1030	NJ
57885	*Cholesterol*	2940	NJ

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON E **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	157	U	**Acenaphthylene**	**2.8**	**J**
N-Nitrosodimethylamine	392	UJ	3-Nitroaniline	392	UJ
Aniline		REJ	**Acenaphthene**	**4**	**J**
Phenol	78	U	2,4-Dinitrophenol	1570	U
Bis(2-Chloroethyl)Ether	78	UJ	4-Nitrophenol	784	U
2-Chlorophenol	78	U	1,6,7-Trimethylnaphthalene	78	U
1,3-Dichlorobenzene	78	UJ	**Dibenzofuran**	**5.9**	**J**
1,4-Dichlorobenzene	78	U	2,4-Dinitrotoluene	392	U
1,2-Dichlorobenzene	78	UJ	Diethylphthalate	392	U
Benzyl Alcohol	78	U	**Fluorene**	**5.8**	**J**
2-Methylphenol	78	U	4-Chlorophenyl-Phenylether	78	U
2,2'-Oxybis[1-chloropropane]	78	UJ	4-Nitroaniline	784	UJ
N-Nitroso-Di-N-Propylamine	78	U	4,6-Dinitro-2-Methylphenol	784	U
4-Methylphenol	**44**	**J**	N-Nitrosodiphenylamine	78	UJ
Hexachloroethane	78	UJ	1,2-Diphenylhydrazine	78	U
Nitrobenzene	78	UJ	4-Bromophenyl-Phenylether	78	U
Isophorone	78	U	Hexachlorobenzene	78	U
2-Nitrophenol	392	U	Pentachlorophenol	392	U
2,4-Dimethylphenol	78	U	Dibenzothiophene	78	U
Bis(2-Chloroethoxy)Methane	78	U	**Phenanthrene**	**18**	**J**
Benzoic Acid	**1890**	**J**	**Anthracene**	**6.1**	**J**
2,4-Dichlorophenol	78	U	Caffeine	78	U
1,2,4-Trichlorobenzene	78	U	Carbazole	78	U
Naphthalene	**11**	**J**	Phenol, 4-Nonyl-	784	U
4-Chloroaniline		REJ	2-Methylphenanthrene	78	U
Hexachlorobutadiene	78	U	1-Methylphenanthrene	78	U
4-Chloro-3-Methylphenol	157	U	Di-N-Butylphthalate	83	U
2-Methylnaphthalene	**9.5**	**J**	**Fluoranthene**	**38**	**J**
1-Methylnaphthalene	78	U	Benzidine	1570	UJ
Hexachlorocyclopentadiene		REJ	**Pyrene**	**33**	**J**
2,4,6-Trichlorophenol	392	U	**Retene**	**16**	**J**
2,4,5-Trichlorophenol	157	U	Butylbenzylphthalate	392	U
1,1'-Biphenyl	78	U	Benzo(a)anthracene	78	U
2-Chloronaphthalene	78	U	3,3'-Dichlorobenzidine	1570	U
2,6-Dimethylnaphthalene	**4.5**	**J**	**Chrysene**	**22**	**J**
2-Nitroaniline	784	UJ	Bis(2-Ethylhexyl) Phthalate	157	U
Dimethylphthalate	78	U	Di-N-Octyl Phthalate	392	U
2,6-Dinitrotoluene	78	U	**Benzo(b)fluoranthene**	**40**	**J**

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BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON E **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	**8.3**	**J**
Benzo[e]pyrene	**13**	**J**
Benzo(a)pyrene	**13**	**J**
Perylene	**38**	**J**
3B-Coprostanol	**432**	**J**
Indeno(1,2,3-cd)pyrene	**9.7**	**J**
Dibenzo(a,h)anthracene	78	U
Benzo(ghi)perylene	392	U

Surrogate Recoveries

2-Fluorophenol	**63**	**%**
D5-Phenol	**64**	**%**
D4-2-Chlorophenol	**61**	**%**
1,2-Dichlorobenzene-D4	**44**	**%**
D5-Nitrobenzene	**45**	**%**
2-Fluorobiphenyl	**59**	**%**
D10-Pyrene	**74**	**%**
D14-Terphenyl	**76**	**%**

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BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON E **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/25/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
544638	*Tetradecanoic acid*	898	NJ
5746587	*Tetradecanoic acid, 12-methyl-, (S)-*	986	NJ
112801	*Oleic Acid*	772	NJ
57114	*Octadecanoic acid*	781	NJ
57885	*Cholesterol*	4240	NJ
80977	*Cholestanol*	846	NJ
34347289	*Cholesta-5,22-dien-3-ol, (3.beta.)-*	1040	NJ
83476	*.gamma.-Sitosterol*	2110	NJ

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON MID **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	121	U	**Acenaphthylene**	**6.4**	**J**
N-Nitrosodimethylamine	303	UJ	3-Nitroaniline	303	UJ
Aniline		REJ	**Acenaphthene**	**4.2**	**J**
Phenol	61	U	2,4-Dinitrophenol	1210	U
Bis(2-Chloroethyl)Ether	61	UJ	4-Nitrophenol	605	U
2-Chlorophenol	61	U	1,6,7-Trimethylnaphthalene	61	U
1,3-Dichlorobenzene	61	UJ	**Dibenzofuran**	**8.1**	**J**
1,4-Dichlorobenzene	61	U	2,4-Dinitrotoluene	303	U
1,2-Dichlorobenzene	61	UJ	Diethylphthalate	303	U
Benzyl Alcohol	61	U	**Fluorene**	**7.7**	**J**
2-Methylphenol	61	U	4-Chlorophenyl-Phenylether	61	U
2,2'-Oxybis[1-chloropropane]	61	UJ	4-Nitroaniline	605	UJ
N-Nitroso-Di-N-Propylamine	61	U	4,6-Dinitro-2-Methylphenol	605	U
4-Methylphenol	**16**	**J**	N-Nitrosodiphenylamine	61	UJ
Hexachloroethane	61	UJ	1,2-Diphenylhydrazine	61	U
Nitrobenzene	61	UJ	4-Bromophenyl-Phenylether	61	U
Isophorone	61	U	Hexachlorobenzene	61	U
2-Nitrophenol	303	U	Pentachlorophenol	303	U
2,4-Dimethylphenol	61	U	Dibenzothiophene	61	U
Bis(2-Chloroethoxy)Methane	61	U	**Phenanthrene**	**30**	**J**
Benzoic Acid	2420	UJ	**Anthracene**	**9.1**	**J**
2,4-Dichlorophenol	61	U	Caffeine	61	U
1,2,4-Trichlorobenzene	61	U	Carbazole	61	U
Naphthalene	**8.7**	**J**	Phenol, 4-Nonyl-	605	U
4-Chloroaniline		REJ	2-Methylphenanthrene	61	U
Hexachlorobutadiene	61	UJ	1-Methylphenanthrene	61	U
4-Chloro-3-Methylphenol	121	U	Di-N-Butylphthalate	61	U
2-Methylnaphthalene	**11**	**J**	**Fluoranthene**	**53**	**J**
1-Methylnaphthalene	**6.6**	**J**	Benzidine	1210	U
Hexachlorocyclopentadiene		REJ	**Pyrene**	**51**	**J**
2,4,6-Trichlorophenol	303	U	**Retene**	**22**	**J**
2,4,5-Trichlorophenol	121	U	Butylbenzylphthalate	303	U
1,1'-Biphenyl	61	U	Benzo(a)anthracene	61	U
2-Chloronaphthalene	61	U	3,3'-Dichlorobenzidine	1210	U
2,6-Dimethylnaphthalene	**14**	**J**	Chrysene	121	U
2-Nitroaniline	605	UJ	**Bis(2-Ethylhexyl) Phthalate**	**119**	**J**
Dimethylphthalate	61	U	Di-N-Octyl Phthalate	303	U
2,6-Dinitrotoluene	61	U	**Benzo(b)fluoranthene**	**45**	**J**

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON MID **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	**14**	**J**
Benzo[e]pyrene	**16**	**J**
Benzo(a)pyrene	**17**	**J**
Perylene	**46**	**J**
3B-Coprostanol	**731**	**J**
Indeno(1,2,3-cd)pyrene	**17**	**J**
Dibenzo(a,h)anthracene	61	U
Benzo(ghi)perylene	**12**	**J**

Surrogate Recoveries

2-Fluorophenol	**49**	**%**
D5-Phenol	**52**	**%**
D4-2-Chlorophenol	**48**	**%**
1,2-Dichlorobenzene-D4	**28**	**%**
D5-Nitrobenzene	**24**	**%**
2-Fluorobiphenyl	**51**	**%**
D10-Pyrene	**76**	**%**
D14-Terphenyl	**74**	**%**

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON MID **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
1534083	*Ethanethioic acid, S-methyl ester*	811	NJ
334485	*Decanoic acid*	1800	NJ
112390	*Hexadecanoic acid, methyl ester*	1070	NJ
10157763	*Benzenesulfonic acid, 4-methyl-, dodecyl ester*	473	NJ
1654860	*Decanoic acid, decyl ester*	2200	NJ
57885	*Cholesterol*	8940	NJ
17472785	*Ergosta-5,22-dien-3-ol, (3.beta.,22E,24S*	2470	NJ
83476	*.gamma.-Sitosterol*	12600	NJ

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON W **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	509	U	Acenaphthylene	254	U
N-Nitrosodimethylamine	1270	UJ	3-Nitroaniline	1270	UJ
Aniline		REJ	**Acenaphthene**	**144**	**J**
Phenol	**820**		2,4-Dinitrophenol	5090	U
Bis(2-Chloroethyl)Ether	254	UJ	**4-Nitrophenol**	**570**	**J**
2-Chlorophenol	254	U	**1,6,7-Trimethylnaphthalene**	**515**	
1,3-Dichlorobenzene	254	UJ	**Dibenzofuran**	**81**	**J**
1,4-Dichlorobenzene	254	U	2,4-Dinitrotoluene	1270	U
1,2-Dichlorobenzene	254	UJ	Diethylphthalate	1270	U
Benzyl Alcohol	254	U	**Fluorene**	**140**	**J**
2-Methylphenol	**1740**		4-Chlorophenyl-Phenylether	254	U
2,2'-Oxybis[1-chloropropane]	254	UJ	4-Nitroaniline	2540	UJ
N-Nitroso-Di-N-Propylamine	254	U	4,6-Dinitro-2-Methylphenol	2540	U
4-Methylphenol	**7950**		N-Nitrosodiphenylamine	254	UJ
Hexachloroethane	254	UJ	1,2-Diphenylhydrazine	254	U
Nitrobenzene	254	UJ	4-Bromophenyl-Phenylether	254	U
Isophorone	254	U	Hexachlorobenzene	254	U
2-Nitrophenol	1270	U	Pentachlorophenol	1270	U
2,4-Dimethylphenol	**5580**		**Dibenzothiophene**	**145**	**J**
Bis(2-Chloroethoxy)Methane	254	U	**Phenanthrene**	**390**	
Benzoic Acid	10200	U	Anthracene	254	U
2,4-Dichlorophenol	254	U	Caffeine	254	U
1,2,4-Trichlorobenzene	254	U	Carbazole	254	U
Naphthalene	**386**		Phenol, 4-Nonyl-	2540	U
4-Chloroaniline		REJ	2-Methylphenanthrene	254	U
Hexachlorobutadiene	254	UJ	1-Methylphenanthrene	254	U
4-Chloro-3-Methylphenol	509	U	Di-N-Butylphthalate	254	U
2-Methylnaphthalene	**1330**		Fluoranthene	254	U
1-Methylnaphthalene	**986**		Benzidine	5090	U
Hexachlorocyclopentadiene		REJ	Pyrene	254	U
2,4,6-Trichlorophenol	1270	U	Retene	254	U
2,4,5-Trichlorophenol	509	U	**Butylbenzylphthalate**	**2970**	**J**
1,1'-Biphenyl	254	U	Benzo(a)anthracene	254	U
2-Chloronaphthalene	254	U	3,3'-Dichlorobenzidine	5090	U
2,6-Dimethylnaphthalene	**1120**		**Chrysene**	**151**	**J**
2-Nitroaniline	2540	UJ	Bis(2-Ethylhexyl) Phthalate	771	U
Dimethylphthalate	254	U	Di-N-Octyl Phthalate	1270	U
2,6-Dinitrotoluene	254	U	Benzo(b)fluoranthene	1270	U

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Analysis Report for

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON W **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	254	U
Benzo[e]pyrene	254	U
Benzo(a)pyrene	254	U
Perylene	254	U
3B-Coprostanol	5090	U
Indeno(1,2,3-cd)pyrene	1270	U
Dibenzo(a,h)anthracene	254	U
Benzo(ghi)perylene	1270	U

Surrogate Recoveries

2-Fluorophenol	**59**	**%**
D5-Phenol	**63**	**%**
D4-2-Chlorophenol	**61**	**%**
1,2-Dichlorobenzene-D4	**39**	**%**
D5-Nitrobenzene	**54**	**%**
2-Fluorobiphenyl	**67**	**%**
D10-Pyrene	**58**	**%**
D14-Terphenyl	**251**	**%**

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Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/07/98 **Method:** SW8270
Field ID: LAGOON W **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Tentatively Identified Compounds

CAS Number	Analyte Description	Result	Qualifier
100538	*Benzenemethanethiol*	104000	NJ
38360815	*3,5-Dimethylthiophenol*	16700	NJ
18800538	*3,4-Dimethylthiophenol*	13400	NJ
118729	*2,6-Dimethylthiophenol*	18400	NJ
13616825	*2,4-Dimethylthiophenol*	12600	NJ
622639	*Benzene, 1-(ethylthio)-4-methyl-*	7580	NJ
2381217	*Pyrene, 1-methyl-*	21500	NJ
139651	*Benzenamine, 4,4'-thiobis-*	29500	NJ
257976	*Benzo(b)phenazine*	74700	NJ
21905668	*Benzoic acid, 2-(4-hydroxyphenoxy)-, methyl ester*	68900	NJ
41555162	*4,7-Benzofurandione, 3-(hydroxymethyl)-6-methoxy-5-*	39800	NJ

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Analysis Report for

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Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A1 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	86	U	Acenaphthylene	43	U
N-Nitrosodimethylamine	216	U	3-Nitroaniline	216	U
Aniline	43	U	Acenaphthene	43	U
Phenol	**24**	**J**	2,4-Dinitrophenol	864	U
Bis(2-Chloroethyl)Ether	43	U	4-Nitrophenol	432	U
2-Chlorophenol	43	U	1,6,7-Trimethylnaphthalene	43	U
1,3-Dichlorobenzene	43	U	Dibenzofuran	43	U
1,4-Dichlorobenzene	43	U	2,4-Dinitrotoluene	216	U
1,2-Dichlorobenzene	43	U	Diethylphthalate	216	U
Benzyl Alcohol	43	U	Fluorene	43	U
2-Methylphenol	43	U	**4-Chlorophenyl-Phenylether**	**2.6**	**J**
2,2'-Oxybis[1-chloropropane]	43	U	4-Nitroaniline	432	U
N-Nitroso-Di-N-Propylamine	43	U	4,6-Dinitro-2-Methylphenol	432	U
4-Methylphenol	43	U	N-Nitrosodiphenylamine	43	U
Hexachloroethane	43	U	1,2-Diphenylhydrazine	43	U
Nitrobenzene	43	U	4-Bromophenyl-Phenylether	43	U
Isophorone	43	U	Hexachlorobenzene	43	U
2-Nitrophenol	216	U	Pentachlorophenol	216	U
2,4-Dimethylphenol	43	U	Dibenzothiophene	43	U
Bis(2-Chloroethoxy)Methane	43	U	Phenanthrene	43	U
Benzoic Acid	**1160**	**J**	Anthracene	43	U
2,4-Dichlorophenol	43	U	Caffeine	43	U
1,2,4-Trichlorobenzene	43	U	Carbazole	43	U
Naphthalene	43	U	Phenol, 4-Nonyl-	432	U
4-Chloroaniline	43	U	2-Methylphenanthrene	43	U
Hexachlorobutadiene	43	U	1-Methylphenanthrene	43	U
4-Chloro-3-Methylphenol	86	U	**Di-N-Butylphthalate**	**11**	**J**
2-Methylnaphthalene	43	U	Fluoranthene	43	U
1-Methylnaphthalene	43	U	Benzidine	864	U
Hexachlorocyclopentadiene	432	UJ	Pyrene	43	U
2,4,6-Trichlorophenol	216	U	Retene	43	U
2,4,5-Trichlorophenol	86	U	**Butylbenzylphthalate**	**2.7**	**J**
1,1'-Biphenyl	**5.5**	**J**	Benzo(a)anthracene	43	U
2-Chloronaphthalene	43	U	3,3'-Dichlorobenzidine	864	U
2,6-Dimethylnaphthalene	43	U	Chrysene	43	U
2-Nitroaniline	432	U	**Bis(2-Ethylhexyl) Phthalate**	**56**	**J**
Dimethylphthalate	43	U	Di-N-Octyl Phthalate	216	U
2,6-Dinitrotoluene	43	U	Benzo(b)fluoranthene	216	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A1 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	43	U
Benzo[e]pyrene	43	U
Benzo(a)pyrene	43	U
Perylene	**3.6**	**J**
3B-Coprostanol	864	U
Indeno(1,2,3-cd)pyrene	216	U
Dibenzo(a,h)anthracene	43	U
Benzo(ghi)perylene	216	U

Surrogate Recoveries

2-Fluorophenol	**55**	**%**
D5-Phenol	**57**	**%**
D4-2-Chlorophenol	**57**	**%**
1,2-Dichlorobenzene-D4	**55**	**%**
D5-Nitrobenzene	**57**	**%**
2-Fluorobiphenyl	**57**	**%**
D10-Pyrene	**68**	**%**
D14-Terphenyl	**68**	**%**

Authorized By: _____ Release Date: 11/2/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A2 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	86	U	Acenaphthylene	43	U
N-Nitrosodimethylamine	216	U	3-Nitroaniline	216	U
Aniline	43	U	Acenaphthene	43	U
Phenol	**12**	**J**	2,4-Dinitrophenol	864	U
Bis(2-Chloroethyl)Ether	43	U	4-Nitrophenol	432	U
2-Chlorophenol	43	U	1,6,7-Trimethylnaphthalene	43	U
1,3-Dichlorobenzene	43	U	Dibenzofuran	43	U
1,4-Dichlorobenzene	43	U	2,4-Dinitrotoluene	216	U
1,2-Dichlorobenzene	43	U	Diethylphthalate	216	U
Benzyl Alcohol	43	U	Fluorene	43	U
2-Methylphenol	43	U	4-Chlorophenyl-Phenylether	43	U
2,2'-Oxybis[1-chloropropane]	43	U	4-Nitroaniline	432	U
N-Nitroso-Di-N-Propylamine	43	U	4,6-Dinitro-2-Methylphenol	432	U
4-Methylphenol	43	U	N-Nitrosodiphenylamine	43	U
Hexachloroethane	43	U	1,2-Diphenylhydrazine	43	U
Nitrobenzene	43	U	4-Bromophenyl-Phenylether	43	U
Isophorone	43	U	Hexachlorobenzene	43	U
2-Nitrophenol	216	U	Pentachlorophenol	216	U
2,4-Dimethylphenol	43	U	Dibenzothiophene	43	U
Bis(2-Chloroethoxy)Methane	43	U	Phenanthrene	43	U
Benzoic Acid	**966**	**J**	Anthracene	43	U
2,4-Dichlorophenol	43	U	Caffeine	43	U
1,2,4-Trichlorobenzene	43	U	Carbazole	43	U
Naphthalene	43	U	Phenol, 4-Nonyl-	432	U
4-Chloroaniline	43	U	2-Methylphenanthrene	43	U
Hexachlorobutadiene	43	U	1-Methylphenanthrene	43	U
4-Chloro-3-Methylphenol	86	U	**Di-N-Butylphthalate**	**10**	**J**
2-Methylnaphthalene	43	U	Fluoranthene	43	U
1-Methylnaphthalene	43	U	Benzidine	864	U
Hexachlorocyclopentadiene	432	UJ	Pyrene	43	U
2,4,6-Trichlorophenol	216	U	Retene	43	U
2,4,5-Trichlorophenol	86	U	**Butylbenzylphthalate**	**2.7**	**J**
1,1'-Biphenyl	**4.2**	**J**	Benzo(a)anthracene	43	U
2-Chloronaphthalene	43	U	3,3'-Dichlorobenzidine	864	U
2,6-Dimethylnaphthalene	43	U	Chrysene	43	U
2-Nitroaniline	432	U	**Bis(2-Ethylhexyl) Phthalate**	**39**	**J**
Dimethylphthalate	43	U	Di-N-Octyl Phthalate	216	U
2,6-Dinitrotoluene	43	U	Benzo(b)fluoranthene	216	U

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A2 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/22/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	43	U
Benzo[e]pyrene	43	U
Benzo(a)pyrene	43	U
Perylene	43	U
3B-Coprostanol	864	U
Indeno(1,2,3-cd)pyrene	216	U
Dibenzo(a,h)anthracene	43	U
Benzo(ghi)perylene	216	U

Surrogate Recoveries

2-Fluorophenol	**53**	**%**
D5-Phenol	**55**	**%**
D4-2-Chlorophenol	**54**	**%**
1,2-Dichlorobenzene-D4	**53**	**%**
D5-Nitrobenzene	**56**	**%**
2-Fluorobiphenyl	**57**	**%**
D10-Pyrene	**63**	**%**
D14-Terphenyl	**67**	**%**

Authorized By: _____ Release Date: 11/2/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8233A1 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier	Analyte	Result	Qualifier
Pyridine	55	U	Acenaphthylene	28	U
N-Nitrosodimethylamine	138	U	3-Nitroaniline	138	U
Aniline	28	U	Acenaphthene	28	U
Phenol	28	U	2,4-Dinitrophenol	553	U
Bis(2-Chloroethyl)Ether	28	U	4-Nitrophenol	277	U
2-Chlorophenol	28	U	1,6,7-Trimethylnaphthalene	28	U
1,3-Dichlorobenzene	28	U	Dibenzofuran	28	U
1,4-Dichlorobenzene	28	U	2,4-Dinitrotoluene	138	U
1,2-Dichlorobenzene	28	U	Diethylphthalate	138	U
Benzyl Alcohol	28	U	Fluorene	28	U
2-Methylphenol	28	U	4-Chlorophenyl-Phenylether	28	U
2,2'-Oxybis[1-chloropropane]	28	U	4-Nitroaniline	277	U
N-Nitroso-Di-N-Propylamine	28	U	4,6-Dinitro-2-Methylphenol	277	U
4-Methylphenol	28	U	N-Nitrosodiphenylamine	28	U
Hexachloroethane	28	UJ	1,2-Diphenylhydrazine	28	U
Nitrobenzene	28	U	4-Bromophenyl-Phenylether	28	U
Isophorone	28	U	Hexachlorobenzene	28	U
2-Nitrophenol	138	U	Pentachlorophenol	138	U
2,4-Dimethylphenol	28	U	Dibenzothiophene	28	U
Bis(2-Chloroethoxy)Methane	28	U	Phenanthrene	28	U
Benzoic Acid	1110	UJ	Anthracene	28	U
2,4-Dichlorophenol	28	U	Caffeine	28	U
1,2,4-Trichlorobenzene	28	U	Carbazole	28	U
Naphthalene	28	U	Phenol, 4-Nonyl-	277	U
4-Chloroaniline	28	U	2-Methylphenanthrene	28	U
Hexachlorobutadiene	28	U	1-Methylphenanthrene	28	U
4-Chloro-3-Methylphenol	55	U	**Di-N-Butylphthalate**	**12**	**J**
2-Methylnaphthalene	28	U	Fluoranthene	28	U
1-Methylnaphthalene	28	U	Benzidine	553	UJ
Hexachlorocyclopentadiene	277	U	Pyrene	28	U
2,4,6-Trichlorophenol	138	U	Retene	28	U
2,4,5-Trichlorophenol	55	U	Butylbenzylphthalate	138	U
1,1'-Biphenyl	**2.6**	**J**	Benzo(a)anthracene	28	U
2-Chloronaphthalene	28	U	3,3'-Dichlorobenzidine	553	U
2,6-Dimethylnaphthalene	28	U	Chrysene	28	U
2-Nitroaniline	277	U	**Bis(2-Ethylhexyl) Phthalate**	**29**	**J**
Dimethylphthalate	28	U	Di-N-Octyl Phthalate	138	U
2,6-Dinitrotoluene	28	U	Benzo(b)fluoranthene	138	U

Authorized By: _____ Release Date: 11/2/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

BNA FOR NOAA

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8233A1 **Method:** SW8270
QC Type: Laboratory Method Blank **Date Prepared:** 08/21/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 09/25/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
Benzo(k)fluoranthene	28	U
Benzo[e]pyrene	28	U
Benzo(a)pyrene	28	U
Perylene	28	U
3B-Coprostanol	553	U
Indeno(1,2,3-cd)pyrene	138	U
Dibenzo(a,h)anthracene	28	U
Benzo(ghi)perylene	138	U

Surrogate Recoveries

2-Fluorophenol	**54**	**%**
D5-Phenol	**57**	**%**
D4-2-Chlorophenol	**56**	**%**
1,2-Dichlorobenzene-D4	**56**	**%**
D5-Nitrobenzene	**56**	**%**
2-Fluorobiphenyl	**57**	**%**
D10-Pyrene	**69**	**%**
D14-Terphenyl	**72**	**%**

Authorized By: _____ Release Date: 11/2/98

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard Washington 98366

CASE NARRATIVE

November 18, 1998

Subject: Whitmarsh Landfill
Samples: 98328000 - 004
Case No. 25529
Officer: Art Johnson
By: Greg Perez
Organics Analysis Unit

POLYCHLORINATED BIPHENYLS

SUMMARY:

No target analytes were detected in these samples. Sample 98328004 contained high levels of a hydrocarbon mixture with a pattern similar to mineral spirits. This interfered with some of the arochlors, particularly 1242, necessitating raising the quantitation limits.

ANALYTICAL METHODS:

The solid samples were Soxhlet extracted using acetone as the solvent. The water samples were extracted using methylene chloride. The samples were treated with mercury to remove sulfur and then treated with sulfuric acid to remove interferences. Analysis was done by Method 8080 using dual column capillary GC analysis with Electron Capture Detectors (ECD).

BLANKS:

No target compounds were detected in the laboratory blanks.

SURROGATES:

Surrogate recoveries for the water samples were low. This may indicate a low bias for the analyte concentrations. Surrogate recoveries for the sediment samples were acceptable.

HOLDING TIMES:

The samples were analyzed within the recommended holding time.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE:

No matrix spikes were analyzed with these samples.

DATA QUALIFIER CODES:

U	-	The analyte was not detected at or above the reported value.
J	-	The analyte was positively identified. The associated numerical value is an estimate.
UJ	-	The analyte was not detected at or above the reported estimated result.
REJ	-	The data are unusable for all purposes.
NAF	-	Not analyzed for.
N	-	For organic analytes there is evidence the analyte is present in this sample.
NJ	-	There is evidence that the analyte is present. The associated numerical result is an estimate.
E	-	This qualifier is used when the concentration of the associated value exceeds the known calibration range.
bold	-	The analyte was present in the sample. (Visual Aid to locate detected compound on report sheet.)

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.1	U
PCB - 1221	1.1	U
PCB - 1232	1.1	U
PCB - 1242	1.1	U
PCB - 1248	1.1	U
PCB - 1254	1.1	U
PCB - 1260	1.1	U

Surrogate Recoveries

Tetrachloro-m-xylene	**58**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**40**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX1) **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** % Recovery

Analyte	Result	Qualifier
PCB - 1260	65	

Surrogate Recoveries

Tetrachloro-m-xylene	52	%
2,2',4,4',5,5'-Br6Biphenyl	24	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328000 (Matrix Spike - LMX2) **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: SAMISH **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** % Recovery

Analyte	Result	Qualifier
PCB - 1260	65	

Surrogate Recoveries

Tetrachloro-m-xylene	52	%
2,2',4,4',5,5'-Br6Biphenyl	41	%

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328001 **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: PADILLA **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.6	U
PCB - 1221	1.6	U
PCB - 1232	1.6	U
PCB - 1242	1.6	U
PCB - 1248	1.6	U
PCB - 1254	1.6	U
PCB - 1260	1.6	U

Surrogate Recoveries

Tetrachloro-m-xylene	**59**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**31**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328002 **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: LAGOON E **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.3	U
PCB - 1221	1.3	U
PCB - 1232	1.3	U
PCB - 1242	1.3	U
PCB - 1248	1.3	U
PCB - 1254	1.3	U
PCB - 1260	1.3	U

Surrogate Recoveries

Tetrachloro-m-xylene	**58**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**41**	**%**

Authorized By: _____ Release Date: 11/17/98

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328003 **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: LAGOON MID **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016		U
PCB - 1221		U
PCB - 1232		U
PCB - 1242		U
PCB - 1248		U
PCB - 1254		U
PCB - 1260		U

Surrogate Recoveries

Tetrachloro-m-xylene	**59**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**38**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Sample: 98328004 **Date Collected:** 08/10/98 **Method:** SW8080
Field ID: LAGOON W **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.6	UJ
PCB - 1221	1.6	UJ
PCB - 1232	22	UJ
PCB - 1242	2100	UJ
PCB - 1248	63	UJ
PCB - 1254	490	UJ
PCB - 1260	7.9	UJ

Surrogate Recoveries

Tetrachloro-m-xylene	**72**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**70**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A1 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.1	U
PCB - 1221	1.1	U
PCB - 1232	1.1	U
PCB - 1242	1.1	U
PCB - 1248	1.1	U
PCB - 1254	1.1	U
PCB - 1260	1.1	U

Surrogate Recoveries

Tetrachloro-m-xylene	**82**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**84**	**%**

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Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Polychlorinated Biphenyls

Project Name: Whitmarsh Landfill **LIMS Project ID:** 2552-98

Lab ID: OBS8225A2 **Method:** SW8080
QC Type: Laboratory Method Blank **Date Prepared:** 08/13/98 **Matrix:** Sediment/Soil
Project Officer: Art Johnson **Date Analyzed:** 08/27/98 **Units:** ug/Kg dw

Analyte	Result	Qualifier
PCB - 1016	1.1	U
PCB - 1221	1.1	U
PCB - 1232	1.1	U
PCB - 1242	1.1	U
PCB - 1248	1.1	U
PCB - 1254	1.1	U
PCB - 1260	1.1	U

Surrogate Recoveries

Tetrachloro-m-xylene	**68**	**%**
2,2',4,4',5,5'-Br6Biphenyl	**71**	**%**

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

Data Review
October 21, 1998

Project: Whitmarsh Landfill

Samples: 98328000 - 98328004

Laboratory: MAXIM Technologies/Pace Analytical

By: Stuart Magoon

Data Review for Polychlorodibenzo-p-dioxin and furan
(2,3,7,8 substituted tetra - octa PCDD/PCDF)

Data from these analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness, following the National Functional Guidelines for Organic Data Review adapted for high resolution dioxin analysis, and the EPA Region 10 SOP for the Validation of PCDD/PCDF.

Samples were prepared and analyzed according to EPA method 8290.

These samples have been reported in nanograms per kilogram (ng/Kg); parts per trillion dry weight.

MAXIM Technologies was acquired by Pace Analytical in September.
MAXIM/Pace have developed their own data "flags". Definitions of the "flags" and qualifiers are included in the report.

Flags are added by the laboratory performing the analysis, usually the analyst. Qualifiers are added by the data reviewer as part of addressing the usability of the data. Generally flags signal the reviewer to access the results and determine what to do about the fact that flags were added. For your reporting purposes the "flags" should not be considered part of the final result. The qualifiers, however, are to be considered part of the final result.

There is a number reported for each analyte that appears in one or two columns. If the number appears in the column labeled "CONC" then this analyte has been detected at the concentration reported. The number in the column labeled "LOD", is the estimated

detection limit as defined in EPA method 8290, at or above which the analyte was not detected. There is an "ND", short for not detected, that appears in the "CONC" column whenever an analyte is not detected. In order to be consistent with Manchester Environmental Laboratory's reporting convention, a result reported as ND with an associated number in the Limit of Detection column, e.g. 0.31, should be considered synonymous with 0.31 U, where "U" is a qualifier.

PCDD/PCDF Analysis

Holding times:

EPA method 8290 specifies a holding time of thirty days (30) from the date of collection to the date of extraction; and forty-five (45) days from extraction to analysis.

Sample no.	Collect date	Extraction date	#days from collection to Extraction	Analysis date	#days from Extraction to Analysis
98328000	08/07/98	08/13/98	6	09/01/98	18
98328000Dup	08/07/98	08/25/98	18	09/15/98	20
98328001	08/07/98	08/13/98	6	09/01/98	18
98328002	08/07/98	08/13/98	6	09/01/98	18
98328003	08/07/98	08/13/98	6	09/01/98	18
98328004	08/07/98	08/13/98	6	09/01/98	18

These samples were extracted and analyzed within holding times.

Method Blank:

Small amounts of some target congeners were detected in the associated method blanks. The concentrations are below that of the lowest calibration standard. According to the method re-analysis is not required when a target congener is detected below the lowest calibration standard. These congeners were also detected most of the samples. If the concentration of a congener in a sample was less than five times that of the method blank a "U" qualifier was added to the result. In cases where the sample concentration for a congener is greater than five times that of the method blank, the method blank result is considered insignificant relative to the concentration detected in the samples. No qualification is warranted in these situations.

Calibration:

The calibration standards were within 20% relative standard deviations (RSD) for all target analytes and 30% for all the reference compounds. All the ion abundance ratios were within +/- 15% of the theoretical value.

Internal Standard Recoveries:

Internal standard recoveries for these samples were within the 40 – 135% QC limits established for each congener, with a few exceptions. As noted in the Discussion section (page 7) of the report from Pace analytical, the internal standard 1234678-HpCDF-^{13}C recoveries for all the samples were not within control limits. Three samples were affected with low 1234678-HpCDF-^{13}C recoveries.

Note that the limit of detection was elevated for 1234678-HpCDF where 1234678-HpCDF-^{13}C recoveries were below 40%. The non-detect results were qualified as estimates ("UJ").

Ion abundance ratios:

Each dioxin and furan isomer reported as detected met the isotopic abundance ratio and retention time criteria for positive identification.

Matrix Spike/Matrix Spike Duplicate (MS/MSD):

MS/MSD recoveries were within quality control limits of 60–140%; and precision data was within ±20 relative percent difference (RPD).

Sample Duplicate:

Sample 98328000 was analyzed twice. The Laboratory forgot to perform matrix spikes in accordance to the work request when the samples were extracted on August 13th. When the Laboratory noticed they forgot to perform matrix spikes on sample 98328000 they set up a new extraction batch, that included a re-analysis of sample 98328000.

Very low levels of dioxins and furans were detected in both the original and duplicate analysis of this sample. Relative percent differences (RPD) for the four 2,3,7,8 substituted congeners detected in both analyses ranged from 45 – 81%. RPDs for all the PCDD/PCDF's that were positively identified in both analyses ranged from 24 – 154%. Variability for all, but total PeCDD and total HxCDF, results are higher than the 25% RPD limit specified by the method 8290. The RPD for the total equivalence is 26%. Results exceeding the RPD limit of 25% have been qualified as estimates ("J").

Summary:

This data is acceptable for use as amended. A number of congeners were qualified with a "J" because the concentration detected was below the lowest calibration standard; results derived from responses outside the calibration range are considered estimates.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

REPORT OF: CHEMICAL ANALYSES

PROJECT: PCDD/PCDF ANALYSES **DATE:** September 18, 1998

ISSUED TO: Washington State Dept. of Ecology
Attn: Mr. Stuart Magoen
7411 Beach Drive East
Port Orchard, WA 98366-8204

REPORT NO: 3030 98-61617

INTRODUCTION

This report presents the results from the analyses performed on five samples which were submitted by a representative of the Washington State Dept. of Ecology. The samples were analyzed for the presence or absence of polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) using a modified version of USEPA Method 8290 as described below.

SAMPLE IDENTIFICATION

Client ID	Sample Type	Date Received	TCT ID
98328000	Solid	08/12/98	66021
98328001	Solid	08/12/98	66022
98328002	Solid	08/12/98	66023
98328003	Solid	08/12/98	66024
98328004	Solid	08/12/98	66025

METHODOLOGY

Sample Extraction

An aliquot of each sample was spiked with $^{13}C_{12}$-labeled PCDD/PCDF internal standards (Table 1) and extracted with toluene in a Soxhlet extractor. The extract was quantitatively transferred to a Kuderna-Danish concentrator, concentrated, and solvent exchanged to hexane. The hexane extract was then spiked with 2,3,7,8-TCDD-$^{37}Cl_4$ enrichment efficiency standard (Table 1) and processed through the analyte enrichment procedures described below. Moisture content was determined by taking an aliquot of each sample to constant weight in an oven.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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REPORT OF: CHEMICAL ANALYSES

METHODOLOGY (Cont.)

PCDD/PCDF Analyte Enrichment

The extraction procedure often removes a variety of compounds, in addition to the PCDDs and PCDFs, from the sample matrix. Some of these compounds can directly interfere with the analyses while others can overload the capillary column causing degradation in chromatographic resolution or sensitivity. The analyte enrichment steps described below are used to remove interferences from the extracts.

Each extract was diluted to 100 mL with hexane, transferred to a separatory funnel, and washed with 1N sodium hydroxide, concentrated sulfuric acid, and aqueous sodium chloride (5% w/v) as needed. The hexane extract was quantitatively transferred to a liquid chromatography column containing alternating layers of silica gel, 40% concentrated sulfuric acid on silica gel, and 33% 1 N sodium hydroxide on silica gel. The column was eluted with 90 mL of hexane and the entire eluate was collected and concentrated, under ambient conditions, to a volume of 1 mL and spiked with the $^{37}Cl_4$-TCDD cleanup standard (Table 1).

Each extract was then fractionated on a liquid chromatography column containing 4 g of activated alumina. The column was eluted with 20 mL of hexane followed by 15 mL of 60% methylene chloride/hexane. The 60% methylene chloride/hexane fraction was concentrated to 1 mL under a stream of dry nitrogen and applied to the top of a chromatography column containing 1 g of 5% AX-21 activated carbon in silica gel. The column was eluted with two 2 mL portions of hexane, 2 mL of cyclohexane/methylene chloride (50:50 v/v) and cyclohexane/methanol/toluene (75:20:5 v/v) in the forward direction, and then with toluene in the reverse direction. The toluene fraction was collected, concentrated, spiked with recovery standards (1,2,3,4-TCDD-$^{13}C_{12}$ and 1,2,3,7,8,9-HxCDD-$^{13}C_{12}$) and taken to a final volume of 20 uL.

PCDD/PCDF Analyses

Each sample extract was analyzed for the presence of PCDDs and PCDFs using combined capillary column gas chromatography/high resolution mass spectrometry (HRGC/HRMS). The instrumentation consisted of a Hewlett Packard Model 5890 gas chromatograph interfaced to a VG Model 70SE high resolution mass spectrometer. The capillary column was interfaced directly into the ion source of the mass spectrometer, thus providing the highest possible sensitivity while minimizing degradation of the chromatographic resolution.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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PCDD/PCDF Analyses (Cont.)

The mass spectrometer was operated in the electron impact ionization mode at a mass resolution of 10,000-11,000 (M/ΔM, 10 percent valley definition). This resolution is sufficient to resolve most interferences, such as PCBs, thus providing the highest level of confidence that the detected levels of PCDD/PCDF were not false positives resulting from interferences. Typical operating parameters for the HRGC/HRMS analyses are summarized in Table 2.

The data were acquired by selected-ion-recording (SIR) using groups of ion masses similar to those described in USEPA Method 8290. The five groups corresponded to the tetrachlorinated through octachlorinated congener classes. Each group contained two ion masses for the PCDDs, two ion masses for the PCDFs, the corresponding ion masses from the two isotopically labeled internal standards, and the ion mass characteristic of the polychlorinated diphenylether (PCDE) which, if present, could cause false responses in the dibenzofuran channels.

Each group of ion masses also contained a lock mass which was used by the data system to automatically correct the mass focus of the instrument. The data system determined the centroid of the lock mass during each data acquisition cycle and corrected the mass focus of the analyte and internal standard ion masses to assure that the centers of the mass peaks were being monitored.

The criteria used to judge positive responses for a PCDD/PCDF isomer included:

* Simultaneous response at both ion masses of the PCDD or PCDF
* Signal-to-noise ratio equal to or greater than 2.5:1.0 for both ion masses
* Chlorine isotope ratio within 15% of the theoretical value
* Chromatographic retention time within +/- 2 seconds of the expected retention time
* Chromatographic retention times within elution windows determined from analyses of standard mixtures
* Absence of simultaneous response in the PCDF and PCDPE ion traces

A list of the exact ion masses monitored for the determination of PCDD/PCDF isomers and the PCDE interferences is presented in Table 3. Also included are the theoretical chlorine isotope ratios for the ten congener classes.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

PCDD/PCDF Quantification and Calculations

The PCDD/PCDF isomers were quantified by comparison of their responses to the responses of the labeled internal standards. Relative response factors were calculated from analyses of standard mixtures containing representatives of each of the PCDD/PCDF congener classes at five concentration levels, and each of the internal standards at one concentration level, as shown in Table 4. The PCDD/PCDF response factors were calculated by comparing the sum of the responses from the two ion masses monitored for each chlorine congener class to the sum of the responses from the two ion masses of the corresponding isotopically labeled internal standard. The formula for the response factor calculation is:

$$Rf = \frac{An \times Qis}{Ais \times Qn}$$

where:

Rf = Response factor
An = Sum of integrated areas for native isomer
Qis = Quantity of labeled internal standard
Ais = Sum of integrated areas for labeled internal standard
Qn = Quantity of native isomer

The levels of PCDD/PCDF in each sample were quantified using the following equation:

$$C = \frac{An \times Qis}{Ais \times W \times Rf}$$

where:

C = Concentration of target isomer or congener class
An = Sum of integrated areas for the target isomer or congener class
Qis = Quantity of labeled internal standard added to the sample
Ais = Sum of integrated areas for the labeled internal standard
W = Sample amount
Rf = Response factor

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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PCDD/PCDF Quantification and Calculations (Cont.)

Each pair of ion mass peaks in the selected-ion-current chromatograms was evaluated manually to determine if it met the criteria for a PCDD or PCDF isomer. Areas of all peaks exhibiting correct ion ratios, having retention times within the correct windows, and having areas corresponding to concentrations in the range covered by the initial calibration were then summed for calculations of total congener concentrations.

A limit of detection (LOD) based on producing a signal that is 2.5 times the noise level, was calculated for each undetected 2,3,7,8-substituted isomer of any tetra through octa chlorinated congener class. The noise heights used to calculate the detection limits were measured at the retention time of the specific isomer. The formula used for calculating the LOD is:

$$LOD = \frac{Hn \times Qis \times 2.5}{His \times W \times Rf}$$

where:

LOD = Single isomer limit of detection
Hn = Sum of noise heights at native isomer retention time
Qis = Quantity of labeled internal standard
His = Sum of peak heights for labeled internal standard
W = Sample amount
Rf = Response factor

The recovery of the 2,3,7,8-TCDD-$^{37}Cl_4$ enrichment efficiency standard and each $^{13}C_{12}$-labeled internal standard, relative to either 1,2,3,4-TCDD-$^{13}C_{12}$ or 1,2,3,7,8,9-HxCDD-$^{13}C_{12}$, was calculated using the following equation:

$$\%R = \frac{Ais \times Qrs \times 100\%}{Rfr \times Ars \times Qis}$$

where:

%R = Percent recovery of labeled internal standard
Ais = Sum of integrated areas of labeled internal standard
Qrs = Quantity of recovery standard
Ars = Sum of integrated areas of recovery standard
Rfr = Response factor of the specific labeled internal standard relative to the recovery standard
Qis = Quantity of the labeled internal standard congener added to the sample

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Quality Control for PCDD/PCDF Analyses

The performance of the sample processing steps and the instrumentation are monitored on a routine basis. The procedures and criteria are summarized below.

One method blank and one laboratory spike sample are typically prepared with each ten samples of any given matrix. Recoveries of the native PCDD/PCDF analytes in the laboratory spike samples generally range from 70 to 130%. Recoveries of selected analytes outside this range do not invalidate the data but provide information which is used by the laboratory to monitor recovery trends and to assure optimization of the method.

Internal standards are spiked into each sample prior to extraction in order to monitor the level of recovery which is achieved for each individual sample. Acceptable recoveries range from 40 to 135 percent for the internal standards unless a deviation is due to variation in instrument response as a result of analytical interferences.

The resolution of the mass spectrometer is verified prior to each analysis to be 10,000 or greater. Hardcopies of the reference peaks are printed at the beginning and end of each analysis day. The resolving power of the DB-5 chromatographic column is checked daily by analyzing a standard solution containing 2,3,7,8-TCDD and the adjacent TCDD isomers. The DB-225 column resolution is checked daily by analyzing a standard solution containing 2,3,7,8-TCDF and the adjacent TCDF isomers. Acceptable performance is achieved when 2,3,7,8-TCDD or 2,3,7,8-TCDF is resolved from the adjacent isomers by a valley of 25% or less. The group times for the selected-ion-monitoring data acquisitions are also checked daily by analyzing the column performance mix which has been modified to contain the first and last eluting isomers of each congener class. In this way one is assured of collecting data representative of the total PCDD/PCDF content and that the 2,3,7,8-substituted isomers are suitably resolved.

Initial calibrations are generated by analyzing standard solutions (see Table 4) containing target native and labeled PCDD/PCDF compounds. Response factors are calculated and averaged for each compound. These averages are used for quantification and for comparison to the daily continuing calibration. The relative standard deviation for each native compound must be 20% or less (30% or less for the labeled compounds) as specified in Method 8290. A continuing calibration standard is analyzed at the beginning and end of each 12-hour shift on days when initial calibrations are not performed. The initial calibration is considered to be valid when the response factors from the continuing calibration analysis fall to within the ranges specified in Method 8290.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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RESULTS

The results from the analyses are presented in the following:

Appendix A - Documentation
Appendix B - PCDD/PCDF Analysis Results
Appendix C - QC and Calibration Results
Appendix D - Sample Chromatograms and Raw Data
Appendix E - Standard Chromatograms and Raw Data
Appendix F - QC Chromatograms and Raw Data

DISCUSSION

The recoveries of the isotopically-labeled PCDD/PCDF internal standards in the sample extracts generally ranged from 55-113%, indicating a level of efficiency through the extraction and enrichment steps that is considered typical for this matrix. With the exception of the labeled 1,2,3,4,6,7,8-HpCDF recoveries, which appear reduced due to interferences in the sample extracts, the labeled standard recoveries were within the Method 8290 target ranges. Since the quantifications of the native 2,3,7,8-substituted isomers were based on isotope dilution, the data were automatically corrected for variation in recovery and accurate values were obtained.

Sample 98328004 was found to contain polychlorinated diphenylethers (PCDEs) and other compounds which interfere with the determination of co-eluting PCDD and PCDF isomers. Any responses in the PCDF ion traces with corresponding responses in the PCDE ion traces are not included in the reported PCDF concentrations. Any affected 2,3,7,8-substituted isomers are flagged "E" or "I" on the data summary sheet.

It should be noted that sample concentrations are determined to two significant figures. Any additional values are a result of cell formatting and can be ignored. Also, isotope ratios have been verified by the analysts to be within the method specified ranges.

A laboratory method blank was prepared and analyzed with each sample batch as part of our routine quality control procedures. The results show the blanks to contain trace levels of selected PCDD/PCDF isomers. These levels were below the calibration range of the method. The sample extracts contained some of these isomers at similar levels (flagged "B") which were also below the calibration range of the method. In general, levels less than five times the background are not considered statistically different from the background.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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DISCUSSION (Cont.)

Laboratory spike and matrix spike samples were prepared with each sample batch by extracting clean sand or sample material that had been fortified with native standard materials. Recoveries of the native compounds in the spike samples ranged from 87-129% with relative percent differences of 0.0-9.3%. These results indicate high degrees of precision and accuracy for these analyses.

REMARKS

The sample extracts will be retained for a period of 60 days from the date of this report and then discarded unless other arrangements are made. The raw mass spectral data will be archived on magnetic tape for a period of not less than one year. Questions regarding the data contained in this report may be directed to the authors at the numbers provided below.

Pace Analytical Services, Inc.

Charles V. Sueper, Manager
St. Paul Chemistry
(612) 659-7520

Steven W. Hannan
Scientist
(612) 659-7336

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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TABLE 1. Spike Levels of PCDD/PCDF Standards

Internal Standards	Spike Level (ng)
2,3,7,8-TCDF-$^{13}C_{12}$	2.0
2,3,7,8-TCDD-$^{13}C_{12}$	2.0
1,2,3,7,8-PeCDF-$^{13}C_{12}$	2.0
2,3,4,7,8-PeCDF-$^{13}C_{12}$	2.0
1,2,3,7,8-PeCDD-$^{13}C_{12}$	2.0
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	2.0
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	2.0
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	2.0
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	2.0
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	2.0
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	2.0
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	2.0
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	2.0
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	2.0
OCDD-$^{13}C_{12}$	4.0
Recovery Standards	
1,2,3,4-TCDD-$^{13}C_{12}$	2.0
1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	2.0
Enrichment Efficiency Standard	
2,3,7,8-TCDD-$^{37}Cl_4$	0.2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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TABLE 2. High Resolution PCDD/PCDF Analyses
HRGC/HRMS Operating Parameters

Mass Resolution	10,000-11,000 (M/ΔM, 10% valley)
Electron Energy	32 electron volts
Accelerating Voltage	8,000 volts
Source Temperature	275°C
Preamplifier Gain	10^{-6} amp/volt
Multiplier Gain	~10^5
Chromatographic Column	60 M DB-5
Transfer Line Temperature	260°C
Injection Mode	Splitless
Carrier Gas	Helium
Carrier Flow Velocity	~30 cm/sec

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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TABLE 3. Exact Ion Masses Monitored
for the Determination of PCDDs, PCDFs, and PCDPEs

Compound	Accurate Mass Mass 1	Mass 2	Theoretical Ratio Mass 1/Mass 2
Tetra-CDDs	319.8965	321.8936	0.77
Tetra-CDFs	303.9016	305.8987	0.77
Hexa-CDPEs	375.8364		
Penta-CDDs	355.8546	357.8517	1.54
Penta-CDFs	339.8597	341.8567	1.54
Hepta-CDPEs	409.7974		
Hexa-CDDs	389.8156	391.8127	1.23
Hexa-CDFs	373.8207	375.8178	1.23
Octa-CDPEs	445.7555		
Hepta-CDDs	423.7766	425.7737	1.03
Hepta-CDFs	407.7817	409.7788	1.03
Nona-CDPEs	479.7165		
Octa-CDD	457.7377	459.7347	0.88
Octa-CDF	441.7428	443.7398	0.88
Deca-CDPE	513.6775		

CDDs = Chlorinated Dibenzo-p-dioxins
CDFs = Chlorinated Dibenzofurans
CDPEs = Chlorinated Diphenylethers

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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TABLE 4. High Resolution Calibration Solutions

	Concentration (pg/uL)				
Native CDDs/CDFs	**CS1**	**CS2**	**CS3**	**CS4**	**CS5**
2,3,7,8-TCDD	0.5	2	10	40	200
2,3,7,8 TCDF	0.5	2	10	40	200
1,2,3,7,8-PeCDD	2.5	10	50	200	1000
1,2,3,7,8-PeCDF	2.5	10	50	200	1000
2,3,4,7,8-PeCDF	2.5	10	50	200	1000
1,2,3,4,7,8-HxCDD	2.5	10	50	200	1000
1,2,3,6,7,8-HxCDD	2.5	10	50	200	1000
1,2,3,7,8,9-HxCDD	2.5	10	50	200	1000
1,2,3,4,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,6,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,7,8,9-HxCDF	2.5	10	50	200	1000
2,3,4,6,7,8-HxCDF	2.5	10	50	200	1000
1,2,3,4,6,7,8-HpCDD	2.5	10	50	200	1000
1,2,3,4,6,7,8-HpCDF	2.5	10	50	200	1000
1,2,3,4,7,8,9-HpCDF	2.5	10	50	200	1000
OCDD	5.0	20	100	400	2000
OCDF	5.0	20	100	400	2000
Internal Standards					
2,3,7,8-TCDD-$^{13}C_{12}$	100	100	100	100	100
2,3,7,8-TCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,7,8-PeCDD-$^{13}C_{12}$	100	100	100	100	100
1,2,3,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100
2,3,4,7,8-PeCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,4,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100
1,2,3,6,7,8-HxCDD-$^{13}C_{12}$	100	100	100	100	100
1,2,3,4,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,7,8,9-HxCDF-$^{13}C_{12}$	100	100	100	100	100
2,3,4,6,7,8-HxCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,4,6,7,8-HpCDD-$^{13}C_{12}$	100	100	100	100	100
1,2,3,4,6,7,8-HpCDF-$^{13}C_{12}$	100	100	100	100	100
1,2,3,4,7,8,9-HpCDF-$^{13}C_{12}$	100	100	100	100	100
OCDD-$^{13}C_{12}$	200	200	200	200	200
Recovery Standards					
1,2,3,4-TCDD-$^{13}C_{12}$	100	100	100	100	100
1,2,3,7,8,9-HxCDD-$^{13}C_{12}$	100	100	100	100	100
Enrichment Efficiency Standard					
2,3,7,8-TCDD-$^{37}C1_4$	0.5	2	10	40	200

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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TABLE 5. 2,3,7,8-TCDD Equivalency Factors (TEFs) for the Polychlorinated Dibenzodioxins and Dibenzofurans

Number	Compound(s)	TEF
1	2,3,7,8-TCDD	1.00
2	1,2,3,7,8-PeCDD	0.50
3	1,2,3,6,7,8-HxCDD	0.1
4	1,2,3,7,8,9-HxCDD	0.1
5	1,2,3,4,7,8-HxCDD	0.1
6	1,2,3,4,6,7,8-HpCDD	0.01
7	OCDD	0.001
8	* Total - TCDD	0.0
9	* Total - PeCDD	0.0
10	* Total - HxCDD	0.0
11	* Total - HpCDD	0.0
12	2,3,7,8-TCDF	0.10
13	1,2,3,7,8-PeCDF	0.05
14	2,3,4,7,8-PeCDF	0.5
15	1,2,3,6,7,8-HxCDF	0.1
16	1,2,3,7,8,9-HxCDF	0.1
17	1,2,3,4,7,8-HxCDF	0.1
18	2,3,4,6,7,8-HxCDF	0.1
19	1,2,3,4,6,7,8-HpCDF	0.01
20	1,2,3,4,7,8,9-HpCDF	0.01
21	OCDF	0.001
22	* Total - TCDF	0.0
23	* Total - PeCDF	0.0
24	* Total - HxCDF	0.0
25	* Total - HpCDF	0.0

*Excluding the 2,3,7,8-substituted congeners.

Reference: 1989 ITEFs

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328000
Lab Sample ID.....66021
Filename.....V80901D
Injected By.....DGP
Total Amount Extracted...0.0166 kg
% Moisture..... 38.9 %
Dry Weight Extracted.....0.0102 kg
ICAL Date.....08/26/98
CCAL Filename(s).....V80901B/V80901N
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/13/98
Analyzed....09/01/98 11:40

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	~~0.28 J*~~	----- 0.3 U	2378-TCDF-13C....	2.00	62
TOTAL TCDF	1.40 J	-----	2378-TCDD-13C....	2.00	73
			12378-PeCDF-13C..	2.00	62
2378-TCDD	ND	0.31	23478-PeCDF-13C..	2.00	63
TOTAL TCDD	2.00 J	-----	12378-PeCDD-13C..	2.00	66
			123478-HxCDF-13C.	2.00	86
12378-PeCDF	ND	0.47	123678-HxCDF-13C.	2.00	82
23478-PeCDF	ND	0.23	234678-HxCDF-13C.	2.00	88
TOTAL PeCDF	0.34 J	-----	123789-HxCDF-13C.	2.00	87
			123478-HxCDD-13C.	2.00	81
12378-PeCDD	ND	0.75	123678-HxCDD-13C.	2.00	80
TOTAL PeCDD	ND	0.75	1234678-HpCDF-13C	2.00	45
			1234789-HpCDF-13C	2.00	74
123478-HxCDF	0.36 J	-----	1234678-HpCDD-13C	2.00	71
123678-HxCDF	0.27 J	-----	OCDD-13C.....	4.00	77
234678-HxCDF	~~0.43 B~~	----- 0.43 U			
123789-HxCDF	ND	0.44	1234-TCDD-13C....	2.00	NA
TOTAL HxCDF	1.10 J	-----	123789-HxCDD-13C.	2.00	NA
123478-HxCDD	ND	0.82	2378-TCDD-37Cl4..	0.20	69
123678-HxCDD	ND	1.20			
123789-HxCDD	ND	0.77			
TOTAL HxCDD	4.80 J	-----	Total 2378-TCDD	0.13	
			Equivalence:	~~0.21~~	ng/kg
1234678-HpCDF	0.74 J	-----	(Using ITE Factors/DB-5 Data)		
1234789-HpCDF	ND	0.63			
TOTAL HpCDF	2.80 J	-----			
1234678-HpCDD	3.70 J	-----			
TOTAL HpCDD	7.80 J	-----			
OCDF	~~1.70 B~~	----- 1.7 U			
OCDD	26.00 J	-----			

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.
B = Less than 5 times higher than method blank level
CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328000-DUPLICATE
Lab Sample ID.....66021-DUP
Filename.....V80915N
Injected By.....MCH
Total Amount Extracted...0.0179 kg
% Moisture..... 38.9 %
Dry Weight Extracted.....0.0109 kg
ICAL Date.....09/15/98
CCAL Filename(s).....V80915S
Method Blank ID.....BLANK-082598

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/25/98
Analyzed....09/15/98 22:50

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	~~0.42 B*~~	----- 0.42 U	2378-TCDF-13C....	2.00	76
TOTAL TCDF	~~0.79 B~~	----- 0.80 U	2378-TCDD-13C....	2.00	75
			12378-PeCDF-13C..	2.00	85
2378-TCDD	ND	0.20	23478-PeCDF-13C..	2.00	88
TOTAL TCDD	1.40 J	-----	12378-PeCDD-13C..	2.00	98
			123478-HxCDF-13C.	2.00	76
12378-PeCDF	ND	0.15	123678-HxCDF-13C.	2.00	71
23478-PeCDF	ND	0.22	234678-HxCDF-13C.	2.00	74
TOTAL PeCDF	0.29 J	-----	123789-HxCDF-13C.	2.00	75
			123478-HxCDD-13C.	2.00	78
12378-PeCDD	ND	0.19	123678-HxCDD-13C.	2.00	80
TOTAL PeCDD	0.47 J	-----	1234678-HpCDF-13C	2.00	75
			1234789-HpCDF-13C	2.00	87
123478-HxCDF	ND	0.32	1234678-HpCDD-13C	2.00	89
123678-HxCDF	0.17 J	-----	OCDD-13C.....	4.00	82
234678-HxCDF	0.40 J	-----			
123789-HxCDF	ND	0.18	1234-TCDD-13C....	2.00	NA
TOTAL HxCDF	1.40 J	-----	123789-HxCDD-13C.	2.00	NA
123478-HxCDD	ND	0.47	2378-TCDD-37Cl4..	0.20	72
123678-HxCDD	ND	0.36			
123789-HxCDD	~~0.18 J~~	----- 0.20 U			
TOTAL HxCDD	3.60 J	-----	Total 2378-TCDD Equivalence: ~~0.15~~ 0.10 ng/kg (Using ITE Factors/DB-5 Data)		
1234678-HpCDF	0.36 J	-----			
1234789-HpCDF	ND	0.24			
TOTAL HpCDF	0.36 J	-----			
1234678-HpCDD	1.90 J	-----			
TOTAL HpCDD	3.90 J	-----			
OCDF	0.91 J	-----			
OCDD	11.00 J	-----			

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.
B = Less than 5 times higher than method blank level
CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328001
Lab Sample ID.....66022
Filename.....V80901E
Injected By.....DGP
Total Amount Extracted...0.0244 kg
% Moisture..... 58.3 %
Dry Weight Extracted.....0.0102 kg
ICAL Date.....08/26/98
CCAL Filename(s).....V80901B/V80901N
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/13/98
Analyzed....09/01/98 12:32

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg		INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	~~0.19 *~~	-----	0.24	2378-TCDF-13C....	2.00	59
TOTAL TCDF	~~0.71 B~~	-----	0.71	2378-TCDD-13C....	2.00	70
				12378-PeCDF-13C..	2.00	63
2378-TCDD	ND	0.13		23478-PeCDF-13C..	2.00	66
TOTAL TCDD	0.44 J	-----		12378-PeCDD-13C..	2.00	68
				123478-HxCDF-13C.	2.00	81
12378-PeCDF	ND	0.10		123678-HxCDF-13C.	2.00	79
23478-PeCDF	ND	0.14		234678-HxCDF-13C.	2.00	84
TOTAL PeCDF	ND	0.12		123789-HxCDF-13C.	2.00	84
				123478-HxCDD-13C.	2.00	75
12378-PeCDD	ND	0.25		123678-HxCDD-13C.	2.00	78
TOTAL PeCDD	0.30 J	-----		1234678-HpCDF-13C	2.00	36I
				1234789-HpCDF-13C	2.00	66
123478-HxCDF	ND	0.17		1234678-HpCDD-13C	2.00	68
123678-HxCDF	ND	0.10		OCDD-13C.....	4.00	74
234678-HxCDF	~~0.29 B~~	-----	0.34			
123789-HxCDF	ND	0.20		1234-TCDD-13C....	2.00	NA
TOTAL HxCDF	0.70 J	-----		123789-HxCDD-13C.	2.00	NA
123478-HxCDD	ND	0.22		2378-TCDD-37Cl4..	0.20	65
123678-HxCDD	ND	0.38				
123789-HxCDD	ND	0.32				
TOTAL HxCDD	~~0.26 J~~	-----	0.30			
1234678-HpCDF	ND	1.00	45			
1234789-HpCDF	ND	0.29				
TOTAL HpCDF	ND	0.65				
1234678-HpCDD	~~1.40 B~~	-----	1.4			
TOTAL HpCDD	5.50	-----				
OCDF	~~0.69 B~~	-----	0.7			
OCDD	12.00	-----				

Total 2378-TCDD Equivalence: ~~0.075~~ 0.012 ng/kg (Using ITE Factors/DB-5 Data)

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.
B = Less than 5 times higher than method blank level
CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable
I = Interference

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328002
Lab Sample ID.....66023
Filename.....V80901F
Injected By.....DGP
Total Amount Extracted...0.0160 kg
% Moisture..... 36.8 %
Dry Weight Extracted.....0.0101 kg
ICAL Date.....08/26/98
CCAL Filename(s).....V80901B/V80901N
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/13/98
Analyzed....09/01/98 13:28

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	~~0.245*~~	----- 0.25 U	2378-TCDF-13C....	2.00	61
TOTAL TCDF	~~0.66 J~~	----- 0.70 U	2378-TCDD-13C....	2.00	75
			12378-PeCDF-13C..	2.00	64
2378-TCDD	ND	0.12	23478-PeCDF-13C..	2.00	69
TOTAL TCDD	1.70	-----	12378-PeCDD-13C..	2.00	72
			123478-HxCDF-13C.	2.00	98
12378-PeCDF	ND	0.97	123678-HxCDF-13C.	2.00	70
23478-PeCDF	~~0.14 J~~	----- 0.15 U	234678-HxCDF-13C.	2.00	86
TOTAL PeCDF	~~0.37 J~~	----- 0.40 U	123789-HxCDF-13C.	2.00	89
			123478-HxCDD-13C.	2.00	98
12378-PeCDD	ND	0.49	123678-HxCDD-13C.	2.00	67
TOTAL PeCDD	ND	0.49	1234678-HpCDF-13C	2.00	22I
			1234789-HpCDF-13C	2.00	57
123478-HxCDF	ND	0.62	1234678-HpCDD-13C	2.00	87
123678-HxCDF	ND	0.24	OCDD-13C.....	4.00	77
234678-HxCDF	~~0.43 B~~	----- 0.43 U			
123789-HxCDF	ND	0.42	1234-TCDD-13C....	2.00	NA
TOTAL HxCDF	1.40 J	-----	123789-HxCDD-13C.	2.00	NA
123478-HxCDD	0.26 J	-----	2378-TCDD-37Cl4..	0.20	69
123678-HxCDD	0.38 J	-----			
123789-HxCDD	ND	0.29			
TOTAL HxCDD	2.70 J	-----			
1234678-HpCDF	ND	7.30 UJ			
1234789-HpCDF	ND	0.78			
TOTAL HpCDF	5.10	-----			
1234678-HpCDD	7.60	-----			
TOTAL HpCDD	23.00	-----			
OCDF	4.50 J	-----			
OCDD	77.00	-----			

Total 2378-TCDD Equivalence: ~~0.36~~ 0.22 ng/kg
(Using ITE Factors/DB-5 Data)

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.
B = Less than 5 times higher than method blank level
CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable
I = Interference

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328003
Lab Sample ID.....66024
Filename.....V80901G
Injected By.....DGP
Total Amount Extracted...0.0281 kg
% Moisture..... 63.6 %
Dry Weight Extracted.....0.0102 kg
ICAL Date.....08/26/98
CCAL Filename(s).....V80901B/V80901N
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/13/98
Analyzed....09/01/98 14:22

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg
2378-TCDF	0.83 J*	-----
TOTAL TCDF	17.00	-----
2378-TCDD	ND	1.40
TOTAL TCDD	1.40	-----
12378-PeCDF	1.10 J	-----
23478-PeCDF	ND	2.30
TOTAL PeCDF	21.00	-----
12378-PeCDD	2.00 J	-----
TOTAL PeCDD	13.00	-----
123478-HxCDF	3.60 J	-----
123678-HxCDF	2.30 J	-----
234678-HxCDF	3.70 J	-----
123789-HxCDF	ND	0.93
TOTAL HxCDF	28.00	-----
123478-HxCDD	2.60 J	-----
123678-HxCDD	8.10	-----
123789-HxCDD	4.00 J	-----
TOTAL HxCDD	92.00	-----
1234678-HpCDF	24.00	-----
1234789-HpCDF	2.00 J	-----
TOTAL HpCDF	26.00	-----
1234678-HpCDD	120.00	-----
TOTAL HpCDD	250.00	-----
OCDF	38.00	-----
OCDD	670.00	-----

INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF-13C....	2.00	55
2378-TCDD-13C....	2.00	73
12378-PeCDF-13C..	2.00	83
23478-PeCDF-13C..	2.00	105
12378-PeCDD-13C..	2.00	100
123478-HxCDF-13C.	2.00	113
123678-HxCDF-13C.	2.00	111
234678-HxCDF-13C.	2.00	108
123789-HxCDF-13C.	2.00	103
123478-HxCDD-13C.	2.00	107
123678-HxCDD-13C.	2.00	96
1234678-HpCDF-13C	2.00	74
1234789-HpCDF-13C	2.00	69
1234678-HpCDD-13C	2.00	84
OCDD-13C.....	4.00	63
1234-TCDD-13C....	2.00	NA
123789-HxCDD-13C.	2.00	NA
2378-TCDD-37Cl4..	0.20	60

Total 2378-TCDD Equivalence: 5.7 ng/kg
(Using ITE Factors/DB-5 Data)

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.

CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Client's Sample ID.....98328004
Lab Sample ID.....66025
Filename.....V80901H
Injected By.....DGP
Total Amount Extracted...0.0259 kg
% Moisture..... 60.8 %
Dry Weight Extracted.....0.0101 kg
ICAL Date.....08/26/98
CCAL Filename(s).....V80901B/V80901N
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/13/98
Analyzed....09/01/98 15:17

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg
2378-TCDF	0.86 J*	-----
TOTAL TCDF	4.80	-----
2378-TCDD	ND	0.29
TOTAL TCDD	3.10	-----
12378-PeCDF	ND E	1.40
23478-PeCDF	0.36 J	-----
TOTAL PeCDF	3.60	-----
12378-PeCDD	0.46 J	-----
TOTAL PeCDD	4.60	-----
123478-HxCDF	ND	0.43
123678-HxCDF	0.61 J	-----
234678-HxCDF	0.89 J	-----
123789-HxCDF	ND	0.21
TOTAL HxCDF	6.80	-----
123478-HxCDD	0.91 J	-----
123678-HxCDD	2.20 J	-----
123789-HxCDD	1.20 J	-----
TOTAL HxCDD	28.00	-----
1234678-HpCDF	ND I	20.00 UJ
1234789-HpCDF	ND	0.71
TOTAL HpCDF	11.00	-----
1234678-HpCDD	36.00	-----
TOTAL HpCDD	96.00	-----
OCDF	12.00	-----
OCDD	270.00	-----

INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF-13C....	2.00	66
2378-TCDD-13C....	2.00	74
12378-PeCDF-13C..	2.00	68
23478-PeCDF-13C..	2.00	68
12378-PeCDD-13C..	2.00	71
123478-HxCDF-13C.	2.00	109
123678-HxCDF-13C.	2.00	104
234678-HxCDF-13C.	2.00	103
123789-HxCDF-13C.	2.00	94
123478-HxCDD-13C.	2.00	99
123678-HxCDD-13C.	2.00	103
1234678-HpCDF-13C	2.00	23I
1234789-HpCDF-13C	2.00	66
1234678-HpCDD-13C	2.00	75
OCDD-13C.....	4.00	65
1234-TCDD-13C....	2.00	NA
123789-HxCDD-13C.	2.00	NA
2378-TCDD-37Cl4..	0.20	72

Total 2378-TCDD Equivalence: 1.7 ng/kg
(Using ITE Factors/DB-5 Data)

* Value may include contributions from other TCDF isomers.

All values are expressed on a dry weight basis.

CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable
I = Interference
E = PCDE Interference

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Lab Sample ID.....BLANK-081398
Filename.....V80826M
Injected By.....MCH
Total Amount Extracted...0.0100 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....08/26/98
CCAL Filename(s).....V80826T
Method Blank ID.....NA

Matrix.....SOLID
Dilution....NA
Collected...NA
Received....NA
Extracted...08/13/98
Analyzed....08/26/98 20:52

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg
2378-TCDF	ND	0.41
TOTAL TCDF	0.24 J	-----
2378-TCDD	ND	0.30
TOTAL TCDD	ND	0.30
12378-PeCDF	ND	0.27
23478-PeCDF	ND	0.30
TOTAL PeCDF	ND	0.29
12378-PeCDD	ND	0.39
TOTAL PeCDD	ND	0.39
123478-HxCDF	ND	0.39
123678-HxCDF	ND	0.56
234678-HxCDF	0.47 J	-----
123789-HxCDF	ND	0.60
TOTAL HxCDF	0.47 J	-----
123478-HxCDD	ND	0.35
123678-HxCDD	ND	0.65
123789-HxCDD	ND	0.49
TOTAL HxCDD	ND	0.50
1234678-HpCDF	ND	0.38
1234789-HpCDF	ND	0.50
TOTAL HpCDF	ND	0.44
1234678-HpCDD	0.37 J	-----
TOTAL HpCDD	0.37 J	-----
OCDF	0.37 J	-----
OCDD	1.10 J	-----

INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF-13C....	2.00	64
2378-TCDD-13C....	2.00	68
12378-PeCDF-13C..	2.00	72
23478-PeCDF-13C..	2.00	75
12378-PeCDD-13C..	2.00	81
123478-HxCDF-13C.	2.00	77
123678-HxCDF-13C.	2.00	77
234678-HxCDF-13C.	2.00	81
123789-HxCDF-13C.	2.00	79
123478-HxCDD-13C.	2.00	79
123678-HxCDD-13C.	2.00	78
1234678-HpCDF-13C	2.00	41
1234789-HpCDF-13C	2.00	77
1234678-HpCDD-13C	2.00	82
OCDD-13C.....	4.00	80
1234-TCDD-13C....	2.00	NA
123789-HxCDD-13C.	2.00	NA
2378-TCDD-37Cl4..	0.20	61

Total 2378-TCDD Equivalence: 0.052 ng/kg
(Using ITE Factors/DB-5 Data)

CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

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METHOD 8290 ANALYSIS RESULTS

Client....WASHINGTON DOE

Lab Sample ID.....BLANK-082598
Filename.....V80915M
Injected By.....MCH
Total Amount Extracted...0.0112 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....09/15/98
CCAL Filename(s).....V80915S
Method Blank ID.....NA

Matrix.....SOLID
Dilution....NA
Collected...NA
Received....NA
Extracted...08/25/98
Analyzed....09/15/98 21:59

NATIVE ISOMERS	CONC ng/kg	LOD ng/kg
2378-TCDF	0.26 J*	-----
TOTAL TCDF	0.67 J	-----
2378-TCDD	ND	0.27
TOTAL TCDD	ND	0.27
12378-PeCDF	ND	0.18
23478-PeCDF	ND	0.17
TOTAL PeCDF	ND	0.18
12378-PeCDD	ND	0.38
TOTAL PeCDD	ND	0.38
123478-HxCDF	ND	0.24
123678-HxCDF	ND	0.18
234678-HxCDF	ND	0.24
123789-HxCDF	ND	0.34
TOTAL HxCDF	ND	0.25
123478-HxCDD	ND	0.39
123678-HxCDD	ND	0.26
123789-HxCDD	ND	0.53
TOTAL HxCDD	ND	0.39
1234678-HpCDF	ND	0.22
1234789-HpCDF	ND	0.27
TOTAL HpCDF	ND	0.25
1234678-HpCDD	0.17 J	-----
TOTAL HpCDD	0.17 J	-----
OCDF	ND	0.22
OCDD	0.42 J	-----

INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF-13C....	2.00	67
2378-TCDD-13C....	2.00	72
12378-PeCDF-13C..	2.00	80
23478-PeCDF-13C..	2.00	80
12378-PeCDD-13C..	2.00	84
123478-HxCDF-13C.	2.00	84
123678-HxCDF-13C.	2.00	84
234678-HxCDF-13C.	2.00	85
123789-HxCDF-13C.	2.00	82
123478-HxCDD-13C.	2.00	76
123678-HxCDD-13C.	2.00	83
1234678-HpCDF-13C	2.00	88
1234789-HpCDF-13C	2.00	106
1234678-HpCDD-13C	2.00	106
OCDD-13C.....	4.00	106
1234-TCDD-13C....	2.00	NA
123789-HxCDD-13C.	2.00	NA
2378-TCDD-37Cl4..	0.20	61

Total 2378-TCDD Equivalence: 0.028 ng/kg
(Using ITE Factors/DB-5 Data)

* Value may include contributions from other TCDF isomers.

CONC= Concentration (Totals include 2378-substituted isomers.)
LOD = Limit of Detection. Totals are averages of individual isomer LODs.
ND = Not Detected
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 SPIKE SAMPLE RESULTS

Client.....WASHINGTON DOE

Lab Sample ID.....SPIKE-081398
Filename.....V80826L
Injected By.....MCH
Total Amount Extracted.....0.0101 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....08/26/98
CCAL Filename(s).....V80826T
Method Blank ID.....BLANK-081398

Matrix.....SOLID
Dilution....NA
Collected...NA
Received....NA
Extracted...08/13/98
Analyzed....08/26/98 19:52

NATIVE ISOMERS	Qs (ng)	Qm (ng)	% REC	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	0.20	0.25	126	2378-TCDF-13C....	2.00	61
				2378-TCDD-13C....	2.00	70
				12378-PeCDF-13C..	2.00	73
2378-TCDD	0.20	0.24	120	23478-PeCDF-13C..	2.00	76
				12378-PeCDD-13C..	2.00	84
				123478-HxCDF-13C.	2.00	83
12378-PeCDF	1.00	1.20	120	123678-HxCDF-13C.	2.00	73
23478-PeCDF	1.00	1.19	119	234678-HxCDF-13C.	2.00	87
				123789-HxCDF-13C.	2.00	88
				123478-HxCDD-13C.	2.00	87
12378-PeCDD	1.00	1.16	116	123678-HxCDD-13C.	2.00	81
				1234678-HpCDF-13C	2.00	41
				1234789-HpCDF-13C	2.00	86
123478-HxCDF	1.00	1.24	124	1234678-HpCDD-13C	2.00	96
123678-HxCDF	1.00	1.24	124	OCDD-13C.....	4.00	91
234678-HxCDF	1.00	1.25	125			
123789-HxCDF	1.00	1.25	125	1234-TCDD-13C....	2.00	NA
				123789-HxCDD-13C.	2.00	NA
123478-HxCDD	1.00	1.29	129	2378-TCDD-37Cl4..	0.20	67
123678-HxCDD	1.00	1.25	125			
123789-HxCDD	1.00	1.24	124			
1234678-HpCDF	1.00	1.11	111			
1234789-HpCDF	1.00	1.29	129			
1234678-HpCDD	1.00	1.15	115			
OCDF	2.00	2.58	129			
OCDD	2.00	2.39	119			

Qs = Quantity Spiked
Qm = Quantity Measured
REC = Recovery (Expressed as Percent)
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 SPIKE SAMPLE RESULTS

Client.....WASHINGTON DOE

TCT Sample ID.....SPIKE-082598
Filename.....V80915H
Injected By.....SWH
Total Amount Extracted.....0.0116 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....09/15/98
CCAL Filename(s).....V80915S
Method Blank ID.....BLANK-082598

Matrix.....SOLID
Dilution....NA
Collected...NA
Received....NA
Extracted...08/25/98
Analyzed....09/15/98 16:55

NATIVE ISOMERS	Qs (ng)	Qm (ng)	% REC	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	0.20	0.19	94	2378-TCDF-13C....	2.00	76
				2378-TCDD-13C....	2.00	79
				12378-PeCDF-13C..	2.00	88
2378-TCDD	0.20	0.19	95	23478-PeCDF-13C..	2.00	87
				12378-PeCDD-13C..	2.00	88
				123478-HxCDF-13C.	2.00	95
12378-PeCDF	1.00	0.89	89	123678-HxCDF-13C.	2.00	91
23478-PeCDF	1.00	0.88	88	234678-HxCDF-13C.	2.00	99
				123789-HxCDF-13C.	2.00	93
				123478-HxCDD-13C.	2.00	92
12378-PeCDD	1.00	0.93	93	123678-HxCDD-13C.	2.00	93
				1234678-HpCDF-13C	2.00	89
				1234789-HpCDF-13C	2.00	109
123478-HxCDF	1.00	0.89	89	1234678-HpCDD-13C	2.00	116
123678-HxCDF	1.00	0.88	88	OCDD-13C.....	4.00	122
234678-HxCDF	1.00	0.89	89			
123789-HxCDF	1.00	0.89	89	1234-TCDD-13C....	2.00	NA
				123789-HxCDD-13C.	2.00	NA
123478-HxCDD	1.00	0.92	92	2378-TCDD-37Cl4..	0.20	71
123678-HxCDD	1.00	0.92	92			
123789-HxCDD	1.00	0.87	87			
1234678-HpCDF	1.00	0.92	92			
1234789-HpCDF	1.00	0.96	96			
1234678-HpCDD	1.00	0.91	91			
OCDF	2.00	1.86	93			
OCDD	2.00	1.80	90			

Qs = Quantity Spiked
Qm = Quantity Measured
REC = Recovery (Expressed as Percent)
NA = Not Applicable

Maxim/TCT Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 SPIKE SAMPLE RESULTS

Client.....WASHINGTON DOE

Client's Sample ID.....98328000-MS
Lab Sample ID.....66021-MS
Filename.....V80915I
Injected By.....SWH
Total Amount Extracted.....0.0170 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....09/15/98
CCAL Filename(s).....V80915S
Method Blank ID.....BLANK-082598

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/25/98
Analyzed....09/15/98 17:45

NATIVE ISOMERS	Qs (ng)	Qm (ng)	% REC	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	0.20	0.21	107	2378-TCDF-13C....	2.00	83
				2378-TCDD-13C....	2.00	84
				12378-PeCDF-13C..	2.00	88
2378-TCDD	0.20	0.20	102	23478-PeCDF-13C..	2.00	82
				12378-PeCDD-13C..	2.00	93
				123478-HxCDF-13C.	2.00	91
12378-PeCDF	1.00	0.98	98	123678-HxCDF-13C.	2.00	90
23478-PeCDF	1.00	0.96	96	234678-HxCDF-13C.	2.00	90
				123789-HxCDF-13C.	2.00	89
				123478-HxCDD-13C.	2.00	91
12378-PeCDD	1.00	0.98	98	123678-HxCDD-13C.	2.00	93
				1234678-HpCDF-13C	2.00	89
				1234789-HpCDF-13C	2.00	98
123478-HxCDF	1.00	1.04	104	1234678-HpCDD-13C	2.00	97
123678-HxCDF	1.00	1.03	103	OCDD-13C.....	4.00	96
234678-HxCDF	1.00	0.99	99			
123789-HxCDF	1.00	0.99	99	1234-TCDD-13C....	2.00	NA
				123789-HxCDD-13C.	2.00	NA
123478-HxCDD	1.00	0.99	99	2378-TCDD-37Cl4..	0.20	81
123678-HxCDD	1.00	0.93	93			
123789-HxCDD	1.00	0.92	92			
1234678-HpCDF	1.00	0.93	93			
1234789-HpCDF	1.00	0.94	94			
1234678-HpCDD	1.00	0.99	99			
OCDF	2.00	1.90	95			
OCDD	2.00	2.07	103			

Qs = Quantity Spiked
Qm = Quantity Measured
REC = Recovery (Expressed as Percent)
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

METHOD 8290 SPIKE SAMPLE RESULTS

Client.....WASHINGTON DOE

Client's Sample ID.....98328000-MSD
Lab Sample ID.....66021-MSD
Filename.....V80915J
Injected By.....MCH
Total Amount Extracted.....0.0178 kg
% Moisture.....NA %
Dry Weight Extracted.....NA
ICAL Date.....09/15/98
CCAL Filename(s).....V80915S
Method Blank ID.....BLANK-082598

Matrix.....SOLID
Dilution....NA
Collected...08/07/98
Received....08/12/98
Extracted...08/25/98
Analyzed....09/15/98 19:08

NATIVE ISOMERS	Qs (ng)	Qm (ng)	% REC
2378-TCDF	0.20	0.22	108
2378-TCDD	0.20	0.21	105
12378-PeCDF	1.00	1.00	100
23478-PeCDF	1.00	0.99	99
12378-PeCDD	1.00	0.96	96
123478-HxCDF	1.00	1.04	104
123678-HxCDF	1.00	0.98	98
234678-HxCDF	1.00	0.98	98
123789-HxCDF	1.00	0.98	98
123478-HxCDD	1.00	0.94	94
123678-HxCDD	1.00	0.98	98
123789-HxCDD	1.00	0.97	97
1234678-HpCDF	1.00	0.97	97
1234789-HpCDF	1.00	0.96	96
1234678-HpCDD	1.00	1.03	103
OCDF	2.00	1.95	98
OCDD	2.00	2.25	113

INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF-13C....	2.00	75
2378-TCDD-13C....	2.00	76
12378-PeCDF-13C..	2.00	85
23478-PeCDF-13C..	2.00	85
12378-PeCDD-13C..	2.00	90
123478-HxCDF-13C.	2.00	84
123678-HxCDF-13C.	2.00	87
234678-HxCDF-13C.	2.00	86
123789-HxCDF-13C.	2.00	88
123478-HxCDD-13C.	2.00	87
123678-HxCDD-13C.	2.00	87
1234678-HpCDF-13C	2.00	83
1234789-HpCDF-13C	2.00	101
1234678-HpCDD-13C	2.00	98
OCDD-13C.....	4.00	105
1234-TCDD-13C....	2.00	NA
123789-HxCDD-13C.	2.00	NA
2378-TCDD-37Cl4..	0.20	71

Qs = Quantity Spiked
Qm = Quantity Measured
REC = Recovery (Expressed as Percent)
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
Tel: 612-617-6400
Fax: 612-617-6444

Pace Analytical

MS/MSD RECOVERY RELATIVE PERCENT DIFFERENCE (RPD) RESULTS

Client..WASHINGTON DOE

MS ID.....98328000-MS
MS Filename.....V80915I
MSD ID.....98328000-MSD
MSD Filename.....V80915J

COMPOUND	MS REC,%	MSD REC,%	RPD,%
2378-TCDF	107	108	0.9
2378-TCDD	102	105	2.9
12378-PeCDF	98	100	2.0
23478-PeCDF	96	99	3.1
12378-PeCDD	98	96	2.1
123478-HxCDF	104	104	0.0
123678-HxCDF	103	98	5.0
234678-HxCDF	99	98	1.0
123789-HxCDF	99	98	1.0
123478-HxCDD	99	94	5.2
123678-HxCDD	93	98	5.2
123789-HxCDD	92	97	5.3
1234678-HpCDF	93	97	4.2
1234789-HpCDF	94	96	2.1
1234678-HpCDD	99	103	4.0
OCDF	95	98	3.1
OCDD	103	113	9.3

MS = Matrix Spike
MSD = Matrix Spike Duplicate
REC = Percent Recovered
RPD = The difference between the two values divided by the average.
NA = Not Applicable

Report No...3030 98-61617

REPORT OF LABORATORY ANALYSIS

Washington State Dept. of Ecology

TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **248008** Analysis File: **U981304**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SP161B2S**
TLI ID:	**211-1-2**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**35.685 g**	Dilution Factor:	**n/a**	% Moisture:	**71.9**
Dry Weight:	**10.027 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**28.1**

Analytes	Conc. (ng/kg)	DL	Ratio	RT	RRT	Flags
2,3,7,8-TCDD	0.22 J		0.65	25:52	1.000	J__
1,2,3,7,8-PeCDD	0.83 J		1.56	30:10	1.001	J__
1,2,3,4,7,8-HxCDD	1.4 J		1.34	33:20	1.001	J__
1,2,3,6,7,8-HxCDD	4.9 J		1.25	33:24	1.000	J__
1,2,3,7,8,9-HxCDD	4.5 J		1.22	33:43	1.009	PRJ
1,2,3,4,6,7,8-HpCDD	67.7		1.05	36:34	1.000	___
1,2,3,4,6,7,8,9-OCDD	490		0.85	39:59	1.000	___
2,3,7,8-TCDF	2.3 J		0.68	25:05	1.001	___
1,2,3,7,8-PeCDF	0.52 J		1.53	29:07	1.001	J__
2,3,4,7,8-PeCDF	0.78 J		1.59	29:49	1.001	J__
1,2,3,4,7,8-HxCDF	1.5 J		1.37	32:38	1.001	J__
1,2,3,6,7,8-HxCDF	0.73 J		1.32	32:44	1.000	J__
2,3,4,6,7,8-HxCDF	1.2 J		1.16	33:14	1.001	J__
1,2,3,7,8,9-HxCDF	ND	0.2				___
1,2,3,4,6,7,8-HpCDF	11.9		1.05	35:33	1.000	___
1,2,3,4,7,8,9-HpCDF	0.89 J		0.96	37:01	1.000	J__
1,2,3,4,6,7,8,9-OCDF	29.8		0.87	40:10	1.005	___

Totals	Conc. (ng/kg)	Number	DL	Flags
Total TCDD	5.8	5		___
Total PeCDD	9.2	9		___
Total HxCDD	49.3	7		___
Total HpCDD	158	2		___
Total TCDF	21.5 J	12		Q__
Total PeCDF	11.2	8		___
Total HxCDF	17.8	9		___
Total HpCDF	31.7	4		___

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Washington State Dept. of Ecology

TLI Project: **46000r1** 1613, Revision B PCDD/PCDF Analysis (c)
Client Sample: **248008** Analysis File: **U981304**

Internal Standards	Conc. (ng/kg)	% Recovery	QC Limits	Ratio	RT	RRT	Flags
$^{13}C_{12}$-2,3,7,8-TCDD	107	53.4	31%-137%	0.80	25:52	1.006	Q
$^{13}C_{12}$-1,2,3,7,8-PeCDD	134	67.1	25%-181%	1.45	30:09	1.173	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDD	126	62.9	32%-141%	1.21	33:19	0.989	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	108	54.3	28%-130%	1.22	33:24	0.991	
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	146	73.2	23%-140%	1.04	36:33	1.085	
$^{13}C_{12}$-1,2,3,4,6,7,8,9-OCDD	302	75.7	17%-157%	0.86	39:58	1.186	
$^{13}C_{12}$-2,3,7,8-TCDF	72.8	36.5	29%-140%	0.75	25:03	0.975	
$^{13}C_{12}$-1,2,3,7,8-PeCDF	119	59.8	24%-185%	1.48	29:06	1.132	
$^{13}C_{12}$-2,3,4,7,8-PeCDF	123	61.5	21%-178%	1.47	29:48	1.160	
$^{13}C_{12}$-1,2,3,4,7,8-HxCDF	121	60.5	26%-152%	0.51	32:37	0.968	
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	116	58.1	26%-123%	0.52	32:44	0.971	
$^{13}C_{12}$-2,3,4,6,7,8-HxCDF	106	53.1	28%-136%	0.52	33:13	0.986	
$^{13}C_{12}$-1,2,3,7,8,9-HxCDF	98.8	49.6	29%-147%	0.52	33:56	1.007	Q
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	118	59.2	28%-143%	0.42	35:33	1.055	
$^{13}C_{12}$-1,2,3,4,7,8,9-HpCDF	144	72.0	26%-138%	0.42	37:01	1.098	

Cleanup Standard	Conc. (ng/kg)	% Recovery	QC Limits	RT	RRT	Flags
$^{37}Cl_4$-2,3,7,8-TCDD	10.4	52.2	42%-164%	25:52	1.006	

Recovery Standards	Ratio	RT	Flags
$^{13}C_{12}$-1,2,3,4-TCDD	0.82	25:42	
$^{13}C_{12}$-1,2,3,7,8,9-HxCDD	1.22	33:42	

Data Reviewer: _____ 06/29/98

161B_PSR v2.02, LARS 6.11.06

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Washington State Dept. of Ecology

TLI Project: **46000r1**
Client Sample: **248008**

Toxicity Equivalents Report
Analysis File: **U981304**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SP161B2S**
TLI ID:	**211-1-2**	Date Extracted:	**06/26/98**	ICal:	**UF5624B**
		Date Analyzed:	**06/29/98**	ConCal:	**UB81300**
Sample Size:	**35.685 g**	Dilution Factor:	**1**	% Moisture:	**71.9**
Dry Weight:	**10.027 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-5**	Analyst:	**WK**	% Solids:	**28.1**

Analytes	Conc. (ng/kg)		TEF		Equivalent
2,3,7,8-TCDD	0.22	x	1.	=	0.22
1,2,3,7,8-PeCDD	0.83	x	0.5	=	0.42
1,2,3,4,7,8-HxCDD	1.4	x	0.1	=	0.14
1,2,3,6,7,8-HxCDD	4.9	x	0.1	=	0.49
1,2,3,7,8,9-HxCDD	4.5	x	0.1	=	0.45
1,2,3,4,6,7,8-HpCDD	67.7	x	0.01	=	0.677
1,2,3,4,6,7,8,9-OCDD	490	x	0.001	=	0.490
TOTAL PCDD					2.89
2,3,7,8-TCDF	1.9	x	0.1	=	0.19
1,2,3,7,8-PeCDF	0.52	x	0.05	=	0.026
2,3,4,7,8-PeCDF	0.78	x	0.5	=	0.39
1,2,3,4,7,8-HxCDF	1.5	x	0.1	=	0.15
1,2,3,6,7,8-HxCDF	0.73	x	0.1	=	0.073
2,3,4,6,7,8-HxCDF	1.2	x	0.1	=	0.12
1,2,3,7,8,9-HxCDF	{0.2}	x	0.1	=	0.02
1,2,3,4,6,7,8-HpCDF	11.9	x	0.01	=	0.119
1,2,3,4,7,8,9-HpCDF	0.89	x	0.01	=	0.0089
1,2,3,4,6,7,8,9-OCDF	29.8	x	0.001	=	0.0298
TOTAL PCDF					1.13

Total EPA TEFs, 1989a: 4.01 ng/kg

{...} indicates that the value is that of a Detection Limit.

GRY_TEF v1.03, MILES 4.16.08

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Printed: 18:35 06/29/98

Washington State Dept. of Ecology

TLI Project: **46000r1** 1613, Revision B, Tetra Only PCDD/PCDF Analysis (b)
Client Sample: **248008** Analysis File: **P982388**

Client Project:	**Whitmarsh Landfill**				
Sample Matrix:	**SOLID**	Date Received:	**06/16/98**	Spike File:	**SPCONB2S**
TLI ID:	**211-1-2**	Date Extracted:	**06/18/98**	ICal:	**PF25088**
		Date Analyzed:	**06/29/98**	ConCal:	**P982380**
Sample Size:	**35.685 g**	Dilution Factor:	**n/a**	% Moisture:	**71.9**
Dry Weight:	**10.027 g**	Blank File:	**U981302**	% Lipid:	**n/a**
GC Column:	**DB-225**	Analyst:	**KH**	% Solids:	**28.1**

Analytes	Conc. (ng/kg)	DL	Ratio	RT	RRT	Flags
2,3,7,8-TCDF	1.9		0.77	22:36	1.001	___

Internal Standard	Conc. (ng/kg)	% Recovery	QC Limits	Ratio	RT	RRT	Flags
$^{13}C_{12}$-2,3,7,8-TCDF	90.8	45.5	29%-140%	0.78	22:35	1.053	___

Recovery Standard	Ratio	RT	Flags
$^{13}C_{12}$-1,2,3,4-TCDD	0.80	21:27	___

Data Reviewer: K- 06/29/98

CONB_PSR v1.00, LARS 6.11.06

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Solutions Taking Shape.

Sediment Toxicity Testing Report

Prepared for

Washington State Department of Ecology
Manchester Environmental Laboratory
7411 Beach Drive East
Port Orchard, Washington 98366

September 1998

OGDEN ENVIRONMENTAL AND ENERGY SERVICES

Sediment Toxicity Testing Report

Prepared for

Washington State Department of Ecology
Manchester Environmental Laboratory
7411 Beach Drive East
Port Orchard, Washington 98366

Prepared by

Ogden Environmental and Energy Services Co., Inc.
Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, California 92121
(619) 458-9044

September 1998
Project No. 318861000 0001

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SECTION 1 - INTRODUCTION

A series of toxicity tests were conducted on marine sediments collected in the State of Washington. Sediment toxicity tests were conducted to assess the effects of the material on three species of marine organisms. Testing was performed in accordance with standardized test protocols using the amphipod, *Ampelisca abdita*, the polychaete *Neanthes arenaceodentata*, and larvae of echinoderm, *Strongylocentrotus purpuratus*. Test procedures followed the Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments (July, 1995).

The sediment testing program was conducted under the direction of Ms. Karin Fedderson of the Washington State Department of Ecology (WADOE) Manchester Environmental Laboratory. Sediments were collected under the direction of WADOE personnel on August 7, 1998. The samples were prepared and shipped via next day delivery service for arrival at Ogden's laboratory on August 11, 1998. Toxicity testing was conducted between August 12 and September 3, 1998 at the Ogden Environmental and Energy Services Bioassay Laboratory in San Diego, California.

SECTION 2 - METHODS AND MATERIALS

2.1 SAMPLE COLLECTION AND SHIPPING

Sediment collection for the amphipod, polychaete, and echinoderm assays was completed on August 7, 1998. The samples were identified as 328000, 328001, 328002, 328003, and 328004. Following collection, sediment samples were placed in glass jars, labeled, and tightly sealed. Samples were then packed in sealed ice chests and shipped to Ogden's Bioassay Laboratory in San Diego, California. Appropriate chain-of-custody procedures were employed during transport of samples. Upon arrival at the laboratory coolers were opened, their contents were verified, and temperatures were recorded. The samples were placed in a 4°C cold room until test initiation. Interstitial pore water was collected from each sample for water quality analysis on August 12, 1998. Pore water was collected by centrifuging approximately 600 g of sediment for 15 minutes at 3500 rpm. Total ammonia, total sulfides, pH, and salinity of the pore water was analyzed and recorded.

2.2 ORGANISM PROCUREMENT AND HANDLING

Amphipods

Test specimens *(Ampelisca abdita)* were collected in northern San Francisco Bay, California by Mr. John Brezina of Brezina and Associates. The organisms were collected in soft, muddy sediment in a subtidal area of 30 to 38 feet in depth. After collection, a 0.5 mm mesh sieve nesting over a 0.125 mm mesh sieve was used to capture amphipods. The amphipods were then transported to a holding facility in buckets containing sieved sediment from the collection location and oxygenated seawater. At the holding facility, the amphipods were identified and sorted to the species level prior to transport to the laboratory. The *A. abdita* were transported to the laboratory in coolers containing sieved sediment from the collection location and oxygenated seawater.

Mr. Brezina maintains a quality assurance log containing the date, weather conditions, physical conditions, and any specific comments pertaining to each collection event. Upon arrival at the laboratory, organism receipt information was recorded in a log book where physical parameters and animal condition were specified. The amphipods were acclimated to test conditions in order to promote and confirm animal health prior to test initiation. During the acclimation period, the animals were observed for any indications of significant mortality.

Worms

Test specimens (*Neanthes arenaceodentata*) were supplied by Dr. Don Reish of California State University at Long Beach. The worms were transported to the laboratory in plastic bags containing oxygen-saturated water and *Enteromorpha* algae (as a food source). Ice chests containing the plastic bags were shipped by overnight delivery service. Upon arrival at the laboratory, organism receipt information was recorded in a log book where physical parameters and animal condition were specified. Worms were acclimated to test conditions and mortality was observed prior to testing.

Echinoderms

The test animal used was the purple sea urchin, *Strongylocentrotus purpuratus*, collected by Ogden personnel from the Mission Bay channel in San Diego, California. The

organisms were transported to the Bioassay Laboratory in a collection bag placed in an ice chest. The sea urchins were maintained at approximately 15°C prior to use in testing.

2.3 BIOASSAY PROTOCOLS

Amphipod Bioassays

Marine amphipod bioassays were conducted in accordance with the Puget Sound Estuary Program (PSEP) "Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, July 1995." Animals were exposed to test sediments for ten days to determine the effects of site sediment on amphipod survival and emergence. The emergence endpoint is used to detect biologically important sublethal effects on behavior. Emergence was monitored on days 6 and 10 by recording the number of live and dead amphipods observed on the water and sediment surface.

Temperature, dissolved oxygen, pH, and salinity were monitored in a replicate surrogate test chamber for each sediment sample. Total ammonia was measured in the overlying water at the beginning and end of the test period. Water quality measurements, except temperature, during the 10-day exposure period were in the range defined as acceptable by the test protocol. The test organisms were inadvertently acclimated to a temperature of 15°C, the temperature at which they arrived. The test was subsequently initiated at this temperature in error. The following day, 17 hours after test initiation, the organisms were slowly acclimated to the prescribed test temperature by transferring test chambers to the 20°C environmental chamber. Animals were closely observed to confirm the absence of effects due to a shift of temperature. No effects of any type were noted, and further, our previous experience with the acclimation of species to varying temperatures would indicate that this was of minor significance to this organism.

The control treatment for this test consisted of sediment from the amphipod collection site. A reference toxicant test was conducted in conjunction with the sediment tests to ensure that organisms were not impacted by stresses other than the test material itself (e.g., injury or disease, unfavorable physical or chemical conditions in the test containers, improper handling, or acclimation, etc.). Reference toxicant testing is a significant part of our QA program, the results of which are monitored over time to evaluate consistency of laboratory conditions and performance.

Worm Bioassays

Worm assays were conducted in accordance with PSEP guidelines. This protocol is similar, with minor modifications, to procedures described in "Protocol for Juvenile Neanthes Sediment Bioassay. U. S. EPA Contract 68-D8-0085. June 1990." The polychaete, *Neanthes arenaceodentata,* was used in a 20-day exposure to sediment samples. Mortality, total biomass, individual worm biomass, and daily growth per individual test organism were measured to determine the effects on specific variables of exposure to the site sediment.

Temperature was monitored daily. Dissolved oxygen, pH, and salinity were measured and recorded prior to each water renewal, every third day. Total ammonia was measured in overlying water at the beginning, on day 10, and at the end of the test period. Animals in each test chamber were fed a diet of Tetramin on alternating days. Water quality was monitored in a replicate surrogate test chamber for each sediment sample. All water quality measurements observed during the 20-day exposure period were within the acceptable range defined in the test protocol.

Two control treatments were performed with this test. One control consisted of clean, filtered seawater without sediment. A second control comprised sediment from the amphipod collection site.

A concurrent reference toxicant test using cadmium chloride was also conducted to confirm animal health and ensure that organisms were not affected by stresses other than the test material itself (i.e., injury or disease, unfavorable physical or chemical conditions in the test chambers, improper handling or acclimation, etc.).

Echinoderm Bioassays

Echinoderm larvae assays were conducted in accordance with PSEP guidelines. This protocol is similar, with minor modifications, to procedures described in Dinnel and Stober (1985) and American Society for Testing and Materials (ASTM 1994). The purple sea urchin, *Strongylocentrotus purpuratus,* was used as the test species for this assay. The sand dollar *Dendraster excentricus* was requested for use as part of the initial request for bids and an attempt was made to initiate testing with that species, however, the quality of the gametes produced was deemed unacceptable and upon examining the

quality of available sea urchin gametes, the decision was made to proceed with the better quality eggs. Animals were exposed to whole sediment test material for 96 hours. Survival and development of larvae were evaluated as endpoints to determine the effect of test material on echinoderm larvae.

Temperature, dissolved oxygen, pH, and salinity were monitored in a replicate surrogate test chamber for each sediment sample. Total ammonia was measured in the overlying water at the beginning and end of the test period. Total sulfides were measured in overlying water at the end of the test period. Water quality measurements during the 96-hr exposure period were within the range specified in the test protocol.

Upon termination of the test, a 10-mL thoroughly mixed subsample from each test chamber was placed in a 20-dram glass shell vial and preserved with buffered formalin. Larval survival and development was determined by examining the embryos under an inverted compound microscope at 100x. Each vial was observed directly under the microscope and a total larvae count was made to assess survival. To determine normal development, all surviving larvae were scored as either normal or abnormal. Normal larvae were defined as those that had successfully reached the four-arm pluteus stage.

A concurrent reference toxicant test with copper chloride was conducted to ensure that the organisms were not being affected by stresses other than the test material itself (i.e., injury or disease, unfavorable physical or chemical conditions in the test chambers, improper handling, or acclimation, etc.). Ogden maintains control charts for each species and toxicant combination for use as a monitoring tool to ensure the consistency of laboratory conditions and performance.

2.4 QUALITY ASSURANCE

Test organisms used in the toxicity tests were collected in areas known to be generally free of pollutants from which quality animals have previously been collected or purchased from reputable suppliers. Organisms were purchased from biologists who were screened by reputation, depth of knowledge concerning the organism of choice, and their ability to consistently deliver healthy test organisms. Upon receipt in the bioassay lab, test organisms were slowly acclimated to test conditions in environmentally controlled holding areas. Acclimation was performed in accordance with each test

protocol for each test organism. Test organisms are evaluated on a performance basis for every test conducted in the laboratory.

The laboratory implements quality assurance procedures with application to all aspects of testing to include source, handling, condition, receipt, and storage of samples and test organisms as well as calibration and maintenance of instruments and equipment used during testing. All data generated by the laboratory is monitored for completeness and accuracy at the end of each day and at the end of each individual test period to ensure generation of the highest quality data. Laboratory negative control and positive controls (i.e., reference toxicant assays) are conducted concurrent to every sample assay. These tests act to confirm test organism quality, sound laboratory conditions, and appropriateness of procedures.

2.5 STATISTICAL ANALYSES

Statistical analyses were conducted only on reference toxicant test data. PSEP guidelines do not specify statistical methods for use with data generated under its guidelines. The median lethal concentration (LC_{50}) and the median effect concentration (EC_{50}) were calculated either by Linear Interpolation or Probit analyses using ToxCalc Comprehensive Toxicity Data Analysis and Database Software, Version 5.0. Probit was used when the data met the restrictions of the model, when Probit did not apply, linear interpolation was used.

SECTION 3 - RESULTS

Test results are summarized on Tables 3-1 through 3-4. Appendices A, B, and C contain water quality observations, reference toxicant data, and statistical analyses, respectively.

3.1 AMPHIPOD BIOASSAYS

Average survival in the control sediments was 90 percent. This value is equal to the PSEP acceptability criterion of 90 percent. Average survival in the test samples 328000 through 328003 ranged from 83 to 95 percent. All replicates of the 328004 sample exhibited 0 percent survival.

Average control emergence (combined live and dead amphipods above or on the sediment surface) was 10 percent. Average emergence at the test sites 328000 through

328003 ranged from 5 to 12 percent. A mean of approximately 73 percent of the amphipods were emerged in sample 328004. A heavy flocculent layer in the 328004 test site chambers prohibited an accurate count of emerged amphipods. It is likely that emergence was actually closer to 100 percent in this sample.

An accurate assessment of emergence among all the sites was difficult due to the limited ability to distinguish dead amphipods, from shed exoskeletons. Due to these inherent difficulties, detailed observations of emergence were recorded only on days 6 and 10. Very few live emerged amphipods (a mean of less than 1 percent) were observed among all sediment samples.

The mean reference toxicant control survival was 97 percent. The median lethal concentration (LC_{50}) was determined to be 0.88 mg/L $CdCl_2$. The 95 percent confidence interval for this determination was 0.68 to 1.06 mg/L. This LC50 is within the range of values (0.49 ± 0.42 mg/L) reported in the PSEP protocol for *A. abdita* (Army Corps of Engineers DAIS Database, 1994).

3.2 WORM BIOASSAYS

Average control survival was 92 percent. Average survival in the test sites 328000 through 328003 ranged from 88 to 100 percent. Survival in all replicates of the 328004 sample was 0 percent.

The average biomass of individual worms exposed to control sediment was 11.4 mg. Mean individual biomass in the test sites 328000 through 328003 ranged from 9.3 to 11.5 mg.

The average daily growth of individual worms exposed to control sediment was 0.55 mg. Mean individual daily growth in the test sites 328000 through 328003 ranged from 0.45 to 0.56 mg.

The reference toxicant control survival was 100 percent. The LC_{50} was 5.9 mg/L $CdCl_2$. The 95 percent confidence interval for this determination was 5.1 to 6.9 mg/L. This LC_{50} is within the range of values (5.0 to 22.0 mg/L) reported in the PSEP protocol for *N. arenaceodentata* (Reish 1984, Johns and Ginn, 1990, and Dillon et al. 1993).

3.3 ECHINODERM LARVAE BIOASSAYS

Mean normal development in the controls was 82 percent. This value is above the PSEP acceptability criterion of 70 percent. Average normal development in samples 328000 through 328003 ranged from 32 to 77 percent. Zero percent normal development was observed among embryos exposed to sample 328004.

Average control survival was determined to be 192 larvae per mL. Average survival relative to the control was variable among the test samples ranging from 38 percent (Site 328001) to 83 percent (sediment sample 328002). The loss of embryos associated with sediments may have contributed to the low recovery and variability among replicates and samples. No survivors were detected among embryos exposed to site 328004 sediments.

A combined endpoint of percent normal development of surviving embryos relative to the total number of embryos added was also calculated. The average control response for this endpoint was 53 percent. Mean responses for samples 328000 through 328003 were between 9 and 35 percent.

The reference toxicant control survival was 22.9 larvae per mL. Average control normal development was 91 percent. The EC_{50} for normal development was 11.2 µg/L $CuCl_2$. This LC50 is within the range of values (18 ± 15 µg/L) determined previously at the Ogden laboratory. A survival LC_{50} endpoint calculation was not possible due to a minimal dose response.

Table 3-1. 10-Day Amphipod Survival Results
Washington State Department of Ecology - Manchester Laboratory

Site	Rep.	Number Alive	Number Dead	Percent Survival	Average Percent Survival ± 1 sd
Control	A	18	2	90	
	B	17	3	85	
	C	19	1	95	
	D	18	2	90	
	E	18	2	90	90 ± 4
328000	A	17	3	85	
	B	20	0	100	
	C	19	1	95	
	D	19	1	95	
	E	20	0	100	95 ± 6
328001	A	15	5	75	
	B	18	2	90	
	C	19	1	95	
	D	20	0	100	
	E	19	1	95	91 ± 10
328002	A	20	0	100	
	B	19	1	95	
	C	20	0	100	
	D	17	3	85	
	E	19	1	95	95 ± 6
328003	A	16	4	80	
	B	20	0	100	
	C	18	2	90	
	D	19	1	95	
	E	10	10	50	83 ± 20
328004	A	0	20	0	
	B	0	20	0	
	C	0	20	0	
	D	0	20	0	
	E	0	20	0	0 ± 0

Table 3-2. Amphipod Emergence Results
Washington State Department of Ecology - Manchester Laboratory

Site	Rep.	Average Number Emerged [a]	Percent Emergence	Average Percent Emergence ± 1 sd
Control	A	2.5	13	
	B	2	10	
	C	0.5	3	
	D	3	15	
	E	1.5	8	10 ± 5
328000	A	5	25	
	B	0.5	3	
	C	2	10	
	D	3	15	
	E	1.5	8	12 ± 9
328001	A	1	5	
	B	2	10	
	C	2	10	
	D	3.5	18	
	E	3.5	18	12 ± 5
328002	A	3.5	18	
	B	1.5	8	
	C	1	5	
	D	3	15	
	E	3	15	12 ± 5
328003	A	0	0	
	B	1	5	
	C	1	5	
	D	2	10	
	E	1	5	5 ± 4
328004	A	13 [b]	65 [b]	
	B	15 [b]	75 [b]	
	C	15 [b]	75 [b]	
	D	15 [b]	75 [b]	
	E	15 [b]	75 [b]	73 [b] ± 5

[a] Number emerged includes the mean number of live and dead organisms counted on days 6 and 10. (Dead organisms were indistinguishable from exoskeletons)

[b] Estimated number due to a heavy flocculent layer on the sediment surface.

Table 3-3. Worm Survival and Growth Results
Washington State Department of Ecology - Manchester Laboratory

Site	Rep	Initial Worm Count	Final Worm Count	Avg. Percent Surv. ± 1sd	Total Biomass (mg)	Avg. Total Biomass (mg) ± 1sd	Avg. Individual Biomass Per Rep. (mg)	Avg. Individual Biomass Per Site (mg) ± 1sd	Avg. Indv. Daily Growth Per Rep. (mg)	Avg. Indv. Daily Growth Per Site (mg) ± 1sd
Seawater Control	A	5	4		49.2		12.3		0.60	
	B	5	4		48.2		12.1		0.59	
	C	5	5		57.6		11.5		0.56	
	D	5	5		51.0		10.2		0.49	
	E	5	5	92 ± 11	55.1	52.2 ± 4.0	11.0	11.4 ± 0.8	0.53	0.55 ± 0.04
Sediment Control	A	5	5		58.9		11.8		0.57	
	B	5	5		53.3		10.7		0.52	
	C	5	5		55.3		11.1		0.54	
	D	5	5		48.3		9.7		0.47	
	E	5	5	100 ± 0	66.1	56.4 ± 6.6	13.2	11.3 ± 1.3	0.64	0.55 ± 0.07
328000	A	5	5		56.2		11.2		0.55	
	B	5	5		57.6		11.5		0.56	
	C	5	5		60.7		12.1		0.59	
	D	5	5		47.5		9.5		0.46	
	E	5	5	100 ± 0	51.5	54.7 ± 5.2	10.3	10.9 ± 1.0	0.50	0.53 ± 0.05
328001	A	5	5		39.2		7.8		0.38	
	B	5	5		50.3		10.1		0.49	
	C	5	5		52.2		10.4		0.51	
	D	5	5		39.1		7.8		0.37	
	E	5	5	100 ± 0	50.4	46.2 ± 6.5	10.1	9.3 ± 1.3	0.49	0.45 ± 0.07
328002	A	5	5		52.0		10.4		0.50	
	B	5	5		48.1		9.6		0.46	
	C	5	5		42.5		8.5		0.41	
	D	5	5		48.7		9.7		0.47	
	E	5	2	88 ± 27	19.9	42.2 ± 12.9	10.0	9.6 ± 0.7	0.48	0.47 ± 0.04
328003	A	5	5		57.6		11.5		0.56	
	B	5	5		65.6		13.1		0.64	
	C	5	4		40.9		10.2		0.49	
	D	5	5		53.4		10.7		0.52	
	E	5	5	96 ± 9	60.3	55.6 ± 9.3	12.1	11.5 ± 1.1	0.59	0.56 ± 0.06
328004	A	5	0		NA		NA		0.0	
	B	5	0		NA		NA		0.0	
	C	5	0		NA		NA		0.0	
	D	5	0		NA		NA		0.0	
	E	5	0	0 ± 0	NA	NA	NA	NA	0.0	NA

NA = Not applicable due to zero percent survival.

Initial Individual Biomass (mg)

Rep A	Rep B	Rep C	Mean	sd
0.32	0.36	0.32	0.34	0.02

SMS = L 134 normal
CSL = L 111 normal

Table 3-4. Echinoderm Larvae Survival and Development Results
Washington State Department of Ecology - Manchester Laboratory

Site	Rep	Number Normal	Number Abnormal	Total Number	Percent Normal	Average % Normal ± 1 sd	Percent Survival	Average % Surviva ± 1 sd	Combined Normal / Total Added [a]	vg. Combined Norm. / Total Added [a] ± 1 sd
Control	A	132	52	184	72		NA		45	
	B	147	19	166	89		NA		50	
	C	158	42	205	80		NA		55	
	D	174	21	195	89		NA		59	
	E	172	38	210	82	82 ± 7	NA	NA	58	53 ± 6
328000	A	145	19	164	88		85		49	
	B	33	25	58	57		30		11	
	C	83	32	115	72		60		28	
	D	163	26	189	86		98		55	
	E	91	23	114	80	77 ± 13	59	67 ± 26	31	35 ± 18
328001	A	2	27	29	7		15		1	
	B	23	48	71	32		37		8	
	C	21	35	56	38		29		7	
	D	39	42	81	48		42		13	
	E	46	83	129	36	32 ± 15	67	38 ± 19	16	9 ± 6
328002	A	33	124	157	21		82		11	
	B	53	110	163	33		85		18	
	C	96	80	176	55		92		33	
	D	21	136	157	13		82		7	
	E	77	70	147	52	35 ± 18	77	83 ± 6	26	19 ± 10
328003	A	24	144	168	14		88		8	
	B	26	92	118	22		61		9	
	C	94	59	153	61		80		32	
	D	36	56	92	39		48		12	
	E	53	70	123	43	36 ± 19	64	68 ± 16	18	16 ± 10
328004	A	0	0	0	0		0		0	
	B	0	0	0	0		0		0	
	C	0	0	0	0		0		0	
	D	0	0	0	0		0		0	
	E	0	0	0	0	0 ± 0	0	0 ± 0	0	0 ± 0

Time Zero - Initial Counts	Rep A	B	C	D	E	F	Mean
	312	261	196	312	325	364	295

[a] Combined Normal /Total added = (no. surviving normal larvae/no. embryos inoculated).

NA = Not applicable. Survival responses for each site are based on the control survival. 192 larvae/ 10 mls. = 19.2 larvae/ ml.

SECTION 4 - DISCUSSION

4.1 AMPHIPOD BIOASSAYS

Average control survival in both the sediment and reference toxicant tests was above 90 percent which indicates that the test organisms were healthy and test conditions were adequate. The LC_{50} results from the reference toxicant test fell within a range of published values further supporting the above conclusion.

Survival and emergence among samples 328000 through 328003 was similar to that obtained in the controls. These results suggest that these sediments did not induce acute lethal or sublethal impacts on the test organisms. Zero percent survival among amphipods exposed to sample 328004 suggests that this sediment was acutely toxic to *Ampelisca abdita*. Nearly all amphipods exposed to this sample failed to bury upon test initiation in the sediment, indicating a sublethal impact as well.

4.2 WORM BIOASSAYS

Average control survival in both the sediment and reference toxicant tests was above 90 percent which indicates that the test organisms were healthy and test conditions were adequate. The LC_{50} results from the reference toxicant test fell within the published range of values further supporting the above conclusion.

Survival and growth among samples 328000 through 328003 was similar to that obtained in the controls. These results suggest that these sediments did not induce acute lethal or sublethal impacts on the test organisms. Zero percent survival among polychaetes exposed to sample 328004 suggests that the sediment was acutely toxic to *N. arenaceodentata*. Calculation of a growth endpoint for worms exposed to sample 328004 was not possible due to zero survival.

4.3 ECHINODERM LARVAE BIOASSAYS

Mean normal development in controls for both the sediment and reference toxicant tests was above 70 percent indicating that the test organisms were healthy and test conditions were adequate. The EC_{50} results from the reference toxicant test fell within the range of values previously obtained at Ogden further supporting the above conclusion.

Development among embryos exposed to sample 328000 was very similar to that obtained in the control. This result suggests that this sample did not induce acute sublethal impacts on purple sea urchin embryos. Relative to the control, a decreased incidence of normal development among larvae exposed to samples 328001 through 328003 and zero percent normal development among embryos exposed to sample 328004 suggests that these sediments did induce acute sublethal impacts on the test organisms.

Survival of echinoderm larvae in a whole sediment test is difficult to interpret due the loss of embryos associated with the sediments and the failure of abnormal echinoderm larvae to disintegrate (Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, July 1995). Sample 328001 showed decreased survival relative to samples 328000, 328002, and 328003. There was zero percent survival among embryos exposed to sample 328004.

Values for the endpoint of combined normal survivors/total number of embryos inoculated were lower in all samples tested relative to the mean control value. A value of zero was obtained for embryos exposed to sample 328004. The loss of embryos remaining associated with the sediment may partially explain the decreased values obtained among the test samples relative to the control, which lacks sediment. A decreased number of embryos in the controls relative to the total number inoculated may be due to adherence of embryos to the sides of the exposure chamber and failure of some eggs to divide.

SECTION 5 - REFERENCES

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APPENDIX A

WATER QUALITY OBSERVATIONS

AMPHIPOD BIOASSAYS

Appendix Table A-1. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

CONTROL					
Day	**Temp. (°C)**	**D.O. (mg/L)**	**pH (units)**	**Salinity (ppt)**	**NH_3 (mg/L)**
0	14.8 [a]	8.7	7.75	28	2.1
1	18.8	7.5	7.61	28	
2	20.3	5.1	7.47	28	
3	20.4	7.4	7.91	28	
4	20.7	7.3	7.76	28	
5	20.5	7.9	7.91	28	
6	20.5	7.1	7.95	28	
7	20.6	7.1	7.86	28	
8	20.6	7.2	7.94	28	
9	20.6	7.2	8.07	27	
10	20.8	8.0	8.08	27	< 0.10

Appendix Table A-2. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

328000					
Day	**Temp. (°C)**	**D.O. (mg/L)**	**pH (units)**	**Salinity (ppt)**	**NH_3 (mg/L)**
0	14.8 [a]	8.6	7.81	28	0.73
1	18.4	7.7	7.61	28	
2	20.3	7.2	7.70	28	
3	20.3	7.3	7.85	28	
4	20.7	7.2	7.73	28	
5	20.5	7.8	7.95	28	
6	20.5	7.1	8.15	28	
7	20.6	7.2	8.17	28	
8	20.5	7.2	8.22	28	
9	20.5	7.2	8.39	28	
10	20.8	7.9	8.37	28	0.12

Appendix Table A-3. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

328001					
Day	**Temp. (°C)**	**D.O. (mg/L)**	**pH (units)**	**Salinity (ppt)**	**NH_3 (mg/L)**
0	14.6 [a]	8.5	7.78	28	1.5
1	18.4	7.4	7.54	28	
2	20.3	7.1	7.83	28	
3	20.3	7.0	8.01	28	
4	20.7	7.0	8.01	28	
5	20.5	7.5	8.15	28	
6	20.5	6.9	8.16	28	
7	20.6	7.0	8.19	28	
8	20.5	7.0	8.17	28	
9	20.5	7.0	8.24	28	
10	20.8	7.2	8.22	28	0.98

Appendix Table A-4. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

328002					
Day	**Temp. (°C)**	**D.O. (mg/L)**	**pH (units)**	**Salinity (ppt)**	**NH_3 (mg/L)**
0	14.7 [a]	8.5	7.78	28	0.85
1	18.8	7.4	7.50	28	
2	20.3	7.2	7.64	28	
3	20.4	7.3	7.76	28	
4	20.6	7.2	7.68	28	
5	20.4	7.7	7.83	28	
6	20.4	7.0	7.89	28	
7	20.5	7.1	7.83	28	
8	20.6	7.1	7.90	28	
9	20.5	7.2	8.05	28	
10	20.7	7.9	8.05	28	0.24

Appendix Table A-5. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

328003					
Day	**Temp. (°C)**	**D.O. (mg/L)**	**pH (units)**	**Salinity (ppt)**	**NH_3 (mg/L)**
0	14.7 [a]	8.5	7.77	28	0.37
1	19.1	7.3	7.50	28	
2	20.3	7.1	7.76	28	
3	20.4	7.1	7.94	28	
4	20.5	6.9	7.96	28	
5	20.5	7.4	8.05	28	
6	20.4	5.1	7.84	28	
7	20.5	6.7	8.04	28	
8	20.5	6.8	8.05	28	
9	20.5	6.6	8.14	28	
10	20.8	7.3	8.16	28	9.9

Appendix Table A-6. 10-Day Solid Phase Water Quality Results (*Ampelisca abdita*)
Washington State Department of Ecology - Manchester Laboratory

328004					
Day	Temp. (°C)	D.O. (mg/L)	pH (units)	Salinity (ppt)	NH_3 (mg/L)
0	14.6 [a]	8.6	7.92	28	1.3
1	19.2	7.2	7.51	28	
2	20.3	7.2	7.73	28	
3	20.3	7.3	7.86	28	
4	20.5	7.2	7.76	28	
5	20.4	7.8	7.90	28	
6	20.4	7.1	7.95	27	
7	20.5	7.2	7.94	27	
8	20.4	7.2	7.95	27	
9	20.4	7.2	8.11	27	
10	20.7	7.7	8.08	27	5.0

WORM BIOASSAYS

Appendix Table A-7. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

Seawater Control							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.8	7.97	28	20.3	< 0.10
1	NO	NO	--	--	--	20.1	
2	YES	NO	--	--	--	20.3	
3	NO	YES	7.2	7.86	28	20.4	
4	YES	NO	--	--	--	20.6	
5	NO	NO	--	--	--	20.5	
6	YES	YES	6.8	7.83	28	20.3	
7	NO	NO	--	--	--	20.6	
8	YES	NO	--	--	--	20.5	
9	NO	YES	6.2	7.72	28	20.5	
10	YES	NO	--	--	--	20.4	2.2
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.0	7.76	28	20.4	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	5.9	7.53	28	20.4	
16	YES	NO	--	--	--	20.5	
17	NO	NO	--	--	--	20.5	
18	YES	YES	6.5	7.59	28	20.6	
19	NO	NO	--	--	--	20.4	
20	NA	NA	7.1	7.61	28	20.8	4.2

Appendix Table A-8. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

Sediment Control							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.5	8.00	28	20.3	2.6
1	NO	NO	--	--	--	20.1	
2	YES	NO	--	--	--	20.3	
3	NO	YES	6.9	7.91	28	20.3	
4	YES	NO	--	--	--	20.6	
5	NO	NO	--	--	--	20.5	
6	YES	YES	6.7	7.94	28	20.3	
7	NO	NO	--	--	--	20.4	
8	YES	NO	--	--	--	20.5	
9	NO	YES	6.6	7.87	28	20.4	
10	YES	NO	--	--	--	20.4	3.9
11	NO	NO	--	--	--	20.3	
12	YES	YES	6.9	7.90	28	20.4	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	6.4	7.70	28	20.4	
16	YES	NO	--	--	--	20.5	
17	NO	NO	--	--	--	20.5	
18	YES	YES	6.7	7.66	28	20.6	
19	NO	NO	--	--	--	20.4	
20	NA	NA	7.2	7.69	28	20.8	0.9

Appendix Table A-9. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

328000							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.3	7.96	28	20.3	0.49
1	NO	NO	--	--	--	20.3	
2	YES	NO	--	--	--	20.3	
3	NO	YES	7.0	7.91	28	20.3	
4	YES	NO	--	--	--	20.4	
5	NO	NO	--	--	--	20.4	
6	YES	YES	6.5	7.86	28	20.3	
7	NO	NO	--	--	--	20.4	
8	YES	NO	--	--	--	20.4	
9	NO	YES	6.5	7.87	28	20.4	
10	YES	NO	--	--	--	20.3	3.3
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.0	7.99	28	20.3	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	6.6	7.88	28	20.4	
16	YES	NO	--	--	--	20.4	
17	NO	NO	--	--	--	20.5	
18	YES	YES	6.8	7.82	28	20.6	
19	NO	NO	--	--	--	20.4	
20	NA	NA	7.3	7.92	28	20.8	5.5

Appendix Table A-10. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

328001							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.3	7.82	28	20.3	2.2
1	NO	NO	--	--	--	20.4	
2	YES	NO	--	--	--	20.3	
3	NO	YES	6.6	7.83	28	20.3	
4	YES	NO	--	--	--	20.4	
5	NO	NO	--	--	--	20.4	
6	YES	YES	6.3	7.88	28	20.3	
7	NO	NO	--	--	--	20.3	
8	YES	NO	--	--	--	20.4	
9	NO	YES	6.9	8.07	28	20.4	
10	YES	NO	--	--	--	20.3	5.9
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.2	8.13	28	20.3	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	7.0	8.05	28	20.4	
16	YES	NO	--	--	--	20.4	
17	NO	NO	--	--	--	20.4	
18	YES	YES	7.1	8.01	28	20.5	
19	NO	NO	--	--	--	20.3	
20	NA	NA	7.5	8.10	28	20.7	7.6

Appendix Table A-11. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

328002							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.5	7.86	28	20.3	0.73
1	NO	NO	--	--	--	20.6	
2	YES	NO	--	--	--	20.3	
3	NO	YES	7.1	7.92	28	20.3	
4	YES	NO	--	--	--	20.4	
5	NO	NO	--	--	--	20.4	
6	YES	YES	7.0	7.99	28	20.4	
7	NO	NO	--	--	--	20.3	
8	YES	NO	--	--	--	20.4	
9	NO	YES	6.8	7.96	28	20.4	
10	YES	NO	--	--	--	20.3	5.5
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.1	7.95	28	20.3	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	6.8	7.85	28	20.4	
16	YES	NO	--	--	--	20.4	
17	NO	NO	--	--	--	20.4	
18	YES	YES	6.8	7.77	28	20.5	
19	NO	NO	--	--	--	20.4	
20	NA	NA	7.4	7.84	28	20.8	5.6

Appendix Table A-12. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

328003							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.5	8.03	28	20.3	< 0.10
1	NO	NO	--	--	--	20.7	
2	YES	NO	--	--	--	20.3	
3	NO	YES	6.9	7.98	28	20.3	
4	YES	NO	--	--	--	20.4	
5	NO	NO	--	--	--	20.5	
6	YES	YES	6.6	7.95	28	20.4	
7	NO	NO	--	--	--	20.3	
8	YES	NO	--	--	--	20.4	
9	NO	YES	6.6	8.00	28	20.4	
10	YES	NO	--	--	--	20.3	7.7
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.0	8.03	28	20.3	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	6.9	7.97	28	20.4	
16	YES	NO	--	--	--	20.4	
17	NO	NO	--	--	--	20.4	
18	YES	YES	7.0	7.93	28	20.6	
19	NO	NO	--	--	--	20.4	
20	NA	NA	7.6	8.03	28	20.8	10.5

Appendix Table A-13. Worm Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

328004							
Day	Fed	H_2O Change	Dissolved O_2 (mg/L)	pH (Units)	Salinity (ppt)	Temperature (°C)	NH_3 (mg/L)
0	YES	NEW WATER	7.1	7.85	28	20.4	1.2
1	NO	NO	--	--	--	20.7	
2	YES	NO	--	--	--	20.3	
3	NO	YES	6.9	7.87	28	20.4	
4	YES	NO	--	--	--	20.5	
5	NO	NO	--	--	--	20.5	
6	YES	YES	6.8	7.92	28	20.4	
7	NO	NO	--	--	--	20.4	
8	YES	NO	--	--	--	20.5	
9	NO	YES	6.0	7.88	28	20.4	
10	YES	NO	--	--	--	20.3	2.3
11	NO	NO	--	--	--	20.3	
12	YES	YES	7.1	7.93	28	20.3	
13	NO	NO	--	--	--	20.4	
14	YES	NO	--	--	--	20.4	
15	NO	YES	6.8	7.79	28	20.4	
16	YES	NO	--	--	--	20.4	
17	NO	NO	--	--	--	20.4	
18	YES	YES	6.7	7.74	28	20.6	
19	NO	NO	--	--	--	20.3	
20	NA	NA	7.4	7.84	28	20.8	6.6

ECHINODERM BIOASSAYS

Appendix Table A-14. Echinoderm Development Water Quality Results
Washington State Department of Ecology

Site	D.O. (mg/L)					pH (units)					Salinity (ppt)					Temperature (°C)					NH_3 (mg/L)		H_2S (mg/L) [a]	
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96
Control	8.2	8.2	8.3	8.4	8.1	7.92	7.88	7.79	7.86	7.85	28	28	28	28	28	15.1	14.4	14.5	14.5	14.7	0.73	0.49	< 0.05	< 0.05
328000	7.0	6.4	6.3	6.5	6.5	7.90	7.88	7.71	7.76	7.74	28	28	28	28	28	15.6	14.4	14.8	14.6	14.8	0.12	0.37	< 0.05	< 0.05
328001	6.0	6.2	5.4	5.7	5.0	7.82	7.78	7.59	7.67	7.61	28	28	28	28	28	15.9	14.8	14.9	14.6	15.0	0.37	0.24	< 0.05	< 0.05
328002	6.7	6.0	5.7	5.9	5.7	7.59	7.62	7.37	7.56	7.47	28	28	28	28	28	15.8	14.7	14.8	14.6	15.1	0.12	< 0.1	< 0.05	< 0.05
328003	6.7	5.9	6.0	6.3	6.3	7.54	7.48	7.37	7.53	7.53	28	28	28	28	28	15.8	14.8	14.8	14.8	15.0	0.24	0.12	0.04	< 0.05
328004	5.8	5.4	4.9	5.6	5.3	7.92	7.85	7.59	7.57	7.56	28	28	28	28	28	15.8	14.8	15.0	14.8	15.1	0.61	0.12	< 0.05	< 0.05

[a] Measured as un-ionized H_2S; 0-hr readings represent sediment porewater, 96-hr readings represent overlying water in the test chamber.

INTERSTITIAL PORE WATER

Appendix Table A-15. Interstitial Pore Water - Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

Site	pH (units)	Salinity (ppt)	NH_3 (mg/L)	Un-ionized H_2S (mg/L)
Seawater Control	7.93	28	< 0.10	< 0.04
328000	7.47	29	2.6	< 0.04
328001	7.35	27	11.2	< 0.04
328002	7.06	29	3.1	< 0.04
328003	6.93	31	2.9	0.04
328004	7.50	25	11.20	< 0.04

APPENDIX B

REFERENCE TOXICANT RESULTS

AMPHIPOD

Appendix Table B-1. Amphipod Reference Toxicant Bioassay Results
Washington State Department of Ecology - Manchester Laboratory

$CdCl_2$ Concentration (mg/L)	Rep	Initial Number of Amphipods	Final Number of Amphipods	Percent Survival	Average Percent Survival
Control	a	10	9	90	
	b	10	10	100	
	c	10	10	100	97
0.125	a	10	8	80	
	b	10	7	70	
	c	10	10	100	83
0.25	a	10	8	80	
	b	10	7	70	
	c	10	9	90	80
0.50	a	10	3	30	
	b	10	3	30	
	c	10	5	50	37
1.0	a	10	1	10	
	b	10	0	0	
	c	10	0	0	3
2.0	a	10	0	0	
	b	10	0	0	
	c	10	0	0	0

Appendix Table B-2. Amphipod Reference Toxicant Bioassay Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

$CdCl_2$ Concentration (mg/L)		Dissolved Oxygen (mg/L)					pH (units)					Salinity (ppt)					Temperature (°C)				
	Rep	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0[a]	24	48	72	96
Control	A	7.8	7.7	6.9	7.0	7.2	8.06	7.76	7.79	7.74	7.62	28	28	28	28	28	16.3	18.8	20.4	20.5	20.5
	B	7.8	7.7	6.9	7.0	7.2	8.06	7.76	7.79	7.74	7.62	28	28	28	28	28	16.3	18.8	20.4	20.5	20.5
	C	7.8	7.7	6.9	7.0	7.2	8.06	7.76	7.79	7.74	7.62	28	28	28	28	28	16.3	18.8	20.4	20.5	20.5
0.25	A	7.6	7.4	6.9	7.0	7.2	8.08	7.81	7.78	7.74	7.66	28	28	28	28	28	16.4	18.6	20.3	20.5	20.4
	B	7.6	7.4	6.9	7.0	7.2	8.08	7.81	7.78	7.74	7.66	28	28	28	28	28	16.4	18.6	20.3	20.5	20.4
	C	7.6	7.4	6.9	7.0	7.2	8.08	7.81	7.78	7.74	7.66	28	28	28	28	28	16.4	18.6	20.3	20.5	20.4
0.50	A	7.6	7.5	6.9	7.1	7.1	8.08	7.83	7.78	7.75	7.68	28	28	28	28	28	16.4	18.7	20.3	20.5	20.4
	B	7.6	7.5	6.9	7.1	7.1	8.08	7.83	7.78	7.75	7.68	28	28	28	28	28	16.4	18.7	20.3	20.5	20.4
	C	7.6	7.5	6.9	7.1	7.1	8.08	7.83	7.78	7.75	7.68	28	28	28	28	28	16.4	18.7	20.3	20.5	20.4
1.0	A	7.5	7.4	6.8	6.9	6.9	8.09	7.88	7.78	7.74	7.67	28	28	28	28	28	16.3	18.8	20.3	20.5	20.4
	B	7.5	7.4	6.8	6.9	6.9	8.09	7.88	7.78	7.74	7.67	28	28	28	28	28	16.3	18.8	20.3	20.5	20.4
	C	7.5	7.4	6.8	6.9	6.9	8.09	7.88	7.78	7.74	7.67	28	28	28	28	28	16.3	18.8	20.3	20.5	20.4
2.0	A	7.5	7.4	6.8	6.9	6.9	8.09	7.85	7.79	7.74	7.67	28	28	28	28	28	16.1	18.9	20.3	20.5	20.4
	B	7.5	7.4	6.8	6.9	6.9	8.09	7.85	7.79	7.74	7.67	28	28	28	28	28	16.1	18.9	20.3	20.5	20.4
	C	7.5	7.4	6.8	6.9	6.9	8.09	7.85	7.79	7.74	7.67	28	28	28	28	28	16.1	18.9	20.3	20.5	20.4
4.0	A	7.5	7.5	6.8	6.6	6.9	8.10	7.86	7.78	7.71	7.66	28	28	28	28	28	15.8	19.1	20.3	20.6	20.4
	B	7.5	7.5	6.8	6.6	6.9	8.10	7.86	7.78	7.71	7.66	28	28	28	28	28	15.8	19.1	20.3	20.6	20.4
	C	7.5	7.5	6.8	6.6	6.9	8.10	7.86	7.78	7.71	7.66	28	28	28	28	28	15.8	19.1	20.3	20.6	20.4

[a] The test was initiated at 15°C, the holding temperature of the organisms on the day of initiation (Tech error). The organisms were slowly acclimated to the proper temperature by moving the test to the 20°C chamber at 0900 on Day 1.

Worm

Appendix Table B-3. Worm Reference Toxicant Bioassay Results
Washington State Department of Ecology - Manchester Laboratory

$CdCl_2$ Concentration (mg/L)	Rep	Initial Number of Worms	Final Number of Worms	Percent Survival	Average Percent Survival
Control	a b c	10 10 10	10 10 10	100 100 100	100
2.5	a b c	10 10 10	10 9 10	100 90 100	97
5	a b c	10 10 10	9 6 7	90 60 70	73
10	a b c	10 10 10	0 1 1	0 10 10	7
20	a b c	10 10 10	0 0 0	0 0 0	0
40	a b c	10 10 10	0 0 0	0 0 0	0

Appendix Table B-4. Worm Reference Toxicant Bioassay Water Quality Results
Washington State Department of Ecology - Manchester Laboratory

$CdCl_2$ Concentration (mg/L)	Rep	Dissolved Oxygen (mg/L)					pH (units)					Salinity (ppt)					Temperature (°C)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control	A	7.5	6.9	6.8	7.0	6.9	8.07	7.74	7.74	7.73	7.46	28	28	28	28	28	20.5	20.3	20.3	20.5	20.5
	B	7.5	6.9	6.8	7.0	6.9	8.07	7.74	7.74	7.73	7.46	28	28	28	28	28	20.5	20.3	20.3	20.5	20.5
	C	7.5	6.9	6.8	7.0	6.9	8.07	7.74	7.74	7.73	7.46	28	28	28	28	28	20.5	20.3	20.3	20.5	20.5
2.5	A	7.5	7.2	6.7	7.0	6.9	8.07	7.77	7.75	7.73	7.61	28	28	28	28	28	20.6	20.3	20.4	20.5	20.5
	B	7.5	7.2	6.7	7.0	6.9	8.07	7.77	7.75	7.73	7.61	28	28	28	28	28	20.6	20.3	20.4	20.5	20.5
	C	7.5	7.2	6.7	7.0	6.9	8.07	7.77	7.75	7.73	7.61	28	28	28	28	28	20.6	20.3	20.4	20.5	20.5
5.0	A	7.5	7.1	6.8	6.8	6.8	8.06	7.78	7.76	7.71	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
	B	7.5	7.1	6.8	6.8	6.8	8.06	7.78	7.76	7.71	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
	C	7.5	7.1	6.8	6.8	6.8	8.06	7.78	7.76	7.71	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
10	A	7.5	7.2	6.9	6.9	6.6	8.06	7.79	7.77	7.73	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
	B	7.5	7.2	6.9	6.9	6.6	8.06	7.79	7.77	7.73	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
	C	7.5	7.2	6.9	6.9	6.6	8.06	7.79	7.77	7.73	7.63	28	28	28	28	28	20.7	20.1	20.4	20.5	20.5
20	A	7.4	7.2	7.1	7.1	6.5	8.06	7.79	7.79	7.75	7.62	27	28	28	28	27	20.6	20.1	20.4	20.5	20.5
	B	7.4	7.2	7.1	7.1	6.5	8.06	7.79	7.79	7.75	7.62	27	28	28	28	27	20.6	20.1	20.4	20.5	20.5
	C	7.4	7.2	7.1	7.1	6.5	8.06	7.79	7.79	7.75	7.62	27	28	28	28	27	20.6	20.1	20.4	20.5	20.5
40	A	7.6	7.2	7.2	7.2	7.0	8.06	7.79	7.79	7.76	7.68	27	27	27	27	27	20.4	20.3	20.5	20.5	20.5
	B	7.6	7.2	7.2	7.2	7.0	8.06	7.79	7.79	7.76	7.68	27	27	27	27	27	20.4	20.3	20.5	20.5	20.5
	C	7.6	7.2	7.2	7.2	7.0	8.06	7.79	7.79	7.76	7.68	27	27	27	27	27	20.4	20.3	20.5	20.5	20.5

ECHINODERM

Table B-5. Echinoderm Larvae Survival and Development Results
Reference Toxicant Test

$CuCl_2$ (ug/L)	Rep	Number Normal	Number Abnormal	Total Number	Percent Normal	Average % Normal	Percent Survival	Average % Survival	Combined Normal / Total Added [a]	Avg. Combined Norm. / Total Added [a]
Control	A	215	21	236	91		NA		73	
	B	195	15	210	93		NA		66	
	C	237	24	261	91		NA		80	
	D	188	22	210	90		NA		64	
	E	211	19	230	92	91	NA	NA	72	71
2.5	A	214	22	236	91		103		73	
	B	235	16	251	94		110		80	
	C	193	16	209	92		91		65	
	D	216	19	235	92		103		73	
	E	256	33	289	89	91	126	107	87	76
5	A	206	21	227	91		99		70	
	B	139	145	284	49		124		47	
	C	194	37	231	84		101		66	
	D	181	35	216	84		94		61	
	E	190	9	199	95	81	87	101	64	62
10	A	165	93	258	64		113		56	
	B	123	151	274	45		120		42	
	C	165	83	248	67		108		56	
	D	196	54	250	78		109		66	
	E	138	149	287	48	60	125	115	47	53
20	A	0	250	250	0		109		0	
	B	0	288	288	0		126		0	
	C	0	279	279	0		122		0	
	D	0	276	276	0		121		0	
	E	0	281	281	0	0	123	120	0	0
40	A	0	186	186	0		81		0	
	B	0	206	206	0		90		0	
	C	0	207	207	0		90		0	
	D	0	245	245	0		107		0	
	E	1	187	188	0	0	82	90	0	0

Time Zero - Initial Counts	Rep A	B	C	D	E	F	Mean
	312	261	196	312	325	364	295

[a] Combined Normal /Total added = (no. surviving normal larvae/no. embryos inoculated).

NA = Not applicable. Survival responses for each site are based on the control survival, a mean of 229 larvae/ 10 mls = 22.9 larvae/ ml.

Appendix Table B-6. Echinoderm Development Water Quality Results

Reference Toxicant Test

$CuCl_2$	D.O. (mg/L)					pH (units)					Salinity (ppt)					Temperature (°C)				
(ug/L)	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control	8.2	8.3	8.3	7.7	8.0	7.94	7.91	7.73	7.70	7.87	28	28	28	28	28	15.6	14.9	15.0	14.8	15.2
2.5	8.3	8.3	8.3	8.1	8.1	7.94	7.91	7.74	7.72	7.88	28	28	28	28	28	15.3	14.8	15.0	15.1	15.2
5.0	8.4	8.3	8.3	8.1	8.0	7.94	7.92	7.75	7.73	7.88	28	28	28	28	28	15.2	14.8	15.0	15.2	15.2
10	8.4	8.3	8.3	8.2	8.0	7.94	7.91	7.74	7.74	7.87	28	28	28	28	28	15.2	14.7	15.0	15.2	15.2
20	8.4	8.2	8.3	8.2	8.0	7.95	7.93	7.76	7.74	7.87	28	28	28	28	28	15.4	15.0	15.1	15.2	15.3
40	8.4	8.2	8.2	8.2	8.0	7.96	7.94	7.77	7.75	7.87	28	28	28	28	28	15.5	15.1	15.3	15.6	15.5

APPENDIX C

REFERENCE TOXICANT

STATISTICAL ANALYSES

AMPHIPOD

Amphipod Survival Bioassay-96 Hr Survival

Start Date:	8/14/98	Test ID:	980814AARA	Sample ID:	REF-Ref Toxicant
End Date:	8/18/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	ASTM 93	Test Species:	A A-Ampelisca abdita
Comments:					

Conc-mg/L	1	2	3
L-Lab Control	0.9000	1.0000	1.0000
0.25	0.8000	0.7000	1.0000
0.5	0.8000	0.7000	0.9000
1	0.3000	0.3000	0.5000
2	0.1000	0.0000	0.0000
4	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
L-Lab Control	0.9667	1.0000	1.3577	1.2490	1.4120	6.930	3				1	30
0.25	0.8333	0.8621	1.1701	0.9912	1.4120	18.578	3	1.660	2.470	0.2791	5	30
0.5	0.8000	0.8276	1.1158	0.9912	1.2490	11.576	3	2.141	2.470	0.2791	6	30
*1	0.3667	0.3793	0.6482	0.5796	0.7854	18.326	3	6.279	2.470	0.2791	19	30
*2	0.0333	0.0345	0.2131	0.1588	0.3218	44.153	3	10.130	2.470	0.2791	29	30
4	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3				30	30

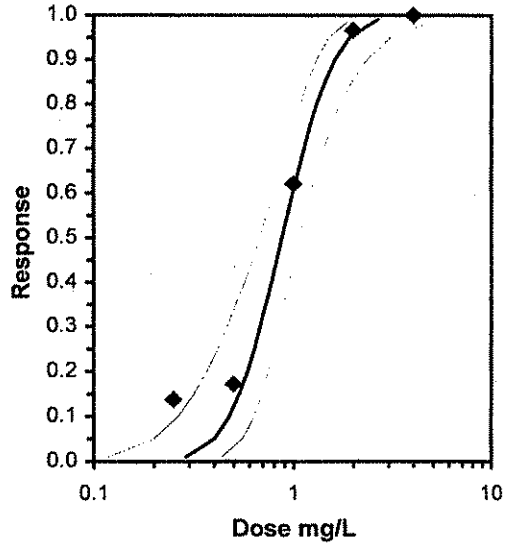
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.947	0.835	0.54308	-0.4017
Bartlett's Test indicates equal variances (p = 0.77)	1.80547	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	0.5	1	0.70711		0.17858	0.18695	0.64816	0.01915	8.7E-06	4, 10

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.84132	1.00034	2.88066	6.80198	0.03333	1.60907	11.3449	0.66	-0.0564	0.20656	8
Intercept	5.27305	0.20542	4.87043	5.67566							
TSCR	0.09563	0.03918	0.01883	0.17243							

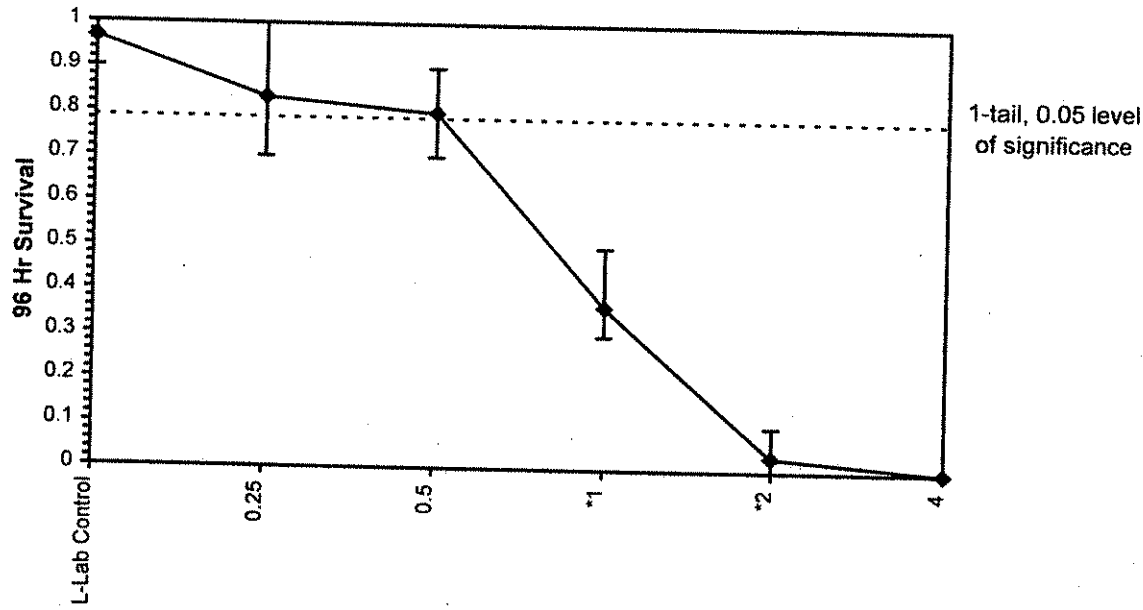
Point	Probits	mg/L	95% Fiducial Limits	
EC01	2.674	0.29046	0.11656	0.43592
EC05	3.355	0.40165	0.1989	0.55476
EC10	3.718	0.47741	0.26367	0.6327
EC15	3.964	0.53644	0.31828	0.69274
EC20	4.158	0.58852	0.36904	0.74573
EC25	4.326	0.63721	0.41833	0.79566
EC40	4.747	0.77852	0.568	0.94625
EC50	5.000	0.87822	0.6753	1.06182
EC60	5.253	0.99067	0.79279	1.20666
EC75	5.674	1.21038	0.99973	1.54515
EC80	5.842	1.31052	1.08363	1.72409
EC85	6.036	1.43774	1.1828	1.9715
EC90	6.282	1.61552	1.31103	2.35086
EC95	6.645	1.92023	1.5123	3.08125
EC99	7.326	2.65534	1.94493	5.2027



Amphipod Survival Bioassay-96 Hr Survival

Start Date:	8/14/98	Test ID:	980814AARA	Sample ID:	REF-Ref Toxicant
End Date:	8/18/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	ASTM 93	Test Species:	A A-Ampelisca abdita
Comments:					

Dose-Response Plot



Worm

Polychaete 96 Hr. Survival Bioassay-96 Hr Survival

Start Date:	8/14/98	Test ID:	980814NARA	Sample ID:	REF-Ref Toxicant
End Date:	8/18/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	ASTM 93	Test Species:	NA-Neanthes arenaceodentata
Comments:					

Conc-mg/L	1	2	3
L-Lab Control	1.0000	1.0000	1.0000
2.5	1.0000	0.9000	1.0000
5	0.9000	0.6000	0.7000
10	0.0000	0.1000	0.1000
20	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
L-Lab Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3				0	30
2.5	0.9667	0.9667	1.3577	1.2490	1.4120	6.930	3	0.580	2.420	0.2266	1	30
*5	0.7333	0.7333	1.0421	0.8861	1.2490	17.922	3	3.951	2.420	0.2266	8	30
*10	0.0667	0.0667	0.2674	0.1588	0.3218	35.184	3	12.226	2.420	0.2266	28	30
20	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3				30	30
40	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3				30	30

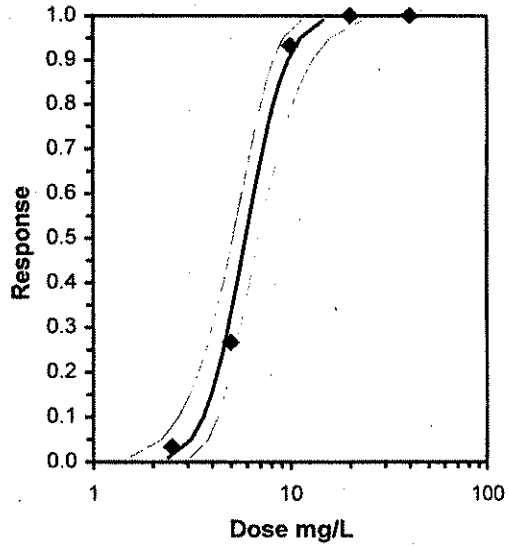
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.93066	0.805	0.35123	0.70147
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	2.5	5	3.53553		0.11628	0.11926	0.83457	0.01315	6.4E-06	3, 8

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.91826	0.97431	4.00862	7.82791	0	1.71319	11.3449	0.63	0.77366	0.16897	4
Intercept	0.42125	0.77643	-1.1006	1.94306							
TSCR											

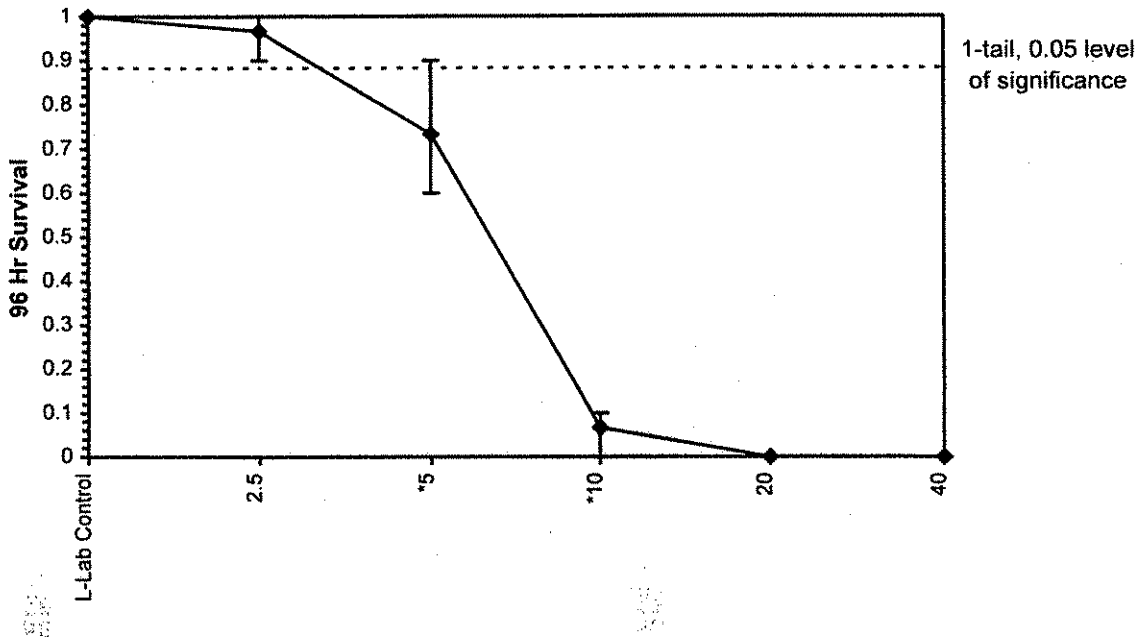
Point	Probits	mg/L	95% Fiducial Limits	
EC01	2.674	2.40206	1.51086	3.09245
EC05	3.355	3.13138	2.2101	3.82104
EC10	3.718	3.6068	2.69734	4.29239
EC15	3.964	3.9677	3.07802	4.65398
EC20	4.158	4.28012	3.41169	4.97292
EC25	4.326	4.56769	3.71964	5.27381
EC40	4.747	5.38091	4.5744	6.1823
EC50	5.000	5.93832	5.12938	6.87044
EC60	5.253	6.55347	5.703	7.70037
EC75	5.674	7.72025	6.68949	9.46414
EC80	5.842	8.23894	7.09544	10.3167
EC85	6.036	8.88768	7.58284	11.4333
EC90	6.282	9.777	8.22278	13.045
EC95	6.645	11.2614	9.23837	15.9188
EC99	7.326	14.6806	11.4165	23.2831



Polychaete 96 Hr. Survival Bioassay-96 Hr Survival

Start Date:	8/14/98	Test ID:	980814NARA	Sample ID:	REF-Ref Toxicant
End Date:	8/18/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CDCL-Cadmium chloride
Sample Date:		Protocol:	ASTM 93	Test Species:	NA-Neanthes arenaceodentata
Comments:					

Dose-Response Plot



ECHINODERM

Echinoderm Larval Development Test-Proportion Normal

Start Date:	8/12/98	Test ID:	980812DEVR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	PSEP95-Puget Sound Sedi	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	Echinoderm Development Test				

Conc-ug/L	1	2	3	4	5
L-Lab Control	0.9110	0.9286	0.9080	0.8952	0.9174
2.5	0.9068	0.9363	0.9234	0.9191	0.8858
5	0.9075	0.4894	0.8398	0.8380	0.9548
10	0.6395	0.4489	0.6653	0.7840	0.4808
20	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0053

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
L-Lab Control	0.9121	1.0000	1.2703	1.2412	1.3002	1.710	5				101	1147
2.5	0.9143	1.0025	1.2750	1.2261	1.3156	2.643	5	-0.069	2.360	0.1633	106	1220
5	0.8059	0.8836	1.1417	0.7748	1.3565	19.371	5	1.858	2.360	0.1633	247	1157
*10	0.6037	0.6619	0.8937	0.7342	1.0874	16.209	5	5.442	2.360	0.1633	530	1317
*20	0.0000	0.0000	0.0302	0.0295	0.0316	2.766	5	17.923	2.360	0.1633	1374	1374
*40	0.0011	0.0012	0.0422	0.0319	0.0730	40.892	5	17.749	2.360	0.1633	1031	1032

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.78388	0.9	-1.3632	6.5223
Bartlett's Test indicates unequal variances (p = 4.27E-12)	62.1958	15.0863		

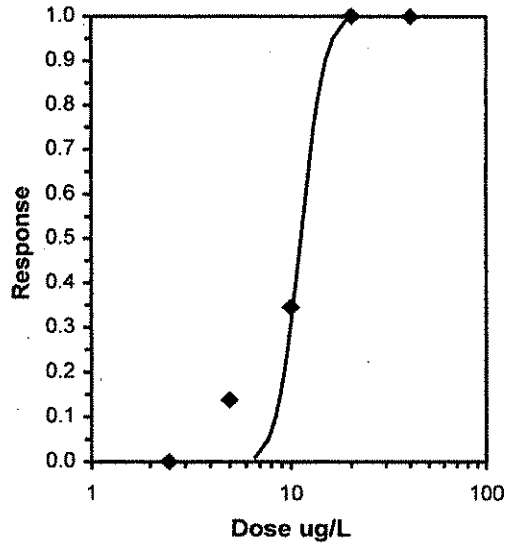
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	5	10	7.07107		0.1125	0.12331	1.73555	0.01197	4.1E-17	5, 24

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	10.3285	151.694	-472.43	493.088	0.08806	199388	11.3449	0.0E+00	1.04923	0.09682	8
Intercept	-5.8369	156.067	-502.51	490.84							
TSCR	0.14669	1.61044	-4.9785	5.27185							

Point	Probits	ug/L	95% Fiducial Limits
EC01	2.674	6.66795	
EC05	3.355	7.76202	
EC10	3.718	8.41685	
EC15	3.964	8.88959	
EC20	4.158	9.28418	
EC25	4.326	9.63663	
EC40	4.747	10.5852	
EC50	5.000	11.2003	
EC60	5.253	11.8511	
EC75	5.674	13.0177	
EC80	5.842	13.5118	
EC85	6.036	14.1116	
EC90	6.282	14.9042	
EC95	6.645	16.1616	
EC99	7.326	18.8133	

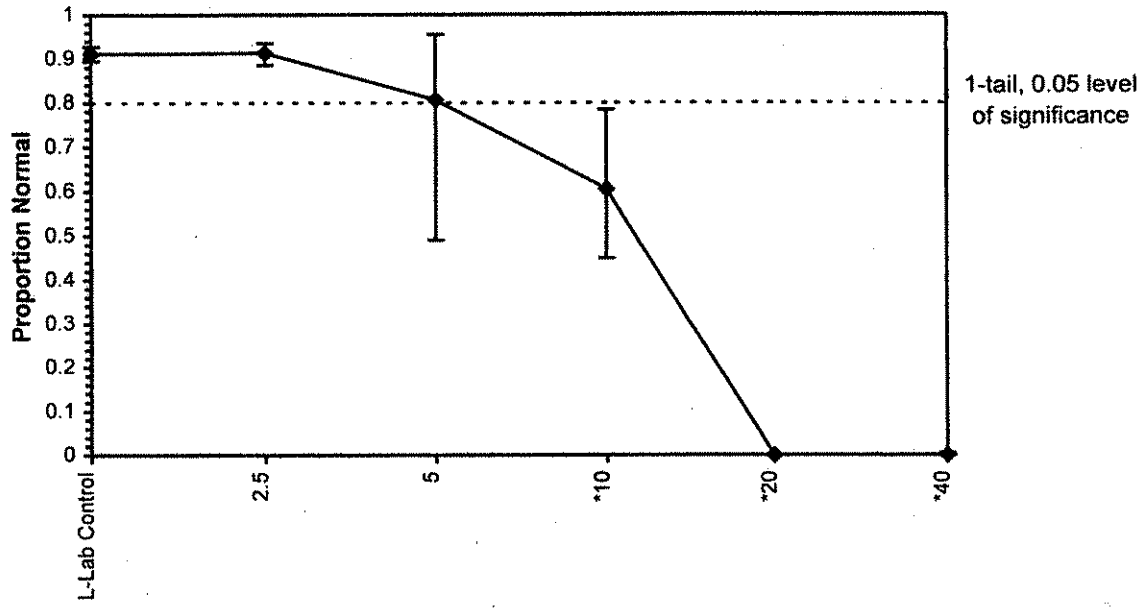
Significant heterogeneity detected (p = 0.00E+00)



Echinoderm Larval Development Test-Proportion Normal

Start Date:	8/12/98	Test ID:	980812DEVR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	PSEP95-Puget Sound Sedi	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	Echinoderm Development Test				

Dose-Response Plot



Echinoderm Larval Development Test-Proportion Alive

Start Date:	8/12/98	Test ID:	980812DEVR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	PSEP95-Puget Sound Sedi	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	Echinoderm Development Test				

Conc-ug/L	1	2	3	4	5
L-Lab Control	1.0000	1.0000	1.0000	1.0000	1.0000
2.5	1.0000	1.0000	0.9127	1.0000	1.0000
5	0.9913	1.0000	1.0000	0.9432	0.8690
10	1.0000	1.0000	1.0000	1.0000	1.0000
20	1.0000	1.0000	1.0000	1.0000	1.0000
40	0.8122	0.8996	0.9039	1.0000	0.8210

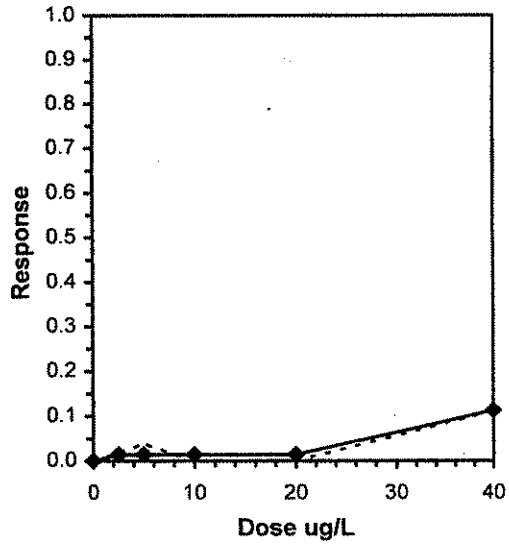
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
L-Lab Control	1.0000	1.0000	1.5377	1.5377	1.5377	0.000	5				1.0000	1.0000
2.5	0.9825	0.9825	1.4844	1.2708	1.5377	8.043	5	0.817	2.360	0.1542	0.9858	0.9858
5	0.9607	0.9607	1.4167	1.2004	1.5377	10.423	5	1.852	2.360	0.1542	0.9858	0.9858
10	1.0000	1.0000	1.5377	1.5377	1.5377	0.000	5	0.000	2.360	0.1542	0.9858	0.9858
20	1.0000	1.0000	1.5377	1.5377	1.5377	0.000	5	0.000	2.360	0.1542	0.9858	0.9858
*40	0.8873	0.8873	1.2596	1.1226	1.5377	13.289	5	4.255	2.360	0.1542	0.8873	0.8873

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.84125	0.9	0.03684	2.84408
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	20	40	28.2843		0.03358	0.03362	0.06071	0.01068	0.00135	5, 24

Linear Interpolation (80 Resamples)

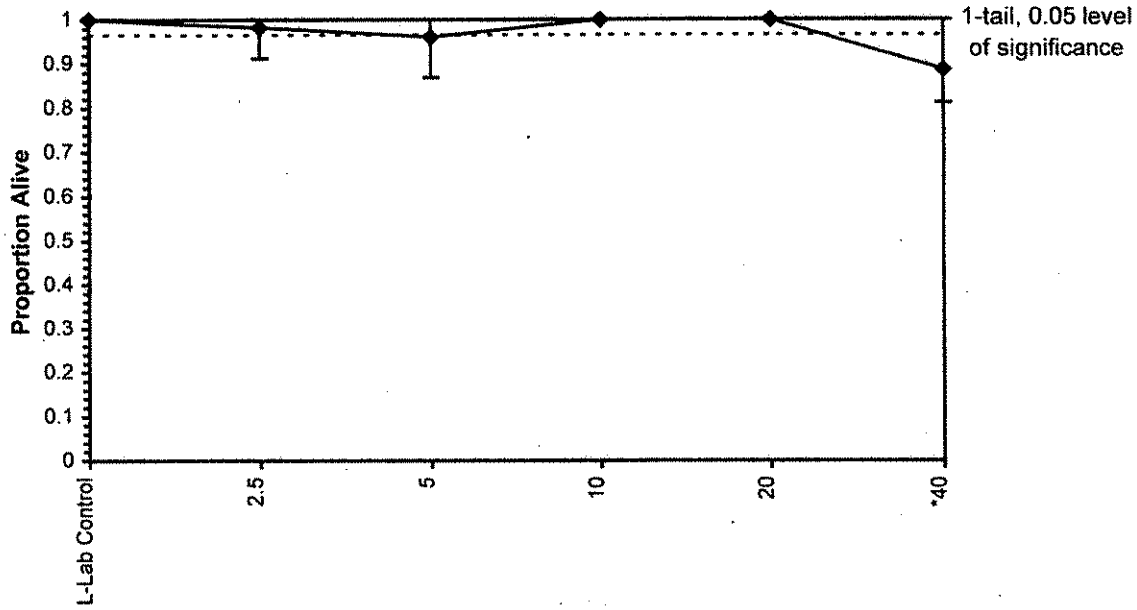
Point	ug/L	SD	95% CL(Exp)		Skew
IC05	27.273	2.343	22.202	34.969	1.6206
IC10	37.428				
IC15	>40				
IC20	>40				
IC25	>40				
IC40	>40				
IC50	>40				



Echinoderm Larval Development Test-Proportion Alive

Start Date:	8/12/98	Test ID:	980812DEVR	Sample ID:	REF-Ref Toxicant
End Date:	8/14/98	Lab ID:	CAOEE-Ogden Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	PSEP95-Puget Sound Sedi	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	Echinoderm Development Test				

Dose-Response Plot



Test: ECH-Echinoderm Larval Development Test | Test ID: 980812DEVR
Species: SP-Strongylocentrotus purpuratus | Protocol: PSEP95-Puget Sound Sediments
Sample ID: REF-Ref Toxicant | Sample Type: CUCL-Copper chloride
Start Date: 8/12/98 End Date: 8/14/98 | Lab ID: CAOEE-Ogden Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
	1	1	L-Lab Control	229	229	236	✓215	
	2	2	L-Lab Control	229	229	210	195	
	3	3	L-Lab Control	229	229	261	237	
	4	4	L-Lab Control	229	229	210	188	
	5	5	L-Lab Control	229	229	230	211	
	6	1	2.500	229	236	236	214	
	7	2	2.500	229	251	251	235	
	8	3	2.500	229	209	209	193	
	9	4	2.500	229	235	235	216	
	10	5	2.500	229	289	289	256	
	11	1	5.000	229	227	227	206	
	12	2	5.000	229	284	284	139	
	13	3	5.000	229	231	231	194	
	14	4	5.000	229	216	216	181	
	15	5	5.000	229	199	199	190	
	16	1	10.000	229	258	258	165	
	17	2	10.000	229	274	274	123	
	18	3	10.000	229	248	248	165	
	19	4	10.000	229	250	250	196	
	20	5	10.000	229	287	287	138	
	21	1	20.000	229	250	250	0	
	22	2	20.000	229	288	288	0	
	23	3	20.000	229	279	279	0	
	24	4	20.000	229	276	276	0	
	25	5	20.000	229	281	281	0	
	26	1	40.000	229	186	186	0	
	27	2	40.000	229	206	206	0	
	28	3	40.000	229	207	207	0	
	29	4	40.000	229	245	245	0	
	30	5	40.000	229	188	188	1	

Comments: Echinoderm Development Test

APPENDIX D

CHAIN-OF-CUSTODY FORM

REQUEST FOR LABORATORY SERVICES page 1 of 1 PIC#:

Laboratory:
Marilyn Schwartz
Ogden Bioassay
5550 Morehouse Drive, Suite B
San Diego, CA 92121

Project: [redacted]

Date:
August 10, 1998

X Enforcement
___ Return to Client
X Return Cooler

Item No.	Sample Numbers		Quantity	Unit Price	Total Cost
1.	328000	Analyze these sediments for Acute Amphipod	5	$500	$2500
	through	(*Ampelisca* sp.), Chronic Juvenile Polychaete,	5	$500	$2500
	328004	(Neanthes sp.),and Echinoderm Larval Development	5	$500	$2500
		(*Dendraster* sp.). All test must be conducted using PSEP and WDOE Sediment Management Standards.			
2.		Deliverables shall include a copy of this signed and dated request, reports, raw data and tables, etc. Deliverables are due within twenty (20) days of sample receipt.			

TOTAL COST: $7500.00

Requested by (Your contact if any questions arise): Karin Feddersen (360) 871 - 8829

WA State Dept. Of Ecology
Manchester Laboratory
7411 Beach Drive East
Port Orchard, WA 98366-8204

Chain of Custody*: 98/8/11 10:20

Relinquished By:	Received By: M. BAUMOND	Year | Month | Day | Hour | Minutes

Seal Intact 000834[illegible] and 001384

*Signatures on this part of the form pertain to the custody of these samples and not to the cost of the analysis.

Condition on arrival good

Invoice will be paid after sample analyses have passed a QA/QC review.

Washington State Department of Ecology - Manchester Laboratory
One-tail Student's t-test Results (August, 1998)

10-Day Amphipod (*Ampelisca abdita*) Bioassay

Percent Survival

Site	Mean	p value	Signif. Less Than Control [a]
Control	90	NA	NA
328000	95	0.054	No
328001	91	0.283	No
328002	95	0.054	No
328003	83	0.347	No
328004	0	< 0.001	Yes

Percent Emergence

Site	Mean	p value	Signif. Less Than Control [a]
Control	10	NA	NA
328000	12	0.341	No
328001	12	0.236	No
328002	12	0.241	No
328003	5	0.083	No
328004	73	< 0.001	Yes

20-Day Worm (*Neanthes arenaceodentata*) Bioassay

Percent Survival

Site	Mean	p value	Signif. Less Than Control [a]
Sed. Control	100	NA	NA
328000	100	0.500	No
328001	100	0.500	No
328002	88	0.173	No
328003	96	0.173	No
328004	0	< 0.001	Yes

Growth (mg) - Average Biomass per Individual

Site	Mean	p value	Signif. Less Than Control [a]
Sed. Control	11.3	NA	NA
328000	10.9	0.334	No
328001	9.3	0.020	Yes
328002	9.6	0.021	Yes
328003	11.5	0.381	No
328004	NA [b]	NA [b]	NA [b]

Echinoderm Development - Sand Dollar (*Dendraster excentricus*)

Percent Normal Development

Site	Mean	p value	Signif. Less Than Control [a]
Control	82	NA	NA
328000	77	0.218	No
328001	32	< 0.001	Yes
328002	35	0.001	Yes
328003	36	0.001	Yes
328004	0	< 0.01	Yes

Percentages were arcsine square root transformed prior to analysis.

[a] alpha level = 0.05

[b] NA = Not applicable due to zero percent survival

Ammonia Results
Washington State Department of Ecology

Interstitial Porewater

Site	Total NH_3 (mg/L) 0 hr	Unionized NH_3 (mg/L) 0 hr
Control	< 0.10	< 0.01
328000	2.6	0.02
328001	11.2	0.06
328002	3.1	0.01
328003	2.9	0.01
328004	11.2	0.08

96-hr Echinoderm Development Bioassay - Overlying Water

Site	Total NH_3 (mg/L) 0 hr	Total NH_3 (mg/L) 96 hr	Unionized NH_3 (mg/L) 0 hr	Unionized NH_3 (mg/L) 96 hr
Control	0.73	0.49	0.01	0.01
328000	0.12	0.37	< 0.01	< 0.01
328001	0.37	0.24	0.01	< 0.01
328002	0.12	< 0.10	< 0.01	< 0.01
328003	0.24	0.12	< 0.01	< 0.01
328004	0.61	0.12	0.01	< 0.01

10-Day Amphipod Bioassay - Overlying Water

Site	Total NH_3 (mg/L) Day 0	Total NH_3 (mg/L) Day 10	Unionized NH_3 (mg/L) Day 0	Unionized NH_3 (mg/L) Day 10
Control	2.1	< 0.10	0.02	< 0.01
328000	0.73	0.12	0.01	0.01
328001	1.5	0.98	0.02	0.05
328002	0.85	0.24	0.01	0.01
328003	0.37	9.9	0.01	0.53
328004	1.3	5.0	0.02	0.21

10-Day Worm Bioassay - Overlying Water

Site	Total NH_3 (mg/L) Day 0	Total NH_3 (mg/L) Day 10	Total NH_3 (mg/L) Day 20	Unionized NH_3 (mg/L) Day 0	Unionized NH_3 (mg/L) Day 10	Unionized NH_3 (mg/L) Day 20
Seawater Cont.	< 0.10	2.2	4.2	< 0.01	0.04	0.06
Sediment Cont.	2.6	3.9	0.90	0.09	0.10	0.02
328000	0.49	3.3	5.5	0.02	0.09	0.15
328001	2.2	5.9	7.6	0.05	0.24	0.32
328002	0.73	5.5	5.6	0.02	0.18	0.12
328003	< 0.10	7.7	10.5	< 0.01	0.25	0.36
328004	1.2	2.3	6.6	0.03	0.06	0.14