Applied Marine Sciences, Inc.

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Quality Control Report

Project No.: G339645-0001
Project Title: USACE O&M NAE
Fire Pond/Turner's Reservoir
Client: Battelle-Duxbury Operations

AMS Project No.: 9903-34
Date Analyzed: 12/6/99
Matrix: Soil
Methods: EPA SW9060

Continuing Calibration Data

AMS Sample ID	Parameter	SRM Result %	SRM Theoretical %	RPD %	QC Limits % RPD
Std1	TOC	4.88	4.80	1.65	<5

TOC Method Blank

AMS Sample ID	Weight (g)	Result (ug CO2)	TOC (%)	TDL (%)
Blank	0.6387	27.8	ND	0.01

Samples in Batch (AMS ID): 5049 5051 5053 5055 5057 5059 5061
5050 5052 5054 5056 5058 5060

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance.

AMS, Inc. Project Manager

Attachment 4

Metals Results

METALS – SEDIMENT QA/QC SUMMARY

PROJECT: Turner's Reservoir

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, WA

MATRIX: Sediment

SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of three (3) sediment samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until analysis.

Three (3) sediment samples were shipped (frozen) to Battelle MSL on 11/29/1999 for metals analysis. Samples were received at Battelle MSL on 11/30/1999 and were logged into Battelle's log-in system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Range of Recovery	SRM Accuracy	Relative Precision	Method Detection Limit (µg/g dry)
Arsenic	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.5
Cadmium	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.1
Chromium	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Copper	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Lead	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Mercury	CVAA	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.02
Nickel	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Zinc	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0

METHOD: Eight (8) metals were analyzed: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to EPA method 245.5 (EPA 1991). The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following a modified version of EPA Method 200.8 (EPA 1991).

To prepare sediment samples for analysis, samples were freeze-dried and blended in a Spex mixer-mill. 0.25-g aliquots of dried homogenous sample were digested using a mixture of nitric and hydrofluoric acids in a nitrogen vented system. This method was employed to allow volatilization of SiF_4, removing a significant amount of matrix interference from the digestate and allowing quantitative recovery of the crustal elements. The digestion method used follows a modified version of EPA method 200.2 (EPA 1991). The modification involved precluding the addition of hydrochloric acid and inclusion of hydrofluoric acid to achieve a total digestion.

METALS – SEDIMENT QA/QC SUMMARY

HOLDING TIMES: Three (3) samples were received on 11/30/1999 and were logged into Battelle's sample tracking system. Hg samples collected on 11/10/1999 were digested and analyzed within the 28 day holding time. All other metals were digested and analyzed within the holding time. Samples were immediately frozen to -80°C and subsequently freeze dried. Dried samples were held at ambient temperatures prior to digestion. The following list summarizes all analysis dates:

Task	Date Performed
Evaporative digestion	12/06/1999
ICP/MS Analysis	12/10/1999
CVAA-Hg	12/07/1999.

DETECTION LIMITS: Target detection limits were met for all metals. MDLs were determined by multiplying the standard deviation of the results of a minimum of 7 replicate low level sediment spikes by the student t value at the 99th percentile.

BLANKS: One method blank was analyzed with this digestion batch. The Zn blank results (21.8 µg/g) were higher than the detection limit (1.00 µg/g). Upon close examination of all other QC results for Zn, it is apparent this blank was the result of random contamination and the sample results were not affected by this contamination. Therefore, the digestion and analyses were not repeated. The results for Zn have been flagged with a "B" to indicate the blank result was greater than 5 times the detection limit.

LABORATORY CONTROL SAMPLE One procedural blank was spiked with all metals. Recoveries of all metals were within the control limits of 70-130%.

MATRIX SPIKES: One sample was spiked with all metals. Recoveries of all appropriately spiked metals were within the QC limits of 70-130%. The native concentrations of Cr, Cu, Ni, and Zn were much greater than the spiked level, thereby, masking the recovery of the spike.

REPLICATES: One sample was digested and analyzed in duplicate. Precision for duplicate analyses is reported by calculating the relative percent difference (RPD) between the replicate results. RPD values for all metals were within the QC limits of ≤30%.

SRM: One standard reference material (SRM) was analyzed; SRM 2704, a freshwater riverine sediment, obtained from the National Institute of Standards and Technology.

SRM 2704 has 15 certified metals. Recovery for all of the certified metals were within the control limit of "25% of the certified value.

REFERENCES:

EPA. 1991. *Methods for the Determination of Metals in Environmental Samples.* EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch.

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TURNER
CONCENTRATIONS OF METALS IN SEDIMENT
Samples Received: 11/30/99

(concentrations in µg/g dry weight - not blank corrected)

Client ID	Client Description	MSL Code	Sponsor I.D.	Matrix	Sample Wet Wt. (g)	Sample Dry [a] Wt. (g)	Moisture (%)	Cr ICP-MS	Ni ICP-MS	Cu ICP-MS	Zn ICP-MS	As ICP/MS	Cd ICP-MS	ICP-M
SAMPLE RESULTS														
CP#1	Central Pond	1427*1	X3031	Sediment	94.26	12.704	86.52	407	564	1350	731 B	11.3	80.9	2
TR#3	Turners's Reservoir Site 3	1427*2	X3034	Sediment	105.77	28.269	73.27	350	1050	1400	678 B	6.54	71.9	1
TR#2	Turners's Reservoir Site 2	1427*3	X3037	Sediment	88.46	12.395	85.99	897	1750	2710	1500 B	13.5	157	4
QC RESULTS														
Procedural Blank														
NA	NA		NA	Sediment				1.00 U	1.00 U	1.00 U	21.8 B	0.500 U	0.100 U	1.
Detection Limit								**1.00**	**1.00**	**1.00**	**1.00**	**0.500**	**0.100**	**1.**
Standard Reference Material														
NA	NA	2704	NA	Sediment				129	43.1	96.9	427	22.6	3.43	1
		2704	certified value					135	44.1	98.6	438	23.4	3.45	1
		2704	range					±5	±3.0	±5.0	±12	±0.8	0.22	±
			% difference					**4%**	**2%**	**2%**	**2%**	**3%**	**1%**	**2**
Laboratory Control Sample														
NA	NA		Amount Spiked					25.0	25.0	25.0	101	25.0	25.0	25
			Blank - seds					1.00 U	1.00 U	1.00 U	21.8	0.500 U	0.100 U	1.0
			Blank Spike					18.8	24.7	24.7	99.6	24.4	25.3	26
			Amount Recovered					18.8	24.7	24.7	77.8	24.4	25.3	26
			Percent Recovery	Sediment				**75%**	**99%**	**99%**	**77%**	**98%**	**101%**	**105**

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TURNER

CONCENTRATIONS OF METALS IN SEDIMENT

Samples Received: 11/30/99

(concentrations in µg/g dry weight - not blank corrected)

Client ID	Client Description	MSL Code	Sponsor I.D.	Matrix	Sample Wet Wt. (g)	Sample Dry [a] Wt. (g)	Moisture (%)	Cr ICP-MS	Ni ICP-MS	Cu ICP-MS	Zn ICP-MS	As ICP/MS	Cd ICP-MS	Pb ICP-MS	Hg CVAA
Matrix Spike															
CP#1	Central Pond		Amount Spiked					25.0	25.0	25.0	101	25.0	25.0	25.0	1.00
CP#1	Central Pond		1427*1					409	559	1350	729	11.1	80.4	262	1.54
			1427*1 MS					420	571	1330	798	34.3	105	287	2.58
			Amount Recovered					11.4	12.4	-20.0	68.5	23.2	24.9	25.5	1.04
			Percent Recovery	Sediment				**SL**	**SL**	**SL**	**SL**	**93%**	**100%**	**102%**	**104%**
Replicate															
CP#1	Central Pond	1427*1	X3031	Sediment				407	564	1353	731 B	11.3	80.9	262	1.55
CP#1	Central Pond	1427*1	X3031	Sediment				411	554	1348	728 B	10.9	79.9	261	1.54
			% difference					**1%**	**2%**	**0%**	**0%**	**3%**	**1%**	**0%**	**1%**

[a] Approximately 0.25-g aliquots of homogenous sample were digested and analyzed.

U = not detected at or above detection limit.

NC = not certified.

NA = not analyzed.

N/A = not applicable.

B = Blank results greater than 5 times MDL.

SL = spike level is inappropriate for native sample concentration.

METALS – TISSUE QA/QC SUMMARY

PROJECT: Turner's Reservoir

PARAMETER: Metals

LABORATORY: Battelle/Marine Sciences Laboratory, Sequim, WA

MATRIX: Tissue

SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of 12 fish tissue samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until processing.

Per direction from NAE, samples were held frozen until they could be grouped with other project samples to reduce the cost of sample analyses. Per direction from NAE, nine (9) of the 12 samples were selected for processing and analysis. These nine samples were shipped (frozen) to Battelle MSL on 12/07/1999 for processing and metals analysis. Samples were received at Battelle MSL on 12/08/1999 and were logged into Battelle's log-in system.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Range of Recovery	SRM Accuracy	Relative Precision	Method Detection Limit (µg/g dry)
Arsenic	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.5
Cadmium	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.1
Chromium	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Copper	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Lead	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Mercury	CVAA	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.02
Methyl Mercury	CVAF	<5× DL	70 – 130%	≤ 30%	≤ 30%	0.005
Nickel	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0
Zinc	ICP/MS	<5× DL	70 – 130%	≤ 30%	≤ 30%	1.0

METHOD: Nine (9) metals were analyzed: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), methyl mercury (MeHg), nickel (Ni), and zinc (Zn). Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to EPA method 245.5 (EPA 1991). MeHg was analyzed using cold-vapor atomic fluorescence according to Battelle Method MSL I-015-03. The remaining metals were analyzed by inductively coupled plasma mass spectrometry (ICP/MS) following a modified version of EPA Method 200.8 (EPA 1991).

To prepare tissue samples for analysis, samples were freeze-dried and blended in a Spex mixer-mill. Approximately 0.2- to 0.5-g aliquots of homogenous sample were digested using a mixture of nitric and hydrofluoric acids, following a modified version of EPA 200.2 (EPA 1991).

METALS – TISSUE QA/QC SUMMARY

HOLDING TIMES: Nine (9) samples were received on 12/08/1999 and were logged into Battelle's log-in system. Samples were composited according to instructions received 12/14/1999 to provide three (3) samples for digestion and analysis. Samples were immediately frozen to -80°C and subsequently freeze dried. Dried samples were held at ambient temperatures prior to digestion. Samples for Hg and MeHg were received outside the 28 day holding time (samples received at Battelle Duxbury 71 days after collection). Samples for Hg and MeHg were digested within 103 days of collection and analyzed within 110 days from collection (number of days determined from earliest collection date, 09/09/1999). All other metals were analyzed within the 6 month holding time. The following list summarizes all analysis dates.

Task	Date Performed
Sample Collection	09/09, 09/23, and 09/24/1999
Sample Composite	12/14/1999
HNO3:HF digestion	12/21/1999 (digested 75-days past holding time)
ICP/MS Analysis	01/03/2000
CVAA-Hg	12/28/1999

DETECTION LIMITS: Target detection limits were met for all metals. MDLs were determined by multiplying the standard deviation of the results of a minimum of 7 replicate low-level sediment spikes by the student t value at the 99th percentile.

BLANKS: One method blank was analyzed. No metals were detected above the MDL in the blanks. No data were blank corrected.

LABORATORY CONTROL SAMPLE A procedural blank was spiked with all metals. Recoveries of all metals were within the control limits of 70-130%.

MATRIX SPIKES: One sample was spiked with all metals. Recoveries of all spiked metals were within the QC limits of 70-130%. Native concentrations of Zn were much higher than the spike amount, thereby masking the spike recovery.

REPLICATES: One sample was digested and analyzed in duplicate. Precision for duplicate analyses is reported by calculating the relative percent difference (RPD) between the replicate results. RPD values for all detectable metals were within the QC limits of ≤30%.

SRM: One standard reference material (SRM), DORM-2 (dogfish muscle tissue) was analyzed. All values were within the control limit of ≤30%.

REFERENCES:

EPA. 1991. *Methods for the Determination of Metals in Environmental Samples.* EPA-600/4-91-010. Environmental Services Division, Monitoring Management Branch.

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TURNER
CONCENTRATIONS OF METALS IN TISSUE
Samples Received: 12/8/99

(concentrations in µg/g dry weight - not blank corrected

Client ID	Client Description	MSL Code	Sponsor I.D.	Matrix	Sample Wet Wt. (g)	Sample Dry Wt. (g)	Moisture (%)	Cr ICP-MS	Ni ICP-MS	Cu ICP-MS	Zn ICP-MS	As ICP/MS	ICP-MS
SAMPLE RESULTS													
LMB-01-001, LMB-01-002 and LMB-004-001	Turners and Central Pond, Fillet	1427*4	X3039, X3040, X3044	Tissue	64.37	14.769	77.06	1.00 U	1.00 U	1.00 U	34.8	0.500 U	0.1
YB-002-001, YB-007-001 and YB-007-002	Turners, Fillet	1427*5	X3043, X3049, X3050	Tissue	8.42	1.475	82.47	1.00 U	1.00 U	1.03	17.0	0.500 U	0.1
WS-004-001, WS-004-002 and WS-004-003	Central Pond, Fillet	1427*6	X3045, X3046, X3047	Tissue	49.60	12.353	75.20	1.00 U	1.00 U	1.43	56.7	0.500 U	0.1
QC RESULTS													
Procedural Blank													
NA	NA		NA	Tissue				1.00 U	1.00 U	1.00 U	1.00 U	0.500 U	0.1
Detection Limit								**1.00**	**1.00**	**1.00**	**1.00**	**0.500**	**0.1**
Standard Reference Material													
NA	NA	DORM-2	NA	Tissue				31.5	16.5	2.22	20.1	15.9	0.03
		DORM-2	certified value					34.7	19.4	2.34	25.6	18.0	0.0
		DORM-2	range					±5.5	±3.1	±0.16	±2.3	±1.1	±0.0
			% difference					**9%**	**15%**	**5%**	**22%**	**12%**	9
Laboratory Control Sample													
NA	NA		Amount Spiked					5.00	5.00	5.00	5.00	5.00	5.
			Blank - tiss					1.00 U	1.00 U	1.00 U	1.00 U	0.500 U	0.1
			Blank Spike					5.00	4.77	4.72	4.06	4.50	4.
			Amount Recovered					5.00	4.77	4.72	4.06	4.50	4.
			Percent Recovery	Tissue				**100%**	**95%**	**94%**	**81%**	**90%**	**93**

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CONCENTRATIONS OF METALS IN TISSUE
Samples Received: 12/8/99

(concentrations in µg/g dry weight - not blank corrected)

Client ID	Client Description	MSL Code	Sponsor I.D.	Matrix	Sample Wet Wt. (g)	Sample Dry [a] Wt. (g)	Moisture (%)	Cr ICP-MS	Ni ICP-MS	Cu ICP-MS	Zn ICP-MS	As ICP/MS	Cd ICP-MS	Pb ICP-MS	Hg CVAA	MeHg CVAF
Matrix Spike																
			Amount Spiked					5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.01	1.01
LMB-01-001, LMB-01-002 and LMB-004-001	Turners and Central Pond, Fillet		1427*4					1.00 U	1.00 U	1.00 U	32.5	0.500 U	0.100 U	1.00 U	0.555 X	0.386 X
LMB-01-001, LMB-01-002 and LMB-004-001	Turners and Central Pond, Fillet		1427*4 MS					4.31	5.18	5.12	25.0	4.69	4.55	4.37	1.45 X	1.50 X
			Amount Recovered					4.31	5.18	5	2.5	4.69	4.55	4.37	0.895	1.11
			Percent Recovery	Tissue				**86%**	**104%**	**102%**	**SL**	**94%**	**91%**	**87%**	**88%**	**110%**
Replicate																
LMB-01-001, LMB-01-002 and LMB-004-001	Turners and Central Pond, Fil	1427*4	X3039, X3040, X3044	Tissue				1.00 U	1.00 U	1.00 U	34.8 B	0.500 U	0.100 U	1.00 U	0.567 X	0.635 X
LMB-01-001, LMB-01-002 and LMB-004-001	Turners and Central Pond, Fil	1427*4	X3039, X3040, X3044	Tissue				1.00 U	1.00 U	1.00 U	30.2 B	0.500 U	0.100 U	1.00 U	0.576 X	0.613 X
			% difference					**N/A**	**N/A**	**N/A**	**14%**	**N/A**	**N/A**	**N/A**	**2%**	**4%**

[a] Approximately 0.2- to 0.5-g aliquots of homogenous sample were digested and analyzed.

U = not detected at or above detection limit.

X = Exceeded holding time (analyzed after 28-d from ***collection***)

NC = not certified.

NA = not analyzed.

N/A = not applicable.

B = Blank results greater than 5 times MDL.

SL = spike level is inappropriate for native sample concentration.

Attachment 5

PCB/Pesticide Results

PESTICIDE AND PCB – SEDIMENT QA/QC SUMMARY

PROJECT: Turner's Reservoir

PARAMETER: Pesticide and PCB

LABORATORY: Battelle, Duxbury, MA

MATRIX: Sediment

SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of three (3) sediment samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until analysis.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	MS Recovery	SRM % Diff.	Relative Precision	Achieved Detection Limit (µg/kg DW)	Target Detection Limit (µg/kg DW)
Pest/ PCB	GC/ECD EPA SW846 8081 Modified	<5x DL	40-120% Recovery	40-120% Recovery (analyte conc. in MS must be >5x background)	≤30% (from range of certified values)	≤30% (between MS and MSD, for analytes >5x background)	Pest: 0.12 – 0.84 PCB: 0.14 – 1.53 Toxaphene: 16.7	Pest: 20 PCB: 1

METHOD: Sediment samples were extracted for pesticides, PCB and PAH following general NS&T methodologies. An aliquot of well mixed, wet sediment was extracted three times with dichloromethane using shaker techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated and processed through alumina column and HPLC. The post-HPLC extract was concentrated, fortified with RIS and split qualitatively for GC/ECD and GC/MS analysis. The GC/ECD split was solvent exchanged with hexane and analyzed directly using gas chromatography/electron capture detection (GC/ECD) following EPA method 8081 (Modified). Sample data were quantified by the method of internal standards, using the RIS compounds.

HOLDING TIMES: Samples were prepared for analysis in a single analytical batch. Samples were extracted within one month of collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
99-672	12/6/1999	1/5 - 6/2000

PESTICIDE AND PCB – SEDIMENT QA/QC SUMMARY

DETECTION LIMITS:

Detection limits reported are based on a 7 replicate MDL study and adjusted for individual sample weights and moisture contents.

Achieved detection limits were generally less than the target detection limits suggested in the project scope of work. The only exception was $Cl_2(08)/Cl_2(05)$ that had an achieved MDL slightly higher than the target detection limit.

BLANKS:

A procedural blank (PB) was prepared with the analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

99-672 – Pest/PCBs were undetected in the PB with the exception of $Cl_4(52)$, $Cl_5(118)$ and $Cl_7(187)$, which were detected at levels <2× MDL. Concentrations of these PCB congeners in the associated field samples were approximately 10 to 100× > blank levels.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was prepared with the analytical batch. The percent recoveries of Pest/PCBs were calculated to measure data quality in terms of accuracy.

99-672 – Pest/PCBs were under-recovered in the LCS sample.

Corrective Action – the chromatogram and peak integrations were reviewed. It appears that 60-75% of this sample was lost during sample preparation. Recoveries of Pest/PCBs in the MS/MSD were very good, indicating that the method is in control.

MATRIX SPIKES:

A matrix spike (MS)/matrix spike duplicate (MSD) sample was prepared with each analytical batch. The percent recoveries of Pest/ PCBs in the MS/MSD were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between percent recoveries of Pest/ PCBs in the MS and MSD were calculated to measure data quality in terms of precision.

99-672 – Percent recoveries and RPDs were within the laboratory control limits specified by the method (40 – 120% recovery and RPD≤30%, where concentration in MS >5x background), with the exception of Endrin Aldehyde (2%).

Corrective Action – The chromatogram and peak integrations were reviewed. The poor recovery of Endrin Aldehyde in the MS and MSD, as well as the elevated RPD between MS and MSD, has been attributed to using insufficient volume of dichloromethane to elute the alumina cleanup column.

PESTICIDE AND PCB – SEDIMENT QA/QC SUMMARY

SURROGATES: Two surrogate compounds were added prior to extraction, including $Cl_3(34)$ and $Cl_5(112)$. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

99-672 – Surrogate recoveries were within the control limits in all samples, with the exception of the LCS sample.

Corrective Action – As noted above (LCS section), it appears that 60-75% of this sample was lost during sample preparation. It would not be appropriate to re-extract the LCS sample, as this is a QC sample intended to be extracted at the same time as authentic samples.

REPLICATES: Not required.

SRM: A standard reference material (SRM, NIST 1941a) was prepared with the analytical batch. The percent difference (PD) between the measured value and the certified range was calculated to measure data quality in terms of accuracy.

99-672 – SRM PDs were within the control limits for all certified pesticides and PCBs with the exception of:

$Cl_5(87)$ – 43%
$Cl_7(170)$ – 792%
$Cl_7(180)$ – 70%
$Cl_9(206)$ – 340%

Corrective Action – $Cl_7(170)$, $Cl_7(180)$ and $Cl_9(206)$ have historically had elevated PDs. Phthalate contamination may contribute to the elevated PDs for these compounds. Recoveries of these PCB congeners in the MS/MSD were within the control limits specified by the method.

Achieved Detection Limits
Pesticides/PCB in Sediment

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Units:	Achieved DLs in Sediment ug/kg, dry wt.
Aldrin	0.16
a-BHC	0.56
b-BHC	0.16
d-BHC	0.16
g-BHC	0.19
cis Chlordane	0.15
g-Chlordane	0.13
2,4 DDE	0.70
4,4 DDE	0.17
2,4 DDD	0.15
4,4 DDD	0.13
2,4 DDT	0.84
4,4 DDT	0.26
Dieldrin	0.37
Endosulfan I	0.36
Endosulfan II	0.12
Endosulfan sulfate	0.14
Endrin	0.59
Endrin aldehyde	0.58
Heptachlor	0.17
Heptachlor epoxide	0.17
Methoxychlor	0.38
Cl2(08)/Cl2(05)	1.53
Cl3(18)	0.16
Cl3(28)	0.14
Cl4(44)	0.16
Cl4(49)	0.16
Cl4(52)	0.16
Cl4(66)	0.17
Cl5(87)	0.15
Cl5(101)	0.15
Cl5(105)	0.16
Cl5(118)	0.19
Cl6(128)	0.24
Cl6(138)	0.22
Cl6(153)	0.18
Cl7(170)	0.19
Cl7(180)	0.21
Cl7(183)	0.17
Cl7(184)	0.22
Cl7(187)	0.16
Cl8(195)	0.17
Cl9(206)	0.17
Cl10(209)	0.18
Toxaphene	16.70

Procedural Blank Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description:	NA
Battelle ID:	XI94PB
Batch ID:	99-672
Matrix:	Sediment
Collection Date:	NA
Extraction Date:	06-Dec-99
Analysis Date:	05-Jan-00
Sample Wet Wt. (g):	30 a
Sample Dry Wt. (g):	8 a
Moisture (%)	NA
Units:	ug/kg, dry wt.

Aldrin	0.16 U
a-BHC	0.56 U
b-BHC	0.16 U
d-BHC	0.16 U
g-BHC	0.19 U
cis Chlordane	0.15 U
g-Chlordane	0.13 U
2,4 DDE	0.70 U
4,4 DDE	0.17 U
2,4 DDD	0.15 U
4,4 DDD	0.13 U
2,4 DDT	0.84 U
4,4 DDT	0.26 U
Dieldrin	0.37 U
Endosulfan I	0.36 U
Endosulfan II	0.12 U
Endosulfan sulfate	0.14 U
Endrin	0.59 U
Endrin aldehyde	0.58 U
Heptachlor	0.17 U
Heptachlor epoxide	0.17 U
Methoxychlor	0.38 U
Cl2(08)/Cl2(05)	1.53 U
Cl3(18)	0.16 U
Cl3(28)	0.14 U
Cl4(44)	0.16 U
Cl4(49)	0.16 U
Cl4(52)	0.12 J
Cl4(66)	0.17 U
Cl5(87)	0.15 U
Cl5(101)	0.15 U
Cl5(105)	0.16 U
Cl5(118)	0.34
Cl6(128)	0.24 U
Cl6(138)	0.22 U
Cl6(153)	0.18 U
Cl7(170)	0.19 U
Cl7(180)	0.21 U
Cl7(183)	0.17 U
Cl7(184)	0.22 U
Cl7(187)	0.09 J
Cl8(195)	0.17 U
Cl9(206)	0.17 U
Cl10(209)	0.18 U
Toxaphene	16.70 U

Surrogate Recoveries (%):	
Cl3(34)	78
Cl5(112)	80

a Average wet and dry weight of the batch reported.
ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Laboratory Control Spike Data

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description:	NA
Battelle ID:	XI95LCS
Batch ID:	99-672
Matrix:	Sediment
Collection Date:	NA
Extraction Date:	06-Dec-99
Analysis Date:	05-Jan-00
Sample Wet Wt. (g):	NA
Sample Dry Wt. (g):	NA
Moisture (%)	NA
Units:	ng

	EZ83		% Recovery	
Aldrin	128.211	24.52	19	&
a-BHC	128.128	22.33	17	&
b-BHC	128.160	24.80	19	&
d-BHC	128.179	23.82	19	&
g-BHC	128.282	23.48	18	&
cis Chlordane	128.922	26.98	21	&
g-Chlordane	128.755	27.54	21	&
2,4 DDE	126.243	27.23	22	&
4,4 DDE	128.192	27.99	22	&
2,4 DDD	128.000	26.68	21	&
4,4 DDD	128.186	23.69	18	&
2,4 DDT	125.616	26.33	21	&
4,4 DDT	128.173	28.07	22	&
Dieldrin	128.134	31.24	24	&
Endosulfan I	128.179	21.77	17	&
Endosulfan II	128.211	18.01	14	&
Endosulfan sulfate	128.224	24.77	19	&
Endrin	128.256	27.52	21	&
Endrin aldehyde	128.173	6.29	5	&
Heptachlor	128.147	25.24	20	&
Heptachlor epoxide	128.256	26.08	20	&
Methoxychlor	128.179	26.33	21	&
Cl2(08)/Cl2(05)	128.128	23.51	18	&
Cl3(18)	128.000	24.14	19	&
Cl3(28)	128.000	24.23	19	&
Cl4(44)	128.000	26.23	20	&
Cl4(49)	120.000	23.45	20	&
Cl4(52)	128.128	26.05	20	&
Cl4(66)	128.000	25.53	20	&
Cl5(87)	120.000	25.35	21	&
Cl5(101)	128.128	27.08	21	&
Cl5(105)	128.128	28.22	22	&
Cl5(118)	128.128	28.05	22	&
Cl6(128)	128.000	28.14	22	&
Cl6(138)	128.128	28.35	22	&
Cl6(153)	128.000	27.98	22	&
Cl7(170)	128.128	28.22	22	&
Cl7(180)	128.128	28.84	23	&
Cl7(183)	120.000	26.95	22	&
Cl7(184)	120.480	27.13	23	&
Cl7(187)	128.128	28.73	22	&
Cl8(195)	128.000	28.56	22	&
Cl9(206)	128.000	28.53	22	&
Cl10(209)	128.000	28.84	23	&
Toxaphene	NA	16.70	NA	

Surrogate Recoveries:

Cl3(34)	19	&
Cl5(112)	22	&

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Matrix Spike Data

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:		CP#1	CP#1			CP#1			
Client Description:		Central Pond	Central Pond			Central Pond			
Battelle ID:		X3030	XI96MS			XI97MSD			
Batch ID:		99-672	99-672			99-672			
Matrix:		Sediment	Sediment			Sediment			
Collection Date:		10-Nov-99	NA			NA			
Extraction Date:		06-Dec-99	06-Dec-99			06-Dec-99			
Analysis Date:		06-Jan-00	05-Jan-00			05-Jan-00			
Sample Wet Wt. (g):		30.74	13.02			12.65			
Sample Dry Wt. (g):		10.41	4.14			4.26			
Moisture (%)		66.13	68.20			66.33			
Units:	EZ83	ug/kg, dry wt.	ug/kg, dry wt.	% Recovery		ug/kg, dry wt.	% Recovery		RPD
Aldrin	128.211	0.12 U	28.49	92		28.68	95		3.5
a-BHC	128.128	0.43 U	31.63	102		32.20	107		4.6
b-BHC	128.160	0.12 U	28.32	91		29.69	99		7.6
d-BHC	128.179	0.12 U	26.80	87		28.22	94		8.0
g-BHC	128.282	0.15 U	28.97	93		29.95	99		6.2
cis Chlordane	128.922	5.68	35.16	95		35.37	98		3.6
g-Chlordane	128.755	3.46	38.07	111		38.14	115		3.1
2,4 DDE	126.243	2.08	29.48	90		29.94	94		4.5
4,4 DDE	128.192	25.89	55.97	97		54.81	96		1.1
2,4 DDD	128.000	1.08	23.81	74		24.84	79		7.3
4,4 DDD	128.186	5.76	27.23	69		30.30	82		16.2
2,4 DDT	125.616	0.64 U	27.42	90		27.52	93		3.2
4,4 DDT	128.173	3.19	26.83	76		26.75	78		2.5
Dieldrin	128.134	1.47	25.07	76		26.29	82		7.9
Endosulfan I	128.179	0.28 U	23.23	75		24.99	83		10.2
Endosulfan II	128.211	2.08	17.28	49		20.53	61		22.2
Endosulfan sulfate	128.224	0.11 U	24.53	79		25.85	86		8.1
Endrin	128.256	0.45 U	29.23	94		28.98	96		2.0
Endrin aldehyde	128.173	0.45 U	0.75 J	2	&	0.48 J	2	&	41.0 &
Heptachlor	128.147	0.13 U	28.67	93		28.94	96		3.8
Heptachlor epoxide	128.256	0.13 U	25.64	83		26.17	87		4.9
Methoxychlor	128.179	1.03	22.51	69		22.27	71		1.8
Cl2(08)/Cl2(05)	128.128	1.18 U	31.81	103		32.29	107		4.4
Cl3(18)	128.000	2.74	30.99	91		31.67	96		5.2
Cl3(28)	128.000	7.01	37.47	99		37.53	102		3.0
Cl4(44)	128.000	5.72	35.34	96		35.01	97		1.8
Cl4(49)	120.000	2.69	25.40	78		25.76	82		4.4
Cl4(52)	128.128	7.54	38.23	99		37.75	100		1.3
Cl4(66)	128.000	6.77	37.32	99		38.05	104		5.2
Cl5(87)	120.000	4.25	24.28	69		24.05	70		1.7
Cl5(101)	128.128	11.55	44.56	107		44.37	109		2.3
Cl5(105)	128.128	2.92	26.20	75		25.81	76		1.1
Cl5(118)	128.128	7.39	31.59	78		31.53	80		2.6
Cl6(128)	128.000	1.68	22.90	69		23.10	71		3.8
Cl6(138)	128.128	8.46	33.48	81		32.93	81		0.6
Cl6(153)	128.000	10.82	37.69	87		39.04	94		7.8
Cl7(170)	128.128	8.05	27.89	64		26.69	62		3.4
Cl7(180)	128.128	2.41	19.62	56		18.88	55		1.5
Cl7(183)	120.000	1.24	21.08	68		21.68	73		5.8
Cl7(184)	120.480	0.17 U	15.55	53		15.48	55		2.4
Cl7(187)	128.128	3.53	24.67	68		24.07	68		0.0
Cl8(195)	128.000	0.13 U	16.12	52		15.82	53		1.0
Cl9(206)	128.000	1.98	14.59	41		14.47	42		1.9
Cl10(209)	128.000	2.17	15.25	42		14.44	41		3.5
Toxaphene		16.70 U	16.70 U	NA	NA	16.70 U	NA	NA	NA
Surrogate Recoveries:									
Cl3(34)		90	83			86			
Cl5(112)		50	55			60			

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Standard Reference Material Data
VS.
SIS

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	Nist 1941a
Client Description:	NA
Battelle ID:	XI98SRM
Batch ID:	99-672
Matrix:	Sediment
Collection Date:	NA
Extraction Date:	06-Dec-99
Analysis Date:	06-Jan-00
Sample Wet Wt. (g):	4.90
Sample Dry Wt. (g):	4.79
Moisture (%)	2.21
Units:	ug/kg, dry wt.

		% Difference		Certified Range ug/kg, dry wt.	
a-chlordane	2.66	0.0		2.89	1.77
p,p-DDD	5.96	5.7		5.64	4.48
p,p-DDE	0.97	15.2		0.84	0.62
p,p-DDE	6.05	0.0		7.15	6.03
Cl4(44)	4.92	0.0		5.42	4.18
Cl4(49)	5.88	20.5		11.6	7.4
Cl4(52)	7.31	0.0		7.45	6.33
Cl4(66)	8.84	7.8		8.2	5.4
Cl5(87)	3.58	43.4	&	7.07	6.33
Cl5(101)	13.96	10.8		12.6	9.4
Cl5(105)	3.73	0.0		3.92	3.38
Cl5(118)	9.52	0.0		11.1	8.9
Cl6(128)	1.77	0.0		2.19	1.55
Cl6(138)	15.52	8.2		14.35	12.41
Cl6(153)*	16.77	0.0		19.5	15.7
Cl7(170)*	30.87	792.3	&	3.5	2.54
Cl7(180)	10.90	70.1	&	6.41	5.25
Cl9(206)	20.00	340.4	&	4.54	2.8
Cl10(209)	9.70	9.8		8.83	7.85

Surrogate Recoveries:

Cl3(34)	78
Cl5(112)	64

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	CP#1	TR#3	TR#2
Client Description:	Central Pond	Turner's Reservoir Site 3	Turner's Reservoir Site 2
Battelle ID:	X3030	X3033	X3036
Batch ID:	99-672	99-672	99-672
Matrix:	Sediment	Sediment	Sediment
Collection Date:	10-Nov-99	10-Nov-99	10-Nov-99
Extraction Date:	06-Dec-99	06-Dec-99	06-Dec-99
Analysis Date:	06-Jan-00	06-Jan-00	06-Jan-00
Sample Wet Wt. (g):	30.74	30.47	29.16
Sample Dry Wt. (g):	10.41	6.87	6.50
Moisture (%)	66.13	77.44	77.70
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Aldrin	0.12 U	0.19 U	0.20 U
a-BHC	0.43 U	0.65 U	0.68 U
b-BHC	0.12 U	0.18 U	0.19 U
d-BHC	0.12 U	0.18 U	0.19 U
g-BHC	0.15 U	0.22 U	0.23 U
cis Chlordane	5.68	5.22	3.51
g-Chlordane	3.46	4.09	2.54
2,4 DDE	2.08	4.48	1.05
4,4 DDE	25.89	60.50	11.94
2,4 DDD	1.08	2.81	0.64
4,4 DDD	5.76	13.30	4.33
2,4 DDT	0.64 U	0.98 U	1.03 U
4,4 DDT	3.19	4.85	3.61
Dieldrin	1.47	1.97	0.91
Endosulfan I	0.28 U	0.42 U	0.45 U
Endosulfan II	2.08	3.27	1.38
Endosulfan sulfate	0.11 U	0.16 U	0.17 U
Endrin	0.45 U	0.68 U	0.72 U
Endrin aldehyde	0.45 U	0.68 U	0.72 U
Heptachlor	0.13 U	0.19 U	0.20 U
Heptachlor epoxide	0.13 U	0.20 U	0.21 U
Methoxychlor	1.03	0.44 U	0.47 U
Cl2(08)/Cl2(05)	1.18 U	1.79 U	1.89 U
Cl3(18)	2.74	5.40	1.04
Cl3(28)	7.01	11.23	3.26
Cl4(44)	5.72	10.34	3.07
Cl4(49)	2.69	5.39	1.00
Cl4(52)	7.54	14.14	2.92
Cl4(66)	6.77	12.51	2.84
Cl5(87)	4.25	7.88	1.89
Cl5(101)	11.55	20.57	4.39
Cl5(105)	2.92	5.77	1.51
Cl5(118)	7.39	12.99	3.01
Cl6(128)	1.68	3.28	0.89
Cl6(138)	8.46	14.91	5.07
Cl6(153)	10.82	19.15	5.68
Cl7(170)	8.05	11.29	15.75
Cl7(180)	2.41	4.61	2.10
Cl7(183)	1.24	2.42	0.81
Cl7(184)	0.17 U	0.26 U	0.27 U
Cl7(187)	3.53	5.38	3.56
Cl8(195)	0.13 U	0.20 U	0.21 U
Cl9(206)	1.98	4.63	2.59
Cl10(209)	2.17	4.40	2.85
Toxaphene	16.70 U	16.70 U	16.70 U
Surrogate Recoveries:			
Cl3(34)	90	73	79
Cl5(112)	50	43	71

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

PESTICIDE AND PCB –TISSUE QA/QC SUMMARY

PROJECT: Turner's Reservoir

PARAMETER: Pesticides and PCB

LABORATORY: Battelle, Duxbury, MA

MATRIX: Tissue

SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of 12 fish tissue samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until processing.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	MS Recovery	SRM % Diff.	Relative Precision	Achieved Detection Limit (µg/kg DW)	Target Detection Limit (µg/kg DW)
Pest/ PCB	GC/MS EPA SW846 8081 Modified	<5x DL	40-120% Recovery	40-120% Recovery (analyte conc. in MS must be >5x background)	NA	≤30% (for analytes >10x MDL)	Pest: 0.20 – 0.90 PCB: 0.21 – 1.49	Not provided

METHOD: Tissue samples were extracted for Pesticides, PCBs and PAH following general NS&T methodologies. An aliquot of wet tissue was extracted three times with dichloromethane using maceration techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated to approximately 10-mL and an aliquot removed for lipid content determination. The remaining extract was processed through alumina column and HPLC. The post-HPLC extract was concentrated, fortified with RIS and split qualitatively for GC/ECD and GC/MS analysis. The GC/ECD split was solvent exchanged with hexane and analyzed directly using gas chromatography/electron capture detection (GC/ECD) following EPA method 8081 (Modified). Sample data were quantified by the method of internal standards, using the RIS compounds.

HOLDING TIMES: **Processing** – Nine (9) of the 12 fish tissue samples received were composited and processed to prepare a total of three (3) fish tissue samples for analysis. Battelle Marine Sciences Laboratory (MSL) processed fish and shipped tissue homogenates to Battelle Duxbury for fillet analysis. Fillet tissue samples were received 12/17/1999 (2.2 °C on arrival). Tissue homogenates were stored frozen until analysis.

Analysis – Samples were prepared for analysis in a single analytical batch. Samples were extracted within approximately four months of collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
99-706	12/27/1999	1/8 – 10/2000

PESTICIDE AND PCB –TISSUE QA/QC SUMMARY

DETECTION LIMITS:

Detection limits reported are based on a 7 replicate MDL study and adjusted for individual sample weights and moisture contents.

Target detection limits were not provided in the project scope of work. Achieved detection limits are reported with the data.

BLANKS:

A procedural blank (PB) was prepared with the analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

99-706 – Pest/PCBs were undetected in the PB.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was prepared with the analytical batch. The percent recoveries of Pest/PCBs were calculated to measure data quality in terms of accuracy.

99-706 – Pest/PCBs were recovered within the laboratory control limits specified by the method (40 – 120%), with the exception of Endrin aldehyde (8%) and Methoxychlor (38%).

Corrective Action – The chromatogram and peak integrations were reviewed. The poor recovery of Endrin Aldehyde in the LCS has been attributed to using insufficient volume of dichloromethane to elute the alumina cleanup column. Methoxychlor was recovered slightly under the lower control limit.

MATRIX SPIKES:

A matrix spike (MS)/matrix spike duplicate (MSD) sample was prepared with the analytical batch. The percent recoveries of Pest/PCBs in the MS/MSD were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between percent recoveries of Pest/PCBs in the MS and MSD were calculated to measure data quality in terms of precision.

99-706 – Percent recoveries and RPDs were within the laboratory control limits specified by the method (40 – 120% recovery and RPD$\leq$30%, where concentration in MS >5x background), with the exception of Endrin aldehyde (7%) and Methoxychlor (37%, 36%).

Corrective Action – The chromatogram and peak integrations were reviewed. The poor recovery of Endrin Aldehyde in the MS/MSD has been attributed to using insufficient volume of dichloromethane to elute the alumina cleanup column. Methoxychlor was recovered slightly under the lower control limit.

PESTICIDE AND PCB –TISSUE QA/QC SUMMARY

SURROGATES: Two surrogate compounds were added prior to extraction, including Cl_3(34) and Cl_5(112). The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

99-706 – Surrogate recoveries were within the control limits in all samples, with the exception of Cl_5(112) in the sample duplicate (white sucker collected from Central Pond).

Corrective Action – The chromatogram and peak integrations were reviewed and the cause of the elevated recovery was not apparent.

REPLICATES: A sample duplicate was prepared with the analytical batch. The RPD between replicate analyses for Pest/PCBs was calculated to measure data quality in terms of precision.

99-706 –RPDs were within the control limits for all detected Pest/PCB with the following exceptions:

Cl_5(118) 34.8%
Cl_6(138) 39.4%
4,4'-DDE 45.4%
2,4-DDD 37.7%
Dieldrin 45.5%

Corrective Action – The chromatogram and peak integrations were reviewed. Elevated RPDs may be due to sample non-homogeneity.

SRM: The project work plan required preparation of a standard reference material (SRM) with the analytical batch. However, an SRM was inadvertently not prepared with the tissue samples.

Note – The SRM is used to assess data quality in terms of accuracy. Results from the LCS and MS/MSD analyses are also used to assess data quality in terms of accuracy. Percent recoveries of Pest/PCB in the LCS and MS/MSD were within the control limits specified by the method (40 – 120%), with the exception of Endrin aldehyde and Methoxychlor.

Achieved Detection Limits
Pesticides/PCB in Tissue

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Units:	Achieved DLs in Tissue ug/kg, dry wt.
Cl2(08)/Cl2(05)	0.81
Cl3(17)/Cl2(15)	0.29
Cl3(18)	0.31
Cl3(24)/Cl3(27)	0.50
Cl3(28)	0.36
Cl4(44)	0.38
Cl4(49)	0.41
Cl4(52)	0.40
Cl4(66)	0.68
Cl4(77)	0.76
Cl5(87)	0.45
Cl5(101)	1.49
Cl5(105)	0.42
Cl5(110)	0.57
Cl5(118)	0.71
Cl5(126)	0.42
Cl6(128)	0.69
Cl6(129)	0.36
Cl6(138)	0.73
Cl6(153)	1.19
Cl6(169)	0.31
Cl7(170)	0.33
Cl7(180)	0.73
Cl7(183)	0.43
Cl7(184)	0.45
Cl7(187)	0.47
Cl8(195)	0.32
Cl8(201)/Cl6(157)	0.21
Cl9(206)	0.29
Cl10(209)	0.22
Aldrin	0.30
a-BHC	0.37
b-BHC	0.20
d-BHC	0.22
g-BHC	0.30
a Chlordane	0.47
g-Chlordane	0.34
2,4 DDE	0.79
4,4 DDE	0.69
2,4 DDD	0.31
4,4 DDD	0.43
2,4 DDT	0.85
4,4 DDT	0.50
Dieldrin	0.62
Endosulfan I	0.51
Endosulfan II	0.42
Endosulfan sulfate	0.46
Endrin	0.57
Endrin aldehyde	0.41
Endrin ketone	0.44
Heptachlor	0.54
Heptachlor epoxide	0.37
Hexachlorobenzene	0.25
4,4-DDMU	0.39
a-chlordene	0.90
trans Nonachlor	0.52
cis Nonachlor	0.38
Methoxychlor	0.46
Mirex	0.35

Procedural Blank Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description:	NA
Battelle ID:	XK73PB
Batch ID:	99-706
Matrix:	Tissue
Collection Date:	NA
Extraction Date:	27-Dec-99
Analysis Date:	08-Jan-00
Sample Wet Wt. (g)	13 a
Sample Dry Wt. (g):	3 a
Moisture (%):	NA
% Lipid (wet):	NA
Units:	ug/kg, dry wt.

Cl2(08)/Cl2(05)	0.81 U
Cl3(17)/Cl2(15)	0.29 U
Cl3(18)	0.31 U
Cl3(24)/Cl3(27)	0.50 U
Cl3(28)	0.36 U
Cl4(44)	0.38 U
Cl4(49)	0.41 U
Cl4(52)	0.40 U
Cl4(66)	0.68 U
Cl4(77)	0.76 U
Cl5(87)	0.45 U
Cl5(101)	1.49 U
Cl5(105)	0.42 U
Cl5(110)	0.57 U
Cl5(118)	0.71 U
Cl5(126)	0.42 U
Cl6(128)	0.69 U
Cl6(129)	0.36 U
Cl6(138)	0.73 U
Cl6(153)	1.19 U
Cl6(169)	0.31 U
Cl7(170)	0.33 U
Cl7(180)	0.73 U
Cl7(183)	0.43 U
Cl7(184)	0.45 U
Cl7(187)	0.47 U
Cl8(195)	0.32 U
Cl8(201)/Cl6(157)	0.21 U
Cl9(206)	0.29 U
Cl10(209)	0.22 U
Aldrin	0.30 U
a-BHC	0.37 U
b-BHC	0.20 U
d-BHC	0.22 U
g-BHC	0.30 U
a Chlordane	0.47 U
g-Chlordane	0.34 U
2,4 DDE	0.79 U
4,4 DDE	0.69 U
2,4 DDD	0.31 U
4,4 DDD	0.43 U
2,4 DDT	0.85 U
4,4 DDT	0.50 U
Dieldrin	0.62 U
Endosulfan I	0.51 U
Endosulfan II	0.42 U
Endosulfan sulfate	0.46 U
Endrin	0.57 U
Endrin aldehyde	0.41 U
Endrin ketone	0.44 U
Heptachlor	0.54 U
Heptachlor epoxide	0.37 U
Hexachlorobenzene	0.25 U
4,4-DDMU	0.39 U
a-chlordene	0.90 U
trans Nonachlor	0.52 U
cis Nonachlor	0.38 U
Methoxychlor	0.46 U
Mirex	0.35 U

Surrogate Recoveries (%):	
Cl3(34)	80
Cl5(112)	80

a Average wet and dry weight of the batch reported.
ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:		NA
Client Description:		NA
Battelle ID:		XK74LCS
Batch ID:		99-706
Matrix:		Tissue
Collection Date:		NA
Extraction Date:		27-Dec-99
Analysis Date:		08-Jan-00
Sample Wet Wt. (g)		NA
Sample Dry Wt. (g):		NA
Moisture (%):		NA
% Lipid (wet):		NA
Units:		ng

	ng FB34		% Recovery	
Cl2(08)/Cl2(05)	128.128	96.37	75	
Cl3(17)/Cl2(15)	NA	0.87 U	NA	
Cl3(18)	128.000	91.03	71	
Cl3(24)/Cl3(27)	NA	1.49 U	NA	
Cl3(28)	128.000	98.64	77	
Cl4(44)	128.000	99.61	78	
Cl4(49)	120.000	90.35	75	
Cl4(52)	128.128	99.33	78	
Cl4(66)	128.000	108.36	85	
Cl4(77)	128.128	114.03	89	
Cl5(87)	120.000	96.18	80	
Cl5(101)	128.128	106.60	83	
Cl5(105)	128.128	115.29	90	
Cl5(110)	120.480	102.32	85	
Cl5(118)	128.128	112.24	88	
Cl5(126)	128.000	122.33	96	
Cl6(128)	128.000	114.18	89	
Cl6(129)	120.480	105.02	87	
Cl6(138)	128.128	112.15	88	
Cl6(153)	128.000	109.36	85	
Cl6(169)	120.600	122.63	102	
Cl7(170)	128.128	118.73	93	
Cl7(180)	128.128	117.30	92	
Cl7(183)	120.000	101.47	85	
Cl7(184)	120.480	93.46	78	
Cl7(187)	128.128	111.85	87	
Cl8(195)	128.000	118.87	93	
Cl8(201)/Cl6(157)	NA	0.62 U	NA	
Cl9(206)	128.000	123.83	97	
Cl10(209)	128.000	121.17	95	
Aldrin	128.211	91.94	72	
a-BHC	128.128	85.53	67	
b-BHC	128.160	96.04	75	
d-BHC	128.179	94.15	73	
g-BHC	128.282	88.68	69	
a Chlordane	128.922	98.93	77	
g-Chlordane	128.755	103.70	81	
2,4 DDE	128.000	102.76	80	
4,4 DDE	128.186	103.55	81	
2,4 DDD	126.243	107.52	85	
4,4 DDD	128.192	105.75	82	
2,4 DDT	125.616	105.17	84	
4,4 DDT	128.173	104.71	82	
Dieldrin	128.134	100.97	79	
Endosulfan I	128.179	86.49	67	
Endosulfan II	128.211	84.16	66	
Endosulfan sulfate	128.224	82.18	64	
Endrin	128.256	92.00	72	
Endrin aldehyde	128.173	10.81	8	&
Endrin ketone	128.186	104.12	81	
Heptachlor	128.147	86.15	67	
Heptachlor epoxide	128.256	92.25	72	
Hexachlorobenzene	126.595	92.49	73	
4,4-DDMU	125.490	102.85	82	
a-chlordene	NA	2.71 U	NA	
trans Nonachlor	126.494	99.64	79	
cis Nonachlor	64.186	52.44	82	
Methoxychlor	128.179	48.27	38	&
Mirex	125.490	100.69	80	

Surrogate Recoveries:

Cl3(34)	76
Cl5(112)	88

ME - Estimate, significant matrix interference.
NA - Not applicable, analyte not spiked into LCS/MS/MSD.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Matrix Spike Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:		LMB-01-001, LMB-01-002 and LMB-004-001	X3726		X3726			
Client Description:		Turners and Central Pond Fillet	NA		NA			
Battelle ID:		X3726	XK75MS		XK76MSD			
Batch ID:		99-706	99-706		99-706			
Matrix:		Tissue	Tissue		Tissue			
Collection Date:		09-Sep-99	NA		NA			
Extraction Date:		27-Dec-99	27-Dec-99		27-Dec-99			
Analysis Date:		10-Jan-00	08-Jan-00		09-Jan-00			
Sample Wet Wt. (g)		15.11	10.27		10.17			
Sample Dry Wt. (g):		3.39	2.30		2.28			
Moisture (%):		77.57	77.57		77.57			
% Lipid (wet):		0.40	NA		NA			
Units:		ug/kg, dry wt.	ug/kg, dry wt.		ug/kg, dry wt.			
	ng FB34			% Recovery			% Recovery	% RPD
Cl2(08)/Cl2(05)	128.128	0.72 U	45.33	81		45.13	80	1.4
Cl3(17)/Cl2(15)	NA	0.26 U	0.38 U	NA		0.38 U	NA	NA
Cl3(18)	128.000	0.28 U	50.10	90		43.31	77	15.5
Cl3(24)/Cl3(27)	NA	0.44 U	0.65 U	NA		0.65 U	NA	NA
Cl3(28)	128.000	0.32 U	44.97	81		45.12	80	0.7
Cl4(44)	128.000	0.34 U	46.46	84		45.11	80	3.9
Cl4(49)	120.000	0.73	42.38	80		41.34	77	3.5
Cl4(52)	128.128	1.49	47.24	82		45.91	79	3.9
Cl4(66)	128.000	1.46	51.58	90		50.30	87	3.6
Cl4(77)	128.128	0.67 U	52.57	94		46.46	83	13.3
Cl5(87)	120.000	1.34	39.43	73		40.79	75	2.5
Cl5(101)	128.128	3.84	53.65	90		51.50	85	5.4
Cl5(105)	128.128	1.44	49.36	86		51.33	89	3.0
Cl5(110)	120.480	2.54	44.58	80		47.31	85	5.3
Cl5(118)	128.128	3.99	51.85	86		52.52	86	0.4
Cl5(126)	128.000	0.37 U	50.22	90		54.54	97	7.3
Cl6(128)	128.000	0.80	49.16	87		49.05	86	1.2
Cl6(129)	120.480	0.32 U	44.30	85		42.91	81	4.2
Cl6(138)	128.128	7.55	54.25	84		53.90	83	1.7
Cl6(153)	128.000	4.92	54.63	89		53.33	86	3.6
Cl6(169)	120.600	0.27 U	52.23	100		50.60	96	4.1
Cl7(170)	128.128	1.08	51.29	90		50.05	87	3.5
Cl7(180)	128.128	4.52	54.16	89		53.55	87	2.2
Cl7(183)	120.000	0.96	43.72	82		43.56	81	1.4
Cl7(184)	120.480	0.40 U	36.98	71		39.16	74	4.7
Cl7(187)	128.128	1.80	49.27	85		49.19	84	1.1
Cl8(195)	128.000	0.28 U	50.99	92		49.62	88	3.7
Cl8(201)/Cl6(157)	NA	0.18 U	0.27 U	NA		0.27 U	NA	NA
Cl9(206)	128.000	1.73	53.68	93		51.60	89	5.1
Cl10(209)	128.000	0.90	51.75	92		49.46	87	5.6
Aldrin	128.211	0.27 U	43.49	78		43.15	77	1.8
a-BHC	128.128	0.33 U	40.47	73		40.97	73	0.3
b-BHC	128.160	0.18 U	42.97	77		42.51	76	2.0
d-BHC	128.179	0.20 U	41.52	75		42.50	76	1.3
g-BHC	128.282	0.26 U	41.02	74		41.22	73	0.5
a Chlordane	128.922	2.07	47.27	81		46.16	78	3.5
g-Chlordane	128.755	0.60	48.68	86		47.69	83	3.1
2,4 DDE	128.000	0.70 U	46.94	84		44.42	79	6.5
4,4 DDE	128.186	17.45	63.67	83		66.26	87	4.5
2,4 DDD	126.243	0.60	44.78	81		45.85	82	1.4
4,4 DDD	128.192	3.82	48.56	80		49.26	81	0.6
2,4 DDT	125.616	0.76 U	44.85	82		45.81	83	1.1
4,4 DDT	128.173	0.44 J	45.37	81		45.78	81	0.1
Dieldrin	128.134	1.74	44.98	78		46.74	80	3.0
Endosulfan I	128.179	0.45 U	38.25	69		40.80	73	5.5
Endosulfan II	128.211	0.37 U	34.85	63		37.94	67	7.5
Endosulfan sulfate	128.224	0.40 U	34.78	62		35.39	63	0.8
Endrin	128.256	0.51 U	41.00	74		43.70	78	5.4
Endrin aldehyde	128.173	0.37 U	3.66	7	&	3.72	7	& 0.5
Endrin ketone	128.186	0.39 U	43.04	77		43.45	77	0.0
Heptachlor	128.147	0.48 U	41.04	74		40.94	73	1.2
Heptachlor epoxide	128.256	0.47	42.78	76		41.31	73	4.5
Hexachlorobenzene	126.595	0.22 U	44.51	81		43.79	79	2.6
4,4-DDMU	125.490	1.06	49.12	88		48.02	85	3.3
a-chlordene	NA	0.80 U	1.18 U	NA		1.19 U	NA	NA
trans Nonachlor	126.494	4.27	50.34	84		48.97	81	4.0
cis Nonachlor	64.186	1.83	24.47	81		25.02	82	1.4
Methoxychlor	128.179	0.41 U	20.62	37	&	20.51	36	& 1.5
Mirex	125.490	0.31 U	43.16	79		43.22	79	0.8
Surrogate Recoveries:		65	80			81		
Cl3(34)		63	85			87		
Cl5(112)								

ME - Estimate, significant matrix interference.
NA - Not applicable, analyte not spiked into LCS/MS/MSD.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Sample Duplicate Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	WS-004-001, WS-004-002 and WS-004-003	WS-004-001, WS-004-002 and WS-004-003	
Client Description:	Central Pond Fillet	Central Pond Fillet	
Battelle ID:	X3728	X3728DUP	
Batch ID:	99-706	99-706	
Matrix:	Tissue	Tissue	
Collection Date:	23-Sep-99	23-Sep-99	
Extraction Date:	27-Dec-99	27-Dec-99	
Analysis Date:	10-Jan-00	10-Jan-00	
Sample Wet Wt. (g)	16.16	15.09	
Sample Dry Wt. (g):	3.68	3.44	
Moisture (%):	77.22	77.22	
% Lipid (wet):	2.95	NA	
Units:	ug/kg, dry wt.	ug/kg, dry wt.	
			% RPD
Cl2(08)/Cl2(05)	0.66 U	0.71 U	NA
Cl3(17)/Cl2(15)	0.24 U	0.25 U	NA
Cl3(18)	1.67	1.87	11.3
Cl3(24)/Cl3(27)	0.41 U	0.43 U	NA
Cl3(28)	9.89	10.95	10.2
Cl4(44)	8.11	8.87	8.9
Cl4(49)	10.77	11.43	6.0
Cl4(52)	6.53	7.99	20.1
Cl4(66)	13.20	13.92	5.3
Cl4(77)	0.62 U	0.66 U	NA
Cl5(87)	11.70	0.40 U	NA
Cl5(101)	25.75	23.75	8.1
Cl5(105)	9.10	12.13	28.5
Cl5(110)	0.46 U	0.50 U	NA
Cl5(118)	31.29	44.46	34.8 &
Cl5(126)	0.34 U	0.36 U	NA
Cl6(128)	5.14	5.87	13.3
Cl6(129)	1.13	1.23	8.9
Cl6(138)	65.77	44.13	39.4 &
Cl6(153)	32.17	42.39	27.4
Cl6(169)	0.25 U	0.27 U	NA
Cl7(170)	5.03	5.23	4.0
Cl7(180)	35.90	37.18	3.5
Cl7(183)	4.87	5.52	12.4
Cl7(184)	0.37 U	0.40 U	NA
Cl7(187)	12.15	14.00	14.2
Cl8(195)	4.39	4.40	0.2
Cl8(201)/Cl6(157)	0.17 U	0.18 U	NA
Cl9(206)	4.27	5.04	16.6
Cl10(209)	1.90	2.30	19.0
Aldrin	0.25 U	0.26 U	NA
a-BHC	0.30 U	0.33 U	NA
b-BHC	0.17 U	0.18 U	NA
d-BHC	0.18 U	0.19 U	NA
g-BHC	0.86	0.96	11.3
a Chlordane	31.99	31.31	2.1
g-Chlordane	0.28 U	12.07	NA
2,4 DDE	0.65 U	0.69 U	NA
4,4 DDE	144.75	229.79	45.4 &
2,4 DDD	6.34	9.28	37.7 &
4,4 DDD	33.73	39.87	16.7
2,4 DDT	0.70 U	0.75 U	NA
4,4 DDT	4.67	5:54	17.0
Dieldrin	16.73	26.59	45.5 &
Endosulfan I	0.41 U	0.44 U	NA
Endosulfan II	0.34 U	0.36 U	NA
Endosulfan sulfate	0.37 U	0.40 U	NA
Endrin	0.47 U	0.50 U	NA
Endrin aldehyde	0.34 U	0.36 U	NA
Endrin ketone	0.36 U	0.39 U	NA
Heptachlor	0.44 U	0.47 U	NA
Heptachlor epoxide	3.35	3.46	3.0
Hexachlorobenzene	1.23	1.29	5.4
4,4-DDMU	12.83	11.67	9.5
a-chlordene	0.74 U	0.79 U	NA
trans Nonachlor	27.89	26.40	5.5
cis Nonachlor	11.45	15.35	29.1
Methoxychlor	0.37 U	0.40 U	NA
Mirex	0.30	0.36	18.1
Surrogate Recoveries:			
Cl3(34)	71	82	
Cl5(112)	79	138 &	

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	LMB-01-001, LMB-01-002 and LMB-004-001	YB-002-001, YB-007-001 and YB-007-002	WS-004-001, WS-004-002 and WS-004-003
Client Description:	Turners and Central Pond	Turners	Central Pond
	Fillet	Fillet	Fillet
Battelle ID:	X3726	X3727	X3728
Batch ID:	99-706	99-706	99-706
Matrix:	Tissue	Tissue	Tissue
Collection Date:	09-Sep-99	09-Sep-99 and 24-Sep-99	23-Sep-99
Extraction Date:	27-Dec-99	27-Dec-99	27-Dec-99
Analysis Date:	10-Jan-00	10-Jan-00	10-Jan-00
Sample Wet Wt. (g)	15.11	6.74	16.16
Sample Dry Wt. (g):	3.39	1.31	3.68
Moisture (%):	77.57	80.50	77.22
% Lipid (wet):	0.40	0.68	2.95
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Cl2(08)/Cl2(05)	0.72 U	1.85 U	0.66 U
Cl3(17)/Cl2(15)	0.26 U	0.66 U	0.24 U
Cl3(18)	0.28 U	0.72 U	1.67
Cl3(24)/Cl3(27)	0.44 U	1.14 U	0.41 U
Cl3(28)	0.32 U	0.82 U	9.89
Cl4(44)	0.34 U	0.87 U	8.11
Cl4(49)	0.73	0.94 U	10.77
Cl4(52)	1.49	0.91 U	6.53
Cl4(66)	1.46	2.52	13.20
Cl4(77)	0.67 U	1.73 U	0.62 U
Cl5(87)	1.34	2.06	11.70
Cl5(101)	3.84	5.61	25.75
Cl5(105)	1.44	2.59	9.10
Cl5(110)	2.54	1.30 U	0.46 U
Cl5(118)	3.99	1.62 U	31.29
Cl5(126)	0.37 U	0.95 U	0.34 U
Cl6(128)	0.80	1.53 J	5.14
Cl6(129)	0.32 U	0.82 U	1.13
Cl6(138)	7.55	11.83	65.77
Cl6(153)	4.92	8.15	32.17
Cl6(169)	0.27 U	0.70 U	0.25 U
Cl7(170)	1.08	2.64	5.03
Cl7(180)	4.52	7.50	35.90
Cl7(183)	0.96	1.83	4.87
Cl7(184)	0.40 U	1.04 U	0.37 U
Cl7(187)	1.80	4.04	12.15
Cl8(195)	0.28 U	0.73 U	4.39
Cl8(201)/Cl6(157)	0.18 U	0.47 U	0.17 U
Cl9(206)	1.73	4.33	4.27
Cl10(209)	0.90	2.12	1.90
Aldrin	0.27 U	0.69 U	0.25 U
a-BHC	0.33 U	0.85 U	0.30 U
b-BHC	0.18 U	0.47 U	0.17 U
d-BHC	0.20 U	0.51 U	0.18 U
g-BHC	0.26 U	0.68 U	0.86
a Chlordane	2.07	3.82	31.99
g-Chlordane	0.60	1.83	0.28 U
2,4 DDE	0.70 U	1.81 U	0.65 U
4,4 DDE	17.45	29.75	144.75
2,4 DDD	0.60	0.71 U	6.34
4,4 DDD	3.82	5.90	33.73
2,4 DDT	0.76 U	1.95 U	0.70 U
4,4 DDT	0.44 J	1.15 U	4.67
Dieldrin	1.74	2.78	16.73
Endosulfan I	0.45 U	1.16 U	0.41 U
Endosulfan II	0.37 U	0.95 U	0.34 U
Endosulfan sulfate	0.40 U	1.04 U	0.37 U
Endrin	0.51 U	1.31 U	0.47 U
Endrin aldehyde	0.37 U	0.95 U	0.34 U
Endrin ketone	0.39 U	1.01 U	0.36 U
Heptachlor	0.48 U	1.24 U	0.44 U
Heptachlor epoxide	0.47	0.85 U	3.35
Hexachlorobenzene	0.22 U	0.57 U	1.23
4,4-DDMU	1.06	2.27	12.83
a-chlordene	0.80 U	2.06 U	0.74 U
trans Nonachlor	4.27	5.31	27.89
cis Nonachlor	1.83	1.97	11.45
Methoxychlor	0.41 U	1.05 U	0.37 U
Mirex	0.31 U	0.81 U	0.30
Surrogate Recoveries:			
Cl3(34)	65	63	71
Cl5(112)	63	61	79

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Attachment 6

PAH Results

PAH – SEDIMENT QA/QC SUMMARY

PROJECT: Turner's Reservoir
PARAMETER: PAH
LABORATORY: Battelle, Duxbury, MA
MATRIX: Sediment
SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of three (3) sediment samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until analysis.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	MS Recovery	SRM % Diff.	Relative Precision	Achieved Detection Limit (µg/kg DW)	Target Detection Limit (µg/kg DW)
PAH	GC/ECD EPA SW846 8270C Modified	<5× DL	40-120% Recovery	40-120% Recovery (analyte conc. in MS must be >5x background)	≤30% (from range of certified values)	≤30% (between MS and MSD, for analytes >5x background)	~0.18 – 0.84	20

METHOD: Sediment samples were extracted for pesticides, PCB and PAH following general NS&T methodologies. An aliquot of well mixed, wet sediment was extracted three times with dichloromethane using shaker techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated and processed through alumina column and HPLC. The post-HPLC extract was concentrated, fortified with RIS and split qualitatively for GC/ECD and GC/MS analysis. Sample extracts were analyzed directly using gas chromatography/mass spectrometry (GC/MS) in the selected ion monitoring mode (SIM) following EPA method 8270 (Modified). Sample data were quantified by the method of internal standards, using the RIS compounds.

HOLDING TIMES: Samples were prepared for analysis in a single analytical batch. Samples were extracted within one month of collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
99-672	12/6/1999	1/7/2000

DETECTION LIMITS: Detection limits reported are based on a 7 replicate MDL study and adjusted for individual sample weights and moisture contents.

Achieved detection limits were significantly less than (20 to 100×) the target detection limits suggested in the project scope of work.

PAH – SEDIMENT QA/QC SUMMARY

BLANKS:

A procedural blank (PB) was prepared with the analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

99-672 – Several PAHs were detected in the PB at concentrations >5× the MDL.

Corrective Action – Turner's sediment samples were prepared in the same analytical batch with Fire Pond sediment samples. Two blanks were prepared with this batch (99-672). The PB associated with the Fire Pond sediment samples was clean, while the PB associated with the Turner's sediment samples was contaminated. The contamination appears to be isolated to the PB prepared with the Turners samples.

Concentrations of target PAHs in the associated samples (Turner's sediments) were generally detected at levels 10 to 250× blank levels, with the exception of 2,6-Dimethylnaphthalene. Concentrations of 2,6-Dimethylnaphthalene in the sediment samples were 2 to 6× blank levels and concentrations detected may be somewhat attributed to blank contamination.

Concentrations of PAHs in the blank are well below target detection limits specified in the scope of work (20 µg/kg DW).

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was prepared with the analytical batch. The percent recoveries of PAHs were calculated to measure data quality in terms of accuracy.

99-672 – PAHs were under-recovered in the LCS sample.

Corrective Action – the chromatogram and peak integrations were reviewed. It appears that 60-75% of this sample was lost during sample preparation. Recoveries of PAHs in the MS/MSD were very good, indicating that the method is in control.

MATRIX SPIKES:

A matrix spike (MS)/matrix spike duplicate (MSD) sample was prepared with each analytical batch. The percent recoveries of PAHs in the MS/MSD were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between percent recoveries of PAHs in the MS and MSD were calculated to measure data quality in terms of precision.

99-672 – Percent recoveries and RPDs were within the laboratory control limits specified by the method (40 – 120% recovery and RPD≤30%, where concentration in MS >5x background).

SURROGATES:

Three surrogate compounds were added prior to extraction, including naphthalene-d8, phenanthrene-d10 and chrysene-d12. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

99-672 – Surrogate recoveries were within the control limits in all samples, with the exception of the LCS sample.

Corrective Action – As noted above (LCS section), it appears that 60-75% of this sample was lost during sample preparation. It would not be appropriate to re-extract the LCS sample, as this is a QC sample intended to be extracted at the same time as authentic samples.

PAH – SEDIMENT QA/QC SUMMARY

REPLICATES: Not required.

SRM: A standard reference material (SRM, NIST 1941a) was prepared with the analytical batch. The percent difference (PD) between the measured value and the certified range was calculated to measure data quality in terms of accuracy.

99-672 – SRM PDs were within the control limits for all certified PAHs with the exception of:

Fluorene – 42%
Perylene – 31%

Corrective Action – Fluorene has historically had elevated PDs. The percent difference for Perylene was slightly outside the upper control limit. Recoveries of these PAHs were excellent in the MS/MSD sample.

Achieved Detection Limits
PAH in Sediment

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Units:	Achieved DLs in Sediment ug/kg, dry wt.
Naphthalene	0.84
2-Methylnaphthalene	0.82
1-Methylnaphthalene	0.55
2,6-Dimethylnaphthalene	0.71
Biphenyl	0.32
Acenaphthylene	0.23
Acenaphthene	0.23
Fluorene	0.26
Phenanthrene	0.34
Anthracene	0.18
1-Methylphenanthrene	0.28
Fluoranthene	0.25
Pyrene	0.24
Benz(a)anthracene	0.31
Chrysene	0.24
Benzo(b)fluoranthene	0.28
Benzo(k)fluoranthene	0.20
Benzo(e)pyrene	0.27
Benzo(a)pyrene	0.63
Perylene	0.25
Indeno(1,2,3-c,d)pyrene	0.49
Dibenz(a,h)anthracene	0.27
Benzo(g,h,i)perylene	0.29

Procedural Blank Data

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Project Name: USACE NAE
Delivery Order #45, Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description	NA
Battelle ID:	XI94PB
Batch ID:	99-672
Collection Date	NA
Extraction Date	12/06/99
Analysis Date	01/07/00
Sample Wet Wt. (g):	30 a
Sample Dry Wt. (g):	8 a
Moisture (%)	NA
Units:	ug/kg, dry wt.
Naphthalene	2.68
2-Methylnaphthalene	2.34
1-Methylnaphthalene	1.34
2,6-Dimethylnaphthalene	5.66 B
Biphenyl	0.79
Acenaphthylene	0.41
Acenaphthene	0.45
Fluorene	1.02
Phenanthrene	5.62
Anthracene	1.08
1-Methylphenanthrene	1.67
Fluoranthene	7.35
Pyrene	6.49
Benz(a)anthracene	2.49
Chrysene	4.59
Benzo(b)fluoranthene	3.37
Benzo(k)fluoranthene	2.95
Benzo(e)pyrene	2.81
Benzo(a)pyrene	2.56
Perylene	2.37
Indeno(1,2,3-c,d)pyrene	2.22
Dibenz(a,h)anthracene	0.57
Benzo(g,h,i)perylene	2.00
Surrogate Recovery (%)	
Naphthalene-d8	56
Phenanthrene-d10	65
Chrysene-d12	74

a Average wet and dry weight of the batch reported.
U, not detected; sample-specific MDL reported.
J, detected, but below the sample-specific MDL.
B, detected in the procedural blank at >5x the sample-specific MDL.
& = QC data outside of Data Quality Objectives.
NA = Not Applicable.

Laboratory Control Spike Data

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Project Name: USACE NAE
Delivery Order #45, Turner's Reservoir
Project Number: G339645-0001

Client ID:		NA	
Client Description		NA	
Battelle ID:		XI95LCS	
Batch ID:		99-672	
Collection Date		NA	
Extraction Date		12/06/99	
Analysis Date		01/07/00	
Sample Wet Wt. (g):	EZ83	NA	
Sample Dry Wt. (g):	Amount	NA	Percent
Moisture (%)	Spiked	NA	Recovery
Units:	(ng)	ng	(%)
Naphthalene	2005.00	270.95	14 &
2-Methylnaphthalene	2001.40	276.55	14 &
1-Methylnaphthalene	2010.80	273.83	14 &
2,6-Dimethylnaphthalene	2012.80	286.54	14 &
Biphenyl	2011.20	280.12	14 &
Acenaphthylene	2005.00	280.81	14 &
Acenaphthene	2003.00	291.86	15 &
Fluorene	2004.00	308.76	15 &
Phenanthrene	2005.00	316.28	16 &
Anthracene	2004.00	304.90	15 &
1-Methylphenanthrene	2007.20	352.39	18 &
Fluoranthene	2004.00	366.28	18 &
Pyrene	2051.00	375.46	18 &
Benz(a)anthracene	2005.00	384.40	19 &
Chrysene	2002.00	389.08	19 &
Benzo(b)fluoranthene	2002.00	372.12	19 &
Benzo(k)fluoranthene	2002.00	374.87	19 &
Benzo(e)pyrene	2020.80	387.58	19 &
Benzo(a)pyrene	2004.00	340.94	17 &
Perylene	2010.40	337.14	17 &
Indeno(1,2,3-c,d)pyrene	2004.00	369.02	18 &
Dibenz(a,h)anthracene	2004.00	339.17	17 &
Benzo(g,h,i)perylene	2003.00	358.37	18 &
Surrogate Recovery (%)			
Naphthalene-d8		13 &	
Phenanthrene-d10		15 &	
Chrysene-d12		20 &	

U, not detected; sample-specific MDL reported.
J, detected, but below the sample-specific MDL.
& = QC data outside of Data Quality Objectives.

Matrix Spike Data

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Project Name: USACE NAE
Delivery Order #45, Turner's Reservoir
Project Number: G339645-0001

Client ID:		CP#1	CP#1	CP#1			
Client Description		Central Pond	Central Pond	Central Pond			
Battelle ID:		X3030	XI96MS	XI97MSD			
Batch ID:		99-672	99-672	99-672			
Collection Date		11/10/99	NA	NA			
Extraction Date		12/06/99	12/06/99	12/06/99			
Analysis Date		01/07/00	01/07/00	01/07/00			
Sample Wet Wt. (g):	EZ83	30.74	13.02	12.65	MS	MSD	Relative
Sample Dry Wt. (g):	Amount	10.41	4.14	4.26	Percent	Percent	Percent
Moisture (%)	Spiked	66.13	68.20	66.33	Recovery	Recovery	Difference
Units:	(ng)	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	(%)	(%)	(RPD, %)
Naphthalene	2005.00	43.30	328.02	349.94	59	65	10
2-Methylnaphthalene	2001.40	24.10	347.75	364.56	67	72	8
1-Methylnaphthalene	2010.80	13.54	334.74	348.48	66	71	7
2,6-Dimethylnaphthalene	2012.80	28.55	376.31	396.46	72	78	8
Biphenyl	2011.20	208.77	564.58	586.19	73	80	9
Acenaphthylene	2005.00	56.83	387.56	407.14	68	74	9
Acenaphthene	2003.00	19.04	357.40	373.39	70	75	7
Fluorene	2004.00	36.26	400.08	411.97	75	80	6
Phenanthrene	2005.00	237.46	600.62	632.25	75	84	11
Anthracene	2004.00	68.85	396.97	411.00	68	73	7
1-Methylphenanthrene	2007.20	37.66	387.14	414.33	72	80	10
Fluoranthene	2004.00	618.24	1056.31	1104.34	91	103	13
Pyrene	2051.00	576.03	1014.98	1069.56	89	102	15
Benz(a)anthracene	2005.00	267.29	657.42	683.14	81	88	9
Chrysene	2002.00	479.30	922.00	962.13	92	103	11
Benzo(b)fluoranthene	2002.00	527.47	1023.37	1027.22	103	106	4
Benzo(k)fluoranthene	2002.00	452.66	916.47	948.00	96	105	9
Benzo(e)pyrene	2020.80	452.23	922.44	949.48	96	105	8
Benzo(a)pyrene	2004.00	395.65	821.63	838.99	88	94	7
Perylene	2010.40	239.24	675.77	687.09	90	95	5
Indeno(1,2,3-c,d)pyrene	2004.00	425.20	920.79	941.65	102	110	7
Dibenz(a,h)anthracene	2004.00	94.66	467.07	487.17	77	83	8
Benzo(g,h,i)perylene	2003.00	422.85	895.67	912.12	98	104	6
Surrogate Recovery (%)							
Naphthalene-d8		60	58	64			
Phenanthrene-d10		71	69	76			
Chrysene-d12		68	68	75			

U, not detected; sample-specific MDL reported.
J, detected, but below the sample-specific MDL.
& = QC data outside of Data Quality Objectives.
NA = Not Applicable.

Standard Reference Material Data
Vs.
SIS

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Project Name: USACE NAE
Delivery Order #45, Turner's Reservoir
Project Number: G339645-0001

Client ID:	NIST 1941a		
Client Description	NA		
Battelle ID:	XI98SRM		
Batch ID:	99-672		
Collection Date	NA		
Extraction Date	12/06/99		
Analysis Date	01/07/00		
Sample Wet Wt. (g):	4.90	NIST SRM 1941a	
Sample Dry Wt. (g):	4.79	Range of Certified	Percent
Moisture (%)	2.21	Concentrations	Difference
Units:	ug/kg, dry wt.	ug/kg, dry wt.	(PD, %)
Naphthalene	696.75	1010 +/- 140	20 <
Fluorene	51.74	97.3 +/- 8.6	42 <&
Phenanthrene	414.02	489 +/- 23	11 <
Anthracene	149.90	184 +/- 14	12 <
Fluoranthene	828.42	981 +/- 78	8 <
Pyrene	662.92	811 +/- 24	16 <
Benz(a)anthracene	348.89	427 +/- 25	13 <
Chrysene	535.24	577 +/- 35 A	1 <
Benzo(b)fluoranthene	647.78	740 +/- 110	0
Benzo(k)fluoranthene	531.23	702 +/- 40 C	20 <
Benzo(e)pyrene	502.94	553 +/- 59	0
Benzo(a)pyrene	418.14	628 +/- 52	27 <
Perylene	271.16	452 +/- 58	31 <&
Indeno(1,2,3-c,d)pyrene	447.53	501 +/- 72	0
Dibenz(a,h)anthracene	104.48	117 +/- 13.4 E	0
Benzo(g,h,i)perylene	432.60	525 +/- 67	6 <

Surrogate Recovery (%)	
Naphthalene-d8	54
Phenanthrene-d10	69
Chrysene-d12	73

A = Combined certified concentrations of Chrysene (380 +/- 24 ug/kg) and Triphenylene (197 +/- 11 ug/kg).
C = Combined concentrations of Benzo[k]fluoranthene (361 +/- 18 ug/kg, certified)
and of Benzo[j]fluoranthene (341 +/- 22 ug/kg, noncertified).
E = Combined certifed concentrations for Dibenz[a,h]anthracene (73.9 +/- 9.7 ug/kg)
and Dibenz[a,c]anthracene (43.1 +/- 3.7 ug/kg).
& = QC data outside of Data Quality Objectives.
U, not detected; sample-specific MDL reported.
J, detected, but below the sample-specific MDL.
< = Compared to lower end of certified value range.
> = Compared to upper end of certified value range.
NA = Not Applicable.

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Project Name: USACE NAE
Delivery Order #45, Turner's Reservoir
Project Number: G339645-0001

Client ID:	CP#1	TR#3	TR#2
Client Description	Central Pond	Turners Reservoir Site 3	Turners Reservoir Site 2
Battelle ID:	X3030	X3033	X3036
Batch ID:	99-672	99-672	99-672
Collection Date	11/10/99	11/10/99	11/10/99
Extraction Date	12/06/99	12/06/99	12/06/99
Analysis Date	01/07/00	01/07/00	01/07/00
Sample Wet Wt. (g):	30.74	30.47	29.16
Sample Dry Wt. (g):	10.41	6.87	6.50
Moisture (%)	66.13	77.44	77.70
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Naphthalene	43.30	41.99	24.90
2-Methylnaphthalene	24.10	28.53	12.72
1-Methylnaphthalene	13.54	15.25	7.33
2,6-Dimethylnaphthalene	28.55	31.74	11.77
Biphenyl	208.77	199.73	59.63
Acenaphthylene	56.83	84.78	39.56
Acenaphthene	19.04	27.01	11.47
Fluorene	36.26	64.60	24.96
Phenanthrene	237.46	325.33	176.22
Anthracene	68.85	89.06	44.15
1-Methylphenanthrene	37.66	52.30	29.46
Fluoranthene	618.24	662.24	521.41
Pyrene	576.03	632.73	466.05
Benz(a)anthracene	267.29	278.23	211.26
Chrysene	479.30	544.59	350.99
Benzo(b)fluoranthene	527.47	569.07	360.17
Benzo(k)fluoranthene	452.66	504.10	325.69
Benzo(e)pyrene	452.23	510.86	308.29
Benzo(a)pyrene	395.65	434.94	288.64
Perylene	239.24	607.39	138.09
Indeno(1,2,3-c,d)pyrene	425.20	484.56	286.80
Dibenz(a,h)anthracene	94.66	109.64	62.23
Benzo(g,h,i)perylene	422.85	481.59	284.90
Surrogate Recovery (%)			
Naphthalene-d8	60	53	58
Phenanthrene-d10	71	63	73
Chrysene-d12	68	59	75

U, not detected; sample-specific MDL reported.
J, detected, but below the sample-specific MDL.
& = QC data outside of Data Quality Objectives.
NA = Not Applicable.

PAH –TISSUE QA/QC SUMMARY

PROJECT: Turner's Reservoir
PARAMETER: PAH
LABORATORY: Battelle, Duxbury, MA
MATRIX: Tissue
SAMPLE CUSTODY: A representative from Battelle Duxbury retrieved a total of 12 fish tissue samples on 11/19/1999 from NAE. Samples were received frozen, transported to the laboratory, and stored in the Walk-in-Freezer over the weekend until they could be logged into the laboratory's tracking system on 11/22/1999. Samples were received frozen and in good condition. The cooler temperature on arrival was not recorded. Samples were stored frozen until processing.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Method Blank	Surrogate Recovery	MS Recovery	SRM % Diff.	Relative Precision	Achieved Detection Limit (µg/kg DW)	Target Detection Limit (µg/kg DW)
PAH	GC/MS EPA SW846 8270C Modified	<5× DL	40-120% Recovery	40-120% Recovery (analyte conc. in MS must be >5x background)	NA	≤30% (for analytes >10x MDL)	~0.23-1.70	Not provided

METHOD: Tissue samples were extracted for PAH and Pest/PCBs following general NS&T methodologies. An aliquot of wet tissue was extracted three times with dichloromethane using maceration techniques. The combined extract was dried over anhydrous sodium sulfate, concentrated to approximately 10-mL and an aliquot removed for lipid content determination. The remaining extract was processed through alumina column and HPLC. The post-HPLC extract was concentrated, fortified with RIS and split qualitatively for GC/ECD and GC/MS analysis. Tissue extracts were analyzed directly using gas chromatography/mass spectrometry (GC/MS) in the selected ion monitoring mode (SIM) following EPA method 8270 (Modified). Sample data were quantified by the method of internal standards, using the RIS compounds.

HOLDING TIMES:

Processing – Nine (9) of the 12 fish tissue samples received were composited and processed to prepare a total of three (3) fish tissue samples for analysis. Battelle Marine Sciences Laboratory (MSL) processed fish and shipped tissue homogenates to Battelle Duxbury for fillet analysis. Fillet tissue samples were received 12/17/1999 (2.2 °C on arrival). Tissue homogenates were stored frozen until analysis.

Analysis – Samples were prepared for analysis in a single analytical batch. Samples were extracted within approximately four months of collection and analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
99-706	12/27/1999	1/12/2000

PAH –TISSUE QA/QC SUMMARY

DETECTION LIMITS:

Detection limits reported are based on a 7 replicate MDL study and adjusted for individual sample weights and moisture contents.

Target detection limits were not provided in the project scope of work. Achieved detection limits are reported with the data.

BLANKS:

A procedural blank (PB) was prepared with the analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

99-706 – PAHs were undetected in the PB with the exception of Naphthalene, Fluoranthene, Pyrene, Chrysene, and Perylene. Concentrations of these PAHs in the blank were <5× MDL.

LABORATORY CONTROL SAMPLE

A laboratory control sample (LCS) was prepared with the analytical batch. The percent recoveries of PAHs were calculated to measure data quality in terms of accuracy.

99-706 – PAHs were recovered within the laboratory control limits specified by the method (40 – 120%).

Note – Benzo(b)thiophene, Dibenzofuran and Dibenzothiophene were not included in the universal MS solution used to prepare the LCS. Recovery data for these compounds are not available.

MATRIX SPIKES:

A matrix spike (MS)/matrix spike duplicate (MSD) sample was prepared with the analytical batch. The percent recoveries of PAHs in the MS/MSD were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between percent recoveries of PAHs in the MS and MSD were calculated to measure data quality in terms of precision.

99-706 – Percent recoveries and RPDs were within the laboratory control limits specified by the method (40 – 120% recovery and RPD≤30%, where concentration in MS >5x background).

Note – Benzo(b)thiophene, Dibenzofuran and Dibenzothiophene were not included in the universal MS solution used to prepare the MS/MSD. Recovery data for these compounds are not available.

SURROGATES:

Three surrogate compounds were added prior to extraction, including naphthalene-d8, phenanthrene-d10 and chrysene-d12. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

99-706 – Surrogate recoveries were within the control limits (40 – 120%) in all samples.

PAH –TISSUE QA/QC SUMMARY

REPLICATES: A sample duplicate was prepared with the analytical batch. The RPD between replicate analyses for PAHs was calculated to measure data quality in terms of precision.

99-706 –RPDs were within the control limits for all PAHs with the following exceptions:

Phenanthrene 38.9%RPD
Anthracene 32.4%RPD

Corrective Action – Surrogate recoveries for sample X3728 (composite of WS-004-001, WS-004-002 and WS-004-003) are generally 20% lower than the duplicate sample (X3828DUP), resulting in higher variability between replicates for PAH measurements.

Surrogate correcting the data would result in improved RPDs.

SRM: The project work plan required preparation of a standard reference material (SRM) with the analytical batch. However, an SRM was inadvertently not prepared with the tissue samples.

Note – The SRM is used to assess data quality in terms of accuracy. Results from the LCS and MS/MSD analyses are also used to assess data quality in terms of accuracy. Percent recoveries of PAHs in the LCS and MS/MSD were within the control limits specified by the method (40 – 120%).

Achieved Detection Limits
PAH in Tissue

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Project Name: Turner's Reservoir
Project Number: G339645-0001

	Achieved PAH DLs in Tissue
Units:	ug/kg, dry wt.
Benzo(b)thiophene	1.06
Naphthalene	1.41
2-Methylnaphthalene	1.05
1-Methylnaphthalene	0.46
2,6-Dimethylnaphthalene	0.46
2,3,5-Trimethylnaphthalene	0.74
Biphenyl	0.30
Acenaphthylene	0.36
Acenaphthene	0.23
Dibenzofuran	0.34
Fluorene	0.50
Phenanthrene	0.62
Anthracene	0.40
1-Methylphenanthrenes	0.53
Dibenzothiophene	0.77
Fluoranthene	0.52
Pyrene	1.70
Benzo(a)anthracene	0.36
Chrysene	0.38
Benzo(b)fluoranthene	0.38
Benzo(k)fluoranthene	0.27
Benzo(e)pyrene	0.24
Benzo(a)pyrene	0.56
Perylene	1.62
Indeno(1,2,3-c,d)pyrene	1.06
Dibenz(a,h)anthracene	0.81
Benzo(g,h,i)perylene	1.68

Procedural Blank Data

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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description:	NA
Battelle ID:	XK73PB
Batch ID:	99-706
Matrix:	Tissue
Collection Date:	NA
Extraction Date:	27-Dec-99
Analysis Date:	12-Jan-00
Sample Wet Wt. (g):	13 a
Sample Dry Wt. (g):	3 a
Moisture (%):	NA
% Lipid (wet):	NA
Units:	ug/kg, dry wt.

Benzo(b)thiophene	1.06 U
Naphthalene	3.68
2-Methylnaphthalene	1.05 U
1-Methylnaphthalene	0.46 U
2,6-Dimethylnaphthalene	0.46 U
2,3,5-Trimethylnaphthalene	0.74 U
Biphenyl	0.30 U
Acenaphthylene	0.36 U
Acenaphthene	0.23 U
Dibenzofuran	0.34 U
Fluorene	0.50 U
Phenanthrene	0.62 U
Anthracene	0.40 U
1-Methylphenanthrenes	0.53 U
Dibenzothiophene	0.77 U
Fluoranthene	1.60
Pyrene	3.15
Benzo(a)anthracene	0.36 U
Chrysene	1.70
Benzo(b)fluoranthene	0.38 U
Benzo(k)fluoranthene	0.27 U
Benzo(e)pyrene	0.24 U
Benzo(a)pyrene	0.56 U
Perylene	2.16
Indeno(1,2,3-c,d)pyrene	1.06 U
Dibenz(a,h)anthracene	0.81 U
Benzo(g,h,i)perylene	1.68 U

Surrogate Recoveries (%):	
Naphthalene-d8	73
Phenanthrene-d10	75
Chrysene-d12	83

a Average wet and dry weight of the batch reported.
ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Laboratory Control Spike Data

Battelle
. . . Putting Technology To Work

Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	NA
Client Description:	NA
Battelle ID:	XK74LCS
Batch ID:	99-706
Matrix:	Tissue
Collection Date:	NA
Extraction Date:	27-Dec-99
Analysis Date:	12-Jan-00
Sample Wet Wt. (g):	NA
Sample Dry Wt. (g):	NA
Moisture (%):	NA
% Lipid (wet):	NA
Units:	ng

	ng FB34		% Recovery
Benzo(b)thiophene	NA	3.17 U	NA
Naphthalene	2005.00	1428.28	71
2-Methylnaphthalene	2001.40	1513.87	76
1-Methylnaphthalene	2010.80	1506.86	75
2,6-Dimethylnaphthalene	2012.80	1557.81	77
2,3,5-Trimethylnaphthalene	2013.60	1547.78	77
Biphenyl	2011.20	1489.87	74
Acenaphthylene	2005.00	1474.25	74
Acenaphthene	2003.00	1533.12	77
Dibenzofuran	NA	6.03	NA
Fluorene	2004.00	1531.96	76
Phenanthrene	2005.00	1557.44	78
Anthracene	2004.00	1525.11	76
1-Methylphenanthrenes	2007.20	1711.07	85
Dibenzothiophene	NA	5.61	NA
Fluoranthene	2004.00	1649.71	82
Pyrene	2051.00	1652.73	81
Benzo(a)anthracene	2005.00	1584.00	79
Chrysene	2002.00	1619.69	81
Benzo(b)fluoranthene	2002.00	1542.28	77
Benzo(k)fluoranthene	2002.00	1602.56	80
Benzo(e)pyrene	2020.80	1606.21	79
Benzo(a)pyrene	2004.00	1448.66	72
Perylene	2010.40	1405.76	70
Indeno(1,2,3-c,d)pyrene	2004.00	1432.01	71
Dibenz(a,h)anthracene	2004.00	1385.53	69
Benzo(g,h,i)perylene	2003.00	1116.73	56

Surrogate Recoveries:

Naphthalene-d8	81
Phenanthrene-d10	82
Chrysene-d12	89

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.
NA - Not applicable, analyte not spiked into QC samples.

Matrix Spike/Spike Duplicate Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	LMB-01-001, LMB-01-002 and LMB-004-001	X3726	X3726	
Client Description:	Turners and Central Pond Fillet	NA	NA	
Battelle ID:	X3726	XK75MS	XK76MSD	
Batch ID:	99-706	99-706	99-706	
Matrix:	Tissue	Tissue	Tissue	
Collection Date:	09-Sep-99 and 23-Sep-99	NA	NA	
Extraction Date:	27-Dec-99	27-Dec-99	27-Dec-99	
Analysis Date:	12-Jan-00	12-Jan-00	12-Jan-00	
Sample Wet Wt. (g):	15.11	10.27	10.17	
Sample Dry Wt. (g):	3.39	2.30	2.28	
Moisture (%):	77.57	77.57	77.57	
% Lipid (wet):	0.40	NA	NA	
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	

	ng FB34			% Recovery		% Recovery	% RPD
Benzo(b)thiophene	NA	0.93 U	1.37 U	NA	1.39 U	NA	NA
Naphthalene	2005.00	6.73	607.46	69	614.09	69	0.1
2-Methylnaphthalene	2001.40	3.00	661.71	76	671.77	76	0.5
1-Methylnaphthalene	2010.80	1.73	664.48	76	669.87	76	0.2
2,6-Dimethylnaphthalene	2012.80	0.40 U	696.68	80	697.49	79	0.9
2,3,5-Trimethylnaphthalene	2013.60	0.66 U	695.83	80	698.65	79	0.6
Biphenyl	2011.20	0.26 U	660.33	76	715.13	81	7.0
Acenaphthylene	2005.00	0.32 U	645.72	74	651.05	74	0.2
Acenaphthene	2003.00	0.20 U	676.26	78	693.82	79	1.6
Dibenzofuran	NA	0.30 U	3.95	NA	4.65	NA	NA
Fluorene	2004.00	1.45	701.43	80	697.14	79	1.6
Phenanthrene	2005.00	3.38	690.85	79	691.32	78	0.9
Anthracene	2004.00	0.35 U	672.74	77	673.50	77	0.9
1-Methylphenanthrenes	2007.20	0.47 U	739.34	85	743.30	84	0.4
Dibenzothiophene	NA	0.68 U	2.87	NA	2.77	NA	NA
Fluoranthene	2004.00	0.46 U	698.21	80	704.37	80	0.1
Pyrene	2051.00	1.51 U	709.43	80	714.58	79	0.3
Benzo(a)anthracene	2005.00	0.31 U	671.01	77	675.69	77	0.3
Chrysene	2002.00	0.34 U	689.73	79	700.56	80	0.6
Benzo(b)fluoranthene	2002.00	0.33 U	654.40	75	652.78	74	1.2
Benzo(k)fluoranthene	2002.00	0.24 U	675.48	78	683.11	78	0.1
Benzo(e)pyrene	2020.80	0.21 U	684.74	78	690.34	78	0.2
Benzo(a)pyrene	2004.00	0.50 U	623.30	72	623.87	71	0.9
Perylene	2010.40	1.54	617.99	71	619.99	70	0.7
Indeno(1,2,3-c,d)pyrene	2004.00	0.94 U	595.30	68	588.76	67	2.1
Dibenz(a,h)anthracene	2004.00	0.72 U	579.73	67	573.41	65	2.1
Benzo(g,h,i)perylene	2003.00	1.49 U	496.52	57	494.43	56	1.4
Surrogate Recoveries:							
Naphthalene-d8		62		79		78	
Phenanthrene-d10		61		84		82	
Chrysene-d12		61		87		87	

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.
NA - Not applicable, analyte not spiked into QC samples.

Sample Replicate Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	WS-004-001, WS-004-002 and WS-004-003	WS-004-001, WS-004-002 and WS-004-003	
Client Description:	Central Pond Fillet	Central Pond Fillet	
Battelle ID:	X3728	X3728DUP	
Batch ID:	99-706	99-706	
Matrix:	Tissue	Tissue	
Collection Date:	23-Sep-99	23-Sep-99	
Extraction Date:	27-Dec-99	27-Dec-99	
Analysis Date:	12-Jan-00	12-Jan-00	
Sample Wet Wt. (g):	16.16	15.09	
Sample Dry Wt. (g):	3.68	3.44	
Moisture (%):	77.22	77.22	
% Lipid (wet):	2.95	NA	
Units:	ug/kg, dry wt.	ug/kg, dry wt.	
			% RPD
Benzo(b)thiophene	1.26	1.36	7.4
Naphthalene	22.31	26.92	18.7
2-Methylnaphthalene	17.43	20.42	15.8
1-Methylnaphthalene	9.17	11.25	20.4
2,6-Dimethylnaphthalene	2.47	2.80	12.6
2,3,5-Trimethylnaphthalene	0.60 U	1.17	NA
Biphenyl	2.52	2.98	16.8
Acenaphthylene	2.20	2.93	28.2
Acenaphthene	4.86	6.13	23.1
Dibenzofuran	5.48	6.44	16.1
Fluorene	6.25	8.06	25.4
Phenanthrene	7.21	10.69	38.9 &
Anthracene	1.72	2.39	32.4 &
1-Methylphenanthrenes	0.43 U	0.46 U	NA
Dibenzothiophene	1.82	2.23	20.3
Fluoranthene	6.81	8.82	25.7
Pyrene	3.67	4.61	22.9
Benzo(a)anthracene	0.29 U	0.31 U	NA
Chrysene	1.42	1.56	9.3
Benzo(b)fluoranthene	0.31 U	0.33 U	NA
Benzo(k)fluoranthene	0.22 U	0.24 U	NA
Benzo(e)pyrene	0.19 U	0.21 U	NA
Benzo(a)pyrene	0.46 U	0.49 U	NA
Perylene	1.32 U	1.13 J	NA
Indeno(1,2,3-c,d)pyrene	0.87 U	0.93 U	NA
Dibenz(a,h)anthracene	0.66 U	0.71 U	NA
Benzo(g,h,i)perylene	1.37 U	1.46 U	NA
Surrogate Recoveries:			
Naphthalene-d8	58	77	
Phenanthrene-d10	57	74	
Chrysene-d12	58	77	

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

Field Sample Data

Battelle
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Project Name: Turner's Reservoir
Project Number: G339645-0001

Client ID:	LMB-01-001, LMB-01-002 and LMB-004-001	YB-002-001, YB-007-001 and YB-007-002	WS-004-001, WS-004-002 and WS-004-003
Client Description:	Turners and Central Pond Fillet	Turners Fillet	Central Pond Fillet
Battelle ID:	X3726	X3727	X3728
Batch ID:	99-706	99-706	99-706
Matrix:	Tissue	Tissue	Tissue
Collection Date:	09-Sep-99 and 23-Sep-99	09-Sep-99 and 24-Sep-99	23-Sep-99
Extraction Date:	27-Dec-99	27-Dec-99	27-Dec-99
Analysis Date:	12-Jan-00	12-Jan-00	12-Jan-00
Sample Wet Wt. (g):	15.11	6.74	16.16
Sample Dry Wt. (g):	3.39	1.31	3.68
Moisture (%):	77.57	80.50	77.22
% Lipid (wet):	0.40	0.68	2.95
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Benzo(b)thiophene	0.93 U	2.41 U	1.26
Naphthalene	6.73	11.61	22.31
2-Methylnaphthalene	3.00	4.29	17.43
1-Methylnaphthalene	1.73	2.46	9.17
2,6-Dimethylnaphthalene	0.40 U	1.04 U	2.47
2,3,5-Trimethylnaphthalei	0.66 U	1.69 U	0.60 U
Biphenyl	0.26 U	0.68 U	2.52
Acenaphthylene	0.32 U	0.82 U	2.20
Acenaphthene	0.20 U	0.53 U	4.86
Dibenzofuran	0.30 U	0.78 U	5.48
Fluorene	1.45	1.15 U	6.25
Phenanthrene	3.38	5.29	7.21
Anthracene	0.35 U	0.91 U	1.72
1-Methylphenanthrenes	0.47 U	1.21 U	0.43 U
Dibenzothiophene	0.68 U	1.76 U	1.82
Fluoranthene	0.46 U	3.05	6.81
Pyrene	1.51 U	3.89 U	3.67
Benzo(a)anthracene	0.31 U	0.81 U	0.29 U
Chrysene	0.34 U	0.87 U	1.42
Benzo(b)fluoranthene	0.33 U	0.86 U	0.31 U
Benzo(k)fluoranthene	0.24 U	0.61 U	0.22 U
Benzo(e)pyrene	0.21 U	0.54 U	0.19 U
Benzo(a)pyrene	0.50 U	1.28 U	0.46 U
Perylene	1.54	3.71 U	1.32 U
Indeno(1,2,3-c,d)pyrene	0.94 U	2.43 U	0.87 U
Dibenz(a,h)anthracene	0.72 U	1.85 U	0.66 U
Benzo(g,h,i)perylene	1.49 U	3.83 U	1.37 U
Surrogate Recoveries:			
Naphthalene-d8	62	57	58
Phenanthrene-d10	61	60	57
Chrysene-d12	61	60	58

ME - Estimate, significant matrix interference.
B - Analyte detected at >5X the MDL.
U - Not detected; sample specific MDL reported.
& - QC value outside the accuracy or precision criteria goal.
J - Detected, but below the sample specific MDL.

APPENDIX B

LABORATORY REPORT FOR GROUNDWATER SAMPLES

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
219.233.4777
800.332.4345
Fax: 219.233.8207
www.mastechnology.com

LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report: 452179-98(79-80)
Priority: Standard Written
Status: Final

Sampling Point: TR-1 - Turner Reservoir

Samples Submitted: Two drinking water samples

Copies to: None

----------Collected----------
Date: 11/10/99 Time: 11:30 By: P. Young

----------Received----------
Date: 11/11/99 Time: 09:30

REPORT SUMMARY

Di (2-ethylhexyl) phthalate was detected in the sample submitted for analysis at a concentration of 1.3 ug/L, which is less than the current MCL of 6.0 ug/L. Note: Method 525.2 section 13.2.4 states that phthalates can "appear in variable quantities in laboratory and field reagent blanks, and generally cannot be accurately measured at levels below about 2 ug/L." Di(2-ethylhexyl)phthalate was not detected in the associated laboratory method blank. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis. Other compounds tentatively identified: Hydrocarbon Oil, at a concentration of ~ 720 ug/L in the Method 525.2 analysis. No standard was available to confirm this compound.

Note: Method 525.2 results are suspect due to matrix interference as demonstrated by the degradation of the IS, phenanthrene-d10, which caused the recovery of the SS to be biased high outside the acceptance limits of 70-130% recovery. The SS recovery was manually recalculated against the tracking standard, pyrene-d10.

Note: One of four SS recoveries in the Method 525.2 analysis was biased(51%) outside the acceptance limits of 70-130% recovery. This data was acceptable based on the other three SS recoveries.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yuratt Date: 12/10/99

Finalized By: AHT Date: 12/10/99

Sampling Point: TR-1 - Turner Reservoir

PARAMETER	SDWA Method	MDL * (ug/L)	Results (ug/L)	MCL (ug/L)	Extraction Date	Analysis Date	Lab Number
Alachlor (Lasso)	525.2	0.1	< 0.1	2	11/17/99	11/19/99	452179
Aldicarb				3			
Aldicarb Sulfone				2			
Aldicarb Sulfoxide				4			
Aldrin	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Aroclor 1016	505	0.08	< 0.08	£	11/19/99	11/20/99	452180
Aroclor 1221	505	2.0	< 2.0	£	11/19/99	11/20/99	452180
Aroclor 1232	505	0.5	< 0.5	£	11/19/99	11/20/99	452180
Aroclor 1242	505	0.3	< 0.3	£	11/19/99	11/20/99	452180
Aroclor 1248	505	0.1	< 0.1	£	11/19/99	11/20/99	452180
Aroclor 1254	505	0.1	< 0.1	£	11/19/99	11/20/99	452180
Aroclor 1260	505	0.2	< 0.2	£	11/19/99	11/20/99	452180
Atrazine	525.2	0.1	< 0.1	3	11/17/99	11/19/99	452179
Benzo(a)pyrene	525.2	0.02	< 0.02	0.2	11/17/99	11/19/99	452179
Butachlor	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Carbaryl				---			
Carbofuran				40			
alpha-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
gamma-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Chlordane	505	0.2	< 0.2	2	11/19/99	11/20/99	452180
2,4-D				70			
Dalapon				200			
1,2-Dibromo-3-chloropropane				0.2			
Dicamba				---			
Dieldrin	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Di(2-ethylhexyl)adipate	525.2	0.6	< 0.7	400	11/17/99	11/19/99	452179
Di(2-ethylhexyl)phthalate	525.2	0.6	1.3	6	11/17/99	11/19/99	452179
Dinoseb				7			
Diquat				20			
Endothall				100			
Endrin	525.2	0.01	< 0.01	2	11/17/99	11/19/99	452179
Ethylene dibromide (EDB)				0.05			
Glyphosate (Round-up)				700			
Heptachlor	525.2	0.04	< 0.04	0.4	11/17/99	11/19/99	452179
Heptachlor epoxide	525.2	0.02	< 0.02	0.2	11/17/99	11/19/99	452179
Hexachlorobenzene	525.2	0.1	< 0.1	1	11/17/99	11/19/99	452179
Hexachlorocyclopentadiene	525.2	0.1	< 0.1	50	11/17/99	11/19/99	452179
3-Hydroxycarbofuran				---			
Lindane (gamma-BHC)	525.2	0.02	< 0.02	0.2	11/17/99	11/19/99	452179
Methoxychlor	525.2	0.1	< 0.1	40	11/17/99	11/19/99	452179
Methomyl				---			
Metolachlor (Dual)	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Metribuzin (Sencor)	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
Oxamyl (Vydate)				200			
Pentachlorophenol				1			
Picloram (Tordon)				500			
Propachlor	525.2	0.1	< 0.1	---	11/17/99	11/19/99	452179
2,4,5-TP (Silvex)				50			
Simazine	525.2	0.07	< 0.08	4	11/17/99	11/19/99	452179
2,3,7,8-TCDD (Dioxin)				0.00003			
Toxaphene	505	1.0	< 1.0	3	11/19/99	11/20/99	452180

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

£ Any positive Aroclor result would require analysis for total PCB as decachlorobiphenyl by method 508A (MCL = 0.5 ug/L).

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
219.233.4777
800.332.4345
Fax: 219.233.8207
www.mastechnology.com

LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(81+83)

Priority: Standard Written

Status: Final

Sampling Point: TR-1 - Turner Reservoir

Samples Submitted: One drinking water sample and one laboratory trip blank

Copies to: None

Collected			Received	
Date: 11/10/99	Time: 11:30	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

Chloroform, 1,1-dichloroethylene, cis-1,2-dichloroethylene, ethylbenzene, toluene, 1,1,1-trichloroethane, trichloroethylene and total xylenes were detected in the sample submitted for analysis at the concentrations indicated, which are all less than their current, respective MCLs. 1,1-Dichloroethane, methyl-t-butyl ether (MTBE) and 1,2,4-trimethylbenzene were also detected in the sample submitted for analysis at the concentrations indicated. There are no MCLs for these parameters. None of the other VOCs included in the detailed parameter list were detected in the sample submitted for analysis.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yhott Date: 12/10/99

Finalized By: Date: 12/10/99

Client: United States Army Corp of Engineers

Report : 452179-98(81+83)

Sampling Point: TR-1 - Turner Reservoir

PARAMETER	Report Limit ** (ug/L)	Result (ug/L)	MCL (ug/L)	PARAMETER	Report Limit ** (ug/L)	Result (ug/L)
Regulated Parameters				Unregulated Parameters		
Benzene	0.5	< 0.5	5	Bromobenzene	0.2	< 0.2
Bromodichloromethane	0.1	< 0.1	100 *	Bromochloromethane	0.2	< 0.2
Bromoform	0.1	< 0.1	100 *	Bromomethane	0.5	< 0.5
Carbon tetrachloride	0.1	< 0.1	5	n-Butylbenzene	0.2	< 0.2
Chlorobenzene	0.2	< 0.2	100	sec-Butylbenzene	0.2	< 0.2
Chloroform	0.1	0.2	100 *	tert-Butylbenzene	0.2	< 0.2
Dibromochloromethane	0.1	< 0.1	100 *	Chloroethane	0.5	< 0.5
1,2-Dibromo-3-Chloropropane	0.2	< 0.2	0.2 †	Chloromethane	0.5	< 0.5
1,2-Dibromoethane(EDB)	0.1	< 0.1	0.05 †	2-Chlorotoluene (o-)	0.2	< 0.2
1,2-Dichlorobenzene	0.1	< 0.1	600	4-Chlorotoluene (p-)	0.2	< 0.2
1,4-Dichlorobenzene	0.1	< 0.1	75	Dibromomethane	0.1	< 0.1
1,2-Dichloroethane	0.1	< 0.1	5	1,3-Dichlorobenzene	0.1	< 0.1
1,1-Dichloroethylene	0.2	0.8	7	Dichlorodifluoromethane	0.5	< 0.5
cis-1,2-Dichloroethylene	0.1	1.4	70	1,1-Dichloroethane	0.1	2.5
trans-1,2-Dichloroethylene	0.1	< 0.1	100	1,3-Dichloropropane	0.1	< 0.1
Dichloromethane	0.5	< 0.5	5	2,2-Dichloropropane	0.5	< 0.5
1,2-Dichloropropane	0.1	< 0.1	5	1,1-Dichloropropylene	0.1	< 0.1
Ethylbenzene	0.1	0.2	700	cis-1,3-Dichloropropylene	0.1	< 0.1
Styrene	0.2	< 0.2	100	trans-1,3-Dichloropropylene	0.1	< 0.1
Tetrachloroethylene	0.2	< 0.2	5	Hexachlorobutadiene	0.2	< 0.2
Toluene	0.5	0.8	1000	Isopropylbenzene	0.1	< 0.1
1,2,4-Trichlorobenzene	0.2	< 0.2	70	4-Isopropyltoluene (p-)	0.1	< 0.1
1,1,1-Trichloroethane	0.1	1.8	200	Naphthalene	0.2	< 0.2
1,1,2-Trichloroethane	0.1	< 0.1	5	n-Propylbenzene	0.1	< 0.1
Trichloroethylene	0.1	0.4	5	1,1,1,2-Tetrachloroethane	0.1	< 0.1
Vinyl chloride	0.2	< 0.2	2	1,1,2,2-Tetrachloroethane	0.1	< 0.1
Total Xylenes	0.2	0.9	10,000	1,2,3-Trichlorobenzene	0.2	< 0.2
				Trichlorofluoromethane	0.5	< 0.5
				1,2,3-Trichloropropane	0.2	< 0.2
				1,2,4-Trimethylbenzene	0.1	0.3
				1,3,5-Trimethylbenzene	0.1	< 0.1
				Methyl-t-butyl ether (MTBE)	0.5	0.9

Method: 524.2

Analysis Date: 11/16/99

* The MCL of 100 ug/L is for total trihalomethanes and compliance samples must be collected from the distribution system.

** EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

† Compliance monitoring for these parameters must be done using EPA method 504.1

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
219.233.4777
800.332.4345
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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report: 452179-98(82)

Priority: Standard Written

Status: Final

Sampling Point: TR-1 - Turner Reservoir

Samples Submitted: One drinking water sample

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 11:30	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

Manganese was detected in the sample submitted for analysis at a concentration of 210 ug/L, which is greater than the current SMCL of 50 ug/L. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis at concentrations which exceed, or are equivalent to, their current, respective MCLs or SMCLs.

Detailed quantitative results are presented on the following pages.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yeatt Date: 12/10/99

Finalized By: [illegible] Date: 12/10/99

Sampling Point: TR-1 - Turner Reservoir

METALS							
PARAMETER	SDWA Method	MRL *	Results	MCL	Units	Analysis Date	Lab Number
Antimony	200.8	0.2	< 0.2	6	ug/L	11/24/99	452182
Arsenic	200.8	0.5	< 0.5	50	ug/L	11/24/99	452182
Barium	200.8	0.2	**6.6**	2000	ug/L	11/24/99	452182
Beryllium	200.8	0.2	**0.4**	4	ug/L	11/19/99	452182
Cadmium	200.8	0.2	< 0.2	5	ug/L	11/24/99	452182
Chromium	200.8	0.2	**7.1**	100	ug/L	11/24/99	452182
Mercury	200.8	0.1	< 0.1	2	ug/L	11/18/99	452182
Nickel	200.8	0.5	**9.7**	100	ug/L	11/24/99	452182
Selenium	200.8	2.0	< 2.0	50	ug/L	11/24/99	452182
Thallium	200.8	0.2	< 0.2	2	ug/L	11/24/99	452182

PARAMETER	SDWA Method	MRL *	Results	SMCL	Units	Analysis Date	Lab Number
Manganese	200.8	0.2	**210**	50	ug/L	11/19/99	452182

Comments:

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report: 452179-98(84-85)
Priority: Standard Written
Status: Final

Sampling Point: TR-1D - Turner Reservoir

Samples Submitted: Two drinking water samples

Copies to: None

----------Collected----------
Date: 11/10/99 Time: 11:35 By: P. Young

----------Received----------
Date: 11/11/99 Time: 09:30

REPORT SUMMARY

Di (2-ethylhexyl) phthalate was detected in the sample submitted for analysis at a concentration of 1.0 ug/L, which is less than the current MCL of 6.0 ug/L. Note: Method 525.2 section 13.2.4 states that phthalates can "appear in variable quantities in laboratory and field reagent blanks, and generally cannot be accurately measured at levels below about 2 ug/L." Di(2-ethylhexyl)phthalate was not detected in the associated laboratory method blank. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis. Other compounds tentatively identified: Hydrocarbon Oil, at a concentration of ~ 420 ug/L in the Method 525.2 analysis. No standard was available to confirm this compound.

Note: Method 525.2 results are suspect due to matrix interference as demonstrated by the degradation of the IS, phenanthrene-d10, which caused the recovery of the SS to be biased high outside the acceptance limits of 70-130% recovery. The SS recovery was manually recalculated against the tracking standard, pyrene-d10.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yeatt Date: 12/10/99

Finalized By: [signature] Date: 12/10/99

Sampling Point: TR-1D - Turner Reservoir

PARAMETER	SDWA Method	MDL * (ug/L)	Results (ug/L)	MCL (ug/L)	Extraction Date	Analysis Date	Lab Number
Alachlor (Lasso)	525.2	0.1	< 0.1	2	11/17/99	11/20/99	452184
Aldicarb				3			
Aldicarb Sulfone				2			
Aldicarb Sulfoxide				4			
Aldrin	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Aroclor 1016	505	0.08	< 0.08	£	11/19/99	11/20/99	452185
Aroclor 1221	505	2.0	< 2.0	£	11/19/99	11/20/99	452185
Aroclor 1232	505	0.5	< 0.5	£	11/19/99	11/20/99	452185
Aroclor 1242	505	0.3	< 0.3	£	11/19/99	11/20/99	452185
Aroclor 1248	505	0.1	< 0.1	£	11/19/99	11/20/99	452185
Aroclor 1254	505	0.1	< 0.1	£	11/19/99	11/20/99	452185
Aroclor 1260	505	0.2	< 0.2	£	11/19/99	11/20/99	452185
Atrazine	525.2	0.1	< 0.1	3	11/17/99	11/20/99	452184
Benzo(a)pyrene	525.2	0.02	< 0.02	0.2	11/17/99	11/20/99	452184
Butachlor	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Carbaryl				---			
Carbofuran				40			
alpha-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
gamma-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Chlordane	505	0.2	< 0.2	2	11/19/99	11/20/99	452185
2,4-D				70			
Dalapon				200			
1,2-Dibromo-3-chloropropane				0.2			
Dicamba				---			
Dieldrin	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Di(2-ethylhexyl)adipate	525.2	0.6	< 0.7	400	11/17/99	11/20/99	452184
Di(2-ethylhexyl)phthalate	525.2	0.6	1.0	6	11/17/99	11/20/99	452184
Dinoseb				7			
Diquat				20			
Endothall				100			
Endrin	525.2	0.01	< 0.01	2	11/17/99	11/20/99	452184
Ethylene dibromide (EDB)				0.05			
Glyphosate (Round-up)				700			
Heptachlor	525.2	0.04	< 0.04	0.4	11/17/99	11/20/99	452184
Heptachlor epoxide	525.2	0.02	< 0.02	0.2	11/17/99	11/20/99	452184
Hexachlorobenzene	525.2	0.1	< 0.1	1	11/17/99	11/20/99	452184
Hexachlorocyclopentadiene	525.2	0.1	< 0.1	50	11/17/99	11/20/99	452184
3-Hydroxycarbofuran				---			
Lindane (gamma-BHC)	525.2	0.02	< 0.02	0.2	11/17/99	11/20/99	452184
Methoxychlor	525.2	0.1	< 0.1	40	11/17/99	11/20/99	452184
Methomyl				---			
Metolachlor (Dual)	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Metribuzin (Sencor)	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
Oxamyl (Vydate)				200			
Pentachlorophenol				1			
Picloram (Tordon)				500			
Propachlor	525.2	0.1	< 0.1	---	11/17/99	11/20/99	452184
2,4,5-TP (Silvex)				50			
Simazine	525.2	0.07	< 0.08	4	11/17/99	11/20/99	452184
2,3,7,8-TCDD (Dioxin)				0.00003			
Toxaphene	505	1.0	< 1.0	3	11/19/99	11/20/99	452185

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

£ Any positive Aroclor result would require analysis for total PCB as decachlorobiphenyl by method 508A (MCL = 0.5 ug/L).

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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(86+88)

Priority: Standard Written

Status: Final

Sampling Point: TR-1D - Turner Reservoir

Samples Submitted: One drinking water sample and one laboratory trip blank

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 11:35	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

Chloroform, 1,1-dichloroethylene, cis-1,2-dichloroethylene, ethylbenzene, toluene, 1,1,1-trichloroethane, trichloroethylene and total xylenes were detected in the sample submitted for analysis at the concentrations indicated, which are all less than their current, respective MCLs. 1,1-Dichloroethane, methyl-t-butyl ether (MTBE) and 1,2,4-trimethylbenzene were also detected in the sample submitted for analysis at the concentrations indicated. There are no MCLs for these parameters. None of the other VOCs included in the detailed parameter list were detected in the sample submitted for analysis.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yeott Date: 12/10/99

Finalized By: [signature] Date: 12/10/99

Client: United States Army Corp of Engineers

Report : 452179-98(86+88)

Sampling Point: TR-1D - Turner Reservoir

PARAMETER	Report Limit ** (ug/L)	Result (ug/L)	MCL (ug/L)	PARAMETER	Report Limit ** (ug/L)	Result (ug/L)
Regulated Parameters				Unregulated Parameters		
Benzene	0.5	< 0.5	5	Bromobenzene	0.2	< 0.2
Bromodichloromethane	0.1	< 0.1	100 *	Bromochloromethane	0.2	< 0.2
Bromoform	0.1	< 0.1	100 *	Bromomethane	0.5	< 0.5
Carbon tetrachloride	0.1	< 0.1	5	n-Butylbenzene	0.2	< 0.2
Chlorobenzene	0.2	< 0.2	100	sec-Butylbenzene	0.2	< 0.2
Chloroform	0.1	**0.2**	100 *	tert-Butylbenzene	0.2	< 0.2
Dibromochloromethane	0.1	< 0.1	100 *	Chloroethane	0.5	< 0.5
1,2-Dibromo-3-Chloropropane	0.2	< 0.2	0.2 †	Chloromethane	0.5	< 0.5
1,2-Dibromoethane(EDB)	0.1	< 0.1	0.05 †	2-Chlorotoluene (o-)	0.2	< 0.2
1,2-Dichlorobenzene	0.1	< 0.1	600	4-Chlorotoluene (p-)	0.2	< 0.2
1,4-Dichlorobenzene	0.1	< 0.1	75	Dibromomethane	0.1	< 0.1
1,2-Dichloroethane	0.1	< 0.1	5	1,3-Dichlorobenzene	0.1	< 0.1
1,1-Dichloroethylene	0.2	**0.8**	7	Dichlorodifluoromethane	0.5	< 0.5
cis-1,2-Dichloroethylene	0.1	**1.3**	70	1,1-Dichloroethane	0.1	**2.4**
trans-1,2-Dichloroethylene	0.1	< 0.1	100	1,3-Dichloropropane	0.1	< 0.1
Dichloromethane	0.5	< 0.5	5	2,2-Dichloropropane	0.5	< 0.5
1,2-Dichloropropane	0.1	< 0.1	5	1,1-Dichloropropylene	0.1	< 0.1
Ethylbenzene	0.1	**0.2**	700	cis-1,3-Dichloropropylene	0.1	< 0.1
Styrene	0.2	< 0.2	100	trans-1,3-Dichloropropylene	0.1	< 0.1
Tetrachloroethylene	0.2	< 0.2	5	Hexachlorobutadiene	0.2	< 0.2
Toluene	0.5	**0.7**	1000	Isopropylbenzene	0.1	< 0.1
1,2,4-Trichlorobenzene	0.2	< 0.2	70	4-Isopropyltoluene (p-)	0.1	< 0.1
1,1,1-Trichloroethane	0.1	**1.8**	200	Naphthalene	0.2	< 0.2
1,1,2-Trichloroethane	0.1	< 0.1	5	n-Propylbenzene	0.1	< 0.1
Trichloroethylene	0.1	**0.4**	5	1,1,1,2-Tetrachloroethane	0.1	< 0.1
Vinyl chloride	0.2	< 0.2	2	1,1,2,2-Tetrachloroethane	0.1	< 0.1
Total Xylenes	0.2	**1.0**	10,000	1,2,3-Trichlorobenzene	0.2	< 0.2
				Trichlorofluoromethane	0.5	< 0.5
				1,2,3-Trichloropropane	0.2	< 0.2
				1,2,4-Trimethylbenzene	0.1	**0.3**
				1,3,5-Trimethylbenzene	0.1	< 0.1
				Methyl-t-butyl ether (MTBE)	0.5	**0.9**

Method: 524.2

Analysis Date: 11/16/99

* The MCL of 100 ug/L is for total trihalomethanes and compliance samples must be collected from the distribution system.

** EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

† Compliance monitoring for these parameters must be done using EPA method 504.1

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(87)

Priority: Standard Written

Status: Final

Sampling Point: TR - ID Turner Reservoir

Samples Submitted: One drinking water sample

Copies to: None

----------Collected----------
Date: 11/10/99 Time: 11:35 By: P. Young

----------Received----------
Date: 11/11/99 Time: 09:30

REPORT SUMMARY

Manganese was detected in the sample submitted for analysis at a concentration of 190 ug/L, which is greater than the current SMCL of 50 ug/L. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis at concentrations which exceed, or are equivalent to, their current, respective MCLs or SMCLs.

Detailed quantitative results are presented on the following pages.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yhott Date: 12/10/99

Finalized By: [signature] Date: 12/10/99

Sampling Point: TR - ID Turner Reservoir

METALS							
PARAMETER	SDWA Method	MRL *	Results	MCL	Units	Analysis Date	Lab Number
Antimony	200.8	0.2	< 0.2	6	ug/L	11/24/99	452187
Arsenic	200.8	0.5	**0.6**	50	ug/L	11/24/99	452187
Barium	200.8	0.2	**6.0**	2000	ug/L	11/24/99	452187
Beryllium	200.8	0.2	< 0.2	4	ug/L	11/19/99	452187
Cadmium	200.8	0.2	< 0.2	5	ug/L	11/24/99	452187
Chromium	200.8	0.2	**8.6**	100	ug/L	11/24/99	452187
Mercury	200.8	0.1	< 0.1	2	ug/L	11/18/99	452187
Nickel	200.8	0.5	**9.5**	100	ug/L	11/24/99	452187
Selenium	200.8	2.0	< 2.0	50	ug/L	11/24/99	452187
Thallium	200.8	0.2	< 0.2	2	ug/L	11/24/99	452187

PARAMETER	SDWA Method	MRL *	Results	SMCL	Units	Analysis Date	Lab Number
Manganese	200.8	0.2	**190**	50	ug/L	11/19/99	452187

Comments:

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Environmental Health Laboratories
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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report: 452179-98(89-90)

Priority: Standard Written

Status: Final

Sampling Point: TR-2 - Turner Reservoir

Samples Submitted: Two drinking water samples

Copies to: None

Collected			Received	
Date: 11/10/99	Time: 14:30	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

None of the analytes included in the detailed parameter list were detected in the sample submitted for analysis.

Note: Method 525.2 results are suspect due to matrix interference as demonstrated by the degradation of the IS, phenanthrene-d10, which caused the recovery of the SS to be biased high outside the acceptance limits of 70-130% recovery. The SS recovery was manually recalculated against the tracking standard, pyrene-d10.

Note: One of four SS recoveries in the Method 525.2 analysis was low biased (65%) outside the acceptance limits of 70-130% recovery. This data was acceptable based on the other three SS recoveries.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yuott Date: 12/10/99

Finalized By: [signature] Date: 12/10/99

Sampling Point: TR-2 - Turner Reservoir

PARAMETER	SDWA Method	MDL * (ug/L)	Results (ug/L)	MCL (ug/L)	Extraction Date	Analysis Date	Lab Number
Alachlor (Lasso)	525.2	0.1	< 0.1	2	11/17/99	11/22/99	452189
Aldicarb				3			
Aldicarb Sulfone				2			
Aldicarb Sulfoxide				4			
Aldrin	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Aroclor 1016	505	0.08	< 0.08	£	11/19/99	11/20/99	452190
Aroclor 1221	505	2.0	< 2.0	£	11/19/99	11/20/99	452190
Aroclor 1232	505	0.5	< 0.5	£	11/19/99	11/20/99	452190
Aroclor 1242	505	0.3	< 0.3	£	11/19/99	11/20/99	452190
Aroclor 1248	505	0.1	< 0.1	£	11/19/99	11/20/99	452190
Aroclor 1254	505	0.1	< 0.1	£	11/19/99	11/20/99	452190
Aroclor 1260	505	0.2	< 0.2	£	11/19/99	11/20/99	452190
Atrazine	525.2	0.1	< 0.1	3	11/17/99	11/22/99	452189
Benzo(a)pyrene	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452189
Butachlor	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Carbaryl				---			
Carbofuran				40			
alpha-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
gamma-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Chlordane	505	0.2	< 0.2	2	11/19/99	11/20/99	452190
2,4-D				70			
Dalapon				200			
1,2-Dibromo-3-chloropropane				0.2			
Dicamba				---			
Dieldrin	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Di(2-ethylhexyl)adipate	525.2	0.6	< 0.6	400	11/17/99	11/22/99	452189
Di(2-ethylhexyl)phthalate	525.2	0.6	< 0.6	6	11/17/99	11/22/99	452189
Dinoseb				7			
Diquat				20			
Endothall				100			
Endrin	525.2	0.01	< 0.01	2	11/17/99	11/22/99	452189
Ethylene dibromide (EDB)				0.05			
Glyphosate (Round-up)				700			
Heptachlor	525.2	0.04	< 0.04	0.4	11/17/99	11/22/99	452189
Heptachlor epoxide	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452189
Hexachlorobenzene	525.2	0.1	< 0.1	1	11/17/99	11/22/99	452189
Hexachlorocyclopentadiene	525.2	0.1	< 0.1	50	11/17/99	11/22/99	452189
3-Hydroxycarbofuran				---			
Lindane (gamma-BHC)	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452189
Methoxychlor	525.2	0.1	< 0.1	40	11/17/99	11/22/99	452189
Methomyl				---			
Metolachlor (Dual)	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Metribuzin (Sencor)	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
Oxamyl (Vydate)				200			
Pentachlorophenol				1			
Picloram (Tordon)				500			
Propachlor	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452189
2,4,5-TP (Silvex)				50			
Simazine	525.2	0.07	< 0.08	4	11/17/99	11/22/99	452189
2,3,7,8-TCDD (Dioxin)				0.00003			
Toxaphene	505	1.0	< 1.0	3	11/19/99	11/20/99	452190

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

£ Any positive Aroclor result would require analysis for total PCB as decachlorobiphenyl by method 508A (MCL = 0.5 ug/L).

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(91+93)

Priority: Standard Written

Status: Final

Sampling Point: TR-2 - Turner Reservoir

Samples Submitted: One drinking water sample and one laboratory trip blank

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 14:30	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

None of the VOCs included in the detailed parameter list were detected in the sample submitted for analysis.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yeatts Date: 12/10/99

Finalized By: [illegible] Date: 12/10/99

Client: United States Army Corp of Engineers

Report : 452179-98(91+93)

Sampling Point: TR-2 - Turner Reservoir

PARAMETER	Report Limit ** (ug/L)	Result (ug/L)	MCL (ug/L)	PARAMETER	Report Limit ** (ug/L)	Result (ug/L)
Regulated Parameters				Unregulated Parameters		
Benzene	0.5	< 0.5	5	Bromobenzene	0.2	< 0.2
Bromodichloromethane	0.1	< 0.1	100 *	Bromochloromethane	0.2	< 0.2
Bromoform	0.1	< 0.1	100 *	Bromomethane	0.5	< 0.5
Carbon tetrachloride	0.1	< 0.1	5	n-Butylbenzene	0.2	< 0.2
Chlorobenzene	0.2	< 0.2	100	sec-Butylbenzene	0.2	< 0.2
Chloroform	0.1	< 0.1	100 *	tert-Butylbenzene	0.2	< 0.2
Dibromochloromethane	0.1	< 0.1	100 *	Chloroethane	0.5	< 0.5
1,2-Dibromo-3-Chloropropane	0.2	< 0.2	0.2 †	Chloromethane	0.5	< 0.5
1,2-Dibromoethane(EDB)	0.1	< 0.1	0.05 †	2-Chlorotoluene (o-)	0.2	< 0.2
1,2-Dichlorobenzene	0.1	< 0.1	600	4-Chlorotoluene (p-)	0.2	< 0.2
1,4-Dichlorobenzene	0.1	< 0.1	75	Dibromomethane	0.1	< 0.1
1,2-Dichloroethane	0.1	< 0.1	5	1,3-Dichlorobenzene	0.1	< 0.1
1,1-Dichloroethylene	0.2	< 0.2	7	Dichlorodifluoromethane	0.5	< 0.5
cis-1,2-Dichloroethylene	0.1	< 0.1	70	1,1-Dichloroethane	0.1	< 0.1
trans-1,2-Dichloroethylene	0.1	< 0.1	100	1,3-Dichloropropane	0.1	< 0.1
Dichloromethane	0.5	< 0.5	5	2,2-Dichloropropane	0.5	< 0.5
1,2-Dichloropropane	0.1	< 0.1	5	1,1-Dichloropropylene	0.1	< 0.1
Ethylbenzene	0.1	< 0.1	700	cis-1,3-Dichloropropylene	0.1	< 0.1
Styrene	0.2	< 0.2	100	trans-1,3-Dichloropropylene	0.1	< 0.1
Tetrachloroethylene	0.2	< 0.2	5	Hexachlorobutadiene	0.2	< 0.2
Toluene	0.5	< 0.5	1000	Isopropylbenzene	0.1	< 0.1
1,2,4-Trichlorobenzene	0.2	< 0.2	70	4-Isopropyltoluene (p-)	0.1	< 0.1
1,1,1-Trichloroethane	0.1	< 0.1	200	Naphthalene	0.2	< 0.2
1,1,2-Trichloroethane	0.1	< 0.1	5	n-Propylbenzene	0.1	< 0.1
Trichloroethylene	0.1	< 0.1	5	1,1,1,2-Tetrachloroethane	0.1	< 0.1
Vinyl chloride	0.2	< 0.2	2	1,1,2,2-Tetrachloroethane	0.1	< 0.1
Total Xylenes	0.2	< 0.2	10,000	1,2,3-Trichlorobenzene	0.2	< 0.2
				Trichlorofluoromethane	0.5	< 0.5
				1,2,3-Trichloropropane	0.2	< 0.2
				1,2,4-Trimethylbenzene	0.1	< 0.1
				1,3,5-Trimethylbenzene	0.1	< 0.1
				Methyl-t-butyl ether (MTBE)	0.5	< 0.5

Method: 524.2

Analysis Date: 11/17/99

* The MCL of 100 ug/L is for total trihalomethanes and compliance samples must be collected from the distribution system.

** EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

† Compliance monitoring for these parameters must be done using EPA method 504.1

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
219.233.4777
800.332.4345
Fax: 219.233.8207
www.mastechnology.com

LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(92)

Priority: Standard Written

Status: Final

Sampling Point: TR - 2 Turner Reservoir

Samples Submitted: One drinking water sample

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 14:30	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

Manganese was detected in the sample submitted for analysis at a concentration of 800 ug/L, which is greater than the current SMCL of 50 ug/L. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis at concentrations which exceed, or are equivalent to, their current, respective MCLs or SMCLs.

Detailed quantitative results are presented on the following pages.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yuett Date: 12/10/99

Finalized By: MF Ty Date: 12/10/99

Sampling Point: TR - 2 Turner Reservoir

METALS							
PARAMETER	SDWA Method	MRL *	Results	MCL	Units	Analysis Date	Lab Number
Antimony	200.8	0.2	**0.2**	6	ug/L	11/24/99	452192
Arsenic	200.8	0.5	**17**	50	ug/L	11/24/99	452192
Barium	200.8	0.2	**22**	2000	ug/L	11/29/99	452192
Beryllium	200.8	0.2	< 0.2	4	ug/L	11/19/99	452192
Cadmium	200.8	0.2	< 0.2	5	ug/L	11/24/99	452192
Chromium	200.8	0.2	**18**	100	ug/L	11/24/99	452192
Mercury	200.8	0.1	< 0.1	2	ug/L	11/18/99	452192
Nickel	200.8	0.5	**13**	100	ug/L	11/24/99	452192
Selenium	200.8	2.0	< 2.0	50	ug/L	11/24/99	452192
Thallium	200.8	0.2	< 0.2	2	ug/L	11/24/99	452192

PARAMETER	SDWA Method	MRL *	Results	SMCL	Units	Analysis Date	Lab Number
Manganese	200.8	0.2	**800**	50	ug/L	12/08/99	452192

Comments:

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
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www.mastechnology.com

LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report: 452179-98(94-95)
Priority: Standard Written
Status: Final

Sampling Point: TR-3 - Turner Reservoir

Samples Submitted: Two drinking water samples

Copies to: None

----------Collected----------
Date: 11/10/99 Time: 16:25 By: P. Young

----------Received----------
Date: 11/11/99 Time: 09:30

REPORT SUMMARY

None of the analytes included in the detailed parameter list were detected in the sample submitted for analysis.

Note: Method 505.1 results are suspect due to matrix interference as demonstrated by the low biased recovery of the IS (64%) outside the acceptance limits of 70-130%.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yuratt Date: 12/10/99

Finalized By: [signature] Date: 12/10/99

Sampling Point: TR-3 - Turner Reservoir

PARAMETER	SDWA Method	MDL * (ug/L)	Results (ug/L)	MCL (ug/L)	Extraction Date	Analysis Date	Lab Number
Alachlor (Lasso)	525.2	0.1	< 0.1	2	11/17/99	11/22/99	452194
Aldicarb				3			
Aldicarb Sulfone				2			
Aldicarb Sulfoxide				4			
Aldrin	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Aroclor 1016	505	0.08	< 0.08	£	11/23/99	12/01/99	452195
Aroclor 1221	505	2.0	< 2.0	£	11/23/99	12/01/99	452195
Aroclor 1232	505	0.5	< 0.5	£	11/23/99	12/01/99	452195
Aroclor 1242	505	0.3	< 0.3	£	11/23/99	12/01/99	452195
Aroclor 1248	505	0.1	< 0.1	£	11/23/99	12/01/99	452195
Aroclor 1254	505	0.1	< 0.1	£	11/23/99	12/01/99	452195
Aroclor 1260	505	0.2	< 0.2	£	11/23/99	12/01/99	452195
Atrazine	525.2	0.1	< 0.1	3	11/17/99	11/22/99	452194
Benzo(a)pyrene	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452194
Butachlor	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Carbaryl				---			
Carbofuran				40			
alpha-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
gamma-Chlordane	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Chlordane	505	0.2	< 0.2	2	11/23/99	12/01/99	452195
2,4-D				70			
Dalapon				200			
1,2-Dibromo-3-chloropropane				0.2			
Dicamba				---			
Dieldrin	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Di(2-ethylhexyl)adipate	525.2	0.6	< 0.6	400	11/17/99	11/22/99	452194
Di(2-ethylhexyl)phthalate	525.2	0.6	< 0.6	6	11/17/99	11/22/99	452194
Dinoseb				7			
Diquat				20			
Endothall				100			
Endrin	525.2	0.01	< 0.01	2	11/17/99	11/22/99	452194
Ethylene dibromide (EDB)				0.05			
Glyphosate (Round-up)				700			
Heptachlor	525.2	0.04	< 0.04	0.4	11/17/99	11/22/99	452194
Heptachlor epoxide	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452194
Hexachlorobenzene	525.2	0.1	< 0.1	1	11/17/99	11/22/99	452194
Hexachlorocyclopentadiene	525.2	0.1	< 0.1	50	11/17/99	11/22/99	452194
3-Hydroxycarbofuran				---			
Lindane (gamma-BHC)	525.2	0.02	< 0.02	0.2	11/17/99	11/22/99	452194
Methoxychlor	525.2	0.1	< 0.1	40	11/17/99	11/22/99	452194
Methomyl				---			
Metolachlor (Dual)	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Metribuzin (Sencor)	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
Oxamyl (Vydate)				200			
Pentachlorophenol				1			
Picloram (Tordon)				500			
Propachlor	525.2	0.1	< 0.1	---	11/17/99	11/22/99	452194
2,4,5-TP (Silvex)				50			
Simazine	525.2	0.07	< 0.08	4	11/17/99	11/22/99	452194
2,3,7,8-TCDD (Dioxin)				0.00003			
Toxaphene	505	1.0	< 1.0	3	11/23/99	12/01/99	452195

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

£ Any positive Aroclor result would require analysis for total PCB as decachlorobiphenyl by method 508A (MCL = 0.5 ug/L).

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

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LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(96+98)

Priority: Standard Written

Status: Final

Sampling Point: TR-3 - Turner Reservoir

Samples Submitted: One drinking water sample and one laboratory trip blank

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 16:25	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

cis-1,2-Dichloroethylene and total xylenes were detected in the sample submitted for analysis at the concentrations indicated, which are both less than their current, respective MCLs. Methyl-t-butyl ether (MTBE) and 1,2,4-trimethylbenzene were also detected in the sample submitted for analysis at the concentrations indicated. There are no MCLs for these parameters. None of the other VOCs included in the detailed parameter list were detected in the sample submitted for analysis.

Detailed quantitative results are presented on the following page.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yhott Date: 12/10/99

Finalized By: [illegible] Date: 12/10/99

Client: United States Army Corp of Engineers Report : 452179-98(96+98)

Sampling Point: TR-3 - Turner Reservoir

PARAMETER	Report Limit ** (ug/L)	Result (ug/L)	MCL (ug/L)	PARAMETER	Report Limit ** (ug/L)	Result (ug/L)
Regulated Parameters				Unregulated Parameters		
Benzene	0.5	< 0.5	5	Bromobenzene	0.2	< 0.2
Bromodichloromethane	0.1	< 0.1	100 *	Bromochloromethane	0.2	< 0.2
Bromoform	0.1	< 0.1	100 *	Bromomethane	0.5	< 0.5
Carbon tetrachloride	0.1	< 0.1	5	n-Butylbenzene	0.2	< 0.2
Chlorobenzene	0.2	< 0.2	100	sec-Butylbenzene	0.2	< 0.2
Chloroform	0.1	< 0.1	100 *	tert-Butylbenzene	0.2	< 0.2
Dibromochloromethane	0.1	< 0.1	100 *	Chloroethane	0.5	< 0.5
1,2-Dibromo-3-Chloropropane	0.2	< 0.2	0.2 †	Chloromethane	0.5	< 0.5
1,2-Dibromoethane(EDB)	0.1	< 0.1	0.05 †	2-Chlorotoluene (o-)	0.2	< 0.2
1,2-Dichlorobenzene	0.1	< 0.1	600	4-Chlorotoluene (p-)	0.2	< 0.2
1,4-Dichlorobenzene	0.1	< 0.1	75	Dibromomethane	0.1	< 0.1
1,2-Dichloroethane	0.1	< 0.1	5	1,3-Dichlorobenzene	0.1	< 0.1
1,1-Dichloroethylene	0.2	< 0.2	7	Dichlorodifluoromethane	0.5	< 0.5
cis-1,2-Dichloroethylene	0.1	**0.1**	70	1,1-Dichloroethane	0.1	< 0.1
trans-1,2-Dichloroethylene	0.1	< 0.1	100	1,3-Dichloropropane	0.1	< 0.1
Dichloromethane	0.5	< 0.5	5	2,2-Dichloropropane	0.5	< 0.5
1,2-Dichloropropane	0.1	< 0.1	5	1,1-Dichloropropylene	0.1	< 0.1
Ethylbenzene	0.1	< 0.1	700	cis-1,3-Dichloropropylene	0.1	< 0.1
Styrene	0.2	< 0.2	100	trans-1,3-Dichloropropylene	0.1	< 0.1
Tetrachloroethylene	0.2	< 0.2	5	Hexachlorobutadiene	0.2	< 0.2
Toluene	0.5	< 0.5	1000	Isopropylbenzene	0.1	< 0.1
1,2,4-Trichlorobenzene	0.2	< 0.2	70	4-Isopropyltoluene (p-)	0.1	< 0.1
1,1,1-Trichloroethane	0.1	< 0.1	200	Naphthalene	0.2	< 0.2
1,1,2-Trichloroethane	0.1	< 0.1	5	n-Propylbenzene	0.1	< 0.1
Trichloroethylene	0.1	< 0.1	5	1,1,1,2-Tetrachloroethane	0.1	< 0.1
Vinyl chloride	0.2	< 0.2	2	1,1,2,2-Tetrachloroethane	0.1	< 0.1
Total Xylenes	0.2	**0.4**	10,000	1,2,3-Trichlorobenzene	0.2	< 0.2
				Trichlorofluoromethane	0.5	< 0.5
				1,2,3-Trichloropropane	0.2	< 0.2
				1,2,4-Trimethylbenzene	0.1	**0.2**
				1,3,5-Trimethylbenzene	0.1	< 0.1
				Methyl-t-butyl ether (MTBE)	0.5	**0.5**

Method: 524.2 Analysis Date: 11/17/99

* The MCL of 100 ug/L is for total trihalomethanes and compliance samples must be collected from the distribution system.

** EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

† Compliance monitoring for these parameters must be done using EPA method 504.1

Environmental Health Laboratories
The Nation's Drinking Water Laboratory

South Bend, IN 46617
219.233.4777
800.332.4345
Fax: 219.233.8207
www.mastechnology.com

LABORATORY REPORT

Client: United States Army Corp of Engineers
Attn: Choudary Choday
696 Virginia Road
Concord, MA 01742-2751

Report : 452179-98(97)

Priority: Standard Written

Status: Final

Sampling Point: TR-3 - Turner Reservoir

Samples Submitted: One drinking water sample

Copies to: None

----------Collected----------			----------Received----------	
Date: 11/10/99	Time: 16:25	By: P. Young	Date: 11/11/99	Time: 09:30

REPORT SUMMARY

Manganese was detected in the sample submitted for analysis at a concentration of 1900 ug/L, which is greater than the current SMCL of 50 ug/L. None of the other analytes included in the detailed parameter list were detected in the sample submitted for analysis at concentrations which exceed, or are equivalent to, their current, respective MCLs or SMCLs.

Detailed quantitative results are presented on the following pages.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call us at (219) 233-4777.

Reviewed By: Kelly Yuotte Date: 12/10/99

Finalized By: DKT Date: 12/10/99

Sampling Point: TR-3 - Turner Reservoir

METALS							
PARAMETER	SDWA Method	MRL *	Results	MCL	Units	Analysis Date	Lab Number
Antimony	200.8	0.2	**0.2**	6	ug/L	11/24/99	452197
Arsenic	200.8	0.5	**7.5**	50	ug/L	11/24/99	452197
Barium	200.8	0.2	**26**	2000	ug/L	11/29/99	452197
Beryllium	200.8	0.2	< 0.2	4	ug/L	11/19/99	452197
Cadmium	200.8	0.2	< 0.2	5	ug/L	11/24/99	452197
Chromium	200.8	0.2	**20**	100	ug/L	11/24/99	452197
Mercury	200.8	0.1	< 0.1	2	ug/L	11/18/99	452197
Nickel	200.8	0.5	**9.9**	100	ug/L	11/24/99	452197
Selenium	200.8	2.0	< 2.0	50	ug/L	11/24/99	452197
Thallium	200.8	0.2	< 0.2	2	ug/L	11/24/99	452197

PARAMETER	SDWA Method	MRL *	Results	SMCL	Units	Analysis Date	Lab Number
Manganese	200.8	0.2	**1900**	50	ug/L	12/08/99	452197

Comments:

* EHL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

APPENDIX C

CHECKWELL INSTALLATION LOGS

CHECKWELL INSTALLATION LOGS

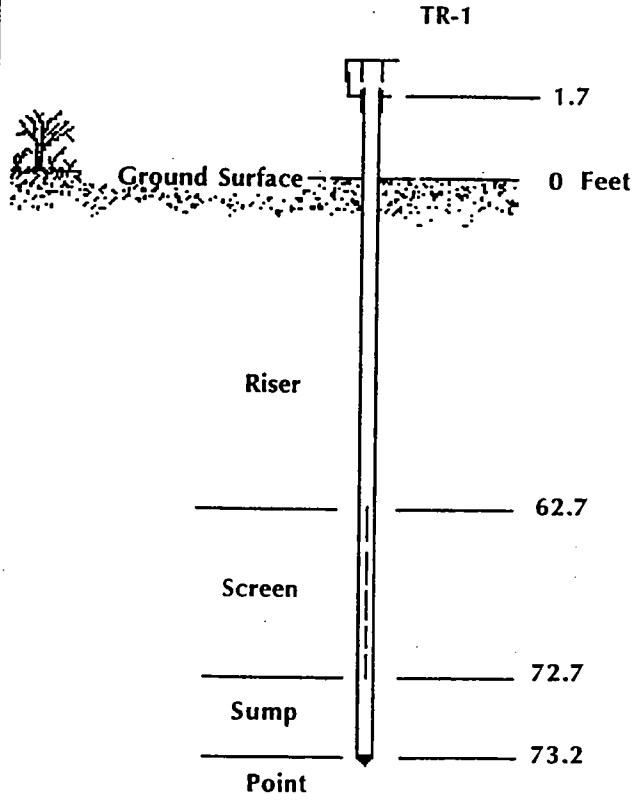
CHECKPOINT Environmental, Inc.
Environmental Science & Engineering

Client: US Army Corps of Engineers
Project: Turner Reservoir, East Providence, RI

Equipment: *Explorer* 6WD Vibratory Drill
Personnel: Richard Cadwgan Paul Young

Pipe ID: 0.62" Screen Slot Width: 0.015"
Soil Samples: No. On-site Analyses: Yes

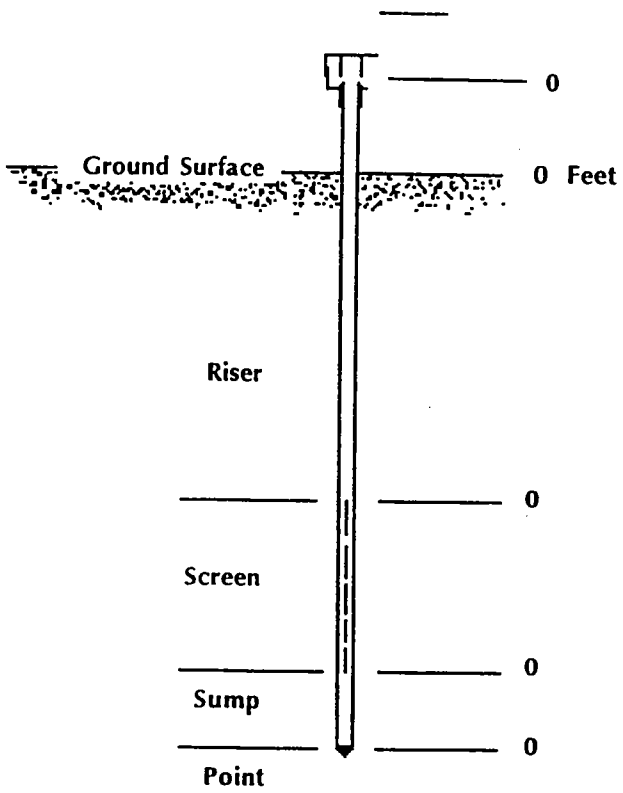
Location: About 90 feet S of former well. See map.
Date: 11-~~1~~99



Refusal: No but dense below 58'
Ground water 5.1 feet below ground*

Total Feet of Pipe •	74.9
Screen Length •	10
Locking Top •	1
Tubing •	101
Points •	1
Collars •	3
GW Samples •	4

Location: ----
Date: 11-xx-99



Refusal: --.
Ground water --- feet below ground*

Total Feet of Pipe •	-
Screen Length •	0
Locking Top •	0
Tubing •	-
Points •	0
Collars •	0
Vials •	0

* Level may not have stabilized

CHECKWELL INSTALLATION LOGS

CHECKPOINT Environmental, Inc.
Environmental Science & Engineering

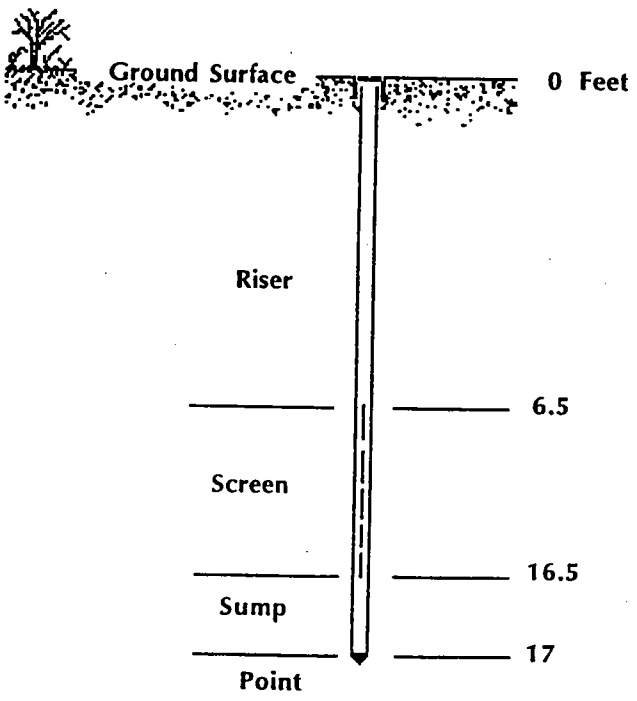
Client: US Army Corps of Engineers
Project: Turner Reservoir, East Providence, RI

Equipment: *Explorer* 6WD Vibratory Drill
Personnel: Richard Cadwgan, Paul Young

Pipe ID: 0.62" Screen Slot Width: 0.015"
Soil Samples: No. On-site Analyses: Yes

TR-2

Location: W side of dam at gate to Bridgham Fm. cons area
Date: 11 -10 -99

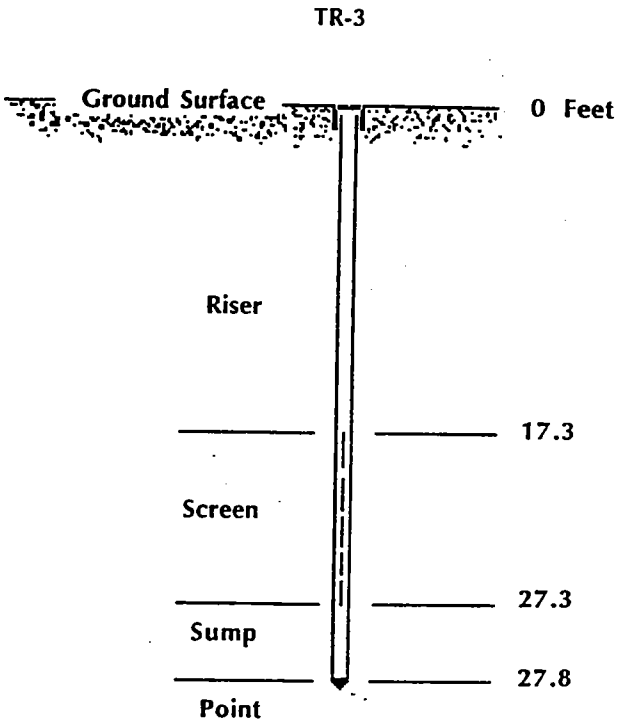


Refusal: Yes possibly in till. Bedrock otcp 500' N.
Ground water --- feet below ground*

Total Feet of Pipe •	17
Screen Length •	10
Flush Mounted Top •	1
Tubing •	19
Points •	1
Collars •	0
Check Valves •	0
GW Samples •	4

TR-3

Location: Seekonk end of dam 8' from red oak.
Date: 11-10 -99



Refusal: Yes and abrupt.
Ground water 8.6 feet below ground*

Total Feet of Pipe •	27.8
Screen Length •	10
Flush Mounted Top •	1
Tubing •	32
Points •	1
Collars •	1
Check Valves •	0
GW Samples •	4

* Level may not have stabilized

APPENDIX D

GROUNDWATER FIELD INVESTIGATION

FIELD INVESTIGATION.

On November 10, 1999, three one-inch diameter groundwater monitoring points were installed by Checkpoint Environmental of Hudson, Massachusetts at three locations bordering Turner Reservoir and Central Pond (Figure 1). A vibratory drill was used to advance the 0.62 inch I.D. steel pipe. The well screen used was 10 feet in length and the well screen slots were 0.015 inches I.D.

Three ground water samples and one duplicate sample were collected to evaluate the subsurface water quality. The ground water samples were not filtered prior to sample collection and no soil samples were collected. A peristaltic pump and polyethylene tubing was used to obtain the ground water samples. The monitoring points were surged with the tubing and the water pumped until clear to the eye to remove as much fine materials as possible prior to collection of the field data and the actual sample.

Five rounds of field data were recorded per each monitoring point location using a YSI Model 600XL probe with the following attached analytical probes: Temperature (° Celsius), pH, Oxidation/Reduction Potential (ORP), and Dissolved Oxygen/Dissolved Oxygen %. Ferrous iron concentrations were determined in the field using a HACH portable field test kit. This field data is presented below. Collected samples were kept on ice prior to overnight shipment by Federal Express to the analytical laboratory (Environmental Health Laboratories, South Bend, Indiana).

Monitoring Point TR-1 Monitoring Point TR-1 was installed approximately 90 feet south of former well #76 in the abandoned wellfield (Figure 1). Depth to water at TR-1 was measured at 5.1 feet below ground surface (bgs). A duplicate sample (TR-1D) was also collected from this location. The monitoring point is still in place and is outfitted with a locking collar and padlock.

Monitoring Point TR-2. Monitoring point TR-2 was installed on the west side of the dam which is located at the southern end of Turner Reservoir between the shoreline rip-rap and entrance gate to the Bridgham Farm Conservation Area (Figure 1). This monitoring point is flush mounted with the ground surface and is secured with a cap but no lock. The driller had to relocate the boring three times due to refusal (glacial till?) at depths of 9 feet to 15 feet bgs. Monitoring point TR-2 was advanced to a final depth of 17 feet bgs at the fourth location. Sample TR-2 was collected from the well screen interval of 6.5 feet to 16.5 feet bgs. Depth to water was not measured as the water level meter had malfunctioned.

Monitoring Point TR-3. Monitoring Point TR-3 was installed on the east side of the dam located at the southern end of Turner Reservoir (Figure 1). This monitoring point is flush mounted with the ground surface and is secured with a cap but no lock. The driller encountered refusal at 27.8 feet bgs and the monitoring point was subsequently installed at this depth. Sample TR-3 was collected from the well screen interval of 17.3 feet to 27.3 feet bgs. Depth to water was measured as 8.58 feet bgs.

The field data presented below represents real-time ground water conditions that were present during the site investigation of November 10, 1999.

Monitoring Point TR-1
Depth of Screened Interval: 62.7 feet - 72.7 feet

Time (hours)	Temp (°C)	PH	ORP	DO(mg/L) /DO%	Ferrous Iron (mg/L)
1040	12.51	6.36	-504.5	0.24/2.2	----
1055	13.21	6.30	-491.6	0.26/2.4	25.8
1105	12.76	6.28	-481.6	0.17/1.6	17.3
1115	12.81	6.28	-476.4	0.17/1.6	17.7
1120	12.81	6.28	-471.3	0.17/1.6	13.6

---- = not measured

Monitoring Point TR-2
Depth of Screened Interval: 6.5 feet - 16.5 feet

Time (hours)	Temp (°C)	pH	ORP	DO(mg/L) /DO%	Ferrous Iron (mg/L)
1355	15.92	6.68	-415.1	0.49/4.9	5.10
1400	15.81	6.79	-407.5	0.12/1.2	3.4
1405	15.78	6.80	-391.5	0.09/1.0	2.91
1410	15.77	6.81	-380.3	0.08/0.9	3.0
1420	15.73	6.81	-371.4	0.08/0.8	3.3

Monitoring Point TR-3
Depth of Screened Interval: 17.3 feet - 27.3 feet

Time (hours)	Temp (°C)	pH	ORP	DO(mg/L) /DO%	Ferrous Iron (mg/L)
1555	15.85	6.66	-121.2	0.69/6.2	2.95
1605	15.59	6.67	-230.2	0.09/0.9	7.6
1610	15.61	6.67	-253.1	0.08/0.8	3.17
1615	15.54	6.67	-261.9	0.08/0.8	5.6
1620	15.52	6.67	-267.8	0.08/0.8	2.11