2021 Hazardous Waste Scanning Project

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INSTALLATION RESTORATION PROGRAM (IRP)

RI/FS

VOLUME IVC

Appendix F (Cont'd)

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MAY 1991

Remedial Investigation/ Feasibility Study (RI/FS) Report 1987-1990

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UNITED STATES AIR FORCE
HUMAN SYSTEMS DIVISION (AFSC)
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NIAGARA IAP RI/FS ITIR
VOLUME II
GROUNDWATER DATA
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INTRODUCTION

The Informal Technical Information Report (ITIR) for data generated from the sampling and analysis program at Niagara International Airport is organized into three volumes. Volume I contains all information pertaining to soil and well boring samples, including sample data for the drummed cuttings (reported in Appendix IB). Volume II reports all data for the groundwater samples, including the USGS well samples and samples taken from the bulk storage tanks containing development and purge water (reported in Appendix IIA and IIB, respectively). Surface water/sediment data is summarized in Volume III.

Each volume of the ITIR contains tables prepared in "Lotus 1-2-3" worksheet format, and identified alphabetically by type of information, subnumbered by table content, followed by an additional letter for each site. Included in each of the three volumes are tables summarizing the following information:

- Sample and QC cross references; These tables cross-reference field sample numbers, sample description and laboratory ID numbers (Tables B-1x), and quality control (QC) sample type and applicable and associated field samples (Tables B-2x). These tables also provide page references for the various types of analyses. All volatile organic compound analyses are grouped together (for example, for groundwater samples, methods SW5030/8020, SW5030/8021, SW5030/8015 and/or E504.1 are listed under the heading volatile/purgeable organics), as are general chemistry parameters. Only the first page number of multiple page tables is listed.

- Collection, extraction and/or analysis dates for all parameters: These sample tracking and holding time summary tables (C-1x, C-2x, C-3x, etc.) summarize all applicable analysis dates for each sample. In cases where more than one analysis is required for a specific analysis type, the latest analysis date is reported. For example, organic analysis by gas chromatography (GC) methods often require a primary and confirmation analysis-the later of the two analysis dates are reported. Similarly, metals are performed by inductively coupled plasma spectrophotometry (ICP) and graphite furnace atomic absorption (GFAA) methods, sometimes over several days - the latest analysis date is entered into the tables.

- Tabulated analytical results for all parameters for all environmental and field QC samples: These analytical results tables (D-1x, D-2x, D-3x, etc.) summarize all analytical results for all samples from a given site. If a specific site was not analyzed for a particular parameter, it is excluded from the tables (and from the numbering sequence). After the tables for each site, tables for any applicable trip blanks, field blanks and equipment wash blanks are presented. For example, in Volume

II, pesticide results for groundwater samples from sites 3 and 13 and the equipment washes are the only tables presented, and are numbered D-4a through D-4b. Surrogate recoveries are reported for each sample, where applicable, for GC analyses. For additional details on GC analyses, please refer to the QA/QC summary (given on the following pages) for Volume II.

- QC sample analysis summaries - laboratory QC: Analytical results for laboratory precision and accuracy samples, in the form of matrix replicates (MR), matrix spikes (MS), or matrix spike/matrix spike duplicate (MS/MSD) pairs are presented in Tables E-1, E-2, etc. Laboratory method blank data for each relevant analysis type are listed in Tables F-1, F-2, etc.

- Overall precision and accuracy summary: Based on the total number of replicates, spikes or MS/MSD analyses for a particular parameter, the "G" Tables summarize the overall range of relative percent deviation (RPD) or percent recovery achieved by the laboratory. This is compared to the control limits for the QC analysis to determine the number of QC analyses within and outside of the limits.

Each volume is numbered sequentially beginning with the first table in the volume and ending with the last page of the last appendix. Each volume is prefaced by a table of contents, this introduction section and a QA/QC summary specific for the data contained in that volume. Chain-of-custody forms are included in an appendix to each volume. In addition, the Table of Contents for each volume identifies what other information may be contained in an appendix (for example, as mentioned earlier, drummed cutting sample results are presented in Appendix IA.)

QA/QC SUMMARY
VOLUME II

A formal, documented QA review has not yet been completed on the data from Niagara; these results will be summarized in the final report. The following items, however, pertain to the overall project, and in particular the groundwater data, and should be considered when reviewing the data contained in the ITIR. These issues often involve deviations from, or modifications to, the analytical and quality assurance/quality control protocols and procedures outlined in the Niagara IAP RI/FS Quality Assurance Project Plan (QAPP), Statement of Work (SOW) or Work Plan documents. In several cases, these modifications were made after consulting with OEHL project personnel, and the resulting decisions were documented in a letter; these correspondence are included as Appendix IA of Volume I of the ITIR.

Field Activities

Several wells originally expected to be sampled were known to be destroyed prior to the onset of RI/FS field efforts. These include: Site 9, MW 9-1 and MW 9-3 (destroyed by Base groundkeepers); Site 5, MW 5-1 and MW 5-3 (destroyed by construction activities); and Site 1, MW 1-4 (destroyed by construction activities). In addition to the above wells for which it was known in advance that sampling would not be possible, the following unexpected problems interfered with sample collection at several other wells.

At Site 13, two wells were not sampled as anticipated. MW 13-1 recharged at a very slow rate and sampling crews were only able to collect samples for volatile organic analysis (SW5030/8021), non-halogenated volatile organic analysis (SW5030/8015), ethylene dibromide (E504.1) and total petroleum hydrocarbons (E418.1). MW 13-2 was dry, and no sample was collected. A sample could not be collected from MW 7-1 (Site 7), which only had a 4-inch water column. At Site 1, two wells were not able to be sampled. MW 1-6 was dry and no sample could be collected. It was also not possible to sample MW 1-2 which was damaged beyond repair by ice.

At Site 9, MW 9-5 (GW-18) was re-sampled for anions and TDS due to bottles being improperly preserved. The anions bottle was received by the laboratory preserved with nitric acid, and the metals bottle was received at a pH of 7.0. Nitrate and orthophosphate had exceeded the hold time before the analysis could be re-performed on the unpreserved bottle. Therefore, the sample was re-collected and anions were analyzed within the hold time. Metals were performed on the preserved sample bottle.

Sample bottles for anion analysis for Site 7 were inadvertently preserved in the field. The laboratory notified the field crew, and samples for Site 7, MW 7-1 and MW 7-2 (GW-22 and GW-23, respectively) were recollected. However, the field duplicate of MW 7-2 (GW-25) and the equipment wash (GW-26) were not recollected. Results for anions and TDS for these samples are annotated in the D-7x table.

Laboratory Activities

All gas chromatography analysis results are reported in the appropriate "D-Table" with the primary analysis result and confirmation analysis result reported side by side, separated by a slash. For example, a methylene chloride concentration of "5.7/4.3" indicates a primary or quantitation analysis result of 5.7 ug/l and a confirmation analysis result of 4.3 ug/l. Similarly, surrogate compound recovery values, listed at the end of the table, represent the percent recovery in the primary/confirmation analyses. If a compound was detected in one analysis, but not in the other, it was not confirmed and therefore is not reported.

A method modification was implemented for groundwater samples being analyzed, as per the OEHL SOW, for purgeable halocarbons and purgeable aromatics by EPA Method E601 and SW 846 Method SW5030/8020, respectively. The laboratory proposed analyzing these samples by SW5030/8021, a method which uses in series each of the individual detectors specified in the above methods. This was discussed with Major Philip Jung (see Appendix IA, Volume I, letter to Sam Taffinder, dated June 8, 1989) and was considered acceptable. The individual methods (E601 and/or SW5030/8020) were used as necessary for confirmation

analysis, or as an alternate primary method if better quality control criteria were achieved. The results are reported in two tables to maintain consistency with the requested analyses. Tables D-1x lists the purgeable halocarbon compounds, and the Table D-2x lists the purgeable aromatic compounds; both tables combined include the total list of volatile organic compounds analyzed by Method SW5030/8021. The cross-reference tables refer to volatile organic compounds (SW5030/8021) and list page references for both D-1x and D-2x tables. In cases where only purgeable aromatics were requested for analysis at a particular site, this analysis was performed by Methods SW5030/8020.

Ethylene dibromide analysis was requested for samples from several sites. The OEHL SOW cited EPA Method E502.1 as a reference for this analysis. The laboratory proposed the use of Method E504.1, which is an approved method using a microextraction technique, in order to achieve the detection limit of 0.03 ug/l. After establishing and executing the procedures required to perform the method, an MDL of 0.3 ug/l was the best which could be achieved. This was discussed with Captain John Erving (OEHL) and Scott Menrath of the New York Department of Environmental Conservation. As indicated in the letter to Mr. Menrath dated November 30, 1989 (Appendix IA), this was not considered to be a problem.

In the OEHL Statement of Work, orthophosphate was included in the list of common anions to be analyzed by Method A429. After discussing the likelihood of this compound being present in the groundwater, and considering the additional field effort required to obtain samples for this parameter (field filtration), Major Jung determined that analyzing for phosphate by Method A429, without performing the field filtration, would be adequate for the purposes of this field investigation. This is summarized in a letter to Mr. Sam Taffinder, dated August 29, 1989 (see Appendix IA).

The laboratory experienced difficulty in the analysis of one of the purgeable halocarbon compounds: 2-chloroethylvinyl ether. This compound was not detected in most of the standards analyzed with these samples, therefore the

results are reported as "NF" (not found due to an analytical problem) for 2-chloroethylvinyl ether for most samples.

Several samples were re-extracted for semivolatile organic analysis due to low surrogate recoveries. The initial extraction was performed within the holding time of 7 days; however, after analysis indicated that surrogate recoveries were outside of the control limits, the samples were re-extracted and re-analyzed outside of the holding time. The results from the re-extracted analyses (having surrogate recoveries within control limits) are reported in the appropriate D-5x table. However, the original analysis results (GC/MS quantitation tables) are included in Appendix IIC to indicate the results obtained from the initial extraction/analysis performed within holding time but with low surrogate recoveries. The affected samples are: Site 3, MW 3-4 (for which there was a field duplicate) and Site 8, MW 8-4, MW 8-2D, MW 8-2 and the equipment wash blank.

Methylene chloride is reported as a detected, confirmed compound for almost all groundwater samples and field QC samples. However, in all but two of the laboratory method blanks (primary and confirmation), methylene chloride was also detected. Results for both primary and confirmation analysis method blanks are presented in Table F-1 and cross-referenced to the applicable samples in Table B-2e. This is the only analysis for which both primary and confirmation analysis method blank results are reported, since it was necessary to demonstrate the likelihood of laboratory contamination being the source of the compound.

Laboratory QC data was reported by the laboratory with the samples, and was generally identified by analysis date, batch number or sample number. These identifiers were enhanced by a preface indicating the general type of analysis (e.g., VO = volatile organic, SV = semivolatile organic, M = metals), and by a suffix indicating the type of QC sample (e.g., MB = method blank, MR = matrix replicate, MSD = matrix spike duplicate).

Control limits for surrogate recoveries, spike recoveries and replicate (or MS/MSD) RPD values are either laboratory generated, or in accordance with

USEPA Contract Laboratory Program (CLP) method control limits. In all cases, the applicable control limit is reported along with the sample data.

Matrix spike/matrix spike duplicates for semivolatile analysis by SW846 Methods 3510/8270 did not include di-n-butyl phthalate as a spike compound. Although the QAPP includes this compound, it is no longer specified in the SW846 (3rd Edition) manual.

Purgeable aromatic organic compounds are analyzed as part of SW5030/8021 and/or SW5030/8020. Depending upon which method is the "primary" analysis, trichloroethylene may co-elute with benzene and interfere with the quantitation. As with all GC methods, the first concentration value of a confirmed result is the primary or quantitation result. However, for benzene, if the two results are significantly different (greater than 10 times) the smaller of the two concentrations is the more reliable.

Mercury analysis exceeded the 28-day method recommended holding time by one day (analyzed on the 29th day after sample collection) for samples from sites 2 (GW-71, GW-72) and site 4 (all).

SYMBOLS/ABBREVIATIONS

NA	- Not analyzed
N/A	- Not applicable
*	- Compound present below measurable detection limit
E	- Estimated value, compound quantitated outside calibration range but within linear range.
OC	- Value not within control limits
J	- Estimated concentration below the method detection limit
NR	- Not reported
MB	- Method blank
MR	- Matrix replicate
MS	- Matrix spike
MSD	- Matrix spike duplicate
RPD	- Relative percent difference
MDL	- Method detection limit

Other, additional symbols may be used which are defined on the specific table where they occur.

ANALYSIS AND METHOD SUMMARIES

TABLES A-1 THROUGH A-2

Table A-1

Analytical Methods*, Holding Times and Detection Limits
GROUNDWATER SAMPLES

Parameter	Method Number*	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
ORGANICS					
Volatile Organic Compounds	SW5030/8021	ug/L	14 Days**	see Table A-1a	see Table A-1a
Purgeable Aromatic Organics	SW5030/8020	ug/L	14 Days**	see Table A-1b	see Table A-1b
Non-halogenated Volatile Organics	SW5030/8015	ug/L	14 Days**	see Table A-1c	see Table A-1c
Ethylene Dibromide	E504.1	ug/L	28 Days	0.3 ug/L	NR
Organochlorine Pesticides/PCB	E608	ug/L	7 Days for Extraction 40 Days for Analysis	see Table A-1d	see Table A-1d
Semivolatile Organic Compounds	E625	ug/L	7 Days for Extraction/ 40 Days for Analysis	see Table A-1e	see Table A-1e
INORGANICS					
Petroleum Hydrocarbons	E418.1	mg/L	28 Days	1.0 mg/L	0.5 mg/L
Metal Screen(25 metals)	E200.7	mg/L	6 Months	see Table A-1f	see Table A-1f
Mercury	E245.1	mg/L	28 Days	0.0002 mg/L	0.00014 mg/L
Lead	E239.2	mg/L	6 Months	0.005 mg/L	0.0008 mg/L

NR - Not reported

Table A-1(continued)

Analytical Methods*, Holding Times and Detection Limits
GROUNDWATER SAMPLES

Parameter	Method Number	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
INORGANICS					
Arsenic	E206.2	mg/L	6 Months	0.005 mg/L	0.00195 mg/L
Selenium	E270.2	mg/L	6 Months	0.005 mg/L	0.00186mg/L
COMMON ANIONS					
Chloride	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Fluoride	A429	mg/L	28 Days	0.1 mg/L	0.1 mg/L
Sulfate	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Nitrate	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Orthophosphate	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Total dissolved Solids	E160.1	mg/L	7 Days	1 mg/L	N/A
Hardness	E130.1	mg/L	6 Months	1 mg/L	N/A

NOTE *: The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020
(USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136,
Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis
of Water and Wastes, 40 CFR136,Appendix C
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,
SW846, 3rd Edition (USEPA, 1986).

NOTE **: Volatile organic holding time is 14 days for aqueous samples preserved with HCl
to pH<2. If not preserved, holding time is 7 days.

Table A-1a

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds; Purgeable Halocarbon Compounds
-Aqueous-

Compound	MDL (ug/L)	IDL (ug/L)
Carbon Tetrachloride	0.3	0.26
1,2-Dichloroethane	0.4	0.37
1,1,1-Trichloroethane	0.4	0.31
1,1-Dichloroethane	0.5	0.44
1,1,2-Trichloroethane	0.5	0.40
1,1,2,2-Tetrachloroethane	2.5	2.54
Chloroethane	0.8	0.61
2-chloroethylvinyl ether	10	NR
Chloroform	0.4	0.38
1,1-Dichloroethene	0.8	0.65
trans-1,2-Dichloroethene	0.3	0.27
1,2-Dichloropropane	0.4	0.34
trans-1,3-Dichloropropene	0.4	0.36
cis-1,3-Dichloropropene	0.5	0.47
Methylene Chloride	0.8	0.73

Table A-1a (continued)

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds; Purgeable Halocarbon Compounds
-Aqueous-

Compound	MDL (ug/L)	IDL (ug/L)
Chloromethane	0.8	0.63
Bromomethane	0.8	0.61
Bromoform	0.5	0.41
Bromodichloromethane	0.5	0.32
Fluorotrichloromethane	2.0	0.62
Dichlorodifluoromethane	2.0	0.98
Chlorodibromomethane	0.4	0.36
Tetrachloroethene	0.8	0.57
Trichloroethene	1	1.09
Chlorobenzene	0.4	0.31
1,3-Dichlorobenzene	0.3	0.24
1,2-Dichlorobenzene	0.3	0.29
1,4-Dichlorobenzene	0.3	0.26

Table A-1b

Method Detection Limits/Instrument Detection Limits
Purgeable Aromatic Organics - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Chlorobenzene	0.3	0.27
1,2-Dichlorobenzene	1.0	0.92
1,3-Dichlorobenzene	0.7	0.66
1,4-Dichlorobenzene	0.7	0.64
Benzene	0.3	0.24
Total Xylenes	1.0	0.72
Toluene	0.3	0.29
Ethylbenzene	0.3	0.25

Table A-1c

Method Detection Limits/Instrument Detection Limits
Non-Halogenated Volatile Organics (SW5030/8015)
- Aqueous -

Parameter	MDL (ug/L)	IDL (ug/L)
Ethanol	100	107
Diethyl Ether	10	2.4
Methyl Ethyl Ketone	10	21*
Methyl Isobutyl Ketone	10	44*

* 10 ug/L is visually obtainable for MEK and MIBK low level contamination and carryover caused variability in recovery values (thus affecting the statistical IDL).

Table A-1d

Method Detection Limits/Instrument Detection Limits
Pesticides Compounds - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Aldrin	0.025	0.01
a-BHC	0.025	0.01
b-BHC	0.025	0.01
g-BHC	0.025	0.02
d-BHC	0.025	0.02
Chlordane	0.20	0.10
4,4'-DDD	0.05	0.01
4,4'-DDE	0.05	0.02
4,4'-DDT	0.10	0.01
Dieldrin	0.05	0.02
Endosulfan I	0.05	0.01
Endosulfan II	0.05	0.01
Endosulfan sulfate	0.10	0.01
Endrin	0.05	0.01
Endrin aldehyde	0.10	NR
Heptachlor	0.025	0.02
Heptachlor epoxide	0.05	0.02
Toxaphene	1.00	0.75
Methoxychlor	0.50	0.20
PCB-1016	0.50	0.02
PCB-1221	0.50	0.20
PCB-1232	0.50	0.01
PCB-1242	0.50	0.08
PCB-1248	0.50	0.08
PCB-1254	0.50	0.20
PCB-1260	0.50	0.10

NR - Not reported

Table A-1e

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
bis(2-chloroethyl)ether	10	4.8
1,3-Dichlorobenzene	10	4.5
1,4-Dichlorobenzene	10	4.2
1,2-Dichlorobenzene	10	4.4
bis(2-chloroisopropyl)ether	10	6.1
N-Nitroso-di-propylamine	10	5.4
Hexachloroethane	10	2.4
Nitrobenzene	10	2.8
Isophorone	10	2.2
bis(2-chloroethoxy)methane	10	1.5
1,2,4-Trichlorobenzene	10	5.6
Naphthalene	10	2.2
Hexachlorobutadiene	10	9.5
Hexachlorocyclopentadiene	10	2.6
2-Chloronaphthalene	10	1.5
Dimethyl phthalate	10	2.4
Acenaphthylene	10	2.4
Fluorene	10	2.1
Acenaphthene	10	2.2
2,4-Dinitrotoluene	10	1.4
2,6-Dinitrotoluene	10	3.6
Diethylphthalate	10	2.5
4-Chlorophenyl phenyl ether	10	3.9
N-Nitrosodiphenylamine	10	2.7
4-Bromophenyl phenyl ether	10	3.3

Table A-1e (continued)

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Hexachlorobenzene	10	2.4
Phenanthrene	10	2.7
Anthracene	10	2.3
Di-n-Butyl phthalate	10	5.6
Fluoranthene	10	6.0
Benzidine	50	19.5
Pyrene	10	8.8
Butyl benzyl phthalate	10	5.4
3,3'-Dichlorobenzidine	20	8.8
Benzo(a)anthracene	10	1.3
Bis(2-ethylhexyl)phthalate	10	8.0
Chrysene	10	1.7
Di-n-octyl phthalate	10	8.7
Benzo(b)fluoranthene	10	4.2
Benzo(k)fluoranthene	10	6.4
Benzo(a)pyrene	10	2.4
Indeno(1,2,3-cd)pyrene	10	5.1
Dibenzo(a,h)anthracene	10	4.3
Benzo(g,h,i)perylene	10	3.2
Phenol	10	3.7
2-Chlorophenol	10	2.7
2-Nitrophenol	10	3.2
2,4-Dimethyphenol	10	3.2
2,4-Dichlorophenol	10	5.4

Table A-1e (continued)

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
4-Chloro-3-methylphenol	10	2.0
2,4,6-Trichlorophenol	10	4.1
2,4-Dinitrophenol	50	2.3
4-Nitrophenol	50	2.3
4,6-Dinitro-2-methylphenol	50	2.4
Pentachlorophenol	50	19.0
Benzyl alcohol	10	4.9
2-Methylphenol	10	5.2
4-Methylphenol	10	1.8
Benzoic acid	50	23.3
4-Chloroaniline	10	3.3
2-Methylnaphthalene	10	2.0
2,4,5-Trichlorophenol	50	6.5
2-Nitroaniline	50	2.2
3-Nitroaniline	50	7.5
Dibenzofuran	10	2.5
4-Nitroaniline	50	1.1

Table A-1f

Method Detection Limits/Instrument Detection Limits
Metals - Aqueous

Parameter	EPA Method	MDL (mg/L)	IDL (mg/L)
Aluminum	E200.7	0.1	0.043
Antimony	E200.7	0.06	0.033
Arsenic	E200.7	0.05	NR
Arsenic	E206.2	0.005	0.00195
Barium	E200.7	0.01	0.002
Beryllium	E200.7	0.002	0.002
Boron	E200.7	0.01	NR
Cadmium	E200.7	0.005	0.003
Calcium	E200.7	0.20	0.104
Chromium	E200.7	0.010	0.005
Cobalt	E200.7	0.010	0.008
Copper	E200.7	0.010	0.003
Iron	E200.7	0.025	0.009
Lead	E200.7	0.05	0.008
Lead	E239.2	0.005	0.008
Magnesium	E200.7	0.20	0.098
Manganese	E200.7	0.005	0.001
Mercury	E245.1	0.0002	0.00014
Molybdenum	E200.7	0.010	NR
Nickel	E200.7	0.015	0.004
Potassium	E200.7	0.4	0.381
Selenium	E200.7	0.100	NR
Selenium	E270.2	0.005	0.00186
Silicon	E200.7	0.020	NR
Silver	E200.7	0.01	0.004
Sodium	E200.7	0.200	0.094
Thallium	E200.7	0.100	0.0021
Vanadium	E200.7	0.01	0.006
Zinc	E200.7	0.01	0.005

NR - Not reported

Table A-2

Analytical Methods, Quality Control Checks and Total Number of Groundwater Analyses
GROUNDWATER SAMPLES SUMMARY

Parameter	Analytical Method	Reporting Units	Number of Sample Analyses	Trip Blanks	Field Blanks	Equipment Washes	Field Replicates	Subtotal Environmental Samples
ORGANICS								
Volatile Organic Compounds	SW5030/8021	ug/L	35	8	8	8	4	63
Purgeable Aromatic Organics	SW5030/8020	ug/L	57(1)	13(1)	15(1)	14(1)	7(1)	106
Non-halogenated Volatile Organics	SW5030/8015	ug/L	16	4	4	4	2	30
Ethylene Dibromide	E504.1	ug/L	20	5	5	5	2	37
Organochlorine Pesticides/PCBs	E608	ug/L	12	0	0	3	2	17
Semivolatile Organic Compounds	E625	ug/L	23	0	0	5	2	30
INORGANICS								
Petroleum Hydrocarbons	E418.1	mg/L	57	0	0	14	6	77
Metal Screen(25 metals)	E200.7	mg/L	56	0	0	14	6	76
Mercury	E245.1	mg/L	56	0	0	14	6	76
Lead	E239.2	mg/L	51	0	0	14	6	71
Arsenic	E206.2	mg/L	56	0	0	14	6	76
Selenium	E270.2	mg/L	56	0	0	14	6	76

(1) *This number includes samples analyzed for purgeable aromatics only (by SW5030/8020) as well as those samples analyzed for purgeable aromatics as part of method SW 5030/8021.

Table A-2(continued)

Analytical Methods, Quality Control Checks and Total Number of Groundwater Analyses
GROUNDWATER SAMPLES SUMMARY

Parameter	Analytical Method	Reporting Units	Number of Sample Analyses	Trip Blanks	Field Blanks	Equipment Washes	Field Replicates	Subtotal Environmental Samples
Common Anions	A429	mg/L	56	0	0	13	5	74
Hardness	E130.1	mg/L	56	0	0	14	6	76
Total Dissolved Solids	E160.1	mg/L	56	0	0	13(2)	5(2)	74

(2) An additional equipment wash and field replicate were analyzed, but not reported, due to analysis being performed on an improperly preserved sample.

Table A-2(continued)

Analytical Methods, Quality Control Checks and Total Number of Groundwater Analyses
GROUNDWATER SAMPLES SUMMARY

Parameter	Analytical Method	Reporting Units	Method Blanks	Matrix Replicates	Matrix/Method Spikes	MS/MSD Analysis	Total Analyses(3)
ORGANICS							
Volatile Organic Compounds	SW5030/8021	ug/L	23	0	0	16	102
Purgeable Aromatic Organics	SW5030/8020	ug/L	19	0	0	32	157
Non-halogenated Volatile Organics	SW5030/8015	ug/L	5	0	0	10	45
Ethylene Dibromide	E502.1	ug/L	5	0	5	0	47
Organochlorine Pesticides/PCBs	E608	ug/L	3	0	0	6	26
Semivolatile Organic Compounds	E625	ug/L	5	0	0	7	42
INORGANICS							
Petroleum Hydrocarbons	E418.1	mg/L	0	0	10	0	87
Metal Screen(25 metals)	E200.7	mg/L	9	10	10	0	105
Mercury	E245.1	mg/L	8	5	5	0	94
Lead	E239.2	mg/L	9	7	7	0	94
Arsenic	E206.2	mg/L	9	8	8	0	101
Selenium	E270.2	mg/L	9	8	8	0	101

(3) Including subtotal from previous page.

Table A-2(continued)

Analytical Methods, Quality Control Checks and Total Number of Groundwater Analyses
GROUNDWATER SAMPLES SUMMARY

Parameter	Analytical Method	Reporting Units	Method Blanks	Matrix Replicates	Matrix/Method Spikes	MS/MSD Analysis	Total Analyses(3)
Common Anions	A429	mg/L	8	10	7	0	99
Hardness	E130.1	mg/L	0	12	0	0	87
Total Dissolved Solids	E160.1	mg/L	0	12	0	0	87

*The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020
(USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136,
Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis
of Water and Wastes, 40 CFR136,Appendix C
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,
SW846, 3rd Edition (USEPA, 1986).

(3) Including subtotal from previous page.

CROSS REFERENCES

TABLES B-1a THROUGH B-2g

Table B-1a
Site Specific Cross Reference
SITE 1

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPHC	General Chemistry
GW-85	Field Blank	51568	107, 182	NA	NA	122	133
GW-86	MW-1-2	51569	107, 166	NA	NA	122, 218	133, 234
GW-87	MW-1-5	51570	107, 166	NA	NA	122, 218	133, 234
GW-88	MW-1D-2 (dupl.)	51571	107, 166	NA	NA	122, 218	133, 234
GW-89	MW-1-1	51572	107, 166	NA	NA	122, 218	133, 234
GW-90	MW-1-7	51573	107, 166	NA	NA	122, 218	133, 234
GW-91	MW-1-D1	51574	107, 166	NA	NA	122, 218	133, 234
GW-92	MW-1D-2	51575	107, 166	NA	NA	122, 218	133, 234
GW-93	Equip. Wash	51576	107, 184	NA	NA	122, 233	133, 248
TB-25	Trip Blank	51577	107, 180	NA	NA	NA	NA
GW-94	Field Blank	51614	107, 182	NA	NA	122	133
GW-95	MW-1-3D	51615	107, 166	NA	NA	122, 219	133, 234
GW-96	MW-1-4D	51616	107, 166	NA	NA	122, 219	133, 234
GW-97	Equip. Wash	51617	107, 184	NA	NA	122, 233	133, 248
TB-27	Trip Blank	51618	107, 180	NA	NA	NA	NA

Table B-1b
Site Specific Cross Reference
SITE 2

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-71	MW-2D-1 (dupl.)	50812	108,167	NA	NA	123,220	134,235
GW-72	MW-2D-1	50813	108,167	NA	NA	123,220	134,235
GW-73	Field Blank	50814	108,182	NA	NA	123	134
TB-23	Trip Blank	50815	108,180,193	NA	NA	NA	NA
GW-74	Field Blank	51024	108,182	NA	NA	123	134
GW-75	MW-2-1	51026	108,167	NA	NA	123,220	134,235
GW-76	MW-2-3	51027	108,167	NA	NA	123,220	134,235
GW-77	MW-2-2	51028	108,167	NA	NA	123,220	134,235
GW-78	MW-2-4	51029	108,167	NA	NA	123,220	134,235
GW-79	Equip. Wash	51030	108,184	NA	NA	123,233	134,248
TB-24	Trip Blank	51035	108,179,193	NA	NA	NA	NA

Table B-1c
Site Specific Cross Reference
SITE 3

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPHC	General Chemistry
GW-49	Field Blank	50325	109,162,182,194	118	118	124	135
GW-50	MW-3-1	50327	109,144,168,185	118	118,196	124,221	135,236
GW-51	MW-3-2	50328	109,144,168,185	118,200	118,196	124,221	135,236
GW-52	MW-3-2D (dupl.)		109,185	118	118,196	124	135
GW-53	MW-3-2D	50329	109,144,168,185	118,200	118,196	124,221	135,236
GW-54	MW-3-6	50330	109,144,168,185	118,200	118,196	124,221	135,236
GW-55	MW-3-3	50331	109,144,168,185	118,200	118,196	124,221	135,236
GW-56	Equip. Wash	50332	109,164,184,195	118,215	118,199	124,233	135,248
GW-57	MW-3-1D	50333	109,144,168,185	108,200	118,196	124,221	135,236
TB-21	Trip Blank	50334	109,160,180,193	NA	NA	NA	NA
GW-58	Field Blank	50515	109,162,182,194	118	118	124	135
GW-59	MW-3-4	50516	109,146,169,186	118,203	118,197	124,222	135,237
GW-60	MW-3-4D	50517	109,146,169,186	118,203	118,197	124,222	135,237
GW-61	MW-3-3D (dupl.)	50518	109,146,169,186	118,203	118,197	124,222	135,237
GW-62	MW-3-7	50519	109,146,169,186	118	118,197	124,222	135,237
GW-62	MW-3-7, Respl.		109	118,203	118	124	135
GW-63	MW-3-3D	50520	109,146,169,186	118,203	118,197	124,222	135,237
GW-64	Equip. Wash	50521	109,164,184,195	118,215	199	124,233	135,248
TB-22	Trip Blank	50522	109,160,180,193	NA	NA	NA	NA

Table B-1d
Site Specific Cross Reference
SITE 4

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-65	Field Blank	50806	110,182,194	NA	NA	125	136
GW-66	MW-4-1	50807	110,170,187	NA	NA	125,223	136,238
GW-67	MW-4-2	50808	110,170,187	NA	NA	125,223	136,238
GW-68	MW-4-3	50809	110,170,187	NA	NA	125,223	136,238
GW-69	MW-4-4	50810	110,170,187	NA	NA	125,223	136,238
GW-70	Equip. Wash	50811	110,184,195	NA	NA	125,233	136,248
TB-23	Trip Blank	50815	110,180,193	NA	NA	NA	NA

Table B-1e
Site Specific Cross Reference
SITE 5

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-42	Field Blank	50313	111,162,181,194	119	119	126	137
GW-43	MW-5-2	50314	111,148,171,188	119,206	119	126,224	137,239
GW-44	MW-5-4	50315	111,148,171,188	119,206	119	126,224	137,239
GW-45	MW-5-1D (dupl.)	50316	111,148,171,188	119,206	119	126,224	137,239
GW-46	MW-5-5	50317	111,148,171,188	119,206	119	126,224	137,239
GW-47	MW-5-1D	50318	111,148,171,188	119,206	119	126,224	137,239
GW-48	Equip. Wash	50319	111,164,183,195	119,215	119	126,233	137,248
TB-20	Trip Blank	50324	111,160,179,193	119	119	NA	NA

Table B-1f
Site Specific Cross Reference
SITE 6

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-80	Field Blank	51025	112,181,194	NA	NA	127	138
GW-81	MW-6-1	51031	112,172,189	NA	NA	127,225	138,240
GW-82	MW-6-2	51032	112,172,189	NA	NA	127,225	138,240
GW-83	MW-6-3	51033	112,172,189	NA	NA	127,225	138,240
GW-84	Equip. Wash	51034	112,183,195	NA	NA	127,232	138,247
TB-24	Trip Blank	51035	112,179,193	NA	NA	NA	NA

Table B-1g
Site Specific Cross Reference
SITE 7

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-21	Field Blank	49545	113,181	NA	NA	128	139
GW-22	MW-7-1	49546	113,173	NA	NA	128,226	139,241
GW-22	MW-7-1, Respl.		NA	NA	NA	128	139,241
GW-23	MW-7-2	49547	113,173	NA	NA	128,226	139,241
GW-23	MW-7-2, Respl.		NA	NA	NA	128	139,241
GW-25	MW-7-2 (dupl.)	49548	113,173	NA	NA	128,226	139,241
GW-26	Equip. Wash	49549	113,183	NA	NA	128,232	139,247
TB-17	Trip Blank	49550	113,179	NA	NA	NA	NA

Table B-1h
Site Specific Cross Reference
SITE 8

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-27	Field Blank	49686	114,162,181	120	120	129	140
GW-28	MW-8-6	49687	114,150,174,190	120,209	120	129	140
GW-28	MW-8-6, Respl.		NA	120	120	129,227	140,242
GW-29	MW-8-3D	49688	114,150,174,190	120,209	120	129,227	140,242
GW-30	MW-8-3D (dupl.)	49689	114,150,174,190	120	120	129,227	140,242
GW-31	MW-8-5	49690	114,150,174,190	120,209	120	129,227	140,242
GW-32	MW-8-1D	49691	114,150,174,190	120,209	120	129,227	140,247
GW-33	Equip. Wash	49692	114,164,183,195	120,215	120	129,232	140
TB-18	Trip Blank	49693	114,160,193	120	NA	NA	NA
GW-34	Field Blank	50171	114,162,181,194	120	120	129	140
GW-35	MW-8-1	50173	114,152,175,191	120,212	120	129,228	140,243
GW-36	MW-8-3	50174	114,152,175,191	120,212	120	129,228	140,243
GW-37	MW-8-2D (dupl.)	50172	114,152,175,191	120	120	129	140
GW-38	MW-8-4	50175	114,152,175,191	120,212	120	129,228	140,243
GW-39	MW-8-2D	50176	114,152,175,191	120,212	120	129,228	140,243
GW-40	MW-8-2	50177	114,152,175,191	120,212	120	129,228	140,243
GW-41	Equip. Wash	50178	114,164,183,195	120,215	120	129,232	140,247
TB-19	Trip Blank	50179	114,160,179,193	NA	NA	NA	NA

Table B-1i
Site Specific Cross Reference
SITE 9

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-15	MW-9-3	49503	115,154,176	NA	NA	130,229	141,244
GW-16	MW-9-7	49504	115,154,176	NA	NA	130,229	141,244
GW-17	MW-9-6	49505	115,154,176	NA	NA	130,229	141,244
GW-18	MW-9-5	49506	115,154,176	NA	NA	130,229	141,244
GW-18	MW-9-5, Respl.		NA	NA	NA	130	141,244
GW-19	Equip. Wash	49507	115,164,183	NA	NA	130,232	141,247
GW-20	Field Blank	49508	115,162,181	NA	NA	130	141
TB-16	Trip Blank	49509	115,160,179	NA	NA	NA	NA

Table B-1j
Site Specific Cross Reference
SITE 10

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPHC	General Chemistry
GW-8	Field Blank	49142	116,162,181	NA	NA	131	142
GW-9	MW-10-3	49140	116,156,177	NA	NA	131,230	142,245
GW-10	MW-10-2	49138	116,156,177	NA	NA	131,230	142,245
GW-11	MW-10-1	49136	116,156,177	NA	NA	131,230	142,245
GW-12	MW-10-4	49137	116,156,177	NA	NA	131,230	142,245
GW-13	MW-10-1D	49139	116,156,177	NA	NA	131,230	142,245
GW-14	Equip. Wash	49141	116,164,183	NA	NA	131,232	142,247
TB-15	Trip Blank	49144	116,160,179	NA	NA	NA	NA

Table B-1k
Site Specific Cross Reference
SITE 13

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
GW-1	Field Blank	49131	117,162,181,194	121	121	132	143
GW-2	MW-13-1	49135	117,158,178,192	121	121	132,231	143
GW-4	MW-13-3	49132	117,158,178,192	121	121,198	132,231	143,246
GW-5	MW-13-4	49133	117,158,178,192	121	121,198	132,231	143,246
GW-7	Equip. Wash	49134	117,164,183,195	121	121,199	132,232	143,247
TB-14	Trip Blank	49143	117,160,179,193	NA	NA	NA	NA

Table B-2a
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-14	Volatile Organics (SW5030/8021)	160,179	13	GW-1
	Non-halogenated Volatile Organics (SW5030/8015)	193		GW-2
	EDB (E504.1)	193		GW-4
				GW-5
				GW-7
TB-15	Volatile Organics (SW5030/8021)	160,179	10	GW-8
				GW-9
				GW-10
				GW-11
				GW-12
				GW-13
				GW-14
TB-16	Volatile Organics (SW5030/8021)	160,179	9	GW-15
				GW-16
				GW-17
				GW-18
				GW-19
				GW-20

Table B-2a (continued)
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-17	Purgeable Aromatic Organics (SW5030/8020)	179	7	GW-21
				GW-22
				GW-23
				GW-25
				GW-26
TB-18	Volatile Organics (SW5030/8021)	160,179	8	GW-27
	Non-halogenated Volatile Organics (SW5030/8015)	193		GW-28
				GW-29
				GW-30
				GW-31
				GW-32
				GW-33
TB-19	Volatile Organics (SW5030/8021)	160,179	8	GW-34
	Non-halogenated Volatile Organics (SW5030/8015)	193		GW-35
				GW-36
				GW-37
				GW-38
				GW-39
				GW-40
				GW-41

Table B-2a (continued)
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-20	Volatile Organics (SW5030/8021)	160,179	5	GW-42
	Non-halogenated Volatile Organics (SW5030/8015)	193		GW-43
				GW-44
				GW-45
				GW-46
				GW-47
				GW-48
TB-21	Volatile Organics (SW5030/8021)	160,180	3	GW-49
	EDB (E504.1)	193		GW-50
				GW-51
				GW-52
				GW-53
				GW-54
				GW-55
				GW-56
				GW-57

Table B-2a (continued)
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-22	Volatile Organics (SW5030/8021)	160,180	3	GW-58
	EDB (E504.1)	193		GW-59
				GW-60
				GW-61
				GW-62
				GW-63
				GW-64
TB-23	Purgeable Aromatic Organics (SW5030/8020)	180	4	GW-65
				GW-66
				GW-67
				GW-68
				GW-69
				GW-70
			2	GW-71
				GW-72
				GW-73

Table B-2a (continued)
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-23 (cont.)	EDB (E504.1)	193	4	GW-65
				GW-66
				GW-67
				GW-68
				GW-69
				GW-70
TB-24	Purgeable Aromatic Organics (SW5030/8020)	179	2	GW-74
				GW-75
				GW-76
				GW-77
				GW-78
				GW-79
			6	GW-80
				GW-81
				GW-82
				GW-83
				GW-84

Table B-2a (continued)
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-24 (cont.)	EDB (E504.1)	193	6	GW-80
				GW-81
				GW-82
				GW-83
				GW-84
TB-25	Purgeable Aromatic Organics (SW5030/8020)	180	1	GW-85
				GW-86
				GW-87
				GW-88
				GW-89
				GW-90
				GW-91
				GW-92
				GW-93
TB-27	Purgeable Aromatic Organics (SW5030/8020)	180	1	GW-94
				GW-95
				GW-96
				GW-97

Table B-2b
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-1	Non-halogenated Volatile Organics (SW5030/8015)	194	13	GW-2
	EDB (E504.1)	194		GW-4
	Volatile Organics (SW5030/8021)	162,181		GW-5
				GW-7
				TB-14
GW-8	Volatile Organics (SW5030/8021)	162,181	10	GW-9
				GW-10
				GW-11
				GW-12
				GW-13
				GW-14
				TB-15
GW-20	Volatile Organics (SW5030/8021)	162,181	9	GW-15
				GW-16
				GW-17
				GW-18
				GW-19
				TB-16

Table B-2b (continued)
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-27	Volatile Organics (SW5030/8021)	162,181	8	GW-28
	Non-halogenated Volatile Organics (SW5030/8015)	194		GW-29
				GW-30
				GW-31
				GW-32
				GW-33
				TB-18
GW-34	Volatile Organics (SW5030/8021)	162,181	8	GW-35
	Non-halogenated Volatile Organics (SW5030/8015)	194		GW-36
				GW-37
				GW-38
				GW-39
				GW-40
				GW-41
				TB-19
GW-21	Purgeable Aromatic Organics (SW5030/8020)	181	7	GW-22
				GW-23
				GW-25
				GW-26
				TB-17

Table B-2b (continued)
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-49	Volatile Organics (SW5030/8021)	194	3	GW-50
	EDB (E504.1)	162,182		GW-51
				GW-52
				GW-53
				GW-54
				GW-55
				GW-56
				GW-57
				TB-21
GW-58	Volatile Organics (SW5030/8021)	194	3	GW-59
	EDB (E504.1)	162,182		GW-60
				GW-61
				GW-62
				GW-63
				GW-64
				TB-22

Table B-2b (continued)
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-80	Purgeable Aromatic Organics (SW5030/8020)	181	6	GW-81
	EDB (E504.1)	194		GW-82
				GW-83
				GW-84
				TB-24
GW-42	Non-halogenated Volatile Organics (SW5030/8015)	194	5	GW-43
	Volatile Organics (SW5030/8021)	162,182		GW-44
				GW-45
				GW-46
				GW-47
				GW-48
				TB-20
GW-65	Purgeable Aromatic Organics (SW5030/8020)	182	4	GW-66
	EDB (E504.1)	194		GW-67
				GW-68
				GW-69
				GW-70
				TB-23

Table B-2b (continued)
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-73	Purgeable Aromatic Organics (SW5030/8020)	182	2	GW-71
				GW-72
				TB-23
GW-74	Purgeable Aromatic Organics (SW5030/8020)	182	2	GW-75
				GW-76
				GW-77
				GW-78
				GW-79
				TB-24
GW-85	Purgeable Aromatic Organics (SW5030/8020)	182	1	GW-86
				GW-87
				GW-89
				GW-90
				GW-91
				GW-92
				GW-93
				TB-25
GW-94	Purgeable Aromatic Organics (SW5030/8020)	182	1	GW-95
				GW-96
				GW-97
				TB-27

Table B-2c
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-7	Non-halogenated Volatile Organics (SW5030/8015)	195	13	GW-1(volatiles only)
	EDB (E504.1)	195		GW-2
	Volatile Organics (SW5030/8021)	164,183		GW-4
	Total Petroleum Hydrocarbons	232		GW-5
	Pesticides/PCB	199		
	Metals, As, Pb, Hg, Se	232		
	Common Anions	247		
	Total Dissolved Solids	247		
	Hardness	247		
GW-14	Volatile Organics (SW5030/8021)	164,183	10	GW-8(volatiles only)
	Total Petroleum Hydrocarobons	232		GW-9
	Metals, As, Pb, Hg, Se	232		GW-10
	Common Anions	247		GW-11
	Total Dissolved Solids	247		GW-12
	Hardness	247		GW-13
GW-19	Volatile Organics (SW5030/8021)	164,183	9	GW-15
	Total Petroleum Hydrocarobons	232		GW-16
	Metals, As, Pb, Hg, Se	232		GW-17
	Common Anions	247		GW-18(excluding anions)
	Total Dissolved Solids	247		GW-20(volatiles only)
	Hardness	247		

Table B-2c (continued)
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-33	Volatile Organics (SW5030/8021)	164,183	8	GW-27(volatiles only)
	Non-halogenated Volatile Organics (SW5030/8015)	195		GW-28(volatiles,TPHC,semivolatiles only)
	Total Petroleum Hydrocarbons	232		GW-29
	Semi-volatile Organics	215		GW-30
	Metals, As, Pb, Hg, Se	232		GW-31
	Common Anions	247		GW-32
	Total Dissolved Solids	247		
	Hardness	247		
GW-41	Volatile Organics (SW5030/8021)	164,183	8	GW-34(volatiles only)
	Non-halogenated Volatile Organics (SW5030/8015)	195		GW-35
	Total Petroleum Hydrocarbons	232		GW-36
	Semi-volatile Organics	215		GW-37
	Metals, As, Pb, Hg, Se	232		GW-38
	Common Anions	247		GW-39
	Total Dissolved Solids	247		GW-40
	Hardness	247		GW-28(metals, general chemistry only)

Table B-2c (continued)
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-26	Purgeable Aromatic Organics (SW5030/8020)	183	7	GW-21(volatiles only)
	Total Petroleum Hydrocarbons	232		GW-22(excluding anions)
	Metals, As, Pb, Hg, Se	232		GW-23(excluding anions)
	Common Anions	247		GW-25
	Total Dissolved Solids	247		
	Hardness	247		
GW-84	Purgeable Aromatic Organics (SW5030/8020)	183	6	GW-80(volatiles only)
	EDB (E504.1)	195		GW-81
	Total Petroleum Hydrocarbons	232		GW-82
	Metals, As, Pb, Hg, Se	232		GW-83
	Common Anions	247		
	Total Dissolved Solids	247		
	Hardness	247		
GW-48	Non-halogenated Volatile Organics (SW5030/8015)	195	5	GW-42(volatiles only)
	Volatile Organics (SW5030/8021)	164,183		GW-43
	Total Petroleum Hydrocarbons	233		GW-44
	Semi-volatile Organics	215		GW-45
	Metals, As, Pb, Hg, Se	233		GW-46
	Total Dissolved Solids	248		GW-47
	Hardness	248		

Table B-2c (continued)
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-48	Common Anions	248	7	GW-22(anions only)
				GW-23(anions only)
			9	GW-18(anions only)
GW-70	Purgeable Aromatic Organics (SW5030/8020)	184	4	GW-65(volatiles only)
	EDB (E504.1)	195		GW-66
	Total Petroleum Hydrocarbons	233		GW-67
	Metals, As, Pb, Hg, Se	233		GW-68
	Common Anions	248		GW-69
	Total Dissolved Solids	248		
	Hardness	248	2	GW-71(excluding EDB)
				GW-72(excluding EDB)
				GW-73(volatiles only,excluding EDB)

Table B-2c (continued)
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-56	EDB (E504.1)	195	3	GW-49(volatiles only)
	Volatile Organics (SW5030/8021)	164,184		GW-50
	Total Petroleum Hydrocarbons	233		GW-51
	Pesticides/PCB	199		GW-52
	Semi-volatile Organics	215		GW-53
	Metals, As, Pb, Hg, Se	233		GW-54
	Common Anions	248		GW-55
	Total Dissolved Solids	248		GW-57
	Hardness	248		
GW-64	EDB (E504.1)	195	3	GW-58(volatiles only)
	Volatile Organics (SW5030/8021)	164,184		GW-59
	Total Petroleum Hydrocarbons	233		GW-60
	Pesticides/PCB	199		GW-61
	Semi-volatile Organics	215		GW-62(excluding semivolatiles)
	Metals, As, Pb, Hg, Se	233		GW-63
	Common Anions	248		
	Total Dissolved Solids	248		
	Hardness	248		

Table B-2c (continued)
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-79	Purgeable Aromatic Organics (SW5030/8020)	184	2	GW-74(volatiles only)
	Total Petroleum Hydrocarbons	233		GW-75
	Metals, As, Pb, Hg, Se	233		GW-76
	Common Anions	248		GW-77
	Total Dissolved Solids	248		GW-78
	Hardness	248		
GW-93	Purgeable Aromatic Organics (SW5030/8020)	184	1	GW-85(volatiles only)
	Total Petroleum Hydrocarbons	233		GW-86
	Metals, As, Pb, Hg, Se	233		GW-87
	Common Anions	248		GW-89
	Total Dissolved Solids	248		GW-90
	Hardness	248		GW-91
				GW-92
GW-97	Purgeable Aromatic Organics (SW5030/8020)	184	1	GW-94(volatiles only)
	Total Petroleum Hydrocarbons	233		GW-95
	Metals, As, Pb, Hg, Se	233		GW-96
	Common Anions	248		
	Total Dissolved Solids	248		
	Hardness	248		

Table B-2d
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-25	Purgeable Aromatic Organics (SW5030/8020)	173	7	GW-21 (volatiles only)
				GW-22
				GW-23
				GW-26
GW-25	Total Petroleum Hydrocarbons	226	13	GW-2
	Metals, As, Pb, Hg, Se	226		GW-4
	Hardness	241		GW-5
				GW-7
			10	GW-9
				GW-10
				GW-11
				GW-12
				GW-14
			9	GW-15
				GW-16
				GW-17
				GW-18
				GW-19
			7	GW-22
				GW-23
				GW-26

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-30	Non-halogenated Volatile Organics (SW5030/8015)	190	13	GW-1 (8015 only)
	Total Petroleum Hydrocarbons	227		GW-2 (8015 only)
	Metals, As, Pb, Hg, Se	227		GW-4 (8015 only)
	Common Anions	242		GW-5 (8015 only)
	Total Dissolved Solids	242		GW-7 (8015 only)
	Hardness	242		
			8	GW-27 (8015 only)
				GW-28
				GW-29
				GW-31
				GW-32
				GW-33
				GW-34 (8015, volatiles only)
				GW-35
				GW-36
				GW-38
				GW-39
				GW-40
				GW-41 (8015 only)

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
		150,174		
GW-30	Volatile Organics (SW5030/8021)		8	GW-27
				GW-28
				GW-29
				GW-31
				GW-32
				GW-33
GW-37	Volatile Organics (SW5030/8021)	152,175	8	GW-34
				GW-35
				GW-36
				GW-38
				GW-39
				GW-40
				GW-41

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-45	Non-halogenated Volatile Organics (SW5030/8015)	188	8	GW-28 (semi-volatiles only)
	Volatile Organics (SW5030/8021)	148,171		GW-29 (semi-volatiles only)
	Total Petroleum Hydrocarbons	224		GW-31 (semi-volatiles only)
	Semivolatile Organics	206		GW-32 (semi-volatiles only)
	Metals, As, Pb, Hg, Se	224		GW-33 (semi-volatiles only)
	Common Anions	239		GW-35 (semi-volatiles only)
	Total Dissolved Solids	239		GW-36 (semi-volatiles only)
	Hardness	239		GW-38 (semi-volatiles only)
				GW-39 (semi-volatiles only)
				GW-40 (semi-volatiles only)
				GW-41 (semi-volatiles only)
			5	GW-42 (volatiles only)
				GW-43
				GW-44
				GW-46
				GW-47
				GW-48
GW-52	EDB (E504.1)	185	13	GW-1 (EDB only)
	Pesticides/PCB	196		GW-4
				GW-5
				GW-7

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-52 (cont.)	EDB (E504.1)	185	3	GW-49 (EDB only)
	Pesticides/PCB	196		GW-50
				GW-51
				GW-53
				GW-54
				GW-55
				GW-56
				GW-57
GW-61	EDB (E504.1)	186	3	GW-58
				GW-59
				GW-60
				GW-62
				GW-63
				GW-64
			4	GW-65
				GW-66
				GW-67
				GW-68
				GW-69
				GW-70

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-61 (cont.)	EDB (E504.1)	186	6	GW-80
				GW-81
				GW-82
				GW-83
				GW-84
GW-61	Pesticides/PCB	197	3	GW-59
				GW-60
				GW-62
				GW-63
				GW-64
GW-61	Volatile Organics (SW5030/8021)	146,169	3	GW-49 (volatiles only)
	Total Petroleum Hydrocarbons	222		GW-50
	Semivolatile Organics	203		GW-51
	Metals, As, Pb, Hg, Se	222		GW-53
	Common Anions	237		GW-54
	Total Dissolved Solids	237		GW-55
	Hardness	237		GW-56
				GW-57
				GW-58 (volatiles only)
				GW-59
				GW-60

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-61 (cont.)	Volatile Organics (SW5030/8021)	146,169	3	GW-62
	Total Petroleum Hydrocarbons	222		GW-63
	Semivolatile Organics	203		GW-64
	Metals, As, Pb, Hg, Se	222		
	Common Anions	237		
	Total Dissolved Solids	237		
	Hardness	237		
GW-71	Purgeable Aromatic Organics (SW5030/8020)	167	4	GW-65 (volatiles only)
	Total Petroleum Hydrocarbons	220		GW-66
	Metals, As, Pb, Hg, Se	220		GW-67
	Common Anions	235		GW-68
	Total Dissolved Solids	235		GW-69
	Hardness	235		GW-70
				GW-72
				GW-73 (volatiles only)
			2	GW-74 (volatiles only)
				GW-75
				GW-76
				GW-77
				GW-78
				GW-79

Table B-2d (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-71 (cont.)	Purgeable Aromatic Organics (SW5030/8020)	167	6	GW-80 (volatiles only)
	Total Petroleum Hydrocarbons	220		GW-81
	Metals, As, Pb, Hg, Se	220		GW-82
	Common Anions	235		GW-83
	Total Dissolved Solids	235		GW-84
	Hardness	235		
GW-88	Purgeable Aromatic Organics (SW5030/8020)	166		
	Total Petroleum Hydrocarbons	218	1	GW-85 (volatiles only)
	Metals, As, Pb, Hg, Se	218		GW-86
	Common Anions	234		GW-87
	Total Dissolved Solids	234		GW-89
	Hardness	234		GW-90
				GW-91
				GW-92
				GW-93
				GW-94 (volatiles only)
				GW-95
				GW-96
				GW-97

Table B-2e
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
10921MB	Common Anions	321	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
M432MB	Se, As, Hg, Pb	318	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
			5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
M431MB	Metals	318	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M431MB (continued)	Metals	318	5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
ED0928MB	Non-halogenated Volatile Organics	312	8	GW34
				GW35
				GW36
				GW39
				GW40
ED0929MB	Non-halogenated Volatile Organics	312	8	GW38
				GW41
				TB19
PO0925MB	Purgeable Aromatic Organics	310	8	GW34
				GW35
				GW36
				GW37
				GW38
				GW39
				GW40
PO0926MB1	Purgeable Aromatic Organics	310	8	GW41
				TB19

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO0926MB1	Volatile organics (primary)	305	8	GW34
				GW35
				GW36
				GW37
				GW38
				GW39
				GW40
				GW41
				TB19
VO1002MB1	Volatile organics (confirmation)	305	8	GW34
				GW35
				GW36
				GW37
				GW38
				GW39
				GW40
				GW41
				TB19
SV0927MB	Semivolatile Organics	315	8	GW35
				GW36
				GW38
				GW39
				GW40
				GW41

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M430MB	Hg, As, Se, Pb	318	8	GW29
				GW30
				GW31
				GW32
				GW33
I0920MB	Common Anions	321	8	GW29
				GW30
				GW31
				GW32
				GW33
M429MB	Metals	318	8	GW29
				GW30
				GW31
				GW32
				GW33
P00922MB1, P00923MB	Purgeable Aromatic Organics	310	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				TB18

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO0925MB1	Volatile organics (primary)	305	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
VO0926MB2	Volatile organics (primary)	303	8	GW33
				TB18
			9	GW20
VO1002MB2	Volatile organics (confirmation)	305	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				TB18
ED0927MB	Non-halogenated Volatile Organics	312	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				TB18

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
SV0926MB	Semivolatile Organics	315	8	GW28
				GW29
				GW31
				GW32
				GW33
I0918MB	Common Anions	321	9	GW15
				GW16
				GW17
				GW19
M415MB	As, Se, Hg, Pb	318	9	GW15
				GW16
				GW17
				GW18
				GW19
			10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
			13	GW 4
				GW 5
				GW 7

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M414MB	Metals	318	9	GW15
				GW16
				GW17
				GW18
				GW19
			10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
			13	GW 4
				GW 5
				GW 7
P00922MB2	Purgeable Aromatic Organics	309	9	GW15
				GW16
				GW17
				GW18
				GW19
				GW20
				TB16

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO0925MB2	Volatile organics (primary)	305	9	GW15
				GW16
				GW17
				GW18
				GW19
				TB16
VO0928MB	Volatile organics (confirmation)	305	9	GW15
				GW16
				GW17
				GW18
				GW19
				GW20
				TB16
M420MB	Metals	318	7	GW22
				GW23
				GW25
				GW26
M421MB	As, Se, Hg, Pb	318	7	GW22
				GW23
				GW25
				GW26
PO0920MB	Purgeable Aromatic Organics	309	7	GW21
				GW22
PO0921MB1	Purgeable Aromatic Organics	309	7	GW23
				GW25
				GW26
				TB17

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I0915MB	Common Anions	321	13	GW 4
				GW 5
				GW 7
			10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
ED0926MB	Non-halogenated Volatile Organics	312	13	GW 1
				GW 2
				GW 4
				GW 5
				GW 7
				TB14
V00920MB	Volatile organics (primary)	303	13	GW 1
				GW 4
				GW 5
V00921MB	Volatile organics (primary)	303	13	GW2
				GW7
			10	GW10
				GW11
				GW13
				GW14

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
V00922MB	Volatile organics (primary)	303	13	TB14
			10	GW 8
				GW 9
				GW12
				TB15
V00927MB	Volatile organics (confirmation)	303	13	GW 1
				GW 2
				GW 4
				GW 5
				GW 7
				TB14
			10	GW 8
				GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
				TB15
P00921MB2	Purgeable Aromatic Organics	309	13	GW 1
P00922MB3	Purgeable Aromatic Organics	309	13	GW 2
				GW 4
				GW 5
				GW 7
				TB14

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
P00922MB3 (continued)	Purgeable Aromatic Organics	309	10	GW 8
				GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
				TB15
PP0920MB	Pesticide/PCB	314	13	GW 4
				GW 5
				GW 7
ED1009MB	Ethylene Dibromide	312	13	GW 1
				GW 2
				GW 4
				GW 5
				GW 7
				TB14
I0922MB	Common Anions	321	9	GW18
			7	GW22
				GW23
			5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
P00926MB2	Purgeable Aromatic Organics	309	5	GW42
				GW43
				GW44
				GW45
				GW46
				GW47
				GW48
				TB20
V00926MB3	Volatile organics (primary)	303	5	GW42
				GW44
				GW45
				GW46
				GW47
V00929MB	Volatile organics (primary)	303	5	GW43
V01002MB	Volatile organics (primary)	303	5	TB20
V01005MB1	Volatile organics (primary)	305	5	GW48
V01003MB	Volatile organics (confirmation)	305	5	GW42
				GW43
				GW44
				GW45
				GW46
				GW47
				GW48
				TB20

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
ED0929MB	Non-halogenated Volatile Organics	312	5	GW42
				GW43
				GW44
				GW45
				GW46
ED1002MB	Non-halogenated Volatile Organics	312	5	GW47
				GW48
SV0928MB	Semivolatile Organics	315	5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
			3	GW62

Table B-2e (continued)
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I0922MB	Common Anions	321	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
M470MB	Se, As, Hg, Pb	320	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
			1	GW95
				GW96
				GW97
M469MB	Metals	319	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
			1	GW95
				GW96
				GW97

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO1003MB	Purgeable Aromatic Organics	309	3	GW51
				GW53
				GW54
				GW55
				GW56
PO1005MB1	Purgeable Aromatic Organics	309	3	GW49
				GW50
				GW57
				TB21
VO1005MB2	Volatile organics (primary)	303	3	GW49
VO1006MB	Volatile organics (primary)	305	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
				TB21
VO1004MB	Volatile organics (confirmation)	307	3	GW49
				GW50
				GW51
				GW53
				GW54
				GW56
				GW57
				TB21

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO1006MB1	Volatile organics (confirmation)	307	3	GW55
ED1010MB	EDB	312	3	GW49
				GW50
				GW51
				GW52
				GW53
				GW54
				GW55
				GW56
				GW57
				TB21
PP0928MB	Pesticide/PCB	314	3	GW50
				GW51
				GW52
				GW53
				GW54
				GW55
				GW56
				GW57
SV0929MB	Semivolatile Organics	315	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
SV0929MB (continued)	Semivolatile Organics	315	3	GW60 GW61 GW63 GW64
I0925MB	Common Anions	321	3	GW59 GW60 GW61 GW62 GW63 GW64
M434MB	As, Se, Hg, Pb	319	3	GW59 GW60 GW61 GW62 GW63 (Hg only GW64 (Hg only
M527MB	As, Se, Pb	319	3	GW63 GW64
M433MB	Metals	319	3	GW59 GW60 GW61 GW62
M526MB	Metals	319	3	GW63 GW64

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO1005MB2	Purgeable Aromatic Organics	310	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22
VO1005MB3	Volatile organics (primary)	307	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22
VO1005MB	Volatile organics (confirmation)	307	3	GW58
VO1006MB2	Volatile organics (confirmation)	307	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
ED1011MB	EDB	312	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22
PP0930MB	Pesticide/PCB	314	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64
SV1018MB	Semivolatile Organics	315	3	GW59
I0928MB	Common Anions	321	6	GW81
				GW82
				GW83
				GW84
			4	GW66
				GW67
				GW68
				GW69
				GW70

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I0928MB (continued)	Common Anions	321	2	GW71
				GW72
				GW75
				GW76
				GW77
				GW78
				GW79
M446MB	As, Se, Hg, Pb	319	6	GW81
				GW82
				GW83
				GW84
			4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
				GW75
				GW76
				GW77
				GW78
				GW79
M445MB	Metals	319	6	GW81
				GW82
				GW83
				GW84

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M445MB (continued)	Metals	319	4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
				GW75
				GW76
				GW77
				GW78
				GW79
ED1012MB	EDB	313	4	GW65
				GW66
				GW67
				GW68
				GW69
				GW70
				TB23
PO1006MB	Purgeable Aromatic Organics	310	4	GW65
				GW66
				GW67
				GW68
				GW69
				GW70

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO1006MB (continued)	Purgeable Aromatic Organics	310	2	GW71
				GW72
				GW73
				TB23
PO1009MB	Purgeable Aromatic Organics	310	6	GW80
				GW81
				GW82
			2	GW74
				GW75
				GW76
				GW77
				GW78
				GW79
PO1010MB1	Purgeable Aromatic Organics	310	6	GW83
				GW84
				TB24
ED1013MB	EDB	313	6	GW80
				GW81
				GW82
				GW83
				GW84
				TB24

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I0929MB	Common Anions	321	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93
				GW95
				GW96
				GW97
M454MB	Metals	320	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93
M455MB	As, Se, Hg, Pb	319	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93

Table B-2e (continued)

QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
P01010MB2	Purgeable Aromatic Organics	311	1	GW85
				GW86
				GW87
				GW88
				GW89
				GW90
				GW91
P01011MB	Purgeable Aromatic Organics	311	1	GW92
				GW93
				TB25
P01012MB	Purgeable Aromatic Organics	311	1	GW94
				GW95
				GW96
				GW97
				TB27

Table B-2f
QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M50373MR/MS	Metals	278	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
			5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
I50316MR	TDS	297	8	GW40
				GW41
			7	GW22
				GW23
			5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I49688MR	TDS	298	8	GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				GW35
				GW36
				GW38
				GW39
I50177MR	Hardness	298	8	GW28
				GW31
				GW32
				GW33
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
I50170MR/MS	Mercury	274	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I50176MR/ I50174MS	Anions	297	8	GW28
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
I49689MR	Hardness	299	13	GW 4
				GW 5
				GW 7
			10	GW 9
				GW10
				GW11
				GW12
				GW13
			9	GW15
				GW16
				GW17
				GW18
				GW19
ED49133MS	EDB	264	13	GW1
				GW2
				GW4
				GW5
				GW7
				TB14

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I49689MR	Hardness	299	8	GW29
				GW30
			7	GW22
				GW23
				GW25
				GW26
I49691MR/MS	Anions	299	8	GW29
				GW30
				GW31
				GW32
		-		GW33
PH1017MS	TPH	279	8	GW28
				GW29
				GW30
				GW31
				GW32
				GW33
M50151MR/MS	Metals, As, Se	278	8	GW29
				GW30
				GW31
				GW32
				GW33

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M48708MR/MS	Mercury	277	8	GW29
				GW30
				GW31
				GW32
				GW33
			7	GW22
				GW23
				GW25
				GW26
PH1011MS	TPH	277	10	GW11
			9	GW15
				GW16
				GW17
PH1012MS	TPH	285	9	GW18
				GW19
			7	GW22
				GW23
				GW25
				GW26
I49506MR/ I49505MS	Anions	300	9	GW15
				GW16
				GW17
				GW19

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I49504MR	TDS	300	9	GW15
				GW16
				GW17
				GW19
M49517MR/MS	Metals, As, Se	279	7	GW22
				GW23
				GW25
				GW26
M49139MR/MS	Metals, As, Se, Hg, Pb	274	13	GW 4
				GW 5
				GW 7
			10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
			9	GW15
				GW16
				GW17
				GW18
				GW19

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples--- Site	Field ID
I49017MR	TDS	301	10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
I49086MR	TDS	301	13	GW 4
				GW 5
				GW 7
I49134MR/MS	Anions	302	13	GW 4
				GW 5
				GW 7
			10	GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
PH1005MS	TPH	276	13	GW 2
				GW 4
				GW 5
				GW 7

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PH1009MS	TPH	276	10	GW 9
				GW10
				GW12
				GW13
				GW14
I50388MR	Anions	296	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
I52570MR	Hardness	302	5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
I50318MR	Anions	295	9	GW18
			7	GW22
				GW23

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
150318MR (continued)	Anions	295	5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
150316MS	Anions	297	9	GW18
			7	GW22
				GW23
			5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
			3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57

Table B-2f (continued)
QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
150327MR	Hardness	293	3	GW50
150333MR	Hardness	286	3	GW51
				GW53
				GW54
				GW55
				GW56
				GW57
150331MR	TDS	296	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
PH1020MS	TPH	281	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M50332MR/MS	As,Se,Pb,Hg, Metals	273	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
			1	GW95 (metals only)
				GW96 (metals only)
				GW97 (metals only)
ED50330MS	EDB	263	3	GW49
				GW50
				GW51
				GW52
				GW53
				GW54
				GW55
				GW56
				GW57
				TB21
I50521MR	TDS	287	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
150521MR (continued)	TDS	287	9	GW18
150330MR	Hardness	287,	3	GW59
150808MR		288		GW60
				GW61
				GW62
				GW63
				GW64
			4	GW66
				GW67
PH1021MS	TPH	281	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64
150517MR/ 150379MS	Anions	288	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M50573MR/MS	Hg	273	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64
M50518MR/MS	Metals, As,Se,Pb	280	3	GW59
				GW60
				GW61
				GW62
M50521MR/MS	Metals, As,Se,Pb	280	3	GW63
				GW64
ED50515MS	EDB	263	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M50813MR/MS	Metals, As,Se,Pb,Hg	282	4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
I50812MR	TDS	289	4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
I50813MR	TDS	289	2	GW72
I51569MR	Hardness	294	6	GW81
				GW82
				GW83
				GW84

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
151569MR (continued)	Hardness	294	4	GW68
				GW69
				GW70
			2	GW71
				GW72
				GW75
				GW76
				GW77
				GW78
				GW79
151029MR/MS	Anions	290	6	GW81
				GW82
				GW83
				GW84
			4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
				GW75
				GW76
				GW77
				GW78
				GW79

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
151033MR	Anions	291	6	GW81
				GW82
				GW83
				GW84
			4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
PH1024MS	TPH	282	4	GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
ED50808MS	EDB	265	4	GW65
				GW66
				GW67
				GW68
				GW69
				GW70
				TB23

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I51026MR	TDS	291	6	GW81
				GW82
				GW83
				GW84
			2	GW75
				GW76
				GW77
				GW78
				GW79
PH1025MS	TPH	284	6	GW81
				GW82
				GW83
				GW84
			2	GW75
				GW76
				GW77
				GW78
				GW79
M51034MR/MS	Metals, As,Se,Pb	283	6	GW81
				GW82
				GW83
				GW84

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M51034MR/MS	Metals, As,Se,Pb	283	2	GW75
(continued)				GW76
				GW77
				GW78
				GW79
ED51032MS	EDB	265	6	GW80
				GW81
				GW82
				GW83
				GW84
				TB24

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I51571MR	TDS	292	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93
I51034MR	Hardness	292	1	GW86
I51558MR,	Hardness	293	1	GW87
I50327MR		293		GW88
				GW89
				GW90
				GW91
				GW92
				GW93
I51569MR/	Anions	294	1	GW86
I51555MS				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
I51569MR/ I51555MS (continued)	Anions	294	1	GW95
				GW96
				GW97
M51572MR/MS	Metals, As,Se	283	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93
M51576MR/MS	Hg	284	6	GW81
				GW82
				GW83
				GW84
			2	GW75
				GW76
				GW77
				GW78
				GW79

Table B-2f (continued)

QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
M51576MR/MS (continued)	Hg	284	1	GW86
				GW87
				GW88
				GW89
				GW90
				GW91
				GW92
				GW93
PH1027MS	TPH	275	1	GW95
				GW96
				GW97
I51612MR	Hardness	295	1	GW95
				GW96
				GW97
I51615MR	TDS	294	1	GW95
				GW96
				GW97
M51615MR/MS	As, Se, Hg, Pb	275	1	GW95
				GW96
				GW97

Table B-2g
QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
ED50174MS/MSD	Non-halogenated volatile organics	267	8	GW34
				GW35
				GW36
				GW38
				GW39
				GW40
				GW41
				TB19
PO50172MS/MSD	Purgeable Aromatic Organics	255	8	GW34
				GW35
				GW36
				GW37
				GW38
				GW39
				GW40
				GW41
				TB19
VO50175MS/MSD	Volatile organics	249	8	GW33
				GW34
				GW35
				GW36
				GW37
				GW38
				GW39
				GW40
				GW41
				TB18
				TB19

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO49690MS/MSD	Purgeable Aromatic Organics	260	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				TB18
ED49687MS/MSD	Non-halogenated volatile organics	264	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
				GW33
				TB18
VO49503MS/MSD	Volatile organics	249	8	GW27
				GW28
				GW29
				GW30
				GW31
				GW32
SV50372MS/MSD	Semivolatile organics	270	8	GW28
				GW29
				GW31
				GW32
				GW33

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO49504MS/MSD	Purgeable Aromatic Organics	259	9	GW15
				GW16
				GW17
				GW18
				GW19
				GW20
				TB16
VO49503MS/MSD	Volatile organics	249	9	GW15
				GW16
				GW17
				GW18
				GW19
				GW20
				TB16
PO49546MS/MSD	Purgeable Aromatic Organics	260	7	GW21
				GW22
PO49547MS/MSD	Purgeable Aromatic Organics	255	7	GW23
				GW25
				GW26
				TB17
VO49131MS/MSD	Volatile organics	250	13	GW 1
				GW 2
				GW 4
				GW 5
				GW 7

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO49131MS/MSD (continued)	Volatile organics	250	10	GW10
				GW11
				GW13
				GW14
VO49141MS/MSD	Volatile organics	250	13	TB14
			10	GW 8
				GW 9
				GW12
				TB15
PO49131MS/MSD	Purgeable Aromatic Organics	254	13	GW 1
PO49141MS/MSD	Purgeable Aromatic Organics	254	13	GW 2
				GW 4
				GW 5
				GW 7
				TB14
			10	GW 8
				GW 9
				GW10
				GW11
				GW12
				GW13
				GW14
				TB15

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PP49134MS/MSD	Pesticide/PCB	269	13	GW 4
				GW 5
				GW 7
ED49131MS/MSD	Non-halogenated volatile organics	266	13	GW 1
				GW 2
				GW 4
				GW 5
				GW 7
				TB14
PO50318MS/MSD	Purgeable Aromatic Organics	262	5	GW42
				GW43
				GW44
				GW45
				GW46
				GW47
				GW48
				TB20
VO50316MS/MSD	Volatile organics	251	5	GW42
				GW44
				GW45
				GW46
				GW47

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
ED50315MS/MSD	Non-halogenated volatile organics	267	5	GW42
				GW43
				GW44
				GW45
				GW46
ED50319MS/MSD	Non-halogenated volatile organics	266	5	GW47
				GW48
VO50314MS	Volatile organics	252	5	GW43
VO50319MS	Volatile organics	252	5	GW48
				TB20
SV50316MS	Semivolatile organics	271	5	GW43
				GW44
				GW45
				GW46
				GW47
				GW48
			3	GW62
SV50294MS	Semivolatile organics	270	8	GW35
				GW36
				GW38
				GW39
				GW40
				GW41

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
VO50325MS/MSD	Volatile organics	251	3	GW49
				GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
				TB21
PO50328MS/MSD	Purgeable Aromatic Organics	256	3	GW51
				GW53
				GW54
				GW55
				GW56
PO50327MS/MSD	Purgeable Aromatic Organics	256	3	GW49
				GW50
				GW57
				TB21
SV50516MS	Semivolatile Organics	272	3	GW59

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PP50331MS/MSD	Pesticide	268	3	GW50
				GW51
				GW52
				GW53
				GW54
				GW55
				GW56
				GW57
SV50329MS/MSD	Semivolatile organics	271	3	GW50
				GW51
				GW53
				GW54
				GW55
				GW56
				GW57
				GW60
				GW61
				GW63
				GW64
PO50518MS/MSD	Purgeable Aromatic Organics	257	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
VO50518MS/MSD	Volatile organics	253	3	GW58
				GW59
				GW60
				GW61
				GW62
				GW63
				GW64
				TB22
PP50520MS/MSD	Pesticide/PCB	268	3	GW59
				GW60
				GW61
				GW62
				GW63
				GW64
PO50810MS/MSD	Purgeable Aromatic Organics	257	4	GW65
				GW66
				GW67
				GW68
				GW69
				GW70
			2	GW71
				GW72
				GW73
				TB23

Table B-2g (continued)

QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	---Applicable Samples---- Site	Field ID
PO51028MS/MSD	Purgeable Aromatic Organics	258	6	GW80
				GW81
				GW82
				GW83
				GW84
			2	GW74
				GW75
				GW76
				GW77
				GW78
				GW79
				TB24
PO51572MS/MSD	Purgeable Aromatic Organics	258	1	GW85
				GW86
				GW87
				GW88
				GW89
				GW90
				GW91
PO51576MS/MSD	Purgeable Aromatic Organics	261	1	GW92
				GW93
				TB25
PO51615MS/MSD	Purgeable Aromatic Organics	261	1	GW94
				GW95
				GW96
				GW97
				TB27

SAMPLE TRACKING

TABLES C-1a THROUGH C-4K

Table C-1a

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 1

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-85	09/28/89	14 days	NA	NA	14 days	10/12/89	14 days	14 days	NA	NA	28 days	NA	NA
GW-86	09/28/89	14 days	NA	NA	14 days	10/10/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-87	09/28/89	14 days	NA	NA	14 days	10/10/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-88	09/28/89	14 days	NA	NA	14 days	10/10/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-89	09/28/89	14 days	NA	NA	14 days	10/10/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-90	09/28/89	14 days	NA	NA	14 days	10/12/89	14 days	14 days	NA	NA	28 days	NA	NA
GW-91	09/28/89	14 days	NA	NA	14 days	10/10/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-92	09/28/89	14 days	NA	NA	14 days	10/11/89	13 days	14 days	NA	NA	28 days	NA	NA
GW-93	09/28/89	14 days	NA	NA	14 days	10/11/89	13 days	14 days	NA	NA	28 days	NA	NA
TB-25	09/28/89	14 days	NA	NA	14 days	10/12/89	14 days	14 days	NA	NA	28 days	NA	NA
GW-94	09/29/89	14 days	NA	NA	14 days	10/12/89	13 days	14 days	NA	NA	28 days	NA	NA
GW-95	09/29/89	14 days	NA	NA	14 days	10/12/89	13 days	14 days	NA	NA	28 days	NA	NA
GW-96	09/29/89	14 days	NA	NA	14 days	10/12/89	13 days	14 days	NA	NA	28 days	NA	NA
GW-97	09/29/89	14 days	NA	NA	14 days	10/12/89	13 days	14 days	NA	NA	28 days	NA	NA
TB-27	09/29/89	14 days	NA	NA	14 days	10/12/89	13 days	14 days	NA	NA	28 days	NA	NA

Table C-1b

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 2

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-71	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	NA	NA
GW-72	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	NA	NA
GW-73	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	NA	NA
TB-23	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-74	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-75	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-76	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-77	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-78	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
GW-79	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	NA	NA
TB-24	09/27/89	14 days	NA	NA	14 days	10/10/89	13 days	14 days	NA	NA	28 days	NA	NA

Table C-1c

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 3

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-49	09/22/89	14 days	10/05/89	13 days	14 days	10/05/89	13 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-50	09/22/89	14 days	10/06/89	14 days	14 days	10/05/89	13 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-51	09/22/89	14 days	10/06/89	14 days	14 days	10/03/89	11 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-52	09/22/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	10/10/89	18 days
GW-53	09/22/89	14 days	10/06/89	14 days	14 days	10/06/89	14 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-54	09/22/89	14 days	10/06/89	14 days	14 days	10/06/89	14 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-55	09/22/89	14 days	10/06/89	14 days	14 days	10/06/89	14 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-56	09/22/89	14 days	10/06/89	14 days	14 days	10/04/89	12 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-57	09/22/89	14 days	10/06/89	14 days	14 days	10/06/89	14 days	14 days	NA	NA	28 days	10/10/89	18 days
TB-21	09/22/89	14 days	10/06/89	14 days	14 days	10/06/89	14 days	14 days	NA	NA	28 days	10/10/89	18 days
GW-58	09/23/89	14 days	10/05/89	12 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-59	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-60	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-61	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-62	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-63	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-64	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
TB-22	09/23/89	14 days	10/06/89	13 days	14 days	10/05/89	12 days	14 days	NA	NA	28 days	10/11/89	18 days
GW-62	09/26/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	NA	NA

Table C-1d

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 4

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-65	09/26/89	14 days	NA	NA	14 days	10/06/89	10 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-66	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-67	09/26/89	14 days	NA	NA	14 days	10/06/89	10 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-68	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-69	09/26/89	14 days	NA	NA	14 days	10/06/89	10 days	14 days	NA	NA	28 days	10/12/89	16 days
GW-70	09/26/89	14 days	NA	NA	14 days	10/06/89	10 days	14 days	NA	NA	28 days	10/12/89	16 days
TB-23	09/26/89	14 days	NA	NA	14 days	10/07/89	11 days	14 days	NA	NA	28 days	10/12/89	16 days

Table C-1e

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 5

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-42	09/21/89	14 days	10/03/89	12 days	14 days	09/27/89	6 days	14 days	09/29/89	8 days	28 days	NA	NA
GW-43	09/21/89	14 days	09/30/89	9 days	14 days	10/04/89	13 days	14 days	09/29/89	8 days	28 days	NA	NA
GW-44	09/21/89	14 days	10/04/89	13 days	14 days	09/28/89	7 days	14 days	09/29/89	8 days	28 days	NA	NA
GW-45	09/21/89	14 days	10/04/89	13 days	14 days	09/26/89	5 days	14 days	09/29/89	8 days	28 days	NA	NA
GW-46	09/21/89	14 days	10/04/89	13 days	14 days	09/28/89	7 days	14 days	09/29/89	8 days	28 days	NA	NA
GW-47	09/21/89	14 days	10/04/89	13 days	14 days	09/26/89	5 days	14 days	10/02/89	11 days	28 days	NA	NA
GW-48	09/21/89	14 days	10/05/89	14 days	14 days	09/26/89	5 days	14 days	10/02/89	11 days	28 days	NA	NA
TB-20	09/21/89	14 days	10/04/89	13 days	14 days	09/27/89	6 days	14 days	10/02/89	11 days	28 days	NA	NA

Table C-1f

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 6

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-80	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	10/13/89	16 days
GW-81	09/27/89	14 days	NA	NA	14 days	10/09/89	12 days	14 days	NA	NA	28 days	10/13/89	16 days
GW-82	09/27/89	14 days	NA	NA	14 days	10/10/89	13 days	14 days	NA	NA	28 days	10/13/89	16 days
GW-83	09/27/89	14 days	NA	NA	14 days	10/10/89	13 days	14 days	NA	NA	28 days	10/13/89	16 days
GW-84	09/27/89	14 days	NA	NA	14 days	10/10/89	13 days	14 days	NA	NA	28 days	10/13/89	16 days
TB-24	09/27/89	14 days	NA	NA	14 days	10/10/89	13 days	14 days	NA	NA	28 days	10/13/89	16 days

Table C-1g

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 7

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-21	09/16/89	14 days	NA	NA	14 days	09/22/89	6 days	14 days	NA	NA	28 days	NA	NA
GW-22	09/16/89	14 days	NA	NA	14 days	09/22/89	6 days	14 days	NA	NA	28 days	NA	NA
GW-23	09/16/89	14 days	NA	NA	14 days	09/22/89	6 days	14 days	NA	NA	28 days	NA	NA
GW-25	09/16/89	14 days	NA	NA	14 days	09/22/89	6 days	14 days	NA	NA	28 days	NA	NA
GW-26	09/16/89	14 days	NA	NA	14 days	09/22/89	6 days	14 days	NA	NA	28 days	NA	NA
TB-17	09/16/89	14 days	NA	NA	14 days	09/23/89	7 days	14 days	NA	NA	28 days	NA	NA
GW-22	09/21/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	NA	NA
GW-23	09/21/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	NA	NA

Table C-1h

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 8

		Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-27	09/19/89	14 days	10/02/89	13 days	14 days	09/26/89	7 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-28	09/19/89	14 days	10/02/89	13 days	14 days	09/26/89	7 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-29	09/19/89	14 days	10/02/89	13 days	14 days	09/26/89	7 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-30	09/19/89	14 days	10/02/89	13 days	14 days	09/26/89	7 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-31	09/19/89	14 days	10/02/89	13 days	14 days	09/26/89	7 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-32	09/19/89	14 days	10/02/89	13 days	14 days	09/23/89	4 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-33	09/19/89	14 days	10/02/89	13 days	14 days	09/27/89	8 days	14 days	09/27/89	8 days	28 days	NA	NA
TB-18	09/19/89	14 days	10/02/89	13 days	14 days	09/23/89	4 days	14 days	09/27/89	8 days	28 days	NA	NA
GW-34	09/20/89	14 days	10/02/89	12 days	14 days	09/27/89	6 days	14 days	09/28/89	8 days	28 days	NA	NA
GW-35	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/28/89	8 days	28 days	NA	NA
GW-36	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/28/89	8 days	28 days	NA	NA
GW-37	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	NA	NA	28 days	NA	NA
GW-38	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/29/89	9 days	28 days	NA	NA
GW-39	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/28/89	8 days	28 days	NA	NA
GW-40	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/28/89	8 days	28 days	NA	NA
GW-41	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/29/89	9 days	28 days	NA	NA
GW-28	09/20/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	NA	NA
TB-19	09/20/89	14 days	10/03/89	13 days	14 days	09/26/89	5 days	14 days	09/29/89	9 days	28 days	NA	NA

Table C-1i

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 9

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-15	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-16	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-17	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-18	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-19	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-20	09/15/89	14 days	09/28/89	13 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
TB-16	09/15/89	14 days	09/29/89	14 days	14 days	09/25/89	10 days	14 days	NA	NA	28 days	NA	NA
GW-18	09/21/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	28 days	NA	NA

Table C-1j

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 10

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-8	09/14/89	14 days	09/28/89	14 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-9	09/14/89	14 days	09/28/89	14 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-10	09/14/89	14 days	09/27/89	13 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-11	09/14/89	14 days	09/27/89	13 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-12	09/14/89	14 days	09/27/89	13 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-13	09/14/89	14 days	09/28/89	14 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
GW-14	09/14/89	14 days	09/28/89	14 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA
TB-15	09/14/89	14 days	09/28/89	14 days	14 days	09/22/89	8 days	14 days	NA	NA	28 days	NA	NA

Table C-1k

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 13

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			EDB (E504.1)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-1	09/13/89	14 days	09/27/89	14 days	14 days	09/21/89	8 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days
GW-2	09/13/89	14 days	09/27/89	14 days	14 days	09/22/89	9 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days
GW-4	09/13/89	14 days	09/27/89	14 days	14 days	09/22/89	9 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days
GW-5	09/13/89	14 days	09/27/89	14 days	14 days	09/22/89	9 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days
GW-7	09/13/89	14 days	09/27/89	14 days	14 days	09/22/89	9 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days
TB-14	09/13/89	14 days	09/28/89(1)	15 days	14 days	09/22/89	9 days	14 days	09/26/89	13 days	28 days	10/09/89	26 days

(1) The primary analysis for this trip blank was performed within the 14 day holding time on 09/22/89. The confirmation analysis was required for methylene chloride confirmation only.

Table C-2a

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 3

		Semivolatile Organics						Pesticides/PCBs					
Field Sample ID	Sampling Date	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
GW-49	09/22/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-50	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/04/89	12 days
GW-51	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/04/89	12 days
GW-52	09/22/89	7 days	NA	NA	40 days	NA	NA	7 days	09/28/89	6 days	40 days	10/04/89	12 days
GW-53	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/05/89	13 days
GW-54	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/05/89	13 days
GW-55	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/05/89	13 days
GW-56	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/05/89	13 days
GW-57	09/22/89	7 days	09/29/89	7 days	40 days	10/12/89	20 days	7 days	09/28/89	6 days	40 days	10/06/89	14 days
GW-58	09/23/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-59	09/23/89	7 days	10/18/89	25 days*	40 days	10/30/89	37 days	7 days	09/30/89	7 days	40 days	10/06/89	13 days
GW-60	09/23/89	7 days	09/29/89	6 days	40 days	10/13/89	20 days	7 days	09/30/89	7 days	40 days	10/06/89	13 days
GW-61	09/23/89	7 days	09/29/89	6 days	40 days	10/13/89	20 days	7 days	09/30/89	7 days	40 days	10/06/89	13 days
GW-62	09/23/89	7 days	NA	NA	40 days	NA	NA	7 days	09/30/89	7 days	40 days	10/06/89	13 days
GW-63	09/23/89	7 days	09/29/89	6 days	40 days	10/13/89	20 days	7 days	09/30/89	7 days	40 days	10/06/89	13 days
GW-64	09/23/89	7 days	09/29/89	6 days	40 days	10/13/89	20 days	7 days	09/30/89	7 days	40 days	10/09/89	16 days
GW-62	09/26/89	7 days	09/28/89	2 days	40 days	10/23/89	27 days	7 days	NA	NA	40 days	NA	NA

* - Sample GW-59 was re-extracted beyond holding times due to low surrogate recoveries.

Table C-2b

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 5

		Semivolatile Organics						Pesticides/PCBs					
Field Sample ID	Sampling Date	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
GW-42	09/21/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-43	09/21/89	7 days	09/28/89	7 days	40 days	10/05/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-44	09/21/89	7 days	09/28/89	7 days	40 days	10/05/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-45	09/21/89	7 days	09/28/89	7 days	40 days	10/11/89	20 days	7 days	NA	NA	40 days	NA	NA
GW-46	09/21/89	7 days	09/28/89	7 days	40 days	10/11/89	20 days	7 days	NA	NA	40 days	NA	NA
GW-47	09/21/89	7 days	09/28/89	7 days	40 days	10/11/89	20 days	7 days	NA	NA	40 days	NA	NA
GW-48	09/21/89	7 days	09/28/89	7 days	40 days	10/11/89	20 days	7 days	NA	NA	40 days	NA	NA
TB-20	09/21/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA

Table C-2c

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 8

		Semivolatile Organics						Pesticides/PCBs					
Field Sample ID	Sampling Date	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
GW-27	09/19/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-28	09/19/89	7 days	09/26/89	7 days	40 days	10/04/89	15 days	7 days	NA	NA	40 days	NA	NA
GW-29	09/19/89	7 days	09/26/89	7 days	40 days	10/03/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-30	09/19/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-31	09/19/89	7 days	09/26/89	7 days	40 days	10/03/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-32	09/19/89	7 days	09/26/89	7 days	40 days	10/03/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-33	09/19/89	7 days	09/26/89	7 days	40 days	10/03/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-34	09/20/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-35	09/20/89	7 days	09/27/89	7 days	40 days	10/04/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-36	09/20/89	7 days	09/27/89	7 days	40 days	10/04/89	14 days	7 days	NA	NA	40 days	NA	NA
GW-37	09/20/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-38	09/20/89	7 days	10/11/89	21 days*	40 days	10/26/89	36 days	7 days	NA	NA	40 days	NA	NA
GW-39	09/20/89	7 days	10/11/89	21 days*	40 days	10/26/89	36 days	7 days	NA	NA	40 days	NA	NA
GW-40	09/20/89	7 days	10/11/89	21 days*	40 days	10/26/89	36 days	7 days	NA	NA	40 days	NA	NA
GW-41	09/20/89	7 days	10/11/89	21 days*	40 days	10/26/89	36 days	7 days	NA	NA	40 days	NA	NA
GW-28	09/20/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA

* = Samples were re-extracted beyond holding times due to low surrogate recoveries. Re-extracted results are reported on Table D-5x. According to the laboratory, the re-extracted results are not significantly different from the original results.

Table C-2d

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 13

		Semivolatile Organics						Pesticides/PCBs					
Field Sample ID	Sampling Date	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
GW-1	09/13/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-2	09/13/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
GW-4	09/13/89	7 days	NA	NA	40 days	NA	NA	7 days	09/20/89	7 days	40 days	10/03/89	20 days
GW-5	09/13/89	7 days	NA	NA	40 days	NA	NA	7 days	09/20/89	7 days	40 days	10/03/89	20 days
GW-7	09/13/89	7 days	NA	NA	40 days	NA	NA	7 days	09/20/89	7 days	40 days	10/03/89	20 days

Table C-3a

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 1

		Metals			Mercury			Total Petroleum Hydrocarbons		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-85	09/28/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-86	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-87	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-88	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-89	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-90	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-91	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-92	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-93	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
GW-94	09/29/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-95	09/29/89	6 months	11/30/89	62 days	28 days	10/27/89	28 days	28 days	10/27/89	28 days
GW-96	09/29/89	6 months	11/30/89	62 days	28 days	10/27/89	28 days	28 days	10/27/89	28 days
GW-97	09/29/89	6 months	11/30/89	62 days	28 days	10/27/89	28 days	28 days	10/27/89	28 days

Table C-3b

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 2

		Metals			Mercury			Total Petroleum Hydrocarbons		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-71	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-72	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-73	09/26/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-74	09/27/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-75	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-76	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-77	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-78	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-79	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days

Table C-3c

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 3

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-49	09/22/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-50	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-51	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-52	09/22/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-53	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-54	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-55	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-56	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-57	09/22/89	6 months	11/27/89	66 days	28 days	10/20/89	28 days	28 days	10/20/89	28 days
GW-58	09/23/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-59	09/23/89	6 months	11/27/89	65 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-60	09/23/89	6 months	11/27/89	65 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-61	09/23/89	6 months	11/27/89	65 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-62	09/23/89	6 months	11/27/89	65 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-63	09/23/89	6 months	12/14/89	82 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-64	09/23/89	6 months	12/14/89	82 days	28 days	10/20/89	27 days	28 days	10/21/89	28 days
GW-62	09/26/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA

Table C-3d

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 4

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-65	09/26/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-66	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-67	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-68	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-69	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days
GW-70	09/26/89	6 months	11/27/89	62 days	28 days	10/25/89	29 days	28 days	10/24/89	28 days

Table C-3e

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 5

		Metals			Mercury			Total Petroleum Hydrocarbons		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-42	09/21/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-43	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days
GW-44	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days
GW-45	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days
GW-46	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days
GW-47	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days
GW-48	09/21/89	6 months	11/27/89	67 Days	28 days	10/07/89	16 Days	28 days	10/18/89	27 days

Table C-3f

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 6

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-80	09/27/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-81	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-82	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-83	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
GW-84	09/27/89	6 months	11/27/89	61 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days

Table C-3g

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 7

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-21	09/16/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-22	09/16/89	6 months	11/28/89	73 days	28 days	10/07/89	21 days	28 days	10/12/89	26 days
GW-23	09/16/89	6 months	11/28/89	73 days	28 days	10/07/89	21 days	28 days	10/12/89	26 days
GW-25	09/16/89	6 months	11/28/89	73 days	28 days	10/07/89	21 days	28 days	10/12/89	26 days
GW-26	09/16/89	6 months	11/28/89	73 days	28 days	10/07/89	21 days	28 days	10/12/89	26 days
GW-22	09/21/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-23	09/21/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA

Table C-3h

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 8

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-27	09/19/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-28	09/19/89	6 months	NA	NA	28 days	NA	NA	28 days	10/17/89	28 days
GW-29	09/19/89	6 months	11/28/89	70 days	28 days	10/07/89	18 days	28 days	10/17/89	28 days
GW-30	09/19/89	6 months	11/28/89	70 days	28 days	10/07/89	18 days	28 days	10/17/89	28 days
GW-31	09/19/89	6 months	11/28/89	70 days	28 days	10/07/89	18 days	28 days	10/17/89	28 days
GW-32	09/19/89	6 months	11/28/89	70 days	28 days	10/07/89	18 days	28 days	10/17/89	28 days
GW-33	09/19/89	6 months	11/28/89	70 days	28 days	10/07/89	18 days	28 days	10/17/89	28 days
GW-34	09/20/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-35	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-36	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-37	09/20/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-38	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-39	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-40	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-41	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	10/18/89	28 days
GW-28	09/20/89	6 months	11/27/89	68 days	28 days	10/07/89	17 days	28 days	NA	NA

Table C-3i

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 9

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-15	09/15/89	6 months	11/28/89	74 days	28 days	10/07/89	22 days	28 days	10/11/89	26 days
GW-16	09/15/89	6 months	11/28/89	74 days	28 days	10/07/89	22 days	28 days	10/11/89	26 days
GW-17	09/15/89	6 months	11/28/89	74 days	28 days	10/07/89	22 days	28 days	10/11/89	26 days
GW-18	09/15/89	6 months	11/28/89	74 days	28 days	10/07/89	22 days	28 days	10/12/89	27 days
GW-19	09/15/89	6 months	11/28/89	74 days	28 days	10/07/89	22 days	28 days	10/12/89	27 days
GW-20	09/15/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-18	09/21/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA

Table C-3j

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 10

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-8	09/14/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-9	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/09/89	25 days
GW-10	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/09/89	25 days
GW-11	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/11/89	27 days
GW-12	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/09/89	25 days
GW-13	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/09/89	25 days
GW-14	09/14/89	6 months	11/28/89	75 days	28 days	10/07/89	23 days	28 days	10/09/89	25 days

Table C-3k

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 13

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-1	09/13/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
GW-2	09/13/89	6 months	NA	NA	28 days	NA	NA	28 days	10/05/89	22 days
GW-4	09/13/89	6 months	11/28/89	76 days	28 days	10/05/89	22 days	28 days	10/05/89	22 days
GW-5	09/13/89	6 months	11/28/89	76 days	28 days	10/05/89	22 days	28 days	10/05/89	22 days
GW-7	09/13/89	6 months	11/28/89	76 days	28 days	10/05/89	22 days	28 days	10/05/89	22 days

Table C-4a

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 1

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-85	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-86	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-87	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-88	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-89	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-90	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-91	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-92	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-93	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
GW-94	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-95	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	<1 days	6 months	11/13/89	45 days
GW-96	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	<1 days	6 months	11/13/89	45 days
GW-97	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	<1 days	6 months	11/13/89	45 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4b

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 2

		Total Dissolved Solids			Common Anions			Hardness		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-71	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/08/89	43 days
GW-72	09/26/89	7 days	10/03/89	7 days	2 days	09/28/89	2 days	6 months	11/08/89	43 days
GW-73	09/26/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-74	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-75	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-76	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-77	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-78	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-79	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4c

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 3

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-49	09/22/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-50	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/08/89	47 days
GW-51	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-52	09/22/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-53	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-54	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-55	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-56	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-57	09/22/89	7 days	09/27/89	5 days	2 days	09/22/89	<1 days	6 months	11/10/89	49 days
GW-58	09/23/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-59	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-60	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-61	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-62	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-63	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-64	09/23/89	7 days	09/28/89	5 days	2 days	09/25/89	2 days	6 months	11/10/89	48 days
GW-62	09/26/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4d

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 4

		Total Dissolved Solids			Common Anions			Hardness		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-65	09/26/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-66	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/10/89	45 days
GW-67	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/10/89	45 days
GW-68	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/08/89	43 days
GW-69	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/08/89	43 days
GW-70	09/26/89	7 days	09/29/89	3 days	2 days	09/28/89	2 days	6 months	11/08/89	43 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4e

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 5

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-42	09/21/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-43	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days
GW-44	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days
GW-45	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days
GW-46	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days
GW-47	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days
GW-48	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	11/07/89	47 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4f

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 6

		Total Dissolved Solids			Common Anions			Hardness		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-80	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-81	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-82	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-83	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days
GW-84	09/27/89	7 days	10/04/89	7 days	2 days	09/28/89	1 day	6 months	11/08/89	42 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4g

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 7

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-21	09/16/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-22	09/16/89	7 days	NA	NA	2 days	NA	NA	6 months	10/13/89	30 days
GW-23	09/16/89	7 days	NA	NA	2 days	NA	NA	6 months	10/13/89	30 days
GW-25	09/16/89	7 days	09/22/89	6 days	2 days	NA	NA	6 months	10/13/89	30 days
GW-26	09/16/89	7 days	09/22/89	6 days	2 days	NA	NA	6 months	10/13/89	30 days
GW-22	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	NA	NA
GW-23	09/21/89	7 days	09/26/89	5 days	2 days	09/22/89	1 day	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4h

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 8

Field Sample ID	Sampling Date	Total Dissolved Solids' Hold Time	Total Dissolved Solids' Analysis Date	Total Dissolved Solids' Elapsed Time	Common Anions Hold Time*	Common Anions Analysis Date	Common Anions Elapsed Time	Hardness Hold Time	Hardness Analysis Date	Hardness Elapsed Time
GW-27	09/19/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-28	09/19/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-29	09/19/89	7 days	09/25/89	6 days	2 days	09/20/89	1 day	6 months	10/13/89	24 days
GW-30	09/19/89	7 days	09/25/89	6 days	2 days	09/20/89	1 day	6 months	10/13/89	24 days
GW-31	09/19/89	7 days	09/25/89	6 days	2 days	09/20/89	1 day	6 months	10/28/89	39 days
GW-32	09/19/89	7 days	09/25/89	6 days	2 days	09/20/89	1 day	6 months	10/28/89	39 days
GW-33	09/19/89	7 days	09/25/89	6 days	2 days	09/20/89	1 day	6 months	10/28/89	39 days
GW-34	09/20/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-35	09/20/89	7 days	09/25/89	5 days	2 days	09/21/89	1 day	6 months	10/28/89	38 days
GW-36	09/20/89	7 days	09/25/89	5 days	2 days	09/21/89	1 day	6 months	10/28/89	38 days
GW-37	09/20/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-38	09/20/89	7 days	09/25/89	5 days	2 days	09/21/89	1 day	6 months	10/28/89	38 days
GW-39	09/20/89	7 days	09/25/89	5 days	2 days	09/21/89	1 day	6 months	10/28/89	38 days
GW-40	09/20/89	7 days	09/26/89	6 days	2 days	09/21/89	1 day	6 months	10/28 '89	38 days
GW-41	09/20/89	7 days	09/26/89	6 days	2 days	09/21/89	1 day	6 months	10/28, 39	38 days
GW-28	09/20/89	7 days	09/25/89	5 days	2 days	09/21/89	1 day	6 months	10/28/89	38 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4i

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 9

		Total Dissolved Solids			Common Anions			Hardness		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-15	09/15/89	7 days	09/22/89	7 days	2 days	09/15/89	0 days	6 months	10/28/89	43 days
GW-16	09/15/89	7 days	09/22/89	7 days	2 days	09/15/89	0 days	6 months	10/13/89	28 days
GW-17	09/15/89	7 days	09/22/89	7 days	2 days	09/15/89	0 days	6 months	10/13/89	28 days
GW-18	09/15/89	7 days	09/22/89	7 days **	2 days	09/18/89	3 days **	6 months	10/13/89	28 days
GW-19	09/15/89	7 days	09/22/89	7 days	2 days	09/15/89	0 days	6 months	10/13/89	28 days
GW-20	09/15/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-18	09/21/89	7 days	09/28/89	7 days	2 days	09/22/89	1 day	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.
** - This sample was resampled due to original sample being analyzed past holding time for anions; the resample analysis results only are reported for both total dissolved solids and common anions on Table D-7x.

Table C-4j

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 10

		Total Dissolved Solids			Common Anions			Hardness		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-8	09/14/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-9	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days
GW-10	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days
GW-11	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days
GW-12	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days
GW-13	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days
GW-14	09/14/89	7 days	09/21/89	7 days	2 days	09/15/89	1 day	6 months	10/13/89	29 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4k

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 13

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-1	09/13/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-2	09/13/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
GW-4	09/13/89	7 days	09/20/89	7 days	2 days	09/15/89	2 days	6 months	10/13/89	29 days
GW-5	09/13/89	7 days	09/20/89	7 days	2 days	09/15/89	2 days	6 months	10/13/89	29 days
GW-7	09/13/89	7 days	09/20/89	7 days	2 days	09/15/89	2 days	6 months	10/13/89	29 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

ANALYTICAL RESULTS FOR ENVIRONMENTAL SAMPLES

TABLES D-1a THROUGH D-71

Table D-1a

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.60	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 5.00	< 2.5
Chloroethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 1.60	< 0.80
2-chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF
Chloroform	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 1.60	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.60	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50
Methylene Chloride	0.8	3.7/3.8	3.9/3.5	3.6/3.0	3.3/2.4	18/11	4.7/0.96
Chloromethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 1.60	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 1.60	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 1.00	< 0.50
Fluorotrichloromethane	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.00	< 2.0
Dichlorodifluoromethane	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.00	< 2.0
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 1.60	< 0.80
Trichloroethene	1	< 1.0	< 1.0	< 1.0	< 1.0	55/27	< 1.0

NF - Not found due to analytical problem.

Table D-1a (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80	< 0.80	3.6/6.6	20/14
Chlorobenzene (See Note)	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.80	< 0.40
1,3-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.60	< 0.30
1,2-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.60	< 0.30
1,4-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.60	< 0.30
Surrogates:							
Bromochloromethane	62-140	101/81	105/78	106/84	101/75	127/97	101/51
1-Chloro-2-bromopropane	73-127	94/90	95/90	97/95	93/85	107/121	82/65
1,4-Dichloropropane	64-136	89/109	90/108	92/110	89/101	95/101	82/78

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1a (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	5.8/2.0	8.2/2.3	9.4/4.9	9.4/4.5	11/5.0
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0

NF - Not found due to analytical problem.

Table D-1a (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	3.1/7.6	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:						
Bromochloromethane	62-140	104/116	132/108	112/102	93/99	81/97
1-Chloro-2-bromopropane	73-127	98/123	115/122	102/108	96/113	82/110
1,4-Dichloropropane	64-136	110/160	117/156	101/146	86/144	77/96

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1b

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	5.3/5.5	3.7/2.9	3.5/2.6	4.4/2.3	4.6/2.5
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	2.4/3.0	1.3/2.1	2.6/3.8

NF = Not found due to analytical problem.

Table D-1b (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5
Purgeable Halocarbon Compounds
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:						
Bromochloromethane	62-140	94/125	107/85	128/116	109/113	136/111
1-Chloro-2-bromopropane	73-127	96/115	104/86	107/124	108/114	116/120
1,4-Dichloropropane	64-136	97/263	111/211	109/277	116/261	112/272

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1c

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8

Field Sample ID		GW28	GW29	GW30	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	1.3/1.6	1.0/1.0	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	1.7/2.3	1.2/1.8	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Chloroethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10	NF	NF	NF	NF	NF
Chloroform	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	1.1/NQ	0.64/NQ	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	3.3/2.5	3.6/5.8	1.1/5.2	0.65J/4.6	1.2/6.1
Chloromethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	2.0	< 2.0	2.2/0.80J	< 2.0	< 2.0	< 2.0
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Trichloroethene	1	< 1.0	1.6/1.7	1.1/1.2	1.7/2.0	4.5/3.5

J = Estimated value below detection limit.
NQ = Quantitation not possible on confirmation column due to interference fron Cis-1,2-Dichloroethene.
NF = Not found due to analytical problem.

Table D-1c (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8

Field Sample ID		GW28	GW29	GW30	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Chlorobenzene (See Note)	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogates:						
Bromochloromethane	62-140	106/64	132/118	124/114	114/113	123/119
1-Chloro-2-bromopropane	73-127	111/127	109/133	102/128	102/125	102/131
1,4-Dichloropropane	64-136	104/124	103/210	99/204	97/217	99/216

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1c (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8

Field Sample ID		GW35	GW36	GW37	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 1.5	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethane	0.5	1.3J/3.9	< 0.50	0.82/1.5	0.62/1.4	0.97/1.9	0.37J/0.96
1,1,2-Trichloroethane	0.5	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 10	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Chloroethane	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF
Chloroform	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 1.5	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	19/23	< 0.80	3.0/4.3	< 0.80	< 0.80	< 0.80
Chloromethane	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 2.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 10	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	2.0	< 10	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chlorodibromomethane	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Trichloroethene	1	190/160	< 1.0	1.1/1.1	< 1.0	1.0/1.4	11/9.5

J = Estimated value below detection limit.
NF = Not found due to analytical problem.

Table D-1c (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8

Field Sample ID		GW35	GW36	GW37	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 4.0	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Chlorobenzene (See Note)	0.4	< 2.0	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene (See Note)	0.3	< 1.5	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene (See Note)	0.3	< 1.5	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene (See Note)	0.3	< 1.5	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogates:							
Bromochloromethane	62-140	147oc/114	123/120	138/109	116/115	115/119	130/114
1-Chloro-2-bromopropane	73-127	130oc/148	114/121	119/125	104/129	96/132	117/136
1,4-Dichloropropane	64-136	126/209	98/188	113/208	88/176	82/170	97/146

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1d

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9

Field Sample ID		GW15	GW16	GW17	GW18
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.5	< 2.5	< 2.5	< 2.5
Chloroethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10	< 10	< 10	< 10	< 10
Chloroform	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	4.0/1.3	3.8/0.99	3.3/<0.8*	3.0/<0.8*
Chloromethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Trichloroethene	1	< 1.0	< 1.0	< 1.0	< 1.0

* = Compound present below detection limit.

Table D-1d (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9

Field Sample ID		GW15	GW16	GW17	GW18
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Chlorobenzene (See Note)	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30
Surrogates:					
Bromochloromethane	62-140	131/93	147oc	115/88	99/91
1-Chloro-2-bromopropane	73-127	125/108	129oc/117	103/112	103/107
1,4-Dichloropropane	64-136	138oc/102	125/58	109/63	103/74

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1e

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 10

Field Sample ID		GW11	GW12	GW13	GW10	GW9
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<30	<6.0	<300	<0.60
1,2-Dichloroethane	0.4	<0.40	<40	<8.0	<400	<0.80
1,1,1-Trichloroethane	0.4	<0.40	<40	<8.0	<400	<0.80
1,1-Dichloroethane	0.5	<0.50	<50	<10	<500	<1.0
1,1,2-Trichloroethane	0.5	<0.50	<50	<10	<500	<1.0
1,1,2,2-Tetrachloroethane	2.5	<2.5	<250	<50	<2500	<5.0
Chloroethane	0.8	<0.80	<80	<16	<800	<1.6
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<40	<8.0	<400	<0.80
1,1-Dichloroethene	0.8	<0.80	<80	<16	<800	<1.6
trans-1,2-Dichloroethene	0.3	<0.30	<30	<6.0	<300	<0.60
1,2-Dichloropropane	0.4	<0.40	<40	<8.0	<400	<0.80
trans-1,3-Dichloropropene	0.4	<0.40	<40	<8.0	<400	<0.80
cis-1,3-Dichloropropene	0.5	<0.50	<50	<10	<500	<1.0
Methylene Chloride	0.8	2.2/1.3	386/488	85/86	4160/4960	8.1/4.4
Chloromethane	0.8	<0.80	<80	<16	<800	<1.6
Bromomethane	0.8	<0.80	<80	<16	<800	<1.6
Bromoform	0.5	<0.50	<50	<10	<500	<1.0
Bromodichloromethane	0.5	<0.50	<50	<10	<500	<1.0
Fluorotrichloromethane	2.0	<2.0	<200	<40	<2000	<4.0
Dichlorodifluoromethane	2.0	<2.0	<200	<40	<2000	<4.0
Chlorodibromomethane	0.4	<0.40	<40	<8.0	<400	<0.80
Tetrachloroethene	0.8	<0.80	<80	<16	<800	<1.6
Trichloroethene	1	<1.0	3500/2500	590/320	28000/25000	61/21

NF = Not found due to analytical problem.

Table D-1e (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 10

Field Sample ID		GW11	GW12	GW13	GW10	GW9
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	21/4.9	<80	115/133	<5.80	<1.6
Chlorobenzene (See Note)	0.4	<0.40	<40	<8.0	<0.40	<0.80
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<30	<6.0	<0.30	<0.60
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<30	<6.0	<0.30	<0.60
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<30	<6.0	<0.30	<0.60
Surrogates:						
Bromochloromethane	62-140	152oc/95	123/98	155oc/83	122/95	144oc/78
1-Chloro-2-bromopropane	73-127	96/99	104/123	109/108	106/119	109/98
1,4-Dichloropropane	64-136	105/78	96/165	103/70	107/158	104/51

Table D-1f

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 13

Field Sample ID		GW4	GW5	GW2
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<15	<0.30	<0.30
1,2-Dichloroethane	0.4	<20	2.3/0.44	<0.40
1,1,1-Trichloroethane	0.4	<20	<0.40	<0.40
1,1-Dichloroethane	0.5	<25	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<25	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<125	<2.5	<2.5
Chloroethane	0.8	<40	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF
Chloroform	0.4	<20	<0.40	<0.40
1,1-Dichloroethene	0.8	<40	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<15	<0.30	<0.30
1,2-Dichloropropane	0.4	<20	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<20	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<25	<0.50	<0.50
Methylene Chloride	0.8	160/270	2.3/0.78	2.8/0.86
Chloromethane	0.8	<40	<0.80	<0.80
Bromomethane	0.8	<40	<0.80	<0.80
Bromoform	0.5	<25	<0.50	<0.50
Bromodichloromethane	0.5	<25	<0.50	<0.50
Fluorotrichloromethane	2.0	<100	<2.0	<2.0
Dichlorodifluoromethane	2.0	<100	<2.0	<2.0
Chlorodibromomethane	0.4	<20	<0.40	<0.40
Tetrachloroethene	0.8	<40	<0.80	<0.80
Trichloroethene	1	<50	<1.0	<1.0

NF = Not found due to analytical problem.

Table D-1f (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5
Purgeable Halocarbon Compounds
Site 13

Field Sample ID		GW4	GW5	GW2
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	1600/1600	2.9/4.5	<0.80
Chlorobenzene (See Note)	0.4	<20	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<15	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<15	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<15	<0.30	<0.30
Surrogates:				
Bromochloromethane	62-140	117/93	80/73	100/84
1-Chloro-2-bromopropane	73-127	117/102	94/98	96/103
1,4-Dichloropropane	64-136	112/102	92/50	103/56

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1g

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		TB14	TB15	TB16	TB18	TB19	TB20	TB21	TB22
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	<10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	3.5/2.0	3.7/1.9	1.7/1.5	3.8/4.4	4.1/4.0	3.6/3.0	4.6/0.87	5.1/3.2
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.

Table D-1g (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		TB14	TB15	TB16	TB18	TB19	TB20	TB21	TB22
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:									
Bromochloromethane	62-140	74/80	79/85	98/101	110/115	117/109	97/111	101/56	124/95
1-Chloro-2-bromopropane	73-127	84/82	82/84	98/113	104/122	120/115	99/109	91/66	104/102
1,4-Dichloropropane	64-136	90/54	90/60	92/140	102/198	125/124	102/238	89/76	103/137

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1h

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
FIELD BLANKS

Field Sample ID		GW1	GW8	GW20	GW27	GW34	GW42	GW49	GW58
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	<10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	4.0/2.4	3.6/4.6	5.4/1.5	8.5/6.0	3.7/5.1	4.0/5.8	5.7/3.5	6.0/2.3
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.

Table D-1h (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
FIELD BLANKS

Field Sample ID		GW1	GW8	GW20	GW27	GW34	GW42	GW49	GW58
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogat.. % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	2.4/2.5	<0.30	<0.30	<0.30	<0.30
Surrogates:									
Bromochloromethane	62-140	102/109	75/74	111/95	105/98	114/115	140/113	110/83	106/107
1-Chloro-2-bromopropane	73-127	118/99	85/77	112/98	105/99	114/120	124/104	102/93	97/120
1,4-Dichloropropane	64-136	116/148	90/53	107/63	97/94	113/206	128/261	98/111	102/141

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1i

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW14	GW19	GW33	GW41	GW48	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	<10	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	1.8/0.95	3.5/2.2	4.7/1.4	3.6/8.2	4.1/3.3	1.3/2.8	5.2/1.1	11/8.9
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.

Table D-1i (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW14	GW19	GW33	GW41	GW48	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	2.2/2.2	<0.30	<0.30	<0.30	<0.30
Surrogates:									
Bromochloromethane	62-140	102/90	83/74	99/113	141/123 QC	116/116	102/109	94/73	82/102
1-Chloro-2-bromopropane	73-127	108/100	84/77	95/109	115/121	112/122	112/107	83/90	85/111
1,4-Dichloropropane	64-136	102/69	95/53	94/80	123/195	118/147	136/237	82/100	83/142

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-2a

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 1

Field Sample ID		GW86	GW87	GW88	GW89	GW90	GW91	GW92	GW95	GW96
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	0.92/0.71	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	1.0/0.91	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:										
a,a,a-Trifluorotoluene	69-129	92	83	93	93	97/91	94	105	96	96

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2b

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 2

Field Sample ID		GW75	GW76	GW77	GW78	GW71	GW72
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	0.33/109*	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.3	<0.3	<0.3	0.52/0.61	<0.3	<0.3
Ethylbenzene	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Surrogate:							
a,a,a-Trifluorotoluene	69-129	98	98	97	68oc/99	96/84	90/84

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

* = High levels of TCE interfered with benzene on the packed column confirmation analysis.

Table D-2c

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	9.9/0.96	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.30	< 0.30	< 0.30	0.39/0.57	0.36/0.52	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogate:							
a,a,a-Trifluorotoluene	69-129	100	102	104/100	93/92	110/89	98/96

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2c (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:						
a,a,a-Trifluorotoluene	69-129	95	101	102	107/95	97

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2d

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 4

Field Sample ID		GW66	GW67	GW68	GW69
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<1.5	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<5.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<3.5	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<3.5	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	23/25	<0.30
Total Xylenes	1.0	<1.0	<1.0	<5.0	<1.0
Toluene	0.3	<0.30	<0.30	<1.5	<0.30
Ethylbenzene	0.3	<0.30	<0.30	2.3/1.45	<0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	100/84	91	98/89	96

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2e

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	0.31/0.40	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:						
a,a,a-Trifluorotoluene	69-129	95	102/79	107	106/76	102

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2f

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 6

Field Sample ID		GW81	GW82	GW83
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30
Surrogate:				
a,a,a-Trifluorotoluene	69-129	74	74/103	98/79

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2g

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 7

Field Sample ID		GW22	GW23	GW25
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	1.1/0.67	0.59/0.45
Ethylbenzene	0.3	<0.30	<0.30	<0.30
Surrogate:				
a,a,a-Trifluorotoluene	69-129	88/100	104/101	103/98

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2h

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 8

Field Sample ID		GW28	GW29	GW30	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogate:						
a,a,a-Trifluorotoluene	69-129	92/118	85/116	87/113	106/106	104

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2h (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 8

Field Sample ID		GW35	GW36	GW37	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.60	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 1.4	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 1.4	< 0.70	< 0.70	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.60	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Xylenes	1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.60	< 0.30	< 0.30	< 0.30	< 0.30	0.64/0.52
Ethylbenzene	0.3	< 0.60	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogate:							
a,a,a-Trifluorotoluene	69-129	121/96	94/93	93/97	95/92	90/95	82/95

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2i

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 9

Field Sample ID		GW15	GW16	GW17	GW18
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	50/44	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	48/47	< 1.0
Toluene	0.3	< 0.30	0.79/0.50	2.0/1.9	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	9.1/9.0	< 0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	97/92	101/95	106/94	98/82

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2j

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 10

Field Sample ID		GW11	GW12	GW10	GW13	GW9
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<3.0	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<10.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<7.0	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<7.0	<0.70	<0.70
Benzene (See Note)	0.3	25/6.0	610/6.1	4000/360	630/8.9	<0.30
Total Xylenes	1.0	2.2/3.5	0.95/1.5	<10.0	<1.0	<1.0
Toluene	0.3	0.46/0.69	1.3/1.9	4.7/7.2	<0.30	<0.30
Ethylbenzene	0.3	3.7/3.1	<0.30	<3.0	<0.30	<0.30
(Surrogate: See Note 2)						
a,a,a-Trifluorotoluene	69-129	113	83	75	79	113

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Note 2: Confirmation analysis surrogate information is not available.

Table D-2k

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 13

Field Sample ID		GW4	GW5	GW2
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	9.1/6.0	<0.30	<0.30
1,2-Dichlorobenzene	1.0	3.6/4.2	<1.0	<1.0
1,3-Dichlorobenzene	0.7	1.1/1.5	<0.70	<0.70
1,4-Dichlorobenzene	0.7	9.7/7.6	<0.70	<0.70
Benzene (See Note)	0.3	2.98/5.3	<0.30	<0.30
Total Xylenes	1.0	7.6/9.2	<1.0	<1.0
Toluene	0.3	15/14	<0.3	1.3/0.33
Ethylbenzene	0.3	3.6/3.3	<0.3	<0.3
Surrogate: (See Note 2)				
a,a,a-Trifluorotoluene	69-129	108	88	100

Note 1: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Note 2: Confirmation analysis surrogate information not available.

Table D-2l

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
TRIP BLANKS

Field Sample ID		TB14	TB15	TB16	TB18	TB19	TB17	TB24	TB20
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:									
a,a,a-Trifluorotoluene	69-129	92	89	81/109	103	98	96/97	98/80	98

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2l (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
TRIP BLANKS

Field Sample ID		TB23	TB21	TB22	TB25	TB27
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:						
a,a,a-Trifluorotoluene	69-129	91	103/98	101	103/88	95

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2m

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
FIELD BLANKS

Field Sample ID		GW1	GW8	GW20	GW27	GW34	GW21	GW80	GW42
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	2.9/3.7	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:									
a,a,a-Trifluorotoluene	69-129	100	95	92/117	93/116	97/92	88/100	101	100/91

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2m (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
FIELD BLANKS

Field Sample ID		GW65	GW49	GW58	GW73	GW74	GW85	GW94
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:								
a,a,a-Trifluorotoluene	69-129	98	100	104/96	85	101/91	95/77	93

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2n

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW14	GW19	GW33	GW41	GW26	GW84	GW48
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	2.9/3.1	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:									
a,a,a-Trifluorotoluene	69-129	96	89	95/72	100/89	95	100/99	102/77	92

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2n (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
EQUIPMENT WASH BLANKS

Field Sample ID		GW70	GW56	GW64	GW79	GW93	GW97
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:							
a,a,a-Trifluorotoluene	69-129	95	97	102/93	75	103	92/87

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-3a
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 3

Field Sample ID		GW50	GW51	GW52	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA	NA	NA	NA	NA	NA
Diethyl Ether	10	NA	NA	NA	NA	NA	NA	NA
Methyl Ethyl Ketone	10	NA	NA	NA	NA	NA	NA	NA
Methyl Isobutyl Ketone	10	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Table D-3a(continued)
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015); Ethylene Dibromide (E504.1)
SITE 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA	NA	NA	NA
Diethyl Ether	10	NA	NA	NA	NA	NA
Methyl Ethyl Ketone	10	NA	NA	NA	NA	NA
Methyl Isobutyl Ketone	10	NA	NA	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30

Table D-3b
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 4

Field Sample ID		GW66	GW67	GW68	GW69
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA	NA	NA
Diethyl Ether	10	NA	NA	NA	NA
Methyl Ethyl Ketone	10	NA	NA	NA	NA
Methyl Isobutyl Ketone	10	NA	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30	<0.30	<0.30

Table D-3c
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	<100	<100	<100	<100	<100
Diethyl Ether	10	<10	<10	<10	<10	<10
Methyl Ethyl Ketone	10	<10	<10	<10	<10	<10
Methyl Isobutyl Ketone	10	<10	<10	<10	<10	<10
Ethylene Dibromide (E504.1)	0.3	NA	NA	NA	NA	NA
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	NA	NA	NA	NA	NA

Table D-3d
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 6

Field Sample ID		GW81	GW82	GW83
Sample Matrix		Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA	NA
Diethyl Ether	10	NA	NA	NA
Methyl Ethyl Ketone	10	NA	NA	NA
Methyl Isobutyl Ketone	10	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30	<0.30

Table D-3e
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 8

Field Sample ID		GW28	GW29	GW30	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	< 100	< 100	< 100	< 100	< 100
Diethyl Ether	10	< 10	< 10	< 10	< 10	< 10
Methyl Ethyl Ketone	10	< 10	< 10	< 10	< 10	< 10
Methyl Isobutyl Ketone	10	< 10	< 10	< 10	< 10	< 10
Ethylene Dibromide (E504.1)	0.3	NA	NA	NA	NA	NA
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	NA	NA	NA	NA	NA

Table D-3e (continued)
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
SITE 8

Field Sample ID		GW35	GW36	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	< 100	< 100	< 100	< 100	< 100
Diethyl Ether	10	< 10	< 10	< 10	< 10	< 10
Methyl Ethyl Ketone	10	< 10	< 10	< 10	< 10	< 10
Methyl Isobutyl Ketone	10	< 10	< 10	< 10	< 10	< 10
Ethylene Dibromide (E504.1)	0.3	NA	NA	NA	NA	NA
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	NA	NA	NA	NA	NA

Table D-3f
Organic Analysis Results: Non-Halogenated Volatile Organics (SW50
Ethylene Dibromide (E504.1)
SITE 13

Field Sample ID		GW4	GW5	GW2
Sample Matrix		Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	<100	<100	<100
Diethyl Ether	10	<10	<10	<10
Methyl Ethyl Ketone	10	<10	<10	<10
Methyl Isobutyl Ketone	10	<10	<10	<10
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30	<0.30

Table D-3g
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
TRIP BLANKS

Field Sample ID		TB14	TB18	TB19	TB24	TB20	TB23	TB21	TB22
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	<100	<100	<100	NA	<100	NA	NA	NA
Diethyl Ether	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Ethyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Isobutyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30

Table D-3h

Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015); Ethylene Dibromide (E504.1)

FIELD BLANKS

Field Sample ID		GW1	GW27	GW34	GW80	GW42	GW65	GW49	GW58
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	<100	<100	<100	NA	<100	NA	NA	NA
Diethyl Ether	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Ethyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Isobutyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30

Table D-3i
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW33	GW41	GW84	GW48	GW70	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	<100	<100	<100	NA	<100	NA	NA	NA
Diethyl Ether	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Ethyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Methyl Isobutyl Ketone	10	<10	<10	<10	NA	<10	NA	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	NA	NA	<0.30	NA	<0.30	<0.30	<0.30

Table D-4a
Pesticides and PCBs Analysis Results
Site 3

Field Sample ID		GW50	GW51	GW52	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4,4'-DDD	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dieldrin	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan sulfate	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endrin	0.05	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endrin aldehyde	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor	0.025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Methoxychlor	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1016	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1221	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1232	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1242	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1248	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1254	0.50	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
PCB-1260	0.50	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Surrogate:								
Dibutylchlorendate	25-154	76	70	90	78	84	92	87

Table D-4a(continued)
Pesticides and PCBs Analysis Results
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
a-BHC	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
b-BHC	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
g-BHC	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
d-BHC	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
Chlordane	0.20	<0.50	<0.50	<0.50	<0.50	<0.50
4,4'-DDD	0.05	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	0.05	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Dieldrin	0.05	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan I	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan II	0.05	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	0.05	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin aldehyde	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Heptachlor	0.025	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toxaphene	1.00	<1.0	<1.0	<1.0	<1.0	<1.0
Methoxychlor	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1016	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1221	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1232	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1242	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1248	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
PCB-1254	0.50	<1.0	<1.0	<1.0	<1.0	<1.0
PCB-1260	0.50	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate:						
Dibutylchlorendate:	25-154	88	104	88	70	96

Table D-4b
Pesticides and PCBs Analysis Results
Site 13

Field Sample ID		GW4	GW5
Sample Matrix		Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	< 0.025	< 0.025
a-BHC	0.025	< 0.025	< 0.025
b-BHC	0.025	< 0.025	< 0.025
g-BHC	0.025	< 0.025	< 0.025
d-BHC	0.025	< 0.025	< 0.025
Chlordane	0.20	< 0.20	< 0.20
4,4'-DDD	0.05	< 0.05	< 0.05
4,4'-DDE	0.05	< 0.05	< 0.05
4,4'-DDT	0.10	< 0.10	< 0.10
Dieldrin	0.05	< 0.05	< 0.05
Endosulfan I	0.05	< 0.05	< 0.05
Endosulfan II	0.05	< 0.05	< 0.05
Endosulfan sulfate	0.10	< 0.10	< 0.10
Endrin	0.05	< 0.05	< 0.05
Endrin aldehyde	0.10	< 0.10	< 0.10
Heptachlor	0.025	< 0.025	< 0.025
Heptachlor epoxide	0.05	< 0.050	< 0.050
Toxaphene	1.00	< 1.0	< 1.0
Methoxychlor	0.50	< 0.50	< 0.50
PCB-1016	0.50	< 0.50	< 0.50
PCB-1221	0.50	< 0.50	< 0.50
PCB-1232	0.50	< 0.50	< 0.50
PCB-1242	0.50	< 0.50	< 0.50
PCB-1248	0.50	< 0.50	< 0.50
PCB-1254	0.50	< 0.50	< 0.50
PCB-1260	0.50	< 0.50	< 0.50
Surrogate:			
Dibutylchlorendate	25-154	89	113

Table D-4c
Pesticides and PCBs Analysis Results
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	< 0.025	<0.05	<0.05
a-BHC	0.025	< 0.025	<0.05	<0.05
b-BHC	0.025	< 0.025	<0.05	<0.05
g-BHC	0.025	< 0.025	<0.05	<0.05
d-BHC	0.025	< 0.025	<0.05	<0.05
Chlordane	0.20	< 0.20	<0.50	<0.50
4,4'-DDD	0.05	< 0.05	<0.10	<0.10
4,4'-DDE	0.05	< 0.05	<0.10	<0.10
4,4'-DDT	0.10	< 0.10	<0.10	<0.10
Dieldrin	0.05	< 0.05	<0.10	<0.10
Endosulfan I	0.05	< 0.05	<0.05	<0.05
Endosulfan II	0.05	< 0.05	<0.10	<0.10
Endosulfan sulfate	0.10	< 0.10	<0.10	<0.10
Endrin	0.05	< 0.05	<0.10	<0.10
Endrin aldehyde	0.10	< 0.10	<0.10	<0.10
Heptachlor	0.025	< 0.025	<0.05	<0.05
Heptachlor epoxide	0.05	< 0.050	<0.05	<0.05
Toxaphene	1.00	< 1.0	<1.0	<1.0
Methoxychlor	0.50	< 0.5	<0.50	<0.50
PCB-1016	0.50	< 0.5	<0.50	<0.50
PCB-1221	0.50	< 0.5	<0.50	<0.50
PCB-1232	0.50	< 0.5	<0.50	<0.50
PCB-1242	0.50	< 0.5	<0.50	<0.50
PCB-1248	0.50	< 0.5	<0.50	<0.50
PCB-1254	0.50	< 0.5	<1.0	<1.0
PCB-1260	0.50	< 0.5	<1.0	<1.0
Surrogate:				
Dibutylchlorendate	25-154	105	86	91

Table D-5a
Organic Analysis Results: Semivolatile Organic Compounds
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10	< 10	< 10	< 10	< 10	< 10
1,3-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
1,4-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
bis(2-chloroisopropyl)ether	10	< 10	< 10	< 10	< 10	< 10	< 10
N-Nitroso-di-propylamine	10	< 10	< 10	< 10	< 10	< 10	< 10
Hexachloroethane	10	< 10	< 10	< 10	< 10	< 10	< 10
Nitrobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
Isophorone	10	< 10	< 10	< 10	< 10	< 10	< 10
bis(2-chloroethoxy)methane	10	< 10	< 10	< 10	< 10	< 10	< 10
1,2,4-Trichlorobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	10	< 10	< 10	< 10	< 10	< 10	< 10
Hexachlorobutadiene	10	< 10	< 10	< 10	< 10	< 10	< 10
Hexachlorocyclopentadiene	10	< 10	< 10	< 10	< 10	< 10	< 10
2-Chloronaphthalene	10	< 10	< 10	< 10	< 10	< 10	< 10
Dimethyl phthalate	10	< 10	< 10	< 10	< 10	< 10	< 10
Acenaphthylene	10	< 10	< 10	< 10	< 10	< 10	< 10
Fluorene	10	< 10	< 10	< 10	< 10	< 10	< 10
Acenaphthene	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4-Dinitrotoluene	10	< 10	< 10	< 10	< 10	< 10	< 10
2,6-Dinitrotoluene	10	< 10	< 10	< 10	< 10	< 10	< 10
Diethylphthalate	10	< 10	< 10	< 10	< 10	< 10	< 10
4-Chlorophenyl phenyl ether	10	< 10	< 10	< 10	< 10	< 10	< 10
N-Nitrosodiphenylamine	10	< 10	< 10	< 10	< 10	< 10	< 10
4-Bromophenyl phenyl ether	10	< 10	< 10	< 10	< 10	< 10	< 10

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Table D-5a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	< 10	< 10	< 10	< 10	< 10	< 10
Phenanthrene	10	< 10	< 10	< 10	< 10	< 10	< 10
Anthracene	10	< 10	< 10	< 10	< 10	< 10	< 10
Di-n-Butyl phthalate	10	< 10*	< 10*	< 10*	< 10*	< 10*	< 10*
Fluoranthene	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzidine	50	< 50	< 50	< 50	< 50	< 50	< 50
Pyrene	10	< 10	< 10	< 10	< 10	< 10	< 10
Butyl benzyl phthalate	10	< 10	< 10	< 10	< 10	< 10	< 10
3,3'-Dichlorobenzidine	20	< 20	< 20	< 20	< 20	< 20	< 20
Benzo(a)anthracene	10	< 10	< 10	< 10	< 10	< 10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10*	< 10	< 10*	< 10*	< 10*	< 10*
Chrysene	10	< 10	< 10	< 10	< 10	< 10	< 10
Di-n-octyl phthalate	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzo(b)fluoranthene	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzo(k)fluoranthene	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzo(a)pyrene	10	< 10	< 10	< 10	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10	< 10	< 10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzo(g,h,i)perylene	10	< 10	< 10	< 10	< 10	< 10	< 10
Phenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2-Chlorophenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2-Nitrophenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4-Dimethyphenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4-Dichlorophenol	10	< 10	< 10	< 10	< 10	< 10	< 10

* Compound present below measurable detection limit.

Table D-5a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3

Field Sample ID		GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4,6-Trichlorophenol	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4-Dinitrophenol	50	< 50	< 50	< 50	< 50	< 50	< 50
4-Nitrophenol	50	< 50	< 50	< 50	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	50	< 50	< 50	< 50	< 50	< 50	< 50
Pentachlorophenol	50	< 50	< 50	< 50	< 50	< 50	< 50
Benzyl alcohol	10	< 10	< 10	< 10	< 10	< 10	< 10
2-Methylphenol	10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methylphenol	10	< 10	< 10	< 10	< 10	< 10	< 10
Benzoic acid	50	< 50	< 50	< 50	< 50	< 50	< 50
4-Chloroaniline	10	< 10	< 10	< 10	< 10	< 10	< 10
2-Methylnaphthalene	10	< 10	< 10	< 10	< 10	< 10	< 10
2,4,5-Trichlorophenol	50	< 50	< 50	< 50	< 50	< 50	< 50
2-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50	< 50
3-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50	< 50
Dibenzofuran	10	< 10	< 10	< 10	< 10	< 10	< 10
4-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50	< 50
Surrogates:							
Nitrobenzene-d5	35-114	96	38	77	86	78	57
2-Fluorobiphenyl	43-116	92	61	66	83	81	61
Terphenyl-d14	33-141	71	65	56	76	64	64
2-Fluorophenol	10-94	48	52	46	49	56	54
Phenol-d5	10-94	11	40	38	42	48	44
2,4,6-Tribromophenol	10-123	70	92	96	96	60	96

Table D-5a

Organic Analysis Results: Semivolatile Organic Compounds

Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	10	<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether	10	<10	<10	<10	<10	<10
N-Nitroso-di-propylamine	10	<10	<10	<10	<10	<10
Hexachloroethane	10	<10	<10	<10	<10	<10
Nitrobenzene	10	<10	<10	<10	<10	<10
Isophorone	10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	10	<10	<10	<10	<10	<10
Naphthalene	10	<10	<10	<10	<10	<10
Hexachlorobutadiene	10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	10	<10	<10	<10	<10	<10
2-Chloronaphthalene	10	<10	<10	<10	<10	<10
Dimethyl phthalate	10	<10	<10	<10	<10	<10
Acenaphthylene	10	<10	<10	<10	<10	<10
Fluorene	10	<10	<10	<10	<10	<10
Acenaphthene	10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	10	<10	<10	<10	<10	<10
Diethylphthalate	10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	10	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	10	<10	<10	<10	<10	<10

Table D-5a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	<10	<10	<10	<10	<10
Phenanthrene	10	<10	<10	<10	<10	<10
Anthracene	10	<10	<10	<10	<10	<10
Di-n-Butyl phthalate	10	<10	<10*	<10*	<10*	17
Fluoranthene	10	<10	<10	<10	<10	<10
Benzidine	50	<50	<50	<50	<50	<50
Pyrene	10	<10	<10	<10	<10	<10
Butyl benzyl phthalate	10	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine	20	<20	<20	<20	<20	<20
Benzo(a)anthracene	10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	10	62	<10	<10*	<10*	10
Chrysene	10	<10	<10	<10	<10	<10
Di-n-octyl phthalate	10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(a)pyrene	10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	10	<10	<10	<10	<10	<10
Phenol	10	<10	<10	<10	<10	<10
2-Chlorophenol	10	<10	<10	<10	<10	<10
2-Nitrophenol	10	<10	<10	<10	<10	<10
2,4-Dimethyphenol	10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	10	<10	<10	<10	<10	<10

* = Compound present below measurable detection limit.

Table D-5a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3

Field Sample ID		GW59	GW60	GW61	GW62	GW63
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	50	<50	<50	<50	<50	<50
4-Nitrophenol	50	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol	50	<50	<50	<50	<50	<50
Pentachlorophenol	50	<50	<50	<50	<50	<50
Benzyl alcohol	10	<10	<10	<10	<10	<10
2-Methylphenol	10	<10	<10	<10	<10	<10
4-Methylphenol	10	<10	<10	<10	<10	<10
Benzoic acid	50	<50	<50	<50	<50	<50
4-Chloroaniline	10	<10	<10	<10	<10	<10
2-Methylnaphthalene	10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	50	<50	<50	<50	<50	<50
2-Nitroaniline	50	<50	<50	<50	<50	<50
3-Nitroaniline	50	<50	<50	<50	<50	<50
Dibenzofuran	10	<10	<10	<10	<10	<10
4-Nitroaniline	50	<50	<50	<50	<50	<50
Surrogates:						
Nitrobenzene-d5	35-114	85	68	71	77	70
2-Fluorobiphenyl	43-116	90	64	64	80	66
Terphenyl-d14	33-141	89	84	65	52	43
2-Fluorophenol	10-94	30	54	22	20	53
Phenol-d5	10-94	32	42	22	20	42
2,4,6-Tribromophenol	10-123	72	76	74	58	98

Table D-5b
Organic Analysis Results: Semivolatile Organic Compounds
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	10	<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether	10	<10	<10	<10	<10	<10
N-Nitroso-di-propylamine	10	<10	<10	<10	<10	<10
Hexachloroethane	10	<10	<10	<10	<10	<10
Nitrobenzene	10	<10	<10	<10	<10	<10
Isophorone	10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	10	<10	<10	<10	<10	<10
Naphthalene	10	<10	<10	<10	<10	<10
Hexachlorobutadiene	10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	10	<10	<10	<10	<10	<10
2-Chloronaphthalene	10	<10	<10	<10	<10	<10
Dimethyl phthalate	10	<10	<10	<10	<10	<10
Acenaphthylene	10	<10	<10	<10	<10	<10
Fluorene	10	<10	<10	<10	<10	<10
Acenaphthene	10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	10	<10	<10	<10	<10	<10
Diethylphthalate	10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	10	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	10	<10	<10	<10	<10	<10

Table D-5b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	<10	<10	<10	<10	<10
Phenanthrene	10	<10	<10	<10	<10	<10
Anthracene	10	<10	<10	<10	<10	<10
Di-n-Butyl phthalate	10	<10*	<10*	<10*	<10*	<10*
Fluoranthene	10	<10	<10	<10	<10	<10
Benzidine	50	<50	<50	<50	<50	<50
Pyrene	10	<10	<10	<10	<10	<10
Butyl benzyl phthalate	10	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine	20	<20	<20	<20	<20	<20
Benzo(a)anthracene	10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	10	<10*	<10*	<10*	<10*	<10*
Chrysene	10	<10	<10	<10	<10	<10
Di-n-octyl phthalate	10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(a)pyrene	10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	10	<10	<10	<10	<10	<10
Phenol	10	<10	<10	<10	<10	<10
2-Chlorophenol	10	<10	<10	<10	<10	<10
2-Nitrophenol	10	<10	<10	<10	<10	<10
2,4-Dimethyphenol	10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	10	<10	<10	<10	<10	<10

* = Compound present below measurable detection limit.

Table D-5b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 5

Field Sample ID		GW43	GW44	GW45	GW46	GW47
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	50	<50	<50	<50	<50	<50
4-Nitrophenol	50	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol	50	<50	<50	<50	<50	<50
Pentachlorophenol	50	<50	<50	<50	<50	<50
Benzyl alcohol	10	<10	<10	<10	<10	<10
2-Methylphenol	10	<10	<10	<10	<10	<10
4-Methylphenol	10	<10	<10	<10	<10	<10
Benzoic acid	50	<50	<50	<50	<50	<50
4-Chloroaniline	10	<10	<10	<10	<10	<10
2-Methylnaphthalene	10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	50	<50	<50	<50	<50	<50
2-Nitroaniline	50	<50	<50	<50	<50	<50
3-Nitroaniline	50	<50	<50	<50	<50	<50
Dibenzofuran	10	<10	<10	<10	<10	<10
4-Nitroaniline	50	<50	<50	<50	<50	<50
Surrogates:						
Nitrobenzene-d5	35-114	98	102	86	85	37
2-Fluorobiphenyl	43-116	80	104	94	84	47
Terphenyl-d14	33-141	38	51	41	26 OC	34
2-Fluorophenol	10-94	36	20	17	26	15
Phenol-d5	10-94	31	22	18	24	18
2,4,6-Tribromophenol	10-123	62	88	78	70	68

Table D-5c
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW28	GW29	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10	< 10	< 10	< 10
1,3-Dichlorobenzene	10	< 10	< 10	< 10	< 10
1,4-Dichlorobenzene	10	< 10	< 10	< 10	< 10
1,2-Dichlorobenzene	10	< 10	< 10	< 10	< 10
bis(2-chloroisopropyl)ether	10	< 10	< 10	< 10	< 10
N-Nitroso-di-propylamine	10	< 10	< 10	< 10	< 10
Hexachloroethane	10	< 10	< 10	< 10	< 10
Nitrobenzene	10	< 10	< 10	< 10	< 10
Isophorone	10	< 10*	< 10	< 10	< 10
bis(2-chloroethoxy)methane	10	< 10	< 10	< 10	< 10
1,2,4-Trichlorobenzene	10	< 10	< 10	< 10	< 10
Naphthalene	10	< 10	< 10	< 10	< 10
Hexachlorobutadiene	10	< 10	< 10	< 10	< 10
Hexachlorocyclopentadiene	10	< 10	< 10	< 10	< 10
2-Chloronaphthalene	10	< 10	< 10	< 10	< 10
Dimethyl phthalate	10	< 10*	< 10	< 10	< 10
Acenaphthylene	10	< 10*	< 10	< 10	< 10
Fluorene	10	< 10*	< 10	< 10	< 10
Acenaphthene	10	< 10*	< 10	< 10	< 10
2,4-Dinitrotoluene	10	< 10	< 10	< 10	< 10
2,6-Dinitrotoluene	10	< 10	< 10	< 10	< 10
Diethylphthalate	10	< 10*	< 10	< 10	< 10
4-Chlorophenyl phenyl ether	10	< 10	< 10	< 10	< 10
N-Nitrosodiphenylamine	10	< 10*	< 10	< 10	< 10
4-Bromophenyl phenyl ether	10	< 10	< 10	< 10	< 10

Table D-5c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW28	GW29	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	< 10	< 10	< 10	< 10
Phenanthrene	10	< 10*	< 10	< 10	< 10
Anthracene	10	< 10*	< 10	< 10	< 10
Di-n-Butyl phthalate	10	< 10	< 10*	< 10*	< 10*
Fluoranthene	10	< 10	< 10	< 10	< 10
Benzidine	50	< 50	< 50	< 50	< 50
Pyrene	10	< 10	< 10	< 10	< 10
Butyl benzyl phthalate	10	< 10	< 10	< 10	< 10
3,3'-Dichlorobenzidine	20	< 20	< 20	< 20	< 20
Benzo(a)anthracene	10	< 10	< 10	< 10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10	< 10*	< 10*	< 10
Chrysene	10	< 10	< 10	< 10	< 10
Di-n-octyl phthalate	10	< 10	< 10	< 10	< 10
Benzo(b)fluoranthene	10	< 10	< 10	< 10	< 10
Benzo(k)fluoranthene	10	< 10	< 10	< 10	< 10
Benzo(a)pyrene	10	< 10	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10	< 10
Benzo(g,h,i)perylene	10	< 10	< 10	< 10	< 10
Phenol	10	< 10	< 10	< 10	< 10
2-Chlorophenol	10	< 10	< 10	< 10	< 10
2-Nitrophenol	10	< 10	< 10	< 10	< 10
2,4-Dimethyphenol	10	< 10	< 10	< 10	< 10
2,4-Dichlorophenol	10	< 10	< 10	< 10	< 10

* Compound present below measurable detection limit.

Table D-5c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW28	GW29	GW31	GW32
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10	< 10	< 10	< 10
2,4,6-Trichlorophenol	10	< 10	< 10	< 10	< 10
2,4-Dinitrophenol	50	< 50	< 50	< 50	< 50
4-Nitrophenol	50	< 50	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	50	< 50	< 50	< 50	< 50
Pentachlorophenol	50	< 50	< 50	< 50	< 50
Benzyl alcohol	10	< 10	< 10	< 10	< 10
2-Methylphenol	10	< 10	< 10	< 10	< 10
4-Methylphenol	10	< 10	< 10	< 10	< 10
Benzoic acid	50	< 50	< 50	< 50	< 50
4-Chloroaniline	10	< 10	< 10	< 10	< 10
2-Methylnaphthalene	10	< 10	< 10	< 10	< 10
2,4,5-Trichlorophenol	50	< 50	< 50	< 50	< 50
2-Nitroaniline	50	< 50	< 50	< 50	< 50
3-Nitroaniline	50	< 50	< 50	< 50	< 50
Dibenzofuran	10	< 10*	< 10	< 10	< 10
4-Nitroaniline	50	< 50	< 50	< 50	< 50
Surrogates:					
Nitrobenzene-d5	35-114	45	66	70	61
2-Fluorobiphenyl	43-116	42 OC	69	61	64
Terphenyl-d14	33-141	31 OC	57	47	60
2-Fluorophenol	10-94	41	28	24	46
Phenol-d5	10-94	36	26	19	36
2,4,6-Tribromophenol	10-123	53	86	52	86

Table D-5c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW35	GW36	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10	< 10	< 10	< 10	< 10
1,3-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10
1,4-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10
1,2-Dichlorobenzene	10	< 10	< 10	< 10	< 10	< 10
bis(2-chloroisopropyl)ether	10	< 10	< 10	< 10	< 10	< 10
N-Nitroso-di-propylamine	10	< 10	< 10	< 10	< 10	< 10
Hexachloroethane	10	< 10	< 10	< 10	< 10	< 10
Nitrobenzene	10	< 10	< 10	< 10	< 10	< 10
Isophorone	10	< 10	< 10	< 10	< 10	< 10
bis(2-chloroethoxy)methane	10	< 10	< 10	< 10	< 10	< 10
1,2,4-Trichlorobenzene	10	< 10	< 10	< 10	< 10	< 10
Naphthalene	10	< 10	< 10	< 10	< 10	< 10
Hexachlorobutadiene	10	< 10	< 10	< 10	< 10	< 10
Hexachlorocyclopentadiene	10	< 10	< 10	< 10	< 10	< 10
2-Chloronaphthalene	10	< 10	< 10	< 10	< 10	< 10
Dimethyl phthalate	10	< 10	< 10	< 10	< 10	< 10
Acenaphthylene	10	< 10	< 10	< 10	< 10	< 10
Fluorene	10	< 10	< 10	< 10	< 10	< 10
Acenaphthene	10	< 10	< 10	< 10	< 10	< 10
2,4-Dinitrotoluene	10	< 10	< 10	< 10	< 10	< 10
2,6-Dinitrotoluene	10	< 10	< 10	< 10	< 10	< 10
Diethylphthalate	10	< 10	< 10	< 10	< 10	< 10
4-Chlorophenyl phenyl ether	10	< 10	< 10	< 10	< 10	< 10
N-Nitrosodiphenylamine	10	< 10	< 10	< 10	< 10	< 10
4-Bromophenyl phenyl ether	10	< 10	< 10	< 10	< 10	< 10

Table D-5c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW35	GW36	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	< 10	< 10	< 10	< 10	< 10
Phenanthrene	10	< 10	< 10	< 10	< 10	< 10
Anthracene	10	< 10	< 10	< 10	< 10	< 10
Di-n-Butyl phthalate	10	< 10*	< 10*	< 10*	18	22
Fluoranthene	10	< 10	< 10	< 10	< 10	< 10*
Benzidine	50	< 50	< 50	< 50	< 50	< 50
Pyrene	10	< 10	< 10	< 10	< 10	< 10*
Butyl benzyl phthalate	10	< 10	< 10	< 10	< 10	< 10*
3,3'-Dichlorobenzidine	20	< 20	< 20	< 20	< 20	< 20
Benzo(a)anthracene	10	< 10	< 10	< 10	< 10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10*	10	< 10*	20	38
Chrysene	10	< 10	< 10	< 10	< 10	< 10
Di-n-octyl phthalate	10	< 10	< 10	< 10	< 10	< 10*
Benzo(b)fluoranthene	10	< 10	< 10	< 10	< 10	< 10*
Benzo(k)fluoranthene	10	< 10	< 10	< 10	< 10	< 10
Benzo(a)pyrene	10	< 10	< 10	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10	< 10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10	< 10	< 10
Benzo(g,h,i)perylene	10	< 10	< 10	< 10	< 10	< 10
Phenol	10	< 10	< 10	< 10	< 10	< 10
2-Chlorophenol	10	< 10	< 10	< 10	< 10	< 10
2-Nitrophenol	10	< 10	< 10	< 10	< 10	< 10
2,4-Dimethyphenol	10	< 10	< 10	< 10	< 10	< 10
2,4-Dichlorophenol	10	< 10	< 10	< 10	< 10	< 10

* Compound present below measurable detection limit.

Table D-5c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8

Field Sample ID		GW35	GW36	GW38	GW39	GW40
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10	< 10	< 10	< 10	< 10
2,4,6-Trichlorophenol	10	< 10	< 10	< 10	< 10	< 10
2,4-Dinitrophenol	50	< 50	< 50	< 50	< 50	< 50
4-Nitrophenol	50	< 50	< 50	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	50	< 50	< 50	< 50	< 50	< 50
Pentachlorophenol	50	< 50	< 50	< 50	< 50	< 50
Benzyl alcohol	10	< 10	< 10	< 10	< 10	< 10
2-Methylphenol	10	< 10	< 10	< 10	< 10	< 10
4-Methylphenol	10	< 10	< 10	< 10	< 10	< 10
Benzoic acid	50	< 50	< 50	< 50	< 50	< 50
4-Chloroaniline	10	< 10	< 10	< 10	< 10	< 10
2-Methylnaphthalene	10	< 10	< 10	< 10	< 10	< 10
2,4,5-Trichlorophenol	50	< 50	< 50	< 50	< 50	< 50
2-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50
3-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50
Dibenzofuran	10	< 10	< 10	< 10	< 10	< 10
4-Nitroaniline	50	< 50	< 50	< 50	< 50	< 50
Surrogates:						
Nitrobenzene-d5	35-114	71	78	54	56	45
2-Fluorobiphenyl	43-116	51	64	67	67	46
Terphenyl-d14	33-141	39	38	42	47	22 OC
2-Fluorophenol	10-94	30	48	48	46	48
Phenol-d5	10-94	32	38	36	39	40
2,4,6-Tribromophenol	10-123	45	72	68	48	84

Table D-5d

Organic Analysis Results: Semivolatile Organic Compounds

EQUIPMENT WASH BLANKS

Field Sample ID		GW33	GW41	GW48	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	10	<10*	<10	<10	<10	<10
1,4-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	10	<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether	10	<10	<10	<10	<10	<10
N-Nitroso-di-propylamine	10	<10	<10	<10	<10	<10
Hexachloroethane	10	<10	<10	<10	<10	<10
Nitrobenzene	10	<10	<10	<10	<10	<10
Isophorone	10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	10	<10	<10	<10	<10	<10
Naphthalene	10	<10	<10	<10	<10	<10
Hexachlorobutadiene	10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	10	<10	<10	<10	<10	<10
2-Chloronaphthalene	10	<10	<10	<10	<10	<10
Dimethyl phthalate	10	<10	<10	<10	<10	<10
Acenaphthylene	10	<10	<10	<10	<10	<10
Fluorene	10	<10	<10	<10	<10	<10
Acenaphthene	10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	10	<10	<10	<10	<10	<10
Diethylphthalate	10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	10	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	10	<10	<10	<10	<10	<10

Table D-5d (continued)
Organic Analysis Results: Semivolatile Organic Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW33	GW41	GW48	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	<10	<10	<10	<10	<10
Phenanthrene	10	<10	<10	<10	<10	<10
Anthracene	10	<10	<10	<10	<10	<10
Di-n-Butyl phthalate	10	<10*	<10*	<10*	<10*	<10
Fluoranthene	10	<10	<10	<10	<10	<10
Benzidine	50	<50	<50	<50	<50	<50
Pyrene	10	<10	<10	<10	<10	<10
Butyl benzyl phthalate	10	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine	20	<20	<20	<20	<20	<20
Benzo(a)anthracene	10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	10	<10*	<10*	<10*	<10	<10*
Chrysene	10	<10	<10	<10	<10	<10
Di-n-octyl phthalate	10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(a)pyrene	10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	10	<10	<10	<10	<10	<10
Phenol	10	<10	<10	<10	<10	<10
2-Chlorophenol	10	<10	<10	<10	<10	<10
2-Nitrophenol	10	<10	<10	<10	<10	<10
2,4-Dimethyphenol	10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	10	<10	<10	<10	<10	<10

* = Compound present below measurable detection limit.

Table D-5d (continued)
Organic Analysis Results: Semivolatile Organic Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW33	GW41	GW48	GW56	GW64
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	50	<50	<50	<50	<50	<50
4-Nitrophenol	50	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol	50	<50	<50	<50	<50	<50
Pentachlorophenol	50	<50	<50	<50	<50	<50
Benzyl alcohol	10	<10	<10	<10	<10	<10
2-Methylphenol	10	<10	<10	<10	<10	<10
4-Methylphenol	10	<10	<10	<10	<10	<10
Benzoic acid	50	<50	<50	<50	<50	<50
4-Chloroaniline	10	<10	<10	<10	<10	<10
2-Methylnaphthalene	10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	50	<50	<50	<50	<50	<50
2-Nitroaniline	50	<50	<50	<50	<50	<50
3-Nitroaniline	50	<50	<50	<50	<50	<50
Dibenzofuran	10	<10	<10	<10	<10	<10
4-Nitroaniline	50	<50	<50	<50	<50	<50
Surrogates:						
Nitrobenzene-d5	35-114	62	70	66	73	82
2-Fluorobiphenyl	43-116	71	82	82	69	72
Terphenyl-d14	33-141	54	110	67	91	110
2-Fluorophenol	10-94	44	69	16	18	46
Phenol-d5	10-94	32	48	14	16	30
2,4,6-Tribromophenol	10-123	96	105	80	30	84

Table D-6a
Inorganic Analysis Results: Metals, TPH
SITE 1

Field Sample ID			GW86	GW87	GW88	GW89	GW90	GW91	GW92
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	20.8	3.86	0.437	21.7	2.97	0.152	0.170
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	0.072	<0.050	0.051
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	0.0053	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.219	0.062	0.098	0.263	0.042	0.045	0.090
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.192	0.161	0.109	0.148	0.083	0.094	0.112
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	128	130	106	500	253	213	101
Chromium	Cr	0.010	0.022	<0.010	<0.010	0.022	<0.010	<0.010	<0.010
Cobalt	Co	0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	0.113	0.049	<0.010	0.055	<0.010	<0.010	<0.010
Iron	Fe	0.025	28.1	5.78	3.40	30.5	6.18	0.960	2.93
Lead	Pb	0.05	<0.050	<0.050	0.069	0.321	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	0.057	0.023	0.096	NA*	0.0086	<0.005	0.029
Magnesium	Mg	0.20	69.0	74.2	47.8	335	281	94.7	48.1
Manganese	Mn	0.005	1.23	0.907	0.128	1.64	1.81	0.071	0.132
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.046	<0.015	<0.015	0.033	<0.015	<0.015	<0.015
Potassium	K	0.4	3.56	1.03	1.12	6.61	3.34	2.09	0.910
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	30.0	11.0	6.18	31.6	10.9	7.47	5.64
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	27.8	60.2	29.2	68.8	90.5	33.9	29.2
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	0.038	<0.010	<0.010	0.036	<0.010	<0.010	<0.010
Zinc	Zn	0.01	0.463	0.309	0.206	1.04	0.089	0.026	0.089
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0

NA* = Not analyzed by GFAA due to high concentrations which were adequately determined by ICP.

Table D-6a (continued)
Inorganic Analysis Results: Metals, TPH
SITE 1

Field Sample ID			GW95	GW96
Sample Matrix			Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.245	0.216
Antimony	Sb	0.06	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005
Barium	Ba	0.01	0.048	0.047
Beryllium	Be	0.002	<0.002	<0.002
Boron	B	0.01	0.061	0.058
Cadmium	Cd	0.005	<0.005	<0.005
Calcium	Ca	0.20	395	134
Chromium	Cr	0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010
Copper	Cu	0.010	<0.010	<0.010
Iron	Fe	0.025	2.18	1.27
Lead	Pb	0.05	<0.050	<0.050
Lead (E239.2)	Pb	0.005	<0.005	<0.005
Magnesium	Mg	0.20	308	44.0
Manganese	Mn	0.005	0.599	0.569
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010
Nickel	Ni	0.015	<0.015	<0.015
Potassium	K	0.4	1.54	1.94
Selenium	Se	0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005
Silicon	Si	0.020	8.09	4.74
Silver	Ag	0.01	0.521	<0.010
Sodium	Na	0.200	60.2	25.1
Thallium	Tl	0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	<0.010
Zinc	Zn	0.01	0.027	0.420
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0

Table D-6b
Inorganic Analysis Results: Metals, TPH
SITE 2

Field Sample ID			GW75	GW76	GW77	GW78	GW71	GW72
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.188	2.02	0.444	1.07	<0.100	<0.100
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	<0.010	0.036	0.018	0.054	0.062	0.067
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.116	0.054	0.056	0.108	0.074	0.090
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	532	537	333	139	152	158
Chromium	Cr	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	0.011	<0.010	0.013	<0.010	<0.010	<0.010
Iron	Fe	0.025	0.676	3.82	1.11	4.43	1.10	4.13
Lead	Pb	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	<0.005	0.005	<0.005	<0.005	<0.005	0.004
Magnesium	Mg	0.20	408	466	319	84.4	55.7	57.6
Manganese	Mn	0.005	1.84	0.723	0.526	1.74	0.224	0.260
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.016	0.026	<0.015	<0.015	<0.015	<0.015
Potassium	K	0.4	1.67	2.58	1.61	1.07	0.620	0.926
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	10.3	11.3	8.86	8.09	5.67	6.02
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	67.6	74.2	66.3	84.3	61.6	64.4
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	Zn	0.01	0.184	0.456	0.042	0.036	0.172	0.186
Total Petroleum Hydrocarbons	TPH	1.0	1.2	<1.0	<1.0	1.3	<1.0	<1.0

Table D-6c
Inorganic Analysis Results: Metals, TPH
SITE 3

Field Sample ID			GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	31.4	14.2	0.760	48.2	0.106	1.40
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	0.012	0.008	< 0.005	0.013	< 0.005	< 0.005
Barium	Ba	0.01	0.744	0.160	0.057	0.533	0.141	0.089
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	1.27	0.168	0.078	0.509	0.739	0.087
Cadmium	Cd	0.005	0.064	< 0.005	< 0.005	0.006	< 0.005	< 0.005
Calcium	Ca	0.20	603	220	315	44.9	221	196
Chromium	Cr	0.010	0.127	0.015	< 0.010	0.060	< 0.010	< 0.010
Cobalt	Co	0.010	0.015	< 0.010	< 0.010	0.038	< 0.010	< 0.010
Copper	Cu	0.010	0.857	0.058	< 0.010	0.162	< 0.010	< 0.010
Iron	Fe	0.025	61.4	23.6	5.05	91.0	1.47	3.13
Lead	Pb	0.05	0.841	0.378	0.051	0.121	< 0.050	< 0.050
Lead (E239.2)	Pb	0.005	NA*	NA*	0.082	NA*	0.027	0.014
Magnesium	Mg	0.20	87.9	120	69.4	173	100	59.8
Manganese	Mn	0.005	1.69	0.952	0.208	4.41	1.07	0.143
Mercury (E245.1)	Hg	0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Molybdenum	Mo	0.01	< 0.010	< 0.010	0.032	< 0.010	< 0.010	< 0.010
Nickel	Ni	0.015	0.233	0.024	0.035	0.103	< 0.015	< 0.015
Potassium	K	0.4	29.4	4.57	3.65	11.1	2.57	2.69
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	38.1	29.0	47.8	57.8	9.41	65.9
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	Na	0.20	214	67.2	37.1	36.3	69.7	23.2
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	0.051	0.023	< 0.010	0.074	< 0.010	< 0.010
Zinc	Zn	0.01	2.77	0.822	1.50	1.93	0.346	0.051
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

NA* - Not analyzed by GFAA due to high concentrations which were adequately determined by ICP.

Table D-6c
Inorganic Analysis Results: Metals, TPH
SITE 3

Field Sample ID			GW59	GW60	GW61	GW62	GW63
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	18.9	<0.100	<0.100	5.53	0.211
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.137	0.067	0.049	0.067	0.043
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.129	0.098	0.318	0.092	0.088
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	553	203	301	167	262
Chromium	Cr	0.010	0.035	<0.010	<0.010	0.014	<0.010
Cobalt	Co	0.010	0.012	<0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	0.021	<0.010	<0.010	<0.010	<0.010
Iron	Fe	0.025	23.4	0.905	0.723	8.67	1.75
Lead	Pb	0.05	0.154	<0.050	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	NA*	<0.005	<0.005	0.013	<0.005
Magnesium	Mg	0.20	65.6	56.6	87.0	58.4	91.1
Manganese	Mn	0.005	0.513	0.065	0.050	1.05	0.073
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.016	<0.015	<0.015	<0.015	<0.015
Potassium	K	0.4	3.73	3.51	2.53	1.83	1.74
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	25.6	4.31	5.38	10.3	5.41
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	30.0	43.6	29.2	80.1	24.8
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	0.029	<0.010	<0.010	<0.010	<0.010
Zinc	Zn	0.01	0.493	<0.010	<0.010	0.207	<0.010
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NA* - Not analyzed by GFAA due to high concentrations which were adequately determined by ICP.

Table D-6d
Inorganic Analysis Results: Metals, TPH
SITE 4

Field Sample ID			GW66	GW67	GW68	GW69
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	6.79	1.37	4.35	1.70
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.100	0.060	0.237	0.037
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.146	0.093	0.113	0.333
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	53.3	48.3	270	189
Chromium	Cr	0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010	0.017	<0.010
Copper	Cu	0.010	0.024	0.013	0.022	0.011
Iron	Fe	0.025	13.4	3.46	9.44	3.76
Lead	Pb	0.05	0.076	<0.050	0.078	<0.050
Lead (E239.2)	Pb	0.005	0.078	0.031	0.060	0.010
Magnesium	Mg	0.20	45.6	31.7	181	125
Manganese	Mn	0.005	1.16	1.21	1.92	1.36
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.031	0.015	0.51	<0.015
Potassium	K	0.4	3.08	2.23	2.28	2.07
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	18.6	10.7	16.4	10.8
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	73.5	76.4	74.3	76.9
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	0.011	<0.010	<0.010	<0.010
Zinc	Zn	0.01	0.701	0.189	0.388	0.131
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0

Table D-6e
Inorganic Analysis Results: Metals, TPH
SITE 5

Field Sample ID			GW43	GW44	GW45	GW46	GW47
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	11.8	5.79	<0.100	30.7	<0.100
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.175	0.125	0.143	0.354	0.164
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.114	0.079	0.112	0.245	0.063
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	313	243	218	392	213
Chromium	Cr	0.010	0.020	0.014	<0.010	0.044	<0.010
Cobalt	Co	0.010	<0.010	<0.010	<0.010	0.024	<0.010
Copper	Cu	0.010	0.032	<0.010	<0.010	0.079	<0.010
Iron	Fe	0.025	18.8	9.48	1.62	52.0	2.18
Lead	Pb	0.05	0.100	0.078	<0.050	0.247	<0.050
Lead (E239.2)	Pb	0.005	0.100	0.068	<0.005	0.646	0.008
Magnesium	Mg	0.20	144	111	78.6	181	79.7
Manganese	Mn	0.005	1.38	0.761	0.122	2.75	0.129
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.024	<0.015	<0.015	0.057	<0.015
Potassium	K	0.4	4.05	3.14	1.93	8.26	1.92
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	35.0	18.6	6.04	43.8	6.28
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	47.2	58.3	36.2	290	41.6
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	0.019	0.008	<0.010	0.053	<0.010
Zinc	Zn	0.01	1.20	0.634	0.088	1.56	0.128
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D-6f
Inorganic Analysis Results: Metals, TPH
SITE 6

Field Sample ID			GW81	GW82	GW83
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.667	2.27	0.792
Antimony	Sb	0.06	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.016	0.037	0.022
Beryllium	Be	0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.079	0.049	0.052
Cadmium	Cd	0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	436	334	313
Chromium	Cr	0.010	<0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	0.028	0.029	0.011
Iron	Fe	0.025	2.63	3.94	1.33
Lead	Pb	0.05	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	0.007	0.008	0.008
Magnesium	Mg	0.20	665	251	280
Manganese	Mn	0.005	0.642	0.257	0.322
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	0.017	<0.015	<0.015
Potassium	K	0.4	1.97	2.35	2.69
Selenium	Se	0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	8.62	12.1	10.2
Silver	Ag	0.01	<0.010	<0.010	<0.010
Sodium	Na	0.200	126	71.3	64.2
Thallium	Tl	0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	<0.010	<0.010
Zinc	Zn	0.01	0.292	0.204	0.724
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0

Table D-6g
Inorganic Analysis Results: Metals, TPH
SITE 7

Field Sample ID			GW22	GW23	GW25
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	1.90	20.5	9.30
Antimony	Sb	0.06	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.074	0.213	0.112
Beryllium	Be	0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.270	0.128	0.087
Cadmium	Cd	0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	96.8	352	130
Chromium	Cr	0.010	<0.010	0.036	0.018
Cobalt	Co	0.010	<0.010	0.012	<0.010
Copper	Cu	0.010	0.013	0.073	0.030
Iron	Fe	0.025	3.36	24.4	10.3
Lead	Pb	0.05	<0.050	0.076	<0.050
Lead (E239.2)	Pb	0.005	0.022	0.076	0.030
Magnesium	Mg	0.20	62.3	202	65
Manganese	Mn	0.005	0.577	0.912	0.466
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	<0.015	0.041	0.018
Potassium	K	0.4	0.610	2.54	1.64
Selenium	Se	0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	8.23	56.5	18.2
Silver	Ag	0.01	<0.010	<0.010	<0.010
Sodium	Na	0.200	14.1	7.79	7.96
Thallium	Tl	0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	0.028	<0.010
Zinc	Zn	0.01	0.244	3.40	1.36
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0

Table D-6h
Inorganic Analysis Results: Metals, TPH
SITE 8

Field Sample ID			GW28	GW29	GW30	GW31	GW32
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	2.13	< 0.100	< 0.100	18.0	0.909
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	< 0.005	0.005	0.006	0.005	< 0.005
Barium	Ba	0.01	0.040	0.069	0.071	0.283	0.095
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.208	0.106	0.013	0.212	0.125
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Calcium	Ca	0.20	276	259	279	43.	189
Chromium	Cr	0.010	0.012	< 0.010	< 0.010	0.026	< 0.010
Cobalt	Co	0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.010
Copper	Cu	0.010	< 0.010	< 0.010	< 0.010	0.041	< 0.010
Iron	Fe	0.025	5.16	4.17	2.93	32.5	0.816
Lead	Pb	0.05	< 0.050	< 0.050	< 0.050	0.080	< 0.050
Lead (E239.2)	Pb	0.005	0.007	< 0.005	< 0.005	0.062	< 0.005
Magnesium	Mg	0.20	240	137	154	201	72.7
Manganese	Mn	0.005	2.05	0.164	0.161	2.049	0.052
Mercury (E245.1)	Hg	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Molybdenum	Mo	0.010	0.059	< 0.010	< 0.010	< 0.010	< 0.010
Nickel	Ni	0.015	< 0.015	< 0.015	< 0.015	0.038	< 0.015
Potassium	K	0.4	7.54	3.67	3.30	6.04	3.50
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	8.69	6.07	6.48	27.3	8.02
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	475	56.6	59.0	57.1	47.0
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	0.035	< 0.010	< 0.010	0.036	< 0.010
Zinc	Zn	0.01	0.076	0.033	0.030	1.04	0.154
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table D-6h (continuted)
Inorganic Analysis Results: Metals, TPH
SITE 8

Field Sample ID			GW35	GW36	GW38	GW39	GW40
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	67.0	56.8	45.8	31.7	94.9
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	0.009	0.009	0.011	0.012	0.024
Barium	Ba	0.01	0.574	0.547	0.578	0.310	0.954
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.400	0.369	0.314	0.182	0.512
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.122
Calcium	Ca	0.20	840	922	949	392	1760
Chromium	Cr	0.010	0.093	0.086	0.062	0.025	0.180
Cobalt	Co	0.010	0.185	0.041	0.037	0.010	0.071
Copper	Cu	0.010	0.108	0.161	0.143	0.033	0.419
Iron	Fe	0.025	121	90.7	76.5	30.9	148
Lead	Pb	0.05	0.217	0.307	0.302	0.226	1.03
Lead (E239.2)	Pb	0.005	0.184	0.534	0.332	0.212	1.24
Magnesium	Mg	0.20	268	409	442	174	509
Manganese	Mn	0.005	4.96	4.89	4.76	1.08	9.08
Mercury (E245.1)	Hg	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0004
Molybdenum	Mo	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Nickel	Ni	0.015	0.145	0.104	0.087	0.027	0.194
Potassium	K	0.4	12.2	12.9	9.31	13.6	14.4
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	78.6	72.1	58.1	57.2	84.9
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	50.2	47.7	44.2	78.0	13.3
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	0.112	0.104	0.080	0.032	0.158
Zinc	Zn	0.01	4.47	2.68	2.29	1.40	6.12
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table D-6i
Inorganic Analysis Results: Metals, TPH
SITE 9

Field Sample ID			GW15	GW16	GW17	GW18
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	2.54	2.47	< 0.100	0.469
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Barium	Ba	0.01	0.029	0.037	0.026	0.021
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.587	0.335	0.122	0.077
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Calcium	Ca	0.20	555	642	560	741
Chromium	Cr	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cobalt	Co	0.010	< 0.010	< 0.010	< 0.010	0.016
Copper	Cu	0.010	0.022	< 0.010	< 0.010	0.017
Iron	Fe	0.025	4.51	5.68	2.08	3.45
Lead	Pb	0.05	< 0.050	< 0.050	< 0.050	< 0.050
Lead (E239.2)	Pb	0.005	0.010	0.006	< 0.005	< 0.005
Magnesium	Mg	0.20	264	325	374	854
Manganese	Mn	0.005	0.453	1.50	3.03	2.48
Mercury (E245.1)	Hg	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Molybdenum	Mo	0.010	< 0.010	< 0.010	0.012	0.010
Nickel	Ni	0.015	0.020	< 0.015	< 0.015	< 0.015
Potassium	K	0.4	5.24	52.5	2.16	2.95
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	9.48	11.6	6.07	8.19
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	254	300	173	382
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	< 0.010	< 0.010	< 0.010	< 0.010
Zinc	Zn	0.01	0.362	0.084	0.019	0.172
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	1.2	1.5	< 1.0

Table D-6j
Inorganic Analysis Results: Metals, TPH
SITE 10

Field Sample ID			GW11	GW12	GW10	GW13	GW9
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	2.53	7.00	12.7	0.696	35.1
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	0.263	0.089	0.130	0.122	0.332
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.074	<0.010	<0.010	0.057	<0.010
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	203	233	288	260	69.7
Chromium	Cr	0.010	<0.010	<0.010	0.033	<0.010	0.051
Cobalt	Co	0.010	<0.010	<0.010	<0.010	<0.010	0.023
Copper	Cu	0.010	0.019	0.015	0.064	<0.010	0.098
Iron	Fe	0.025	4.74	11.1	17.6	2.08	58.0
Lead	Pb	0.05	<0.050	<0.050	0.052	<0.050	0.206
Lead (E239.2)	Pb	0.005	0.011	0.014	0.070	0.011	0.256
Magnesium	Mg	0.20	97.4	97.3	148	71.6	31.7
Manganese	Mn	0.005	0.973	2.69	0.723	0.254	2.64
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	0.016	<0.010	<0.010	<0.010
Nickel	Ni	0.015	<0.015	0.028	0.028	<0.015	0.079
Potassium	K	0.4	2.11	2.84	4.04	1.20	7.79
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	9.60	16.1	27.4	7.08	61.6
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	27.3	81.1	19.3	11.5	7.73
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	0.015	0.031	<0.010	0.069
Zinc	Zn	0.01	0.147	0.292	1.11	0.087	2.89
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D-6k
Inorganic Analysis Results: Metals, TPH
SITE 13

Field Sample ID			GW4	GW5	GW2
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	60.6	35.5	NA
Antimony	Sb	0.06	<0.60	<0.60	NA
Arsenic	As	0.05	<0.05	<0.05	NA
Arsenic (E206.2)	As	0.005	0.015	<0.005	NA
Barium	Ba	0.01	0.475	0.245	NA
Beryllium	Be	0.002	<0.002	<0.002	NA
Boron	B	0.01	<0.010	<0.010	NA
Cadmium	Cd	0.005	<0.005	<0.005	NA
Calcium	Ca	0.20	524	572	NA
Chromium	Cr	0.010	0.100	0.050	NA
Cobalt	Co	0.010	0.045	0.026	NA
Copper	Cu	0.010	0.112	0.083	NA
Iron	Fe	0.025	106	57.3	NA
Lead	Pb	0.05	0.102	0.102	NA
Lead (E239.2)	Pb	0.005	0.063	0.079	NA
Magnesium	Mg	0.20	185	412	NA
Manganese	Mn	0.005	4.94	3.80	NA
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	NA
Molybdenum	Mo	0.010	0.015	<0.010	NA
Nickel	Ni	0.015	0.125	0.062	NA
Potassium	K	0.4	14.7	10.6	NA
Selenium	Se	0.100	<0.100	<0.100	NA
Selenium (E270.2)	Se	0.005	<0.005	<0.005	NA
Silicon	Si	0.020	69.2	63.1	NA
Silver	Ag	0.01	<0.010	<0.010	NA
Sodium	Na	0.200	571	164	NA
Thallium	Tl	0.100	<0.100	<0.100	NA
Vanadium	V	0.01	0.122	0.064	NA
Zinc	Zn	0.01	0.877	1.31	NA
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0

Table D-6l
Inorganic Analysis Results: Metals, TPH
EQUIPMENT WASH BLANKS

Field Sample ID			GW7	GW14	GW19	GW33	GW41	GW26	GW84
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	<0.100	<0.100	0.100	<0.100	<0.100	<0.100	<0.100
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	0.022	0.033	<0.010	0.035	<0.010	0.026	0.020
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	<0.200	2.77	4.47	<0.200	<0.200	<0.200	<0.200
Chromium	Cr	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	Fe	0.025	<0.025	0.028	0.100	<0.025	<0.025	<0.025	0.025
Lead	Pb	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Magnesium	Mg	0.20	<0.200	<0.200	5.27	<0.200	<0.200	<0.200	<0.200
Manganese	Mn	0.005	<0.005	<0.005	0.023	<0.005	<0.005	<0.005	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	Ni	0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Potassium	K	0.4	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	0.176	0.238	0.217	0.102	0.078	0.124	0.102
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	<0.200	0.350	2.36	<0.200	<0.200	0.207	<0.200
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	Zn	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D-6l (continued)
Inorganic Analysis Results: Metals, TPH
EQUIPMENT WASH BLANKS

Field Sample ID			GW48	GW70	GW56	GW64	GW79	GW93	GW97
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Antimony	Sb	0.06	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Arsenic	As	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Arsenic (E206.2)	As	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	Ba	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium	Be	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	B	0.01	<0.010	0.013	0.029	0.036	0.038	0.087	<0.010
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	Ca	0.20	0.216	0.074	<0.200	<0.200	<0.200	<0.200	<0.200
Chromium	Cr	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	Co	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	Cu	0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	Fe	0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.049	<0.025
Lead	Pb	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Lead (E239.2)	Pb	0.005	<0.005	<0.005	<0.005	<0.005	<0.0002	<0.005	<0.005
Magnesium	Mg	0.20	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Manganese	Mn	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
Nickel	Ni	0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Potassium	K	0.4	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400	<0.400
Selenium	Se	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Selenium (E270.2)	Se	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silicon	Si	0.020	0.061	0.079	0.195	0.090	0.084	0.093	0.113
Silver	Ag	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	Na	0.200	0.216	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Thallium	Tl	0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Vanadium	V	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	Zn	0.01	<0.010	<0.010	<0.010	0.018	<0.010	<0.010	<0.010
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D-7a
General Chemistry Analysis Results
SITE 1

Field Sample ID		GW86	GW87	GW88	GW89	GW90	GW91	GW92	GW95	GW96
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids	1.0	520	820	520	2000	2400	1300	480	3200	690
Anions: Fluoride	0.1	1.2	0.8	0.71	0.61	1.4	0.74	0.69	0.88	0.42
Chloride	0.5	34	84	42	87	31	41	44	74	65
Nitrate-Nitrogen	0.5	<0.5	<0.5	<0.5	<0.5	0.64	<0.5	<0.5	<0.50	<0.50
Phosphate*	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Sulfate	0.5	120	220	120	1600	1900	640	120	2000	170
Total Hardness	1.0	700	720	480	2800	2000	1100	530	2400	580

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7b
General Chemistry Analysis Results
SITE 2

Field Sample ID			GW75	GW76	GW77	GW78	GW71	GW72
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	4000	4100	2900	1000	960	800
Anions:	Fluoride	0.1	1.4	1.4	0.66	1.2	0.9	0.8
	Chloride	0.5	16	19	25	140	150	140
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50	<0.50	<0.5	<0.5
	Phosphate*	0.5	<0.50	<0.50	<0.50	<0.50	<0.5	<0.5
	Sulfate	0.5	2600	2900	2100	300	170	160
Total Hardness		1.0	3400	3400	2600	720	620	630

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7c
General Chemistry Analysis Results
SITE 3

Field Sample ID			GW50	GW51	GW53	GW54	GW55	GW57
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	2500	780	1200	780	1300	1000
Anions:	Fluoride	0.1	0.22	0.91	1.1	0.46	1.0	0.70
	Chloride	0.5	200	120	84	55	100	43
	Nitrate-Nitrogen	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	1600	170	510	38	370	420
Total Hardness		1.0	1800	1100	1100	1600	1000	800

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7c (continued)
General Chemistry Analysis Results
SITE 3

Field Sample ID			GW59	GW60	GW61	GW62	GW63
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	2400	1000	1500	1100	1400
Anions:	Fluoride	0.1	0.97	0.74	0.81	0.18	0.78
	Chloride	0.5	55	77	35	41	34
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
	Phosphate*	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate	0.5	1600	400	820	540	820
Total Hardness		1.0	1900	770	1000	730	1100

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7d
General Chemistry Analysis Results
SITE 4

Field Sample ID			GW66	GW67	GW68	GW69
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	4300	3400	1100	1700
Anions:	Fluoride	0.1	1.4	0.5	1.1	1.9
	Chloride	0.5	220	130	140	49
	Nitrate-Nitrogen	0.5	<0.5	<0.5	<0.5	<0.5
	Phosphate*	0.5	<0.5	<0.5	<0.5	<0.5
	Sulfate	0.5	2300	1860	480	560
Total Hardness		1.0	3100	2320	1360	1140

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7e
General Chemistry Analysis Results
SITE 5

Field Sample ID			GW43	GW44	GW45	GW46	GW47
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	980	1000	1100	1700	1200
Anions:	Fluoride	0.1	0.46	0.77	0.30	0.57	0.30
	Chloride	0.5	75	160	60	27	64
	Nitrate-Nitrogen	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Phosphate*	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Sulfate	0.5	300	300	550	920	590
Total Hardness		1.0	1700	1200	960	2100	900

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7f
General Chemistry Analysis Results
SITE 6

Field Sample ID			GW81	GW82	GW83
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	5400	2200	2300
Anions:	Fluoride	0.1	1.5	1.5	1.1
	Chloride	0.5	43	210	150
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50
	Phosphate*	0.5	<0.50	<0.50	<0.50
	Sulfate	0.5	3900	1000	1200
Total Hardness		1.0	6000	1700	2000

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7g
General Chemistry Analysis Results
SITE 7

Field Sample ID			GW22	GW23	GW25
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	500	450	NR*
Anions:	Fluoride	0.1	0.89	0.81	NA**
	Chloride	0.5	19	11	NA**
	Nitrate-Nitrogen	0.5	<0.50	<0.50	NA**
	Phosphate*	0.5	<0.50	<0.50	NA**
	Sulfate	0.5	110	99	NA**
Total Hardness		1.0	610	530	570

NR* = Not reported due to analysis performed on an improperly preserved sample.

NA** = Not analyzed due to sample container being improperly preserved.

* = Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7h
General Chemistry Analysis Results
SITE 8

Field Sample ID			GW28	GW29	GW30	GW31	GW32
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	4100	1900	2000	1400	1200
Anions:	Fluoride	0.1	0.58	0.58	0.61	0.54	0.61
	Chloride	0.5	29	82	89	54	68
	Nitrate-Nitrogen	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	2500	940	1000	780	510
Hardness		1.0	1800	1200	1300	1800	830

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7h (continued)
General Chemistry Analysis Results
SITE 8

Field Sample ID			GW35	GW36	GW38	GW39	GW40
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	1800	1400	1400	1500	460
Anions:	Fluoride	0.1	0.54	0.60	0.60	0.50	0.14
	Chloride	0.5	83	59	64	81	20
	Nitrate-Nitrogen	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	810	610	720	750	180
Hardness		1.0	2800	2600	2600	2000	4900

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7i
General Chemistry Analysis Results
SITE 9

Field Sample ID			GW15	GW16	GW17	GW18
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	3800	4000	4000	3100
Anions:	Fluoride	0.1	1.2	1.0	1.1	1.5
	Chloride	0.5	330	130	120	75
	Nitrate-Nitrogen	0.5	< 0.50	< 0.50	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	2300	3000	2600	3700
Hardness		1.0	2400	2400	2400	3600

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7j
General Chemistry Analysis Results
SITE 10

Field Sample ID			GW11	GW12	GW10	GW13	GW9
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	1080	1100	560	1160	740
Anions:	Fluoride	0.1	0.57	1.4	0.98	0.49	0.78
	Chloride	0.5	76	31	72	28	18
	Nitrate-Nitrogen	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Phosphate*	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Sulfate	0.5	230	500	460	530	200
Total Hardness		1.0	960	1000	1300	1700	3400

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7k
General Chemistry Analysis Results
SITE 13

Field Sample ID			GW4	GW5
Sample Matrix			Aqueous	Aqueous
		MDL (mg/L)	Results (mg/L)	Results (mg/L)
Parameter				
Total Dissolved Solids		1.0	4080	4250
Anions:	Fluoride	0.1	0.58	1.4
	Chloride	0.5	140	200
	Nitrate-Nitrogen	0.5	<0.50	<0.50
	Phosphate*	0.5	<0.50	<0.50
	Sulfate	0.5	2600	2600
Total Hardness		1.0	2600	3300

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7l
General Chemistry Analysis Results
EQUIPMENT WASH BLANKS

Field Sample ID		GW7	GW14	GW19	GW33	GW41	GW26	GW84
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids	1.0	3.0	40	83	42	<1.0	NR+	33
Anions: Fluoride	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	NA*	<0.10
Chloride	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	NA*	<0.50
Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	NA*	<0.50
Phosphate*	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	NA*	<0.50
Sulfate	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	NA*	<0.50
Total Hardness	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NR+ = Not reported due to analysis performed on improperly preserved sample.
NA* = Not analyzed due to receipt of improperly preserved sample.
* = Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-7l (continued)
General Chemistry Analysis Results
EQUIPMENT WASH BLANKS

Field Sample ID			GW48	GW70	GW56	GW64	GW79	GW93	GW97
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		4.0	<1.0	<10	10	<10	5.0	<1.0	1.0
Anions:	Fluoride	0.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Phosphate*	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate	2.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Hardness		1.0	<1.0	<1	<1.0	<1	<1.0	<1.0	<1.0

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

PRECISION/ACCURACY RESULTS

TABLES E-1 THROUGH E-7

Table E-1
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	V049503MS	V049503MSD		V050175MS	V050175MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	115	110	4.4	105	105	0.0	80-120	20
1,2-Dichloroethane	125 OC	120	4.0	105	110	4.7	82-124	20
1,1,1-Trichloroethane	110	105	4.6	110	115	4.4	80-117	20
1,1-Dichloroethane	110	105	4.6	95	100	5.1	80-120	20
1,1,2-Trichloroethane	125 OC	110	13.0	100	105	4.9	80-120	20
1,1,2,2-Tetrachloroethane	120	105	13.0	95	105	10.0	80-120	20
Chloroethane	110	105	4.6	95	95	0.0	80-120	20
Chloroform	130 OC	120	8.0	110	115	4.4	58-124	20
1,1-Dichloroethene	110	105	4.6	90	90	0.0	84-189	20
trans-1,2-Dichloroethene	110	105	4.6	95	100	5.1	80-120	20
1,2-Dichloropropane	110	105	4.6	100	105	4.9	80-120	20
total-1,3-Dichloropropene	130 OC	118	9.7	108	110	2.3	80-120	20
Methylene Chloride	125 OC	125 OC	0.0	100	105	4.9	80-120	20
Chloromethane	130 OC	130 OC	0.0	100	85	16.2	80-120	20
Bromomethane	110	105	4.6	95	95	0.0	80-120	20
Bromoform	130 OC	115	12.0	105	105	0.0	80-120	20
Bromodichloromethane	125 OC	115	8.3	95	110	15	80-120	20
Fluorotrichloromethane	95	90	5.4	90	90	0.0	80-120	20
Chlorodibromomethane	125 OC	110	13.0	100	105	4.9	75-123	20
Tetrachloroethene	115	110	4.4	105	105	0.0	74-127	20
Trichloroethene	115	110	4.4	110	115	4.4	68-115	20
Vinyl Chloride	120	110	8.7	95	95	0.0	28-163	20
Chlorobenzene	115	100	14.0	100	100	0.0	80-120	20
1,3-Dichlorobenzene	105	100	4.9	90	90	0.0	80-120	20
1,2-Dichlorobenzene	115	110	4.4	100	105	4.9	71-127	20
1,4-Dichlorobenzene	130 OC	125	3.9	115	120	4.3	80-120	20

Table E-1 (continued)
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	V049131MS	V049131MSD		V049141MS	V049141MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	85	85	0.0	95	95	0.0	80-120	20
1,2-Dichloroethane	90	90	0.0	100	100	0.0	82-124	20
1,1,1-Trichloroethane	90	85	5.7	95	95	0.0	80-117	20
1,1-Dichloroethane	90	90	0.0	95	95	0.0	80-120	20
1,1,2-Trichloroethane	90	90	0.0	95	100	5.1	80-120	20
1,1,2,2-Tetrachloroethane	80	85	6.1	95	95	0.0	80-120	20
Chloroethane	70 OC	70 OC	0.0	95	90	5.4	80-120	20
Chloroform	90	90	0.0	110	105	4.7	58-124	20
1,1-Dichloroethene	90	90	0.0	80	80	0.0	84-189	20
trans-1,2-Dichloroethene	85	85	0.0	90	90	0.0	80-120	20
1,2-Dichloropropane	85	85	0.0	100	100	0.0	80-120	20
total-1,3-Dichloropropene	90	90	0.0	105	110	4.7	80-120	20
Methylene Chloride	80	80	0.0	98	102	4.3	80-120	20
Chloromethane	110	110	0.0	75 OC	70 OC	6.9	80-120	20
Bromomethane	70 OC	70 OC	0.0	93	90	2.7	80-120	20
Bromoform	85	80	6.1	100	105	4.9	80-120	20
Bromodichloromethane	90	90	0.0	105	100	4.9	80-120	20
Fluorotrichloromethane	80	80	0.0	85	85	0.0	80-120	20
Chlorodibromomethane	90	90	0.0	105	105	0.0	75-123	20
Tetrachloroethene	85	85	0.0	95	100	5.1	74-127	20
Trichloroethene	95	90	5.4	105	105	0.0	68-115	20
Vinyl Chloride	95	90	5.4	100	100	0.0	28-163	20
Chlorobenzene	85	85	0.0	95	105	10.0	80-120	20
1,3-Dichlorobenzene	75 OC	75 OC	0.0	85	90	5.7	80-120	20
1,2-Dichlorobenzene	85	85	0.0	100	100	0.0	71-127	20
1,4-Dichlorobenzene	100	100	0.0	110	110	0.0	80-120	20

Table E-1 (continued)
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	V050325MS	V050325MSD		V050316MS	V050316MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	115	115	0.0	95	100	5.1	80-120	20
1,2-Dichloroethane	120	115	4.3	105	105	0.0	82-124	20
1,1,1-Trichloroethane	115	115	0.0	100	105	4.9	80-117	20
1,1-Dichloroethane	120	115	4.3	85	90	5.7	80-120	20
1,1,2-Trichloroethane	115	115	0.0	100	100	0.0	80-120	20
1,1,2,2-Tetrachloroethane	105	110	4.7	95	95	0.0	80-120	20
Chloroethane	108	108	0.0	80	85	6.1	80-120	20
Chloroform	125	125	0.0	100	110	9.5	58-124	20
1,1-Dichloroethene	110	110	0.0	75 OC	80 OC	6.4	84-189	20
trans-1,2-Dichloroethene	105	105	0.0	85	90	5.7	80-120	20
1,2-Dichloropropane	110	110	0.0	95	100	5.1	80-120	20
total-1,3-Dichloropropene	118	118	0.0	102	108	5.7	80-120	20
Methylene Chloride	85	80	6.1	80	80	0.0	80-120	20
Chloromethane	125 OC	125 OC	0.0	55 OC	55 OC	0.0	80-120	20
Bromomethane	108	108	0.0	80	85	6.1	80-120	20
Bromoform	110	110	0.0	100	105	4.9	80-120	20
Bromodichloromethane	120	120	0.0	105	105	0.0	80-120	20
Fluorotrichloromethane	95	95	0.0	75 OC	80	6.4	80-120	20
Chlorodibromomethane	115	115	0.0	100	100	0.0	75-123	20
Tetrachloroethene	115	115	0.0	95	100	5.1	74-127	20
Trichloroethene	115	115	0.0	100	105	4.9	68-115	20
Vinyl Chloride	115	115	0.0	58	63	6.9	28-163	20
Chlorobenzene	105	105	0.0	90	95	5.4	80-120	20
1,3-Dichlorobenzene	100	100	0.0	85	90	5.7	80-120	20
1,2-Dichlorobenzene	110	110	0.0	95	100	5.1	71-127	20
1,4-Dichlorobenzene	115	115	0.0	105	110	4.6	80-120	20

Table E-1 (continued)
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	V050314MS	*		V050319MS	*			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	125 OC	NA	N/A	125 OC	NA	N/A	80-120	20
1,2-Dichloroethane	130 OC	NA	N/A	135 OC	NA	N/A	82-124	20
1,1,1-Trichloroethane	125 OC	NA	N/A	120 OC	NA	N/A	80-117	20
1,1-Dichloroethane	125 OC	NA	N/A	125 OC	NA	N/A	80-120	20
1,1,2-Trichloroethane	130 OC	NA	N/A	140 OC	NA	N/A	80-120	20
1,1,2,2-Tetrachloroethane	130 OC	NA	N/A	145 OC	NA	N/A	80-120	20
Chloroethane	120	NA	N/A	110	NA	N/A	80-120	20
Chloroform	140 OC	NA	N/A	140 OC	NA	N/A	58-124	20
1,1-Dichloroethene	115	NA	N/A	110	NA	N/A	84-189	20
trans-1,2-Dichloroethene	120	NA	N/A	120	NA	N/A	80-120	20
1,2-Dichloropropane	120	NA	N/A	125 OC	NA	N/A	80-120	20
total-1,3-Dichloropropene	130 OC	NA	N/A	132 OC	NA	N/A	80-120	20
Methylene Chloride	75 OC	NA	N/A	150 OC	NA	N/A	80-120	20
Chloromethane	115	NA	N/A	70 OC	NA	N/A	80-120	20
Bromomethane	120	NA	N/A	110	NA	N/A	80-120	20
Bromoform	130 OC	NA	N/A	150 OC	NA	N/A	80-120	20
Bromodichloromethane	130 OC	NA	N/A	135 OC	NA	N/A	80-120	20
Fluorotrichloromethane	110	NA	N/A	100	NA	N/A	80-120	20
Chlorodibromomethane	130 OC	NA	N/A	135 OC	NA	N/A	75-123	20
Tetrachloroethene	120	NA	N/A	120	NA	N/A	74-127	20
Trichloroethene	120 OC	NA	N/A	130 OC	NA	N/A	68-115	20
Vinyl Chloride	130	NA	N/A	120	NA	N/A	28-163	20
Chlorobenzene	120	NA	N/A	120	NA	N/A	80-120	20
1,3-Dichlorobenzene	115	NA	N/A	110	NA	N/A	80-120	20
1,2-Dichlorobenzene	125	NA	N/A	130 OC	NA	N/A	71-127	20
1,4-Dichlorobenzene	140 OC	NA	N/A	145 OC	NA	N/A	80-120	20

* = MSD lost in data system crash.

Table E-1 (continued)
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	V050518MS	V050518MSD			
Sample Matrix	Aqueous	Aqueous			
	Results	Results		Control Limits	
Compound	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
Carbon Tetrachloride	95	90	5.5	80-120	20
1,2-Dichloroethane	95	90	5.5	82-124	20
1,1,1-Trichloroethane	95	90	5.5	80-117	20
1,1-Dichloroethane	90	85	5.7	80-120	20
1,1,2-Trichloroethane	90	85	5.7	80-120	20
1,1,2,2-Tetrachloroethane	90	70 OC	25 OC	80-120	20
Chloroethane	84	90	5.7	80-120	20
Chloroform	100	95	5.1	58-124	20
1,1-Dichloroethene	85	80	6.1	84-189	20
trans-1,2-Dichloroethene	85	85	0	80-120	20
1,2-Dichloropropane	90	85	5.7	80-120	20
total-1,3-Dichloropropene	90	88	2.8	80-120	20
Methylene Chloride	95	90	5.4	80-120	20
Chloromethane	115	110	4.4	80-120	20
Bromomethane	84	90	5.7	80-120	20
Bromoform	80	75 OC	6.5	80-120	20
Bromodichloromethane	95	90	5.5	80-120	20
Fluorotrichloromethane	85	80	6.1	80-120	20
Chlorodibromomethane	90	90	0	75-123	20
Tetrachloroethene	90	70 OC	25 OC	74-127	20
Trichloroethene	95	90	5.5	68-115	20
Vinyl Chloride	90	80	2.4	28-163	20
Chlorobenzene	85	80	6.1	80-120	20
1,3-Dichlorobenzene	80	75 OC	6.5	80-120	20
1,2-Dichlorobenzene	85	80	6.1	71-127	20
1,4-Dichlorobenzene	95	95	0	80-120	20

Table E-2

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	P049131MS	P049131MSD		P049141MS	P049141MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	95	90	5.4	105	100	4.9	80-120	20
1,2-Dichlorobenzene	100	95	5.1	110	110	0.0	71-127	20
1,3-Dichlorobenzene	100	95	5.1	110	105	4.7	80-120	20
1,4-Dichlorobenzene	110	105	4.7	115	115	0.0	80-120	20
Benzene	95	95	0.0	105	105	0.0	41-154	20
Toluene	100	95	5.1	105	105	0.0	80-120	20
Ethylbenzene	95	95	0.0	105	105	0.0	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO49547MS	PO49547MSD		PO50172MS	PO50172MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	150 OC	100	40 OC	85	95	11	80-120	20
1,2-Dichlorobenzene	115	95	19	90	95	5.4	71-127	20
1,3-Dichlorobenzene	120	95	23 OC	85	95	11	80-120	20
1,4-Dichlorobenzene	120	95	23 OC	85	95	11	80-120	20
Benzene	155 OC	125	21 OC	120	125	4.1	41-154	20
Toluene	140 OC	105	29 OC	90	95	5.4	80-120	20
Ethylbenzene	135 OC	105	25 OC	90	100	11	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO50328MS	PO50328MSD		PO50327MS	PO50327MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	80	85	6.1	105	110	4.7	80-120	20
1,2-Dichlorobenzene	95	90	5.4	115	110	4.4	71-127	20
1,3-Dichlorobenzene	90	85	5.7	105	110	4.7	80-120	20
1,4-Dichlorobenzene	90	90	0	115	110	4.4	80-120	20
Benzene	32 OC	90	95 OC	125	130	3.9	41-154	20
Toluene	65 OC	90	32 OC	120	120	0	80-120	20
Ethylbenzene	80	90	12	115	115	0	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	P050518MS	P050518MSD		P050810MS	P050810MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	110	110	0	95	95	0	80-120	20
1,2-Dichlorobenzene	110	110	0	100	105	4.9	71-127	20
1,3-Dichlorobenzene	110	110	0	100	100	0	80-120	20
1,4-Dichlorobenzene	120	120	0	105	105	0	80-120	20
Benzene	105	105	0	95	95	0	41-154	20
Toluene	110	105	4.7	105	100	4.9	80-120	20
Ethylbenzene	110	110	4.7	105	100	4.9	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO51028MS	PO51028MSD		PO51572MS	PO51572MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	90	80	12	95	90	5.4	80-120	20
1,2-Dichlorobenzene	95	100	5.1	100	110	9.5	71-127	20
1,3-Dichlorobenzene	90	95	5.4	95	95	0	80-120	20
1,4-Dichlorobenzene	90	95	5.4	100	95	5.1	80-120	20
Benzene	90	24 OC	117 OC	85	90	5.7	41-154	20
Toluene	95	60 OC	45 OC	100	95	5.1	80-120	20
Ethylbenzene	95	80	17	100	95	5.1	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	P049504MS	P049504MSD			
Sample Matrix	Aqueous	Aqueous			
	Results	Results		Control Limits	
Compound	% Recovery	% Recovery	RPD	(% Recovery)	RPD
Chlorobenzene	100	100	0.0	80-120	20
1,2-Dichlorobenzene	100	100	0.0	71-127	20
1,3-Dichlorobenzene	100	95	5.1	80-120	20
1,4-Dichlorobenzene	100	100	0.0	80-120	20
Benzene	120	120	0.0	41-154	20
Toluene	105	105	0.0	80-120	20
Ethylbenzene	110	100	9.5	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO49546MS	PO49546MSD		PO49690MS	PO49690MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	100	100	0.0	105	105	0.0	80-120	20
1,2-Dichlorobenzene	100	100	0.0	110	110	0.0	71-127	20
1,3-Dichlorobenzene	100	95	5.2	110	110	0.0	80-120	20
1,4-Dichlorobenzene	100	100	0.0	110	110	0.0	80-120	20
Benzene	105	105	0.0	130	130	0.0	41-154	20
Toluene	105	105	0.0	115	115	0.0	80-120	20
Ethylbenzene	105	105	0.0	115	115	0.0	80-120	20

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO51576MS	PO51576MSD		PO51615MS	PO51615MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	100	100	0	98	98	0	80-120	20
1,2-Dichlorobenzene	100	100	0	105	105	0	71-127	20
1,3-Dichlorobenzene	100	100	0	98	98	0	80-120	20
1,4-Dichlorobenzene	100	100	0	105	108	2.4	80-120	20
Benzene	46(1)	46(1)	0	105	46 OC	81 OC	41-154	20
Toluene	49(1)	49(1)	0	100	75 OC	29 OC	80-120	20
Ethylbenzene	50(1)	49(1)	2.0	100	100	0	80-120	20

(1) Due to the low recoveries of benzene, toluene, and ethylbenzene, a reference standard was analyzed after the MS/MSD. The recoveries were 95, 100 and 100 percent, respectively. Therefore the low recoveries appear to be attributable to matrix effects or a poor spiking standard.

Table E-2 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	P050318MS	P050318MSD
Sample Matrix	Aqueous	Aqueous

Compound	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	95	90	5.4	80-120	20
1,2-Dichlorobenzene	100	95	5.1	71-127	20
1,3-Dichlorobenzene	100	90	10	80-120	20
1,4-Dichlorobenzene	100	90	10	80-120	20
Benzene	110	105	4.6	41-154	20
Toluene	100	95	5.1	80-120	20
Ethylbenzene	100	95	5.1	80-120	20

Table E-3

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)

Laboratory	ED50330MS			ED50515MS				
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Ethanol	NA	NA	NA	NA	NA	NA	75-125	25
Diethyl Ether	NA	NA	NA	NA	NA	NA	75-125	25
Methyl Ethyl Ketone	NA	NA	NA	NA	NA	NA	75-125	25
Methyl Isobutyl Ketone	NA	NA	NA	NA	NA	NA	75-125	25
Ethylene Dibromide (E504.1)	90	NA	NA	117	NA	NA	75-125	25
1,2-Dibromo-3-Chloropropane (E504.1)	86	NA	NA	90	NA	NA	75-125	25

Table E-3 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)

Laboratory	ED49687MS	ED49687MSD		ED49133MS				
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Ethanol	148 OC	142 OC	4.1	NA	NA	NA	75-125	25
Diethyl Ether	101	102	1.0	NA	NA	NA	75-125	25
Methyl Ethyl Ketone	104	99	4.9	NA	NA	NA	75-125	25
Methyl Isobutyl Ketone	99	99	0.0	NA	NA	NA	75-125	25
Ethylene Dibromide (E504.1)	NA	NA	N/A	100	NA	NA	75-125	25
1,2-Dibromo-3-Chloropropane (E504.1)	NA	NA	N/A	110	NA	NA	75-125	25

Table E-3 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)

Laboratory	ED50808MS			ED51032MS				
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Ethanol	NA	NA	NA	NA	NA	NA	75-125	25
Diethyl Ether	NA	NA	NA	NA	NA	NA	75-125	25
Methyl Ethyl Ketone	NA	NA	NA	NA	NA	NA	75-125	25
Methyl Isobutyl Ketone	NA	NA	NA	NA	NA	NA	75-125	25
Ethylene Dibromide (E504.1)	114	NA	NA	97	NA	NA	75-125	25
1,2-Dibromo-3-Chloropropane (E504.1)	104	NA	NA	97	NA	NA	75-125	25

Table E-3 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)

Laboratory	ED50319MS	ED50319MSD		ED49131MS	ED49131MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Ethanol	89	105	16	94	100	6.6	75-125	25
Diethyl Ether	108	118	8.8	113	104	7.8	75-125	25
Methyl Ethyl Ketone	72 oc	78	8.0	100	68oc	38oc	75-125	25
Methyl Isobutyl Ketone	82	86	4.8	98	76	25	75-125	25
Ethylene Dibromide (E504.1)	NA	NA	N/A	NA	NA	N/A	75-125	25
1,2-Dibromo-3-Chloropropane (E504.1)	NA	NA	N/A	NA	NA	N/A	75-125	25

Table E-3 (Continued)

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)

Laboratory	ED50174MS	ED50174MSD		ED50315MS	ED50315MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Ethanol	130 OC	102	25	117	116	0.8	75-125	25
Diethyl Ether	104	104	0.0	97	100	3.0	75-125	25
Methyl Ethyl Ketone	134 OC	134 OC	0.0	82	84	2.4	75-125	25
Methyl Isobutyl Ketone	122	124	1.6	88	88	0.0	75-125	25
Ethylene Dibromide (E504.1)	NA	NA	N/A	NA	NA	N/A	75-125	25
1,2-Dibromo-3-Chloropropane (E504.1)	NA	NA	N/A	NA	NA	N/A	75-125	25

Table E-4

Matrix Spike/Matrix Spike Duplicate Results
Pesticides and PCBs

Laboratory I.D.	PP50331MS	PP50331MSD		PP50520MS	PP50520MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Lindane	105	100	4.6	75	88	16	47-137	50
Heptachlor	110	105	4.6	75	94	22	49-133	31
Aldrin	70	70	0	75	88	16	47-131	43
Dieldrin	100	84	17	100	63	47 OC	43-133	38
Endrin	104	*	*	103	*	*	46-142	45
4,4'-DDT	108	128	17	123	115	7	31-157	50
Surrogate:								
Dibutylchlorendate	95	101	N/A	119	86	N/A	25-154	N/A

* Could not determine Endrin recovery due to breakdown to endrin ketone and endrin aldehyde.

Table E-4 (continued)

Matrix Spike/Matrix Spike Duplicate Results
Pesticides and PCBs

Laboratory I.D.	PP49134MS	PP49134MSD				
Sample Matrix	Aqueous	Aqueous				
	Results	Results			Control Limits	
Compound	% Recovery	% Recovery	RPD		(% Recovery)	RPD
Lindane	79	70	12		47-137	50
Heptachlor	NS*	NS*	-		49-133	31
Aldrin	NS*	NS*	-		47-131	43
Dieldrin	NS*	NS*	-		43-133	38
Endrin	NS*	NS*	-		46-142	45
4,4'-DDT	84	83	1.2		31-157	50
Surrogate:						
Dibutylchlorendate	NR	NR	N/A	N/A	25-154	N/A

NS* = Different spiking solutions used. Along with lindane and 4,4,'-DDT, the following compounds were spiked: 4,4'-DDE (MS=86% Recovery, MSD=82% Recovery, RPD=4.8) and 4.4'-DDE (MS=71, MSD=72, RPD=1.4).

NR = Not Reported

Table E-5

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds

Laboratory ID	SV50294MS			SV50372MS	SV50372MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
	Results	Results		Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	42	NA	N/A	33 OC	53	46 OC	39-98	28
Acenaphthene	65	NA	N/A	57	72	23	46-118	31
2,4-Dinitrotoluene	80	NA	N/A	62	74	18	24-96	38
Pyrene	108	NA	N/A	70	84	18	26-127	31
N-Nitroso-di-n-propylamine	72	NA	N/A	45	61	30	41-116	38
1,4-Dichlorobenzene	42	NA	N/A	26 OC	49	61 OC	36-97	28
Pentachlorophenol	62	NA	N/A	56	57	2	9-103	50
Phenol	38	NA	N/A	12	40	54 OC	12-89	42
2-Chlorophenol	71	NA	N/A	42	63	40	27-123	40
4-Chloro-3-methylphenol	70	NA	N/A	37	61	49 OC	23-97	42
4-Nitrophenol	64	NA	N/A	48	94 OC	65 OC	10-80	50
Surrogates:								
Nitrobenzene-d5	69	NA	N/A	39	66	N/A	35-114	N/A
2-Fluorobiphenyl	64	NA	N/A	56	73	N/A	30-115	N/A
Terphenyl-d14	92	NA	N/A	63	74	N/A	18-137	N/A
2-Fluorophenol	58	NA	N/A	17	50	N/A	24-113	N/A
Phenol-d5	48	NA	N/A	15	47	N/A	24-113	N/A
2,4,6-Tribromophenol	82	NA	N/A	59	72	N/A	19-122	N/A

Table E-5 (continued)

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds

Laboratory ID	SV50329MS	SV50329MSD		SV50316MS				
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
	Results	Results		Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	73	44	50 OC	61	NA	N/A	39-98	28
Acenaphthene	111	68	48 OC	72	NA	N/A	46-118	31
2,4-Dinitrotoluene	115 OC	64	57 OC	76	NA	N/A	24-96	38
Pyrene	122	76	46 OC	88	NA	N/A	26-127	31
N-Nitroso-di-n-propylamine	81	51	45 OC	60	NA	N/A	41-116	38
1,4-Dichlorobenzene	67	40	50 OC	56	NA	N/A	36-97	28
Pentachlorophenol	22	15	38	12	NA	N/A	9-103	50
Phenol	55	45	20	18	NA	N/A	12-89	42
2-Chlorophenol	78	58	29	37	NA	N/A	27-123	40
4-Chloro-3-methylphenol	89	64	33	52	NA	N/A	23-97	42
4-Nitrophenol	51	46	46	24	NA	N/A	10-80	50
Surrogates:								
Nitrobenzene-d5	102	65	N/A	73	NA	N/A	35-114	N/A
2-Fluorobiphenyl	113	69	N/A	66	NA	N/A	30-115	N/A
Terphenyl-d14	92	59	N/A	50	NA	N/A	18-137	N/A
2-Fluorophenol	69	52	N/A	20	NA	N/A	24-113	N/A
Phenol-d5	72	105	N/A	20	NA	N/A	24-113	N/A
2,4,6-Tribromophenol	105	76	N/A	56	NA	N/A	19-122	N/A

Table E-5 (continued)

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds

Laboratory ID	SV50516MS				
Sample Matrix	Aqueous	Aqueous			
Parameter	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
1,2,4-Trichlorobenzene	38 OC	NA	N/A	39-98	28
Acenaphthene	57	NA	N/A	46-118	31
2,4-Dinitrotoluene	64	NA	N/A	24-96	38
Pyrene	72	NA	N/A	26-127	31
N-Nitroso-di-n-propylamine	58	NA	N/A	41-116	38
1,4-Dichlorobenzene	27 OC	NA	N/A	36-97	28
Pentachlorophenol	25	NA	N/A	9-103	50
Phenol	28	NA	N/A	12-89	42
2-Chlorophenol	48	NA	N/A	27-123	40
4-Chloro-3-methylphenol	70	NA	N/A	23-97	42
4-Nitrophenol	38	NA	N/A	10-80	50
Surrogates:					
Nitrobenzene-d5	NR	NA	N/A	35-114	N/A
2-Fluorobiphenyl	NR	NA	N/A	30-115	N/A
Terphenyl-d14	NR	NA	N/A	18-137	N/A
2-Fluorophenol	NR	NA	N/A	24-113	N/A
Phenol-d5	NR	NA	N/A	24-113	N/A
2,4,6-Tribromophenol	NR	NA	N/A	19-122	N/A

NR = Not reported.

Table E-6

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID		50573	M50573MR		M50573MS	50332	M50332MR		M50332MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	<0.100	<0.100	-	108	75-125	20
Antimony	Sb	NA	NA	N/A	NA	<0.060	<0.060	-	108	75-125	20
Arsenic	As	NA	NA	N/A	NA	<0.050	<0.050	-	83	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	<0.005	<0.005	-	180 OC	75-125	20
Barium	Ba	NA	NA	N/A	NA	<0.010	<0.010	-	111	75-125	20
Beryllium	Be	NA	NA	N/A	NA	<0.002	<0.002	-	95	75-125	20
Boron	B	NA	NA	N/A	NA	0.029	<0.010	200 OC	107	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	<0.005	<0.005	-	100	75-125	20
Calcium	Ca	NA	NA	N/A	NA	<0.200	<0.200	-	NS	75-125	20
Chromium	Cr	NA	NA	N/A	NA	<0.010	<0.010	-	103	75-125	20
Cobalt	Co	NA	NA	N/A	NA	<0.010	<0.010	-	106	75-125	20
Copper	Cu	NA	NA	N/A	NA	<0.010	<0.010	-	103	75-125	20
Iron	Fe	NA	NA	N/A	NA	<0.025	<0.025	-	99	75-125	20
Lead (E239.2)	Pb	NA	NA	N/A	NA	<0.005	<0.005	-	107	75-125	20
Lead	Pb	NA	NA	N/A	NA	<0.050	<0.050	-	101	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	<0.200	<0.200	-	NS	75-125	20
Manganese	Mn	NA	NA	N/A	NA	<0.005	<0.005	-	105	75-125	20
Mercury (E245.1)	Hg	0.043	0.043	0	73 OC	<0.0002	<0.0002	-	116	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	<0.010	<0.010	-	114	75-125	20
Nickel	Ni	NA	NA	N/A	NA	<0.015	<0.015	-	107	75-125	20
Potassium	K	NA	NA	N/A	NA	<0.400	<0.400	-	NS	75-125	20
Selenium	Se	NA	NA	N/A	NA	<0.100	<0.100	-	101	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	<0.005	<0.005	-	84	75-125	20
Silicon	Si	NA	NA	N/A	NA	0.195	0.116	51oc	NS	75-125	20
Silver	Ag	NA	NA	N/A	NA	<0.010	<0.010	-	97	75-125	20
Sodium	Na	NA	NA	N/A	NA	<0.200	<0.200	-	NS	75-125	20
Thallium	Tl	NA	NA	N/A	NA	<0.100	<0.100	-	111	75-125	20
Vanadium	V	NA	NA	N/A	NA	<0.010	<0.010	-	106	75-125	20
Zinc	Zn	NA	NA	N/A	NA	<0.010	<0.010	-	106	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID		49139	M49139MR		M49139MS	50170	M50170MR		M50170MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
		Original	Replicate		Recovery	Original	Replicate		Recovery	Control Limits	
Parameter	Code	(mg/L)	(mg/L)	RPD	(%)	(mg/L)	(mg/L)	RPD	(%)	(% Recovery)	RPD
Aluminum	Al	0.696	0.628	10.3	80	NA	NA	N/A	NA	75-125	20
Antimony	Sb	< 0.060	< 0.060	0.0	97	NA	NA	N/A	NA	75-125	20
Arsenic	As	< 0.050	< 0.050	0.0	90	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	< 0.005	< 0.005	0.0	113	NA	NA	N/A	NA	75-125	20
Barium	Ba	0.122	0.111	9.4	98	NA	NA	N/A	NA	75-125	20
Beryllium	Be	< 0.002	< 0.002	0.0	85	NA	NA	N/A	NA	75-125	20
Boron	B	0.057	0.044	25.7 OC	98	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	< 0.005	< 0.005	0.0	89	NA	NA	N/A	NA	75-125	20
Calcium	Ca	260	268	3.0	NS	NA	NA	N/A	NA	75-125	20
Chromium	Cr	< 0.010	< 0.010	0.0	102	NA	NA	N/A	NA	75-125	20
Cobalt	Co	< 0.010	< 0.010	0.0	98	NA	NA	N/A	NA	75-125	20
Copper	Cu	< 0.010	< 0.010	0.0	94	NA	NA	N/A	NA	75-125	20
Iron	Fe	2.08	1.67	21.9 OC	54 OC	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	0.011	0.021	62.5 OC	104	NA	NA	N/A	NA	75-125	20
Lead	Pb	< 0.050	< 0.050	0.0	88	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	71.6	60.0	17.6	NS	NA	NA	N/A	NA	75-125	20
Manganese	Mn	0.254	0.208	19.9	97	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	<0.0002	<0.0002	0	71 OC	80-120	20
Molybdenum	Mo	< 0.010	< 0.010	0.0	106	NA	NA	N/A	NA	75-125	20
Nickel	Ni	< 0.015	< 0.015	0.0	98	NA	NA	N/A	NA	75-125	20
Potassium	K	1.20	0.820	37.6 OC	NS	NA	NA	N/A	NA	75-125	20
Selenium	Se	< 0.100	< 0.100	0.0	107	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	< 0.005	< 0.005	0.0	57 OC	NA	NA	N/A	NA	75-125	20
Silicon	Si	7.08	6.87	3.0	NS	NA	NA	N/A	NA	75-125	20
Silver	Ag	< 0.010	< 0.010	0.0	90	NA	NA	N/A	NA	75-125	20
Sodium	Na	11.5	10.6	8.1	NS	NA	NA	N/A	NA	75-125	20
Thallium	Tl	< 0.100	< 0.100	0.0	100	NA	NA	N/A	NA	75-125	20
Vanadium	V	< 0.010	< 0.010	0.0	100	NA	NA	N/A	NA	75-125	20
Zinc	Zn	0.087	0.075	14.8	93	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID			MR		PH1027MS	51615	M51615MR		M51615MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike	Control Limits	
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	<0.005	<0.005	-	78	75-125	20
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	<0.005	<0.005	-	95	75-125	20
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	<0.0002	<0.0002	-	110	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	<0.005	<0.005	-	55 OC	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	84	NA	NA	N/A	NA	75-125	20

NS = Not Spiked NR* = Sample amount greater than 4x the spike level; no recovery reported.

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID / Sample Matrix / Parameter	Code	Aqueous Original (mg/L)	MR Aqueous Replicate (mg/L)	RPD	PH1005MS Spike Recovery (%)	Aqueous Original (mg/L)	MR Aqueous Replicate (mg/L)	RPD	PH1009MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	98	NA	NA	N/A	98	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID / Sample Matrix / Parameter	Code	48708 Aqueous Original (mg/L)	M48708MR Aqueous Replicate (mg/L)	RPD	M48708MS Spike Recovery (%)	MR Aqueous Original (mg/L)	MR Aqueous Replicate (mg/L)	RPD	PH1011MS Spike Recovery (%)	Control Limits (% Recovery)	Control Limits RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead (E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Mercury (E245.1)	Hg	0.00066	0.00055	18	100	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	110	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID		50373	M50373MR		M50373	50151	M50151MR		M50151MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	108	<0.100	<0.100	-	NS	75-125	20
Antimony	Sb	<0.060	<0.060	-	103	<0.060	<0.060	-	101	75-125	20
Arsenic	As	NA	NA	N/A	NA	<0.050	<0.050	-	110	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	0.113	0.112	0.9	109	0.020	0.020	0	98	75-125	20
Beryllium	Be	<0.002	<0.002	-	104	<0.002	<0.002	-	98	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	<0.005	<0.005	-	108	<0.005	<0.005	-	95	75-125	20
Calcium	Ca	0.773	0.748	3.3	NS	14.0	14.2	1.4	NS	75-125	20
Chromium	Cr	<0.010	<0.010	-	116	<0.010	<0.010	-	108	75-125	20
Cobalt	Co	<0.010	<0.010	-	114	<0.010	<0.010	-	104	75-125	20
Copper	Cu	<0.010	<0.010	-	113	<0.010	<0.010	-	103	75-125	20
Iron	Fe	0.333	0.319	4.3	108	0.115	0.110	4.4	NS	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	<0.050	<0.050	-	111	<0.050	<0.050	-	107	75-125	20
Magnesium	Mg	14.2	14.0	1.4	NS	4.35	4.29	1.4	NS	75-125	20
Manganese	Mn	0.0658	0.0628	4.7	106	0.012	0.013	8.0	106	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	<0.015	<0.015	-	110	<0.015	<0.015	-	110	75-125	20
Potassium	K	1.800	1.750	2.8	NS	2.33	2.26	1.3	NS	75-125	20
Selenium	Se	NA	NA	N/A	NA	<0.005	<0.005	-	99	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	<0.010	<0.010	-	108	<0.010	<0.010	-	103	75-125	20
Sodium	Na	19.7	19.1	3.1	NS	4.68	4.62	1.3	NS	75-125	20
Thallium	Tl	NA	NA	N/A	NA	<0.005	<0.005	-	118	75-125	20
Vanadium	V	<0.010	<0.010	-	117	<0.010	<0.010	-	100	75-125	20
Zinc	Zn	0.0131	0.0125	4.7	111	<0.010	0.011	200 QC	110	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID / Sample Matrix		49517 Aqueous	M49517MR Aqueous		M49517MS Spike		MR Aqueous		PH1017MS Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	<0.060	<0.060	-	0 OC	NA	NA	N/A	NA	75-125	20
Arsenic	As	0.013	0.016	21 OC	30 OC	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	2.26	2.24	0.89	97	NA	NA	N/A	NA	75-125	20
Beryllium	Be	0.017	0.017	0	93	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	0.023	0.025	1.2	91	NA	NA	N/A	NA	75-125	20
Calcium	Ca	28.6	28.0	2.1	NS	NA	NA	N/A	NA	75-125	20
Chromium	Cr	0.417	0.441	5.6	96	NA	NA	N/A	NA	75-125	20
Cobalt	Co	0.230	0.271	16	103	NA	NA	N/A	NA	75-125	20
Copper	Cu	0.476	0.492	3.3	93	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	0.456	0.465	2.0	97	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	52.3	55.3	5.6	NS	NA	NA	N/A	NA	75-125	20
Manganese	Mn	7.65	7.86	2.7	*	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	0.517	0.533	3.0	100	NA	NA	N/A	NA	75-125	20
Potassium	K	14.0	15.9	13	NS	NA	NA	N/A	NA	75-125	20
Selenium	Se	<0.005	<0.005	-	0 OC	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	<0.010	<0.010	-	0 OC	NA	NA	N/A	NA	75-125	20
Sodium	Na	4.85	5.08	4.6	NS	NA	NA	N/A	NA	75-125	20
Thallium	Tl	<0.005	<0.005	-	84	NA	NA	N/A	NA	75-125	20
Vanadium	V	0.400	0.426	6.3	92	NA	NA	N/A	NA	75-125	20
Zinc	Zn	1.51	1.60	5.8	95	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	108	75-125	20

NS = Not Spiked * Sample concentration greater than 4x spike concentration.

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID		50521	M50521MR		M50521MS	50518	M50518MR		M50518MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	96	<0.100	<0.100	-	96	75-125	20
Antimony	Sb	<0.060	<0.060	-	95	<0.060	<0.060	-	99	75-125	20
Arsenic	As	<0.050	<0.050	-	81	<0.050	<0.050	-	79	75-125	20
Arsenic(E206.2)	As	<0.005	<0.005	-	100	<0.005	<0.005	-	80	75-125	20
Barium	Ba	<0.010	<0.010	-	94	0.049	0.039	22.7 OC	88	75-125	20
Beryllium	Be	<0.002	<0.002	-	84	<0.002	<0.002	-	73 OC	75-125	20
Boron	B	0.036	0.032	12	93	0.318	0.091	111 OC	70 OC	75-125	20
Cadmium	Cd	<0.005	<0.005	-	96	<0.005	<0.005	-	81	75-125	20
Calcium	Ca	<0.200	<0.200	-	NS	301	294	2.35	NS	75-125	20
Chromium	Cr	<0.010	<0.010	-	95	<0.010	<0.010	-	86	75-125	20
Cobalt	Co	<0.010	<0.010	-	99	<0.010	<0.010	-	91	75-125	20
Copper	Cu	<0.010	<0.010	-	93	<0.010	<0.010	-	87	75-125	20
Iron	Fe	<0.025	<0.025	-	92	0.723	0.580	21.9 OC	68 OC	75-125	20
Lead(E239.2)	Pb	<0.005	<0.005	-	100	<0.005	<0.005	-	105	75-125	20
Lead	Pb	<0.050	<0.050	-	91	<0.05	<0.05	-	78	75-125	20
Magnesium	Mg	<0.200	<0.200	-	NS	87.0	77.3	11.8	NS	75-125	20
Manganese	Mn	<0.005	<0.005	-	96	0.050	0.043	15.0	84	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	<0.010	<0.010	-	104	<0.010	<0.010	-	100	75-125	20
Nickel	Ni	<0.015	<0.015	-	94	<0.015	<0.015	-	86	75-125	20
Potassium	K	<0.400	<0.400	-	NS	2.53	2.21	13.5	NS	75-125	20
Selenium	Se	<0.010	<0.010	-	88	<0.100	<0.100	-	8[illegible]	75-125	20
Selenium(E270.2)	Se	<0.005	<0.005	-	113	<0.005	<0.005	-	47 OC	75-125	20
Silicon	Si	0.090	0.097	7.5	NS	5.38	4.88	9.74	NS	75-125	20
Silver	Ag	<0.010	<0.010	-	98	<0.010	<0.010	-	91	75-125	20
Sodium	Na	<0.200	<0.200	-	NS	29.2	24.0	19.5	NS	75-125	20
Thallium	Tl	<0.100	<0.100	-	92	<0.100	<0.100	-	85	75-125	20
Vanadium	V	<0.010	<0.010	-	94	<0.010	<0.010	-	88	75-125	20
Zinc	Zn	0.018	0.019	5.4	97	<0.010	<0.010	-	91	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	NA	NA	NA	NA	N/A	NA	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID / Sample Matrix / Parameter	Code	Aqueous Original (mg/L)	MR Aqueous Replicate (mg/L)	RPD	PH1020MS Spike Recovery (%)	Aqueous Original (mg/L)	MR Aqueous Replicate (mg/L)	RPD	PH1021MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	128 OC	NA	NA	NA	N/A	97	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID		50813	M50813MR		M50813MS		MR		PH1024MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	94	NA	NA	N/A	NA	75-125	20
Antimony	Sb	<0.060	<0.060	-	79	NA	NA	N/A	NA	75-125	20
Arsenic	As	<0.050	<0.050	-	80	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	<0.005	<0.005	-	86	NA	NA	N/A	NA	75-125	20
Barium	Ba	0.062	0.066	6.25	94	NA	NA	N/A	NA	75-125	20
Beryllium	Be	<0.002	<0.002	-	84	NA	NA	N/A	NA	75-125	20
Boron	B	0.074	0.084	12.6	100	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	<0.005	<0.005	-	88	NA	NA	N/A	NA	75-125	20
Calcium	Ca	158	157	0.6	NS	NA	NA	N/A	NA	75-125	20
Chromium	Cr	<0.010	<0.010	-	97	NA	NA	N/A	NA	75-125	20
Cobalt	Co	<0.010	<0.010	-	95	NA	NA	N/A	NA	75-125	20
Copper	Cu	<0.010	<0.010	-	92	NA	NA	N/A	NA	75-125	20
Iron	Fe	4.13	4.22	2.2	NS	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	0.004	0.003	28 OC	105	NA	NA	N/A	NA	75-125	20
Lead	Pb	<0.050	<0.050	-	88	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	57.6	57.7	0.2	NS	NA	NA	N/A	NA	75-125	20
Manganese	Mn	0.260	0.260	0	90	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	<0.0002	<0.0002	-	100	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	<0.010	<0.010	-	106	NA	NA	N/A	[illegible]	75-125	20
Nickel	Ni	<0.015	<0.015	-	94	NA	NA	N/A	NA	75-125	20
Potassium	K	0.926	0.528	55 OC	NS	NA	NA	N/A	NA	75-125	20
Selenium	Se	<0.100	<0.100	-	97	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	<0.005	<0.005	-	70 OC	NA	NA	N/A	NA	75-125	20
Silicon	Si	6.02	5.93	1.5	NS	NA	NA	N/A	NA	75-125	20
Silver	Ag	<0.010	<0.010	-	90	NA	NA	N/A	NA	75-125	20
Sodium	Na	64.4	62.1	3.6	NS	NA	NA	N/A	NA	75-125	20
Thallium	Tl	<0.100	<0.100	-	87	NA	NA	N/A	NA	75-125	20
Vanadium	V	<0.010	<0.010	-	90	NA	NA	N/A	NA	75-125	20
Zinc	Zn	0.186	0.185	0.5	88	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	113	75-125	20

NS = Not Spiked

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID / Sample Matrix / Parameter	Code	51034 Aqueous Original (mg/L)	M51034MR Aqueous Replicate (mg/L)	RPD	M51034MS Spike Recovery (%)	51572 Aqueous Original (mg/L)	M51572MR Aqueous Replicate (mg/L)	RPD	M51572MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	107	21.7	18.9	13.8	NR*	75-125	20
Antimony	Sb	<0.060	<0.060	-	100	<0.060	<0.060	-	76	75-125	20
Arsenic	As	<0.050	<0.050	-	89	<0.050	<0.050	-	75	75-125	20
Arsenic(E206.2)	As	<0.005	<0.005	-	84	0.0053	0.0051	3.8	84	75-125	20
Barium	Ba	<0.010	<0.010	-	113	0.263	0.247	6.3	74 OC	75-125	20
Beryllium	Be	<0.002	<0.002	-	100	<0.002	<0.002	-	72 OC	75-125	20
Boron	B	0.019	0.016	17	116	0.148	0.135	9.2	89	75-125	20
Cadmium	Cd	<0.005	<0.005	-	106	<0.005	<0.005	-	92	75-125	20
Calcium	Ca	<0.200	<0.200	-	NS	500	541	7.9	NS	75-125	20
Chromium	Cr	<0.010	<0.010	-	118	0.022	0.023	4.4	86	75-125	20
Cobalt	Co	<0.010	<0.010	-	113	<0.010	<0.010	-	94	75-125	20
Copper	Cu	<0.010	<0.010	-	114	0.055	0.053	3.7	82	75-125	20
Iron	Fe	<0.025	<0.025	-	107	30.5	28.8	5.7	NR*	75-125	20
Lead(E239.2)	Pb	<0.005	<0.005	-	100	NA	NA	N/A	NA	75-125	20
Lead	Pb	<0.050	<0.050	-	101	0.321	0.253	23.7 OC	86	75-125	20
Magnesium	Mg	<0.200	<0.200	-	NS	335	356	6.1	NS	75-125	20
Manganese	Mn	<0.005	<0.005	-	111	1.64	1.49	9.6	58 OC	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	<0.010	<0.010	-	120	<0.010	<0.010	-	93	75-125	20
Nickel	Ni	<0.015	<0.015	-	111	0.033	0.021	44.4 OC	89	75-125	20
Potassium	K	<0.400	<0.400	-	NS	6.61	5.27	22.6 OC	NS	75-125	20
Selenium	Se	<0.100	<0.100	-	112	<0.100	<0.100	-	96	75-125	20
Selenium(E270.2)	Se	<0.005	<0.005	-	85	<0.005	<0.005	-	51 OC	75-125	20
Silicon	Si	0.102	0.104	1.9	NS	31.6	31.6	0	NS	75-125	20
Silver	Ag	<0.010	<0.010	-	102	<0.010	<0.010	-	87	75-125	20
Sodium	Na	<0.200	<0.200	-	NS	68.8	59.4	14.7	NS	75-125	20
Thallium	Tl	<0.100	<0.100	-	105	<0.100	<0.100	-	81	75-125	20
Vanadium	V	<0.010	<0.010	-	107	0.036	0.034	5.7	83	75-125	20
Zinc	Zn	<0.010	<0.010	-	104	1.04	1.00	2.0	82	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20

NS = Not Spiked NR* = Sample amount greater than 4x the spike level; no recovery reported.

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID			MR		PH1025MS	51576	M51576MR		M51576MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike	Control Limits	
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	N/A	NA	<0.0002	<0.0002	-	110	80-120	20
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	99	NA	NA	N/A	NA	75-125	20

NS = Not Spiked NR* = Sample amount greater than 4x the spike level; no recovery reported.

Table E-6 (Continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID			MR		PH1012MS		
Sample Matrix		Aqueous	Aqueous		Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	NA	NA	75-125	20
Antimony	Sb	NA	NA	NA	NA	75-125	20
Arsenic	As	NA	NA	NA	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	NA	NA	75-125	20
Barium	Ba	NA	NA	NA	NA	75-125	20
Beryllium	Be	NA	NA	NA	NA	75-125	20
Boron	B	NA	NA	NA	NA	75-125	20
Cadmium	Cd	NA	NA	NA	NA	75-125	20
Calcium	Ca	NA	NA	NA	NA	75-125	20
Chromium	Cr	NA	NA	NA	NA	75-125	20
Cobalt	Co	NA	NA	NA	NA	75-125	20
Copper	Cu	NA	NA	NA	NA	75-125	20
Iron	Fe	NA	NA	NA	NA	75-125	20
Lead(E239.2)	Pb	NA	NA	NA	NA	75-125	20
Lead	Pb	NA	NA	NA	NA	75-125	20
Magnesium	Mg	NA	NA	NA	NA	75-125	20
Manganese	Mn	NA	NA	NA	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	NA	NA	80-120	20
Molybdenum	Mo	NA	NA	NA	NA	75-125	20
Nickel	Ni	NA	NA	NA	NA	75-125	20
Potassium	K	NA	NA	NA	NA	75-125	20
Selenium	Se	NA	NA	NA	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	NA	NA	75-125	20
Silicon	Si	NA	NA	NA	NA	75-125	20
Silver	Ag	NA	NA	NA	NA	75-125	20
Sodium	Na	NA	NA	NA	NA	75-125	20
Thallium	Tl	NA	NA	NA	NA	75-125	20
Vanadium	V	NA	NA	NA	NA	75-125	20
Zinc	Zn	NA	NA	NA	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	NA	108	75-125	20

NS = Not Spiked

Table E-7

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	50327	150327MR			50333	150333MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	1800	1800	0	N/A	800	800	0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	50521	150521MR			50330	150330MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	<10	<10	-	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	800	800	0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID / Sample Matrix / Parameter	50517 Aqueous Original (mg/L)	I50517MR Aqueous Replicate (mg/L)	RPD	I50379MS Spike Recovery (%)	50808 Aqueous Original (mg/L)	I50808MR Aqueous Replicate (mg/L)	RPD	Spike Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	0.78	0.8	2.5	99	NA	NA	N/A	NA	69-135	14.5
Chloride	35	34	2.9	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	100	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	100	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	400	370	7.8	103	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	NA	2300	2300	0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	50812	I50812MR		50813	I50813MR					
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	960	880	8.7	N/A	800	800	0	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51569	I51569MR			51029	I51029MR		I51029MS		
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	140	140	0	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	97	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	95	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	310	320	3.2	NA	71-124	11
Total Hardness	700	700	0	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51033	I51033MR			51026	I51026MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	4000	4100	2.5	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	150	140	6.9	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	1200	1100	8.7	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51571	I51571MR			51034	I51034MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	580	520	10.9	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	<1.0	<1.0	-	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51558	I51558MR			50327	I50327MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike	Control Limits	
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	570	550	3.57	N/A	1800	1800	0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51569	I51569MR		I51555MS	51615	I51615MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
	Original	Replicate		Recovery	Original	Replicate		Recovery	Control Limits	
Parameter	(mg/L)	(mg/L)	RPD	(%)	(mg/L)	(mg/L)	RPD	(%)	(% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	3200	3100	3.2	N/A	ND/R	ND/R
Anions: Flouride	0.69	0.70	1.4	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	34	34	0	104	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	120	120	0	100	NA	NA	N/A	NA	71-124	11
Total Hardness	570	550	3.57	N/A	N/A	NA	NA	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51612	I51612MR			50318	I50318MR	I50316M			
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	64	61	4.8	92	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	590	590	0	99	71-124	11
Total Hardness	660	660	0	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	50331	I50331MR			50388	I50388MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	1300	1300	0.0	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	0.46	0.45	2.2	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	<0.50	<0.50	-	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	<0.50	<0.50	-	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	<0.50	<0.50	-	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	6.2	5.9	5.3	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	NA	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	50176	I50176MR		I50174MS	50316	I50316MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
	Original	Replicate		Recovery	Original	Replicate		Recovery	Control Limits	
Parameter	(mg/L)	(mg/L)	RPD	(%)	(mg/L)	(mg/L)	RPD	(%)	(% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	1100	1200	8.7	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	NA	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	81	79	2.5	101	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	97	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	100	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	750	760	1.3	110	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	49688	149688MR			50177	150177MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	1900	1900	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	4900	4900	0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	49689	I49689MR			49691	I49691MR		49691MS		
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	68	68	0	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	510	500	2.0	NA	71-124	11
Total Hardness	1270	1270	0	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	49506	I49506MR		I49505MS	49504	I49504MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
	Original	Replicate		Recovery	Original	Replicate		Recovery	Control Limits	
Parameter	(mg/L)	(mg/L)	RPD	(%)	(mg/L)	(mg/L)	RPD	(%)	(% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	4000	4000	0	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	3600	3600	2.7	94	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	49017	149017MR			49086	149086MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike	Control Limits	
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
Total Dissolved Solids	360	360	0	N/A	48	45	6.5	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	94	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

Table E-7 (cont'd)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	49134	149134MR		49134MS	52570	152570MR				
Sample Matrix	Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
	Original	Replicate		Recovery	Original	Replicate		Recovery	Control Limits	
Parameter	(mg/L)	(mg/L)	RPD	(%)	(mg/L)	(mg/L)	RPD	(%)	(% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	N/A	NA	NA	N/A	N/A	ND/R	ND/R
Anions: Flouride	NA	NA	N/A	NA	NA	NA	N/A	NA	69-135	14.5
Chloride	<0.50	<0.50	-	93	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	<0.50	<0.50	-	99	NA	NA	N/A	NA	67-125	12.3
Phosphate	<0.50	<0.50	-	97	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	<0.50	<0.50	-	96	NA	NA	N/A	NA	71-124	11
Total Hardness	NA	NA	N/A	N/A	20	20	0.0	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

METHOD BLANK RESULTS

TABLES F-1 THROUGH F-7

Table F-1

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V01005MB2	V00927MB	V00926MB2	V00929MB	V01002MB	V00920MB	V00921MB	V00922MB	V00926MB3
Sample Matrix		Aqueous Primary	Aqueous Conf.	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF	NF	NF	NF
Chloroform	0.4	0.50	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.53	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	3.1	2.9	6.1	4.8	2.3	2.9	2.1	2.0	6.1
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	3.2	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table F-1 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V01005MB2	V00927MB	V00926MB2	V00929MB	V01002MB	V00920MB	V00921MB	V00922MB	V00926MB3
Sample Matrix		Aqueous Primary	Aqueous Conf.	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:										
Bromochloromethane	62-140	100	95	100	NR	100	83	99	110	100
1-Chloro-2-bromopropane	73-127	100	100	100	NR	100	78	101	106	100
1,4-Dichloropropane	64-136	100	98	100	NR	100	81	108	101	100

NR = Not reported.
NF = Not found in standard due to analytical problem.

Table F-1 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V00925MB1	V00926MB1	V00925MB2	V01002MB1	V01003MB	V01002MB2	V00928MB	V01005MB1	V01006MB
Sample Matrix		Aqueous Primary	Aqueous Primary	Aqueous Primary	Aqueous Conf.	Aqueous Conf.	Aqueous Conf.	Aqueous Conf.	Aqueous Primary	Aqueous Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	<10	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	<0.80	6.1	<0.80	4.3	3.4	4.3	1.8	1.8	1.8
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table F-1 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID Sample Matrix	MDL (ug/L)	V00925MB1 Aqueous Primary Results (ug/L)	V00926MB1 Aqueous Primary Results (ug/L)	V00925MB2 Aqueous Primary Results (ug/L)	V01002MB1 Aqueous Conf. Results (ug/L)	V01003MB Aqueous Conf. Results (ug/L)	V01002MB2 Aqueous Conf. Results (ug/L)	V00928MB Aqueous Conf. Results (ug/L)	V01005MB1 Aqueous Primary Results (ug/L)	V01006MB Aqueous Primary Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:										
Bromochloromethane	62-140	73	100	100	97	105	97	88	62	100
1-Chloro-2-bromopropane	73-127	80	100	100	106	113	106	93	77	100
1,4-Dichloropropane	64-136	78	100	100	79	78	100	150	87	100

NF = Not found in standard due to analytical problem.

Table F-1 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		VO1004MB	VO1006MB1	VO1005MB3	VO1005MB	VO1006MB2
Sample Matrix		Aqueous Conf.	Aqueous Conf.	Aqueous Primary	Aqueous Conf.	Aqueous Conf.
Compound	MDL (ug/L) Control Limits	Results (ug/L) Surrogate % Recovery	Results (ug/L) Surrogate % Recovery	Results (ug/L) Surrogate % Recovery	Results (ug/L) Surrogate % Recovery	Results (ug/L) Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	4.1	7.3	3.1	11	7.3
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0

Table F-1 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V01004MB	V01006MB1	V01005MB3	V01005MB	V01006MB2
Sample Matrix		Aqueous Conf.	Aqueous Conf.	Aqueous Primary	Aqueous Conf.	Aqueous Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:						
Bromochloromethane	62-140	130	NR	100	120	100
1-Chloro-2-bromopropane	73-127	115	NR	100	101	NR
1,4-Dichloropropane	64-136	246	NR	99	76	NR

NR = Not reported.
NF = Not found in standard due to analytical problem.

Table F-2

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
METHOD BLANKS

Field Sample ID		P01003MB	P01005MB1	P00926MB2	P00921MB2	P00922MB2	P00920MB	P00921MB1	P00922MB3
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:									
a,a,a-Trifluorotoluene	69-129	106	104	104	102	100	98	102	102

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table F-2 (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
METHOD BLANKS

Field Sample ID		PO0922MB1	PO0923MB	PO0925MB	PO0926MB1	PO1005MB2	PO1006MB	PO1009MB	PO1010MB1
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:									
a,a,a-Trifluorotoluene	69-129	100	100	94	104	100	100	102	97

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table F-2 (continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
METHOD BLANKS

Field Sample ID		PO1010MB2	PO1011MB	PO1012MB
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30
Surrogate:				
a,a,a-Trifluorotoluene	69-129	95	103	101

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table F-3
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
METHOD BLANKS

Field Sample ID		ED1010MB	ED1011MB	ED0929MB	ED1002MB	ED0926MB	ED0927MB	ED0928MB	ED1009MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA	<100	<100	<100	<100	<100	NA
Diethyl Ether	10	NA	NA	<10	<10	<10	<	<10	NA
Methyl Ethyl Ketone	10	NA	NA	<10	<10	<10	<10	<10	NA
Methyl Isobutyl Ketone	10	NA	NA	<10	<10	<10	<10	<10	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30	NA	NA	NA	NA	NA	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30	NA	NA	NA	NA	NA	<0.30

Table F-3 (continued)
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
Ethylene Dibromide (E504.1)
METHOD BLANKS

Field Sample ID		ED1012MB	ED1013MB
Sample Matrix		Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	NA	NA
Diethyl Ether	10	NA	NA
Methyl Ethyl Ketone	10	NA	NA
Methyl Isobutyl Ketone	10	NA	NA
Ethylene Dibromide (E504.1)	0.3	<0.30	<0.30
1,2-Dibromo-3-Chloropropane (E504.1)	0.3	<0.30	<0.30

Table F-4
Pesticides and PCBs Analysis Results
METHOD BLANKS

Field Sample ID		PP0928MB	PP0920MB	PP0930MB
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	<0.05	<0.025	<0.05
a-BHC	0.025	<0.05	<0.025	<0.05
b-BHC	0.025	<0.05	<0.025	<0.05
g-BHC	0.025	<0.05	<0.025	<0.05
d-BHC	0.025	<0.05	<0.025	<0.05
Chlordane	0.20	<0.50	<0.20	<0.50
4,4'-DDD	0.05	<0.10	<0.05	<0.10
4,4'-DDE	0.05	<0.10	<0.05	<0.10
4,4'-DDT	0.10	<0.10	<0.10	<0.10
Dieldrin	0.05	<0.10	<0.05	<0.10
Endosulfan I	0.05	<0.05	<0.05	<0.05
Endosulfan II	0.05	<0.10	<0.05	<0.10
Endosulfan sulfate	0.10	<0.10	<0.10	<0.10
Endrin	0.05	<0.10	<0.05	<0.10
Endrin aldehyde	0.10	<0.10	<0.10	<0.10
Heptachlor	0.025	<0.05	<0.025	<0.05
Heptachlor epoxide	0.05	<0.05	<0.05	<0.05
Toxaphene	1.00	<1.0	<1.0	<1.0
Methoxychlor	0.50	<0.50	<0.40	<0.50
PCB-1016	0.50	<0.50	<0.50	<0.50
PCB-1221	0.50	<0.50	<0.50	<0.50
PCB-1232	0.50	<0.50	<0.50	<0.50
PCB-1242	0.50	<0.50	<0.50	<0.50
PCB-1248	0.50	<0.50	<0.50	<0.50
PCB-1254	0.50	<1.0	<0.50	<1.0
PCB-1260	0.50	<1.0	<0.50	<1.0
Surrogate:				
Dibutylchlorendate	25-154	87	111	85

Table F-5
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV0929MB	SV0928MB	SV0926MB	SV0927MB	SV1018MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	10	<10	<10	<10	<10	<10
bis(2-chloroisopropyl)ether	10	<10	<10	<10	<10	<10
N-Nitroso-di-propylamine	10	<10	<10	<10	<10	<10
Hexachloroethane	10	<10	<10	<10	<10	<10
Nitrobenzene	10	<10	<10	<10	<10	<10
Isophorone	10	<10	<10	<10	<10	<10
bis(2-chloroethoxy)methane	10	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	10	<10	<10	<10	<10	<10
Naphthalene	10	<10	<10	<10	<10	<10
Hexachlorobutadiene	10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	10	<10	<10	<10	<10	<10
2-Chloronaphthalene	10	<10	<10	<10	<10	<10
Dimethyl phthalate	10	<10	<10	<10	<10	<10
Acenaphthylene	10	<10	<10	<10	<10	<10
Fluorene	10	<10	<10	<10	<10	<10
Acenaphthene	10	<10	<10	<10	<10	<10
2,4-Dinitrotoluene	10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	10	<10	<10	<10	<10	<10
Diethylphthalate	10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	10	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine	10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	10	<10	<10	<10	<10	<10

Table F-5 (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV0929MB	SV0928MB	SV0926MB	SV0927MB	SV1018MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	<10	<10	<10	<10	<10
Phenanthrene	10	<10	<10	<10	<10	<10
Anthracene	10	<10	<10	<10	<10	<10
Di-n-Butyl phthalate	10	<10	<10*	<10*	<10*	<10
Fluoranthene	10	<10	<10	<10	<10	<10
Benzidine	50	<50	<50	<50	<50	<50
Pyrene	10	<10	<10	<10	<10	<10
Butyl benzyl phthalate	10	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine	20	<20	<20	<20	<20	<20
Benzo(a)anthracene	10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	10	<10*	<10	<10	10	68
Chrysene	10	<10	<10	<10	<10	<10
Di-n-octyl phthalate	10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	10	<10	<10	<10	<10	<10
Benzo(a)pyrene	10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	10	<10	<10	<10	<10	<10
Phenol	10	<10	<10	<10	<10	<10
2-Chlorophenol	10	<10	<10	<10	<10	<10
2-Nitrophenol	10	<10	<10	<10	<10	<10
2,4-Dimethyphenol	10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	10	<10	<10	<10	<10	<10

Table F-5 (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV0929MB	SV0928MB	SV0926MB	SV0927MB	SV1018MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	50	<50	<50	<50	<50	<50
4-Nitrophenol	50	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol	50	<50	<50	<50	<50	<50
Pentachlorophenol	50	<50	<50	<50	<50	<50
Benzyl alcohol	10	<10	<10	<10	<10	<10
2-Methylphenol	10	<10	<10	<10	<10	<10
4-Methylphenol	10	<10	<10	<10	<10	<10
Benzoic acid	50	<50	<50	<50	<50	<50
4-Chloroaniline	10	<10	<10	<10	<10	<10
2-Methylnaphthalene	10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	50	<50	<50	<50	<50	<50
2-Nitroaniline	50	<50	<50	<50	<50	<50
3-Nitroaniline	50	<50	<50	<50	<50	<50
Dibenzofuran	10	<10	<10	<10	<10	<10
4-Nitroaniline	50	<50	<50	<50	<50	<50
Surrogates:						
Nitrobenzene-d5	35-114	39	109	56	63	52
2-Fluorobiphenyl	43-116	49	117	57	56	54
Terphenyl-d14	33-141	81	120	53	75	65
2-Fluorophenol	10-94	21	57	16	60	22
Phenol-d5	10-94	22	48	12	48	22
2,4,6-Tribromophenol	10-123	88	160	28	110	45

* = Compound present below measurable detection limit.

Table F-6
Inorganic Analysis Results: Metals
METHOD BLANKS

Field Sample ID			M420MB	M421MB	M414MB	M415MB	M429MB	M432MB	M431MB	M430MB
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	<0.100	NA	<0.100	NA	<0.100	NA	<0.100	NA
Antimony	Sb	0.06	<0.060	NA	<0.060	NA	<0.060	NA	<0.060	NA
Arsenic	As	0.05	<0.050	NA	<0.050	NA	<0.050	NA	<0.050	NA
Arsenic (E206.2)	As	0.005	NA	<0.005	NA	<0.005	NA	<0.005	NA	<0.005
Barium	Ba	0.01	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Beryllium	Be	0.002	<0.002	NA	<0.002	NA	<0.002	NA	<0.002	NA
Boron	B	0.01	0.029	NA	<0.010	NA	0.016	NA	<0.010	NA
Cadmium	Cd	0.005	<0.005	NA	<0.005	NA	<0.005	NA	<0.005	NA
Calcium	Ca	0.20	0.386	NA	<0.200	NA	<0.200	NA	<0.200	NA
Chromium	Cr	0.010	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Cobalt	Co	0.010	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Copper	Cu	0.010	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Iron	Fe	0.025	<0.025	NA	<0.025	NA	<0.025	NA	<0.025	NA
Lead	Pb	0.05	<0.050	NA	<0.050	NA	<0.050	NA	<0.050	NA
Lead (E239.2)	Pb	0.005	NA	<0.005	NA	<0.005	NA	<0.005	NA	<0.005
Magnesium	Mg	0.20	<0.200	NA	<0.200	NA	<0.200	NA	<0.200	NA
Manganese	Mn	0.005	<0.005	NA	<0.005	NA	<0.005	NA	<0.005	NA
Mercury (E245.1)	Hg	0.0002	NA	<0.0002	NA	<0.0002	NA	<0.0002	NA	<0.0002
Molybdenum	Mo	0.010	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Nickel	Ni	0.015	<0.015	NA	<0.015	NA	<0.015	NA	<0.015	NA
Potassium	K	0.4	<0.400	NA	<0.400	NA	<0.400	NA	<0.400	NA
Selenium	Se	0.100	<0.100	NA	<0.100	NA	<0.100	NA	<0.100	NA
Selenium (E270.2)	Se	0.005	NA	<0.005	NA	<0.005	NA	<0.005	NA	<0.005
Silicon	Si	0.01	0.083	NA	<0.030	NA	0.051	NA	<0.020	NA
Silver	Ag	0.01	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Sodium	Na	0.20	<0.200	NA	<0.200	NA	<0.200	NA	<0.200	NA
Thallium	Tl	0.10	<0.100	NA	<0.100	NA	<0.100	NA	<0.100	NA
Vanadium	V	0.01	<0.010	NA	<0.010	NA	<0.010	NA	<0.010	NA
Zinc	Zn	0.01	0.037	NA	<0.010	NA	<0.010	NA	<0.010	NA

Table F-6 (continued)
Inorganic Analysis Results: Metals
METHOD BLANKS

Field Sample ID			M434MB	M527MB	M433MB	M526MB	M469MB	M446MB	M445MB	M455MB
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	NA	NA	0.102	<0.100	<0.100	NA	<0.100	NA
Antimony	Sb	0.06	NA	NA	<0.060	<0.060	<0.060	NA	<0.060	NA
Arsenic	As	0.05	NA	NA	<0.050	<0.050	<0.050	NA	<0.050	NA
Arsenic (E206.2)	As	0.005	<0.005	<0.005	NA	NA	NA	<0.005	NA	<0.005
Barium	Ba	0.01	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Beryllium	Be	0.002	NA	NA	<0.002	<0.002	<0.002	NA	<0.002	NA
Boron	B	0.01	NA	NA	0.062	0.082	0.497	NA	0.171	NA
Cadmium	Cd	0.005	NA	NA	<0.005	<0.005	<0.005	NA	<0.005	NA
Calcium	Ca	0.20	NA	NA	14.4	<0.200	<0.200	NA	<0.200	NA
Chromium	Cr	0.010	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Cobalt	Co	0.010	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Copper	Cu	0.010	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Iron	Fe	0.025	NA	NA	0.052	<0.025	<0.025	NA	<0.025	NA
Lead	Pb	0.05	NA	NA	<0.050	<0.050	<0.050	NA	<0.050	NA
Lead (E239.2)	Pb	0.005	<0.005	<0.005	NA	NA	NA	<0.005	NA	<0.005
Magnesium	Mg	0.20	NA	NA	3.50	<0.200	<0.200	NA	<0.200	NA
Manganese	Mn	0.005	NA	NA	<0.005	<0.005	<0.005	NA	<0.005	NA
Mercury (E245.1)	Hg	0.0002	<0.0002	NA	NA	NA	NA	<0.0002	NA	<0.0002
Molybdenum	Mo	0.010	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Nickel	Ni	0.015	NA	NA	<0.015	<0.015	<0.015	NA	<0.015	NA
Potassium	K	0.4	NA	NA	0.501	<0.400	<0.400	NA	<0.400	NA
Selenium	Se	0.100	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Selenium (E270.2)	Se	0.005	<0.005	<0.005	NA	NA	NA	<0.005	NA	<0.005
Silicon	Si	0.01	NA	NA	0.184	<0.180	0.032	NA	0.088	NA
Silver	Ag	0.01	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Sodium	Na	0.20	NA	NA	5.48	0.67	<0.200	NA	<0.200	NA
Thallium	Tl	0.10	NA	NA	<0.100	<0.100	<0.100	NA	<0.100	NA
Vanadium	V	0.01	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA
Zinc	Zn	0.01	NA	NA	<0.010	<0.010	<0.010	NA	<0.010	NA

Table F-6 (continued)
Inorganic Analysis Results: Metals
METHOD BLANKS

Field Sample ID			M470MB	M454MB
Sample Matrix			Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	NA	<0.100
Antimony	Sb	0.06	NA	<0.060
Arsenic	As	0.05	NA	<0.050
Arsenic (E206.2)	As	0.005	<0.005	NA
Barium	Ba	0.01	NA	<0.010
Beryllium	Be	0.002	NA	<0.002
Boron	B	0.01	NA	0.035
Cadmium	Cd	0.005	NA	<0.005
Calcium	Ca	0.20	NA	<0.200
Chromium	Cr	0.010	NA	<0.010
Cobalt	Co	0.010	NA	<0.010
Copper	Cu	0.010	NA	<0.010
Iron	Fe	0.025	NA	<0.025
Lead	Pb	0.05	NA	<0.050
Lead (E239.2)	Pb	0.005	<0.005	NA
Magnesium	Mg	0.20	NA	<0.200
Manganese	Mn	0.005	NA	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002	NA
Molybdenum	Mo	0.010	NA	<0.010
Nickel	Ni	0.015	NA	<0.015
Potassium	K	0.4	NA	<0.400
Selenium	Se	0.100	NA	<0.100
Selenium (E270.2)	Se	0.005	<0.005	NA
Silicon	Si	0.01	NA	0.103
Silver	Ag	0.01	NA	<0.010
Sodium	Na	0.200	NA	<0.200
Thallium	Tl	0.100	NA	<0.100
Vanadium	V	0.01	NA	<0.010
Zinc	Zn	0.01	NA	<0.010

Table F-7
General Chemistry Analysis Results
METHOD BLANKS

Field Sample ID			I0922MB	I0925MB	I0915MB	I0918MB	I0920MB	I0921MB	I0928MB	I0929MB
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	Parameter	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Anions:	Fluoride	0.1	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10
	Chloride	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Phosphate	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Sulfate	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

QC SUMMARY

TABLES G-1a THROUGH G-2b

Table G-1a
QC Summary: Precision and Accuracy
Volatile Organic Compounds(SW5030/8021)
Purgeable Halocarbon Compounds

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Carbon Tetrachloride	16	85-125	80-120	14	2	7	0-5.5	20	7	0
1,2-Dichloroethane	16	90-135	82-124	13	3	7	0-5.5	20	7	0
1,1,1-Trichloroethane	16	85-125	80-117	14	2	7	0-5.7	20	7	0
1,1-Dichloroethane	16	85-125	80-120	14	2	7	0-5.7	20	7	0
1,1,2-Trichloroethane	16	85-140	80-120	13	3	7	0-13	20	7	0
1,1,2,2-Tetrachloroethane	16	70-145	80-120	13	3	7	0-25	20	6	1
Chloroethane	16	70-120	80-120	14	2	7	0-6.1	20	7	0
Chloroform	16	90-140	58-124	13	3	7	0-9.5	20	7	0
1,1-Dichloroethane	16	75-115	84-189	12	4	7	0-6.4	20	7	0
trans-1,2-Dichloroethane	16	85-120	80-120	16	0	7	0-5.7	20	7	0
1,2-Dichloropropane	16	85-125	80-120	15	1	7	0-5.7	20	7	0
total-1,3-Dichloropropene	16	88-132	80-120	13	3	7	0-9.7	20	7	0
Methylene Chloride	16	75-150	80-120	12	4	7	0-6.1	20	7	0
Chloromethane	16	55-130	80-120	7	9	7	0-16.2	20	7	0
Bromomethane	16	70-120	80-120	14	2	7	0-6.1	20	7	0
Bromoform	16	75-150	80-120	12	4	7	0-12	20	7	0
Bromodichloromethane	16	90-135	80-120	13	3	7	0-15	20	7	0
Fluorotrichloromethane	16	75-110	80-120	15	1	7	0-6.4	20	7	0
Chlorodibromomethane	16	90-135	75-123	13	3	7	0-13	20	7	0
Tetrachloroethane	16	70-120	74-127	15	1	7	0-25	20	6	1
Trichloroethane	16	90-130	68-115	14	2	7	0-5.5	20	7	0
Vinyl Chloride	16	58-130	28-163	16	0	7	0-8.7	20	7	0
Chlorobenzene	16	80-120	80-120	16	0	7	0-14	20	7	0
1,3-Dichlorobenzene	16	75-115	80-120	15	1	7	0-6.5	20	7	0
1,2-Dichlorobenzene	16	80-130	71-127	15	1	7	0-6.1	20	7	0
1,4-Dichlorobenzene	16	95-145	80-120	13	3	7	0-4.6	20	7	0
Total	416			354	62	182			180	2

Table G-1b
QC Summary: Precision and Accuracy
Purgeable Aromatic Organics (SW5030/8020)

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Chlorobenzene	32	80-150	80-120	31	1	16	0-40	20	15	1
1,2-Dichlorobenzene	32	90-115	71-127	32	0	16	0-19	20	16	0
1,3-Dichlorobenzene	32	85-120	80-120	32	0	16	0-23	20	15	1
1,4-Dichlorobenzene	32	85-120	80-120	32	0	16	0-23	20	15	1
Benzene	32	24-155	41-154	28	4(*)	16	0-117	20	12	4
Toluene	32	49-140	80-120	28	4(*)	16	0-45	20	12	4
Ethylbenzene	32	49-135	80-120	31	1(*)	16	0-25	20	15	1
Total	224			214	10(*)	112			100	12

* = An additional two low recoveries which were outside control limits appear to be attributable to matrix effect.
See data on Table E-2 for PO1576MS/MSD.

Table G-1c
QC Summary: Precision and Accuracy
Non-halogenated Volatile Organic Compounds(SW5030/8015);
Ethylene Dibromide(E504.1)

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Ethanol	10	89-148	75-125	7	3	5	0.8-25	25	5	0
Diethyl Ether	10	97-118	75-125	10	0	5	0-8.8	25	5	0
Methyl Ethyl Ketone	10	68-134	75-125	6	4	5	0-38	25	4	1
Methyl Isobutyl Ketone	10	76-124	75-125	10	0	5	0-25	25	5	0
Ethylene Dibromide(E504.1)	5	90-117	75-125	5	0	NA	NA	NA	NA	NA
1,2-Dibromo-3-Chloropropane (E504.1)	5	86-110	75-125	5	0	NA	NA	NA	NA	NA
Total	50			43	7	20			19	1

Table G-1d
QC Summary: Precision and Accuracy
Pesticides and PCB's

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Lindane	6	70-105	47-137	6	0	3	4.6-16	50	3	0
Heptachlor	4	75-110	49-133	4	0	2	4.6-22	31	2	0
Aldrin	4	70-88	47-131	4	0	2	0-16	43	2	0
Dieldrin	4	63-100	43-133	4	0	2	17-47	38	1	1
Endrin	2	103-104	46-142	2	0	0	-	45	-	-
4,4-DDT	6	83-128	31-157	6	0	3	1.2-17	50	3	0
Total	26			26	0	12			11	1

Table G-1e
QC Summary: Precision and Accuracy
Semivolatile Organic Compounds

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
1,2,4-Trichlorobenzene	7	33-73	39-98	5	2	2	46-50	28	0	2
Acenaphthene	7	57-111	46-118	7	0	2	23-48	31	1	1
2,4-Dinitrotoluene	7	62-115	24-96	6	1	2	18-57	38	1	1
Pyrene	7	70-122	26-127	7	0	2	18-46	31	1	1
N-Nitroso-di-n-propylamine	7	45-81	41-116	7	0	2	30-45	38	1	1
1,4-Dichlorobenzene	7	26-67	36-97	5	2	2	50-61	28	1	1
Pentachlorophenol	7	12-62	9-103	7	0	2	2-38	50	1	1
Phenol	7	12-55	12-89	7	0	2	50-54	42	0	2
2-Chlorophenol	7	37-78	27-123	7	0	2	29-40	40	2	0
4-Chloro-3-methylphenol	7	37-89	23-97	7	0	2	33-49	42	1	1
4-Nitrophenol	7	24-94	10-80	6	1	2	46-65	50	1	1
Total	77			71	6	22			10	12

Table G-1f
QC Summary: Precision and Accuracy
Metals, TPH

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Aluminum	7	80-107	75-125	7	0	9	0-13.8	20	9	0
Antimony	10	0-108	75-125	9	1	10	0	20	10	0
Arsenic	9	30-110	75-125	8	1	9	0-21	20	8	1
Arsenic(E2062)	8	78-180	75-125	7	1	8	0-3.8	20	8	0
Barium	10	74-113	75-125	9	1	10	0-22.7	20	9	1
Beryllium	10	72-104	75-125	9	1	10	0	20	10	0
Boron	7	70-116	75-125	6	1	7	9.2-200	20	4	3
Cadmium	10	81-108	75-125	10	0	10	0-12	20	10	0
Calcium	NS	NS	75-125	NS	NS	10	0-7.9	20	10	0
Chromium	10	86-118	75-125	10	0	10	0-5.6	20	10	0
Cobalt	10	91-114	75-125	10	0	10	0-16	20	10	0
Copper	10	82-114	75-125	10	0	10	0-3.7	20	10	0
Iron	6	54-108	75-125	4	2	9	0-21.9	20	7	2
Lead(E239.2)	7	95-107	75-125	7	0	7	0-62.5	20	5	2
Lead	10	78-111	75-125	10	0	10	0-23.7	20	9	1
Magnesium	NS	NS	75-125	NS	NS	10	0-17.6	20	10	0
Manganese	9	58-111	75-125	8	1	10	0-19.9	20	10	0
Mercury(E245.1)	5	71-110	75-125	3	2	5	0-18	20	5	0
Molybdenum	7	93-120	75-125	7	0	7	0	20	7	0
Nickel	10	86-111	75-125	10	0	10	0-44	20	9	1
Potassium	NS	NS	75-125	NS	NS	10	0-55	20	7	3
Selenium	9	0-112	75-125	8	1	9	0	20	9	0
Selenium(E290.2)	8	47-113	75-125	3	5	8	0	20	8	0
Silicon	NS	NS	75-125	NS	NS	7	0-51	20	6	1
Silver	10	0-108	75-125	9	1	10	0	20	10	0
Sodium	NS	NS	75-125	NS	NS	10	0-19.5	20	10	0
Thallium	9	81-118	75-125	9	0	9	0	20	9	0
Vanadium	10	83-117	75-125	10	0	10	0-6.3	20	10	0
Zinc	10	82-111	75-125	10	0	10	0-200	20	9	1
Total Petroleum Hydrocarbons	10	84-128	75-125	9	1	NA	NA	20	NA	NA
Total	221			202	19	254			248	16

Table G-1g
QC Summary: Precision and Accuracy
General Chemistry

Parameter	Accuracy: Total Number Analyses	Accuracy: Percent Recovery Ranges	Accuracy: Control Limits	Accuracy: Number Within Control Limits	Accuracy: Number Outside Control Limits	Precision: Total Number Analyses	Precision: RPD Ranges	Precision: Control Limits	Precision: Number Within Control Limits	Precision: Number Outside Control Limits
Total Dissolved Solids	Spike Analyses Not Performed for this Parameter - Not Applicable					12	0-10.9	ND/R	12	0
Anions: Fluoride	1	99	69-135	1	0	3	1.4-2.5	14.5	3	0
Chloride	5	92-114	46-114	5	0	9	0-6.9	12.6	9	0
Nitrate-Nitrogen	4	97-100	67-125	4	0	2	0	12.3	2	0
Phosphate	4	95-100	ND/R	4	0	1	0	ND/R	1	0
Sulfate	7	94-110	71-124	7	0	10	0-8.7	ND/R	10	0
Total Hardness	Spike Analyses Not Performed for this Parameter - Not Applicable					12	0-3.6	ND/R	12	0
Total	21			21	0	49			49	0

ND/R = Not defined or reported by the laboratory; statistical control limits unavailable. For the purpose of estimating precision and accuracy, a guideline of RPD < 25 and recovery between 75-125 percent was used as control limits.

Table G-2a
QC Summary: Surrogate Recoveries - Volatile/Purgable Organic Analyses
(SW5030/8021 and SW5030/8020)

Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Volatile Halocarbons Analyses					
Bromochloromethane	63	74-155	62-140	57	6
1-Chloro-2-bromopropane	63	82-130	73-127	61	2
1,4-Dichloropropane	63	77-138	64-136	62	1
Purgable Aromatic Analyses					
a,a,a-Trifluorotoluene	106	68-121	69-129	105	1
Total	295			285	10

Note: These surrogate recoveries include those reported only for the primary analyses.

Table G-2b
QC Summary: Surrogate Recoveries - Groundwater
(Pesticides/PCB's and Semivolatile Organics)

Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Pesticides/PCB Analyses					
Dibutylchlorendate	17	70-113	25-154	17	0
Semivolatile Organic Compounds					
Nitrobenzene-d5	30	37-102	35-114	30	0
2-Fluorobiphenyl	30	42-104	43-116	29	1
Terphenyl-d14	30	22-110	33-141	27	3
2-Fluorophenol	30	15-69	10-94	30	0
Phenol-d5	30	11-48	10-94	30	0
2,4,6-Tribromophenol	30	30-105	10-123	30	0
Total	197			193	4

APPENDIX II A

USGS WELL SAMPLE RESULTS

APPENDIX IIA
USGS WELL DATA

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Table IIA-1
Site Specific Cross Reference
USGS Wells

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Page(s) Metals/ TPH	Page(s) General Chemistry
GW-97	Field Blank	53527	336, 338	NA	NA
GW-98	USGS Well #1	53528	336, 338	339	340
GW-99	USGS Well #2	53529	336, 338	339	340
TB-30	Trip Blank	53530	336, 338	NA	NA

Table IIA-2a

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
USGS WELLS

		Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-97	10/13/89	14 days	10/24/89	11 Days	14 days	10/19/89	6 Days
GW-98	10/13/89	14 days	10/24/89	11 Days	14 days	10/19/89	6 Days
GW-99	10/13/89	14 days	10/18/89	5 Days	14 days	10/18/89	5 Days
TB-30	10/13/89	14 days	10/24/89	11 Days	14 days	10/18/89	5 Days

Table IIA-2b

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
USGS Wells

		Metals			Mercury			Total Petroleum Hydrocarbons		
Field Sample ID	Sampling Date	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-98	10/13/89	6 months	11/30/89	48 Days	28 days	11/01/89	19 Days	28 days	11/03/89	21 Days
GW-99	10/13/89	6 months	11/30/89	48 Days	28 days	11/01/89	19 Days	28 days	11/03/89	21 Days

Table IIA-2c

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
USGS WELLS

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-98	10/13/89	7 days	10/20/89	7 Days	2 days	10/13/89	<1 Day	6 months	11/13/89	31 days
GW-99	10/13/89	7 days	10/20/89	7 Days	2 days	10/13/89	<1 Day	6 months	11/13/89	31 days

* Note: Hold time for nitrate, phosphate = 48 hours;
chloride, fluoride, and sulfate = 28 days.

Table IIA-3

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
USGS Wells

Field Sample ID		GW97	GW98	GW99	TB-30	VO1017MB	VO1018MB	VO1024MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank (See Note)		VO1017MB	VO1018MB	VO1018MB	VO1018MB	Primary	Primary	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF	<10
Chloroform	0.4	<0.40	<0.40	<0.40	0.42/4.4	0.50	0.43	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	2.5/3.8	0.69/3.7	<0.80	2.6/3.1	3.6	6.6	5.1
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.
Note: The confirmation analysis method blank (VO1024MB,Conf.) applies to all samples.

Table IIA-3 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
USGS Wells

Field Sample ID		GW97	GW98	GW99	TB-30	VO1017MB	VO1018MB	VO1024MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank		VO1017MB	VO1018MB	VO1018MB	VO1018MB	Primary	Primary	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:								
Bromochloromethane	62-140	101/108	101/108	108	97/103	100	100	100
1-Chloro-2-bromopropane	73-127	92/ 94	103/110	107	93/105	100	100	100
1,4-Dichloropropane	64-136	91/161	88/169	103	91/169	100	100	100

Table IIA-4

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
USGS Wells

Field Sample ID		GW97	GW98	GW99	TB-30	PO1017MB	PO1018MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank		PO1017MB	PO1018MB	PO1018MB	PO1018MB		
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	0.33/0.35	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:							
a,a,a-Trifluorotoluene	62-129	92/87	101/99	95	90	100	100

Table IIA-5
Inorganic Analysis Results: Metals, TPH
USGS Wells

Field Sample ID			GW98	GW99	M473MB	M474MB
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.109	<0.100	<0.100	NA
Antimony	Sb	0.06	<0.060	<0.060	<0.060	NA
Arsenic	As	0.05	<0.050	<0.050	<0.050	NA
Arsenic (E206.2)	As	0.005	<0.005	<0.005	NA	<0.005
Barium	Ba	0.01	0.021	0.021	<0.010	NA
Beryllium	Be	0.002	<0.002	<0.002	<0.002	NA
Boron	B	0.01	0.938	0.222	0.033	NA
Cadmium	Cd	0.005	<0.005	<0.005	<0.005	NA
Calcium	Ca	0.20	123	23.6	<0.200	NA
Chromium	Cr	0.010	<0.010	<0.010	<0.010	NA
Cobalt	Co	0.010	<0.010	<0.010	<0.010	NA
Copper	Cu	0.010	<0.010	<0.010	<0.010	NA
Iron	Fe	0.025	0.262	0.094	<0.025	NA
Lead	Pb	0.05	<0.050	<0.050	<0.050	NA
Lead (E239.2)	Pb	0.005	0.010	<0.005	NA	<0.005
Magnesium	Mg	0.20	0.042	0.090	<0.200	NA
Manganese	Mn	0.005	0.021	0.044	<0.005	NA
Mercury (E245.1)	Hg	0.0002	<0.0002	<0.0002	NA	<0.0002
Molybdenum	Mo	0.010	<0.010	<0.010	<0.010	NA
Nickel	Ni	0.015	<0.015	<0.015	<0.015	NA
Potassium	K	0.4	10.5	1.32	<0.400	NA
Selenium	Se	0.100	<0.100	<0.100	<0.100	NA
Selenium (E270.2)	Se	0.005	<0.005	<0.005	NA	<0.005
Silicon	Si	0.020	4.02	4.84	0.074	NA
Silver	Ag	0.01	<0.010	<0.010	<0.010	NA
Sodium	Na	0.200	31.2	26.6	0.031	NA
Thallium	Tl	0.100	<0.100	<0.100	<0.100	NA
Vanadium	V	0.01	<0.010	<0.010	<0.010	NA
Zinc	Zn	0.01	1.52	0.034	<0.010	NA
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	N/A	N/A

Table IIA-6
General Chemistry Analysis Results
USGS Wells

Field Sample ID			GW98	GW99	MB1013
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	640	1200	N/A
Anions:	Fluoride	0.1	0.88	0.84	<0.10
	Chloride	0.5	62	38	<0.50
	Nitrate-Nitrogen	0.5	<0.50	<0.50	<0.50
	Phosphate	0.5	<0.50	<0.50	<0.50
	Sulfate	0.5	140	630	<0.50
Total Hardness		1.0	510	1000	N/A

SAIC Science Applications International Corporation
An Employee-Owned Company

541.0913

Chain of Custody Record

Date 10-13-89 Page 1 of 1

Shipment No. 30

Name John J King
Address 1 One Sears Dr. Paramus NJ
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RIFS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Halocarbons/Aromatics SW5030/8021	Petroleum Hydrocarbons E418.1	Metals (Total) Ag, As, Ba, Hg, Se E200.7; E206.2; E245.2; E245.1 E270.2	Hardness E130.1	Common Anions (Cl, NO3, F, SO4, PO4) A429	Total Dissolved Solids E160.1	Temperature	NO. OF CONTAINERS
53527	WTR	GW-97	10-13-89		Ambient Cond Blank	+							2
53528	WTR	GW-98	10-13-89		1865 #1	+	+	+	+	+	+		5
53529	WTR	GW-99	10-13-89		1865 #2	+	+	+	+	+	+		5
	WTR	GW-100	10-13-89		1865 #3	+	+	+	+	+	+		
53530	TB #30					+							1
	CB #30											+	1

Total Number of Containers: 14

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

- Some bottles only contain the minimum volume needed
- TB #30 not preserved with HCl
- Temperature of cooler at shipment 1 °C

Temp of Coolant Blank type CB #30 upon arrival at Lab ___ °C

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: John J King	10-13-89	Signature: Steven M Taylor	
Printed Name: John J King	Time: 1920	Printed Name: Steven M Taylor	Time
Company: SAIC		Company: 10-13-89 19:25	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734-2500

Oakridge
800 Oakridge Turnpike, Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San [illegible] CA 92121
(619) 535-7438

000341

APPENDIX II B

CONTAINERIZED WATER SAMPLE RESULTS

APPENDIX IIB
CONTAINERIZED WATER DATA

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Table IIB-1
Site Specific Cross Reference
Containerized Water

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Page(s) TPH
CW-1	Bulk Storage Container #2	52382	345, 349	351
CW-2	Bulk Storage Container #1	52383	345, 349	351
CW-3	Bulk Storage Container #3	52384	345, 349	351
CW-4	Bulk Storage Container #4	52385	345, 349	351
CW-5	Bulk Storage Container #5	52386	345, 349	351
CW-6	Bulk Storage Container #6	52387	345, 349	352
CW-7	Bulk Storage Container #7	52388	347, 349	352
CW-8	Bulk Storage Container #8	52389	347, 350	352
CW-9	Bulk Storage Container #9	52390	347, 350	352
CW-11	Field Blank	52391	347, 350	NA
TB-29	Trip Blank	52392	347, 350	NA

Table IIB-2a

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
Containerized Water

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021) Hold Time	Volatile Organics (SW5030/8021) Analysis Date	Volatile Organics (SW5030/8021) Elapsed Time	Purgeable Aromatic Organics (SW5030/8020) Hold Time	Purgeable Aromatic Organics (SW5030/8020) Analysis Date	Purgeable Aromatic Organics (SW5030/8020) Elapsed Time	Total Petroleum Hydrocarbon Hold Time	Total Petroleum Hydrocarbon Analysis Date	Total Petroleum Hydrocarbon Elapsed Time
CW-1	10/03/89	14 days	10/16/89	13 Days	14 days	10/13/89	10 Days	28 days	10/30/89	27 Days
CW-2	10/03/89	14 days	10/16/89	13 Days	14 days	10/13/89	10 Days	28 days	10/30/89	27 Days
CW-3	10/03/89	14 days	10/16/89	13 Days	14 days	10/13/89	10 Days	28 days	10/31/89	28 Days
CW-4	10/03/89	14 days	10/13/89	10 Days	14 days	10/13/89	10 Days	28 days	10/31/89	28 Days
CW-5	10/03/89	14 days	10/16/89	13 Days	14 days	10/16/89	13 Days	28 days	10/31/89	28 Days
CW-6	10/03/89	14 days	10/16/89	13 Days	14 days	10/16/89	13 Days	28 days	10/31/89	28 Days
CW-7	10/03/89	14 days	10/16/89	13 Days	14 days	10/13/89	10 Days	28 days	10/31/89	28 Days
CW-8	10/03/89	14 days	10/16/89	13 Days	14 days	10/16/89	13 Days	28 days	10/31/89	28 Days
CW-9	10/03/89	14 days	10/16/89	13 Days	14 days	10/16/89	13 Days	28 days	10/31/89	28 Days
CW-11	10/03/89	14 days	10/17/89	14 Days	14 days	10/17/89	14 Days	28 days	NR	NR
TB-29	10/03/89	14 days	10/16/89	13 Days	14 days	10/16/89	13 Days	28 days	NR	NR

Table IIB-3

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Containerized Water

Field Sample ID		CW-1	CW-2	CW-3	CW-4	CW-5	CW-6	V1016MB1	V1016MB2
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank(See note)		V01013MB	V01013MB	V01013MB	V01013MB	V01013MB	V01013MB	Primary	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	0.80/0.57	<0.40	<0.40	<0.40	<0.40	0.73	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	6.5	2.9
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	1.7/1.1	<0.80	3.0/2.2	2.0/1.6	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.
Note: Confirmation analyses blank(V1016MB2, Conf.) applies to all samples.

Table IIB-3 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Containerized Water

Field Sample ID		CW-1	CW-2	CW-3	CW-4	CW-5	CW-6	V1016MB1	V1016MB2
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank(See note)		VO1013MB	VO1013MB	VO1013MB	VO1013MB	VO1013MB	VO1013MB	Primary	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:									
Bromochloromethane	62-140	90/ 95	97/ 88	111/ 90	88	116/ 88	107/ 81	82	109
1-Chloro-2-bromopropane	73-127	92/108	95/ 97	96/ 97	78	78/106	79/102	82	100
1,4-Dichloropropane	64-136	92/183	90/163	91/150	76	74/178	75/178	85	62oc

Note: These compounds are measured by both of the detectors used in method SW5030/8021.
The values reported here were measured using an HECD.

Table IIB-3 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Containerized Water

Field Sample ID		CW-7	CW-8	CW-9	CW-11	TB-29	V1013MB	V1017MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank (See Note)		V01013MB	V01013MB	V01016MB	V01017MB	V01016MB	Primary	Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF	NF
Chloroform	0.4	<0.40	<0.40	5.0/0.49	<0.40	<0.40	0.71	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	<0.80	<0.80	1.9/0.77	6.3/2.8	2.9/0.75	6.2	3.6
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NF = Not found due to analytical problem.
Note: Confirmation analysis blank (V1016MB2, Conf.) applies to all samples.

Table IIB-3 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Containerized Water

Field Sample ID		CW-7	CW-8	CW-9	CW-11	TB-29	V1013MB	V1017MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank		V01013MB	V01013MB	V01016MB	V01017MB	V01016MB	Primary	Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:								
Bromochloromethane	62-140	86/ 81	84	137/ 81	119/ 84	123/ 73	105	100
1-Chloro-2-bromopropane	73-127	78/ 98	74	114/ 97	114/100	108/ 91	109	100
1,4-Dichloropropane	64-136	73/173	71	118/187	109/171	106/199	102	100

Table 11B-4

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Containerized Water

Field Sample ID		CW-1	CW-2	CW-3	CW-4	CW-5	CW-6	CW-7
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank		PO1013MB	PO1013MB	PO1013MB	PO1013MB	PO1013MB	PO1013MB	PO1013MB
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:								
a,a,a-Trifluorotoluene	69-129	100	100	100	92	96/94	96/93	104

Table 118-4(continued)

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Containerized Water

Field Sample ID		CW-8	CW-9	CW-11	TB-29	PO1013MB	PO1016MB	PO1017MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Applicable Method Blank		PO1013MB	PO1016MB	PO1017MB	PO1016MB	Primary	Primary	Primary
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate								
a,a,a-Triflourotoluene	69-129	92/89	104	92	108	100	89	100

Table IIB-5
Inorganic Analysis Results: Metals, TPH
Containerized Water

Field Sample ID			CW-1	CW-2	CW-3	CW-4	CW-5
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	NR	NR	NR	NR	NR
Antimony	Sb	0.06	NR	NR	NR	NR	NR
Arsenic	As	0.05	NR	NR	NR	NR	NR
Arsenic (E206.2)	As	0.005	NR	NR	NR	NR	NR
Barium	Ba	0.01	NR	NR	NR	NR	NR
Beryllium	Be	0.002	NR	NR	NR	NR	NR
Boron	B	0.01	NR	NR	NR	NR	NR
Cadmium	Cd	0.005	NR	NR	NR	NR	NR
Calcium	Ca	0.20	NR	NR	NR	NR	NR
Chromium	Cr	0.010	NR	NR	NR	NR	NR
Cobalt	Co	0.010	NR	NR	NR	NR	NR
Copper	Cu	0.010	NR	NR	NR	NR	NR
Iron	Fe	0.025	NR	NR	NR	NR	NR
Lead	Pb	0.05	NR	NR	NR	NR	NR
Lead (E239.2)	Pb	0.005	NR	NR	NR	NR	NR
Magnesium	Mg	0.20	NR	NR	NR	NR	NR
Manganese	Mn	0.005	NR	NR	NR	NR	NR
Mercury (E245.1)	Hg	0.0002	NR	NR	NR	NR	NR
Molybdenum	Mo	0.010	NR	NR	NR	NR	NR
Nickel	Ni	0.015	NR	NR	NR	NR	NR
Potassium	K	0.4	NR	NR	NR	NR	NR
Selenium	Se	0.100	NR	NR	NR	NR	NR
Selenium (E270.2)	Se	0.005	NR	NR	NR	NR	NR
Silicon	Si	0.020	NR	NR	NR	NR	NR
Silver	Ag	0.01	NR	NR	NR	NR	NR
Sodium	Na	0.200	NR	NR	NR	NR	NR
Thallium	Tl	0.100	NR	NR	NR	NR	NR
Vanadium	V	0.01	NR	NR	NR	NR	NR
Zinc	Zn	0.01	NR	NR	NR	NR	NR
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NR - Not required

Table IIB-5 (continued)
Inorganic Analysis Results: Metals, TPH
Containerized Water

Field Sample ID			CW-6	CW-7	CW-8	CW-9
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	NR	NR	NR	NR
Antimony	Sb	0.06	NR	NR	NR	NR
Arsenic	As	0.05	NR	NR	NR	NR
Arsenic (E206.2)	As	0.005	NR	NR	NR	NR
Barium	Ba	0.01	NR	NR	NR	NR
Beryllium	Be	0.002	NR	NR	NR	NR
Boron	B	0.01	NR	NR	NR	NR
Cadmium	Cd	0.005	NR	NR	NR	NR
Calcium	Ca	0.20	NR	NR	NR	NR
Chromium	Cr	0.010	NR	NR	NR	NR
Cobalt	Co	0.010	NR	NR	NR	NR
Copper	Cu	0.010	NR	NR	NR	NR
Iron	Fe	0.025	NR	NR	NR	NR
Lead	Pb	0.05	NR	NR	NR	NR
Lead (E239.2)	Pb	0.005	NR	NR	NR	NR
Magnesium	Mg	0.20	NR	NR	NR	NR
Manganese	Mn	0.005	NR	NR	NR	NR
Mercury (E245.1)	Hg	0.0002	NR	NR	NR	NR
Molybdenum	Mo	0.010	NR	NR	NR	NR
Nickel	Ni	0.015	NR	NR	NR	NR
Potassium	K	0.4	NR	NR	NR	NR
Selenium	Se	0.100	NR	NR	NR	NR
Selenium (E270.2)	Se	0.005	NR	NR	NR	NR
Silicon	Si	0.020	NR	NR	NR	NR
Silver	Ag	0.01	NR	NR	NR	NR
Sodium	Na	0.200	NR	NR	NR	NR
Thallium	Tl	0.100	NR	NR	NR	NR
Vanadium	V	0.01	NR	NR	NR	NR
Zinc	Zn	0.01	NR	NR	NR	NR
Total Petroleum Hydrocarbons	TPH	1.0	<1.0	<1.0	<1.0	<1.0

NR - Not required

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Name John J King
Address 1 Sears Dr Paramus NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Lawyer
Project Name Niagara Falls I&P RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Halocarbons/Aromatics SW5030/8021	Petroleum Hydrocarbons E418.1														Temperature °C	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
52382	WTR	CW-1	10-3-89	1208	BST #2	+	+															3	
83	WTR	CW-2	10-3-89	1208	BST #1	+	+															2	
84	WTR	CW-3	10-3-89	1230	BST #3	+	+															3	
85	WTR	CW-4	10-3-89	1157	BST #4	+	+															3	
86	WTR	CW-5	10-3-89	1155	BST #5	+	+															3	
87	WTR	CW-6	10-3-89	1203	BST #6	+	+															3	Temp of Cooler At Shipment
88	WTR	CW-7	10-3-89	1230	BST #7	+	+															3	2 °C
89	WTR	CW-8	10-3-89	1208	BST #8	+	+															3	
90	WTR	CW-9	10-3-89	1210	BST #9	+	+															3	Temp of Cooler Blank (CB #29)
52391	WTR	CW-11	10-3-89	1145	Ambient Cond Blank	+																2	Upon Accival at Lab 2 °C RM
52392	WTR	TB #29	10-3-89	—	—	+																1	
—	WTR	CB #29	10-3-89	—	—																X	1	

Relinquished by
Signature John J King
Printed Name John J King
Company SAIC
Date 10-4-89
Time 1832

Received by
Signature Stephen M. Lacy
Printed Name
Company ECOLOGY & ENVIRONMENT
Date 10-4
Time 1832

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 30

Shipment Method: Lab Courier

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Laboratory Name Ecology & Environment
Address 4493 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Havard

SAIC Location (circle)

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8400 Westpark Dr., McLean, VA 22102
(703) 734-2500

Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

000353

APPENDIX II C

ORIGINAL SEMIVOLATILE ORGANIC RESULTS

Ecology and Environment, Inc.
Instrument Detection Limits

Pesticides/PCBs
(IDL's in ug/L)

Instrument: A Side Varian 6000 #2
1.5% SP 2250/1.95% SP 2401

Contract #:
Case #:

Compound				3 x SD*	3 x SD**	Meets CRDL
Alpha-BHC	0.025	0.025	0.025	<0.002	0.01	X
Beta-BHC	0.025	0.025	0.025	<0.002	0.01	X
Delta-BHC	0.025	0.025	0.026	0.002	0.02	X
Gamma-BHC	0.025	0.026	0.025	0.002	0.02	X
Heptachlor	0.028	0.029	0.029	0.002	0.02	X
Aldrin	0.025	0.025	0.025	<0.002	0.01	X
Heptachlor Epoxide	0.025	0.026	0.025	0.002	0.02	X
Endosulfan I	0.025	0.025	0.025	<0.002	0.01	X
Dieldrin	0.025	0.025	0.025	0.002	0.02	X
Endosulfan II	0.025	0.025	0.025	<0.002	0.01	X
4,4'-DDT	0.027	0.027	0.027	<0.002	0.01	X
Methoxychlor	0.224	0.233	0.239	0.02	0.20	X
4,4-DDE	0.026	0.025	0.026	0.002	0.02	X
Endrin	0.025	0.025	0.025	<0.002	0.01	X
4,4-DDD	0.026	0.026	0.026	<0.002	0.01	X
Endosulfan Sulfate	0.026	0.026	0.026	<0.002	0.01	X
Endrin Ketone	0.025	0.025	0.025	<0.002	0.03	X
Toxaphene	0.50	0.525	0.475	0.075	0.75	X
Chlordane	0.185	0.191	0.193	0.01	0.10	X
Aroclor - 1016	0.244	0.245	0.245	0.002	0.02	X
Aroclor - 1221	0.258	0.255	0.267	0.02	0.20	X
Aroclor - 1232	0.252	0.252	0.252	<0.002	0.01	X
Aroclor - 1242	0.277	0.275	0.272	0.008	0.08	X
Aroclor - 1428	0.253	0.248	0.249	0.008	0.08	X
Aroclor - 1254	0.498	0.497	0.487	0.02	0.20	X
Aroclor - 1260	0.508	0.512	0.516	0.01	0.10	X

*Assuming 1 ml final volume
**For 10 ml final volume

QUANT REPORT

erator ID: USER2 Quant Rev: 6 Quant Time: 891013 10:37
utput File: ^B2172::D1 Injected at: 891013 09:51
ata File: >B2172::A8 Dilution Factor: 2.00000
me: 541.038 50516.09
sc: 7002B 10/13/89PBM 200UL(4100/4200) + 8UL IS BTL# 1

File: CONB78::D2
tle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ast Calibration: 891013 10:12

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	6.64	145	73117	40.00	UG/L	96
)	Phenol-d5	6.46	136	6392	5.14	UG/L 2	100
)	Phenol-d5	6.66	146	1517	1.22	UG/L 1	100
7)	*Naphthalene-d8	10.97	358	264461	40.00	UG/L	87
)	Nitrobenzene-d5	8.83	253	54873	45.75	UG/L 46	82
)	Benzoic Acid	13.41	478	57	.08	UG/L	100
0)	4-Chloro-3-methylphenol	14.61	537	1645	1.60	UG/L	100
2)	*Acenaphthene-d10	16.33	622	124420	40.00	UG/L	86
)	2-Chloronaphthalene	14.65	539	1028	.62	UG/L	82
)	2-Fluorobiphenyl	14.61	537	105824	57.01	UG/L 57	92
9)	Dimethylphthalate	16.19	615	1381	.67	UG/L	96
)	Dimethylphthalate	16.33	622	17924	8.71	UG/L	42
)	Acenaphthylene	15.85	598	1382	.51	UG/L	[illegible]
2)	Acenaphthene	16.42	626	1176	.78	UG/L	[illegible]
5)	Dibenzofuran	16.97	653	1126	.55	UG/L	93
)	2,6-Dinitrotoluene	16.33	622	15905	31.59	UG/L	27
0)	Fluorene	18.79	743	1096	.71	UG/L	77
2)	2,4,6-Tribromophenol	18.77	742	19328	88.98	UG/L 45	54
)	*Phenanthrene-d10	20.66	835	124035	40.00	UG/L	100
)	N-Nitrosodiphenylamine	18.69	738	567	.72	UG/L	100
5)	N-Nitrosodiphenylamine	18.77	742	866	1.09	UG/L	100
)	Phenanthrene	20.71	837	1470	.97	UG/L	96
)	Anthracene	20.71	837	1470	1.29	UG/L	96
1)	Di-n-butylphthalate	23.35	967	10330	5.11	UG/L	95
3)	*Chrysene-d12	28.57	1224	38424	40.00	UG/L	97
)	Benzidine	25.79	1087	455	38.56	UG/L	100
0)	Terphenyl-d14	25.79	1087	39180	66.62	UG/L 67	81
0)	bis(2-Ethylhexyl)phthalate	29.81	1285	4751	8.55	UG/L	94
)	*Perylene-d12	32.77	1418	18655	40.00	UG/L	94

* Compound is ISTD

Meet Tech

Sample Blank
Received:
Complete Emergency Form

QUANT REPORT

Operator ID: USER6 Quant Rev: 6 Quant Time: 891012 22:12
Output File: ^B2158::D1 Injected at: 891012 21:26
Data File: >B2158::A8 Dilution Factor: 2.00000
Name: 541.038 50516.06
Misc: 7002B 10/12/89PBM 200ULK(4100/4200) + 8UL IS BTL#10

ID File: CONB78::D2
Title: BNA ID FILE FOR THE 7002B (CONT. CAL.)
Last Calibration: 891012 13:21

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.45	183	50363	40.00	UG/L	95
3)	2-Fluorophenol	4.06	16	26493	38.80	UG/L	93
4)	Phenol-d5	7.35	178	5160	5.97	UG/L	100
7)	*Naphthalene-d8	11.15	365	181858	40.00	UG/L	87
8)	Nitrobenzene-d5	9.24	271	34874	41.45	UG/L	89
3)	~~Benzoic Acid~~	~~14.65~~	~~537~~	~~180~~	~~.34~~	~~UG/L~~	100
0)	~~4-Chloro-3-methylphenol~~	~~14.65~~	~~537~~	~~1052~~	~~1.46~~	~~UG/L~~	100
2)	*Acenaphthene-d10	16.38	622	94463	40.00	UG/L	93
7)	2-Fluorobiphenyl	14.65	537	77030	57.54	UG/L	91
9)	~~Dimethylphthalate~~	~~16.38~~	~~622~~	~~13368~~	~~8.70~~	~~UG/L~~	44
2)	2,4,6-Tribromophenol	18.79	741	15424	83.87	UG/L	92
3)	*Phenanthrene-d10	20.66	833	99637	40.00	UG/L	100
4)	~~N-Nitrosodiphenylamine~~	~~18.77~~	~~741~~	~~416~~	~~.63~~	~~UG/L~~	100
1)	Di-n-butylphthalate	23.35	965	6240	3.85	UG/L	99
3)	*Chrysene-d12	28.57	1222	35213	40.00	UG/L	86
5)	~~Benzidine~~	~~25.81~~	~~1086~~	~~425~~	~~44.88~~	~~UG/L~~	100
6)	Terphenyl-d14	25.81	1086	33527	59.62	UG/L	91
0)	bis(2-Ethylhexyl)phthalate	29.81	1283	3938	7.82	UG/L	94
2)	*Perylene-d12	32.53	1417	17998	40.00	UG/L	96

* Compound is ISTD

OUT OF CONTROL Analyst:
CC Standard
Duplicate
Spike
Replicate
Holding Time Violation
Run Outside Clock
Sec... Error
Incorrect CC
Contaminated Blank
Reanalysis Required
Submitted:
*Complete Discrepancy Form
| YES | NO* |

Reextract

QUANT REPORT

perator ID: USER2 Quant Rev: 6 Quant Time: 891005 20:53
utput File: ^B2063::D1 Injected at: 891005 20:08
ata File: >B2063::DB Dilution Factor: 2.00000
ame: 541.035 50175.06
isc: 7002B 10/05/89PBM 200UL(4100/4200) + 8UL IS BTL# 2

D File: CONB78::D2
itle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ast Calibration: 891005 19:09

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.54	186	82476 ✓	40.00	UG/L	95
3)	2-Fluorophenol	4.14	19	84551	66.71	UG/L 33 ✓	80
4)	Phenol-d5	7.39	179	88021	61.44	UG/L 31 ✓	100
4)	Phenol-d5	7.80	199	1607	1.12	UG/L	100
7)	*Naphthalene-d8	11.24	368	243632 ✓	40.00	UG/L	88
3)	Nitrobenzene-d5	9.33	274	42024	35.00	UG/L 35 low	85
3)	Benzoic Acid	14.67	537	58	.09	UG/L	100
3)	Benzoic Acid	14.71	539	72	.11	UG/L	100
0)	4-Chloro-3-methylphenol	14.71	539	704	.90	UG/L	100
1)	*Acenaphthene-d10	16.44	624	81835 ✓	40.00	UG/L	89
7)	2-Fluorobiphenyl	14.71	539	42505	30.62	UG/L 31 low	93
9)	Dimethylphthalate	16.44	624	11988	8.53	UG/L	44
7)	2,6-Dinitrotoluene	16.44	624	11035	31.12	UG/L	
1)	Fluorene	18.84	742	1053	1.11	UG/L	
2)	2,4,6-Tribromophenol	18.84	742	15783	133.05	UG/L 66 ✓	
7)	*Phenanthrene-d10	20.73	835	74013 ✓	40.00	UG/L	100
3)	N-Nitrosodiphenylamine	18.86	743	617	1.22	UG/L	100
1)	Di-n-butylphthalate	23.39	966	4761	3.78	UG/L	95
3)	*Chrysene-d12	28.63	1224	33845 ✓	40.00	UG/L	98
3)	Benzidine	25.87	1088	202	21.23	UG/L	100
6)	Terphenyl-d14	25.85	1087	13241	26.43	UG/L 26 low	88
0)	bis(2-Ethylhexyl)phthalate	29.85	1284	3342	7.65	UG/L	94
2)	*Perylene-d12	32.58	1418	19687 ✓	40.00	UG/L	98

* Compound is ISTD

OUT OF CONTROL Analyst: [illegible]

CC Standard —
Surrogate ✓
Spike —
EPA Program —
Replicate —

Holding Time Violation —
Run [illegible] —
[illegible] —
Internal Standard —
Contaminated Blank —

Reanalysis Reextract Repeat
Submitted: YES

*Complete Discrepancy Form

000357

QUANT REPORT

ator ID: USER2 Quant Rev: 6 Quant Time: 891004 23:42
Output File: ^B2043::D1 Injected at: 891004 22:57
Data File: >B2043::DB Dilution Factor: 2.00000
ame: 541.035 50175.06
Misc: 7002B 10/04/89AWH 200UL(4100/4200) + 8UL IS BTL# 6

D File: CONB78::D2
itle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
Last Calibration: 891004 19:17

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.56	190	79211 ✓	40.00	UG/L	98
3)	2-Fluorophenol	4.16	23	79598	71.87	UG/L 36 ✓	81
4)	Phenol-d5	7.40	182	89089	64.72	UG/L 32 ✓	100
17)	*Naphthalene-d8	11.24	371	230694 ✓	40.00	UG/L	86
8)	Nitrobenzene-d5	9.33	277	40995	38.55	UG/L 39 ✓	93
3)	Benzoic Acid	13.59	487	48	.08	UG/L	100
23)	Benzoic Acid	14.71	542	92	.15	UG/L	100
0)	4-Chloro-3-methylphenol	14.71	542	871	1.09	UG/L	100
2)	*Acenaphthene-d10	16.44	627	88334 ✓	40.00	UG/L	80
37)	2-Fluorobiphenyl	14.71	542	47915	32.99	UG/L 33 Low	93
39)	Dimethylphthalate	16.44	627	12749	8.90	UG/L	46
	Fluorene	18.84	745	1082	.99	UG/L	78
	2,4,6-Tribromophenol	18.84	745	16662	131.12	UG/L 65 ✓	98
59)	*Phenanthrene-d10	20.73	838	81517 ✓	40.00	UG/L	100
5)	N-Nitrosodiphenylamine	18.86	746	630	1.12	UG/L	100
1)	Di-n-butylphthalate	23.39	969	6694	4.55	UG/L	92
63)	*Chrysene-d12	28.63	1227	33289 ✓	40.00	UG/L	97
5)	Benzidine	25.87	1091	192	20.23	UG/L	100
6)	Terphenyl-d14	25.85	1090	13059	26.46	UG/L 26 Low	86
0)	bis(2-Ethylhexyl)phthalate	29.85	1287	4711	11.25	UG/L	89
72)	*Perylene-d12	32.58	1421	19011 ✓	40.00	UG/L	95

* Compound is ISTD

OUT OF CONTROL Analyst: Amy

CC Standard —
Surrogate ✓
Spike —
LCS/Known —
Duplicate —

Hold Time Violation —
Run Outside Clock —
Sequence Error —
Insufficient QC —
Contaminated Blank —

Reanalysis Reextract Redigest
Scheduled: YES / NO*
*Complete Discrepancy Form

QUANT REPORT

perator ID: USER2 Quant Rev: 6 Quant Time: 891005 00:36
Output File: ^B2044::D1 Injected at: 891004 23:51
ata-File: >B2044::DB Dilution Factor: 2.00000
ame: 541.035 50176.06
isc: 7002B 10/04/89AWH 200UL(4100/4200) + 8UL IS BTL# 7

D File: CONB78::D2
itle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ast Calibration: 891004 19:17

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.55	189	143405	40.00	UG/L	95
2)	Aniline	6.92	158	2901	.85	UG/L	67
3)	2-Fluorophenol	4.17	23	26395	13.16	UG/L	81
4)	Phenol-d5	7.41	182	63534	25.49	UG/L	100
7)	*Naphthalene-d8	11.25	371	452742	40.00	UG/L	86
8)	Nitrobenzene-d5	9.32	276	116554	55.84	UG/L	79
23)	Benzoic Acid	10.76	347	130	.11	UG/L	100
3)	Benzoic Acid	11.23	370	46	.04	UG/L	100
3)	Benzoic Acid	13.56	485	213	.17	UG/L	100
23)	Benzoic Acid	14.72	542	558	.45	UG/L	100
0)	4-Chloro-3-methylphenol	14.72	542	2353	1.50	UG/L	100
2)	*Acenaphthene-d10	16.45	627	178498	40.00	UG/L	
7)	2-Fluorobiphenyl	14.72	542	127177	43.33	UG/L	
39)	Dimethylphthalate	16.45	627	25706	8.89	UG/L	42
9)	Dimethylphthalate	17.24	666	1828	.63	UG/L	46
7)	2,6-Dinitrotoluene	16.45	627	22458	30.52	UG/L	28
52)	2,4,6-Tribromophenol	18.85	745	5030	19.59	UG/L	89
3)	*Phenanthrene-d10	20.74	838	151608	40.00	UG/L	100
5)	N-Nitrosodiphenylamine	18.85	745	130	.12	UG/L	100
61)	Di-n-butylphthalate	23.40	969	14085	5.14	UG/L	95
43)	*Chrysene-d12	28.65	1227	59711	40.00	UG/L	96
5)	Benzidine	25.86	1090	345	20.26	UG/L	100
06)	Terphenyl-d14	25.86	1090	20921	23.63	UG/L	92
70)	bis(2-Ethylhexyl)phthalate	29.87	1287	13187	17.56	UG/L	94
2)	*Perylene-d12	32.59	1421	35410	40.00	UG/L	96

* Compound is ISTD

CUT OF CONTROL Analyst

QC Standard —
Surrogate —
Spike —
EPA Known —
Replicate —

Hold Time Violation —
Run Control Check —
Sequence Error —
Insufficient QC —
Contaminated Blank —

Reanlysis Required Redigest
Scheduled: YES | NO*

*Complete Discrepancy Form

000359

Reextrad

QUANT REPORT

tor ID: USER2 Quant Rev: 6 Quant Time: 891005 21:47
tput File: ^B2064::D1 Injected at: 891005 21:02
ata File: >B2064::DB Dilution Factor: 2.00000
ame: 541.035 50176.06
sc: 7002B 10/05/89PBM 200UL(4100/4200) + 8UL IS BTL# 3

D File: CON878::D2
tle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ist Calibration: 891005 19:09

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.55	187	161938	40.00	UG/L	97
3)	2-Fluorophenol	4.18	21	29255	11.76	UG/L	86
4)	Phenol-d5	7.39	179	70475	25.06	UG/L	100
7)	*Naphthalene-d8	11.25	369	513057	40.00	UG/L	88
8)	Nitrobenzene-d5	9.32	274	137077	54.21	UG/L	85
1)	2,4-Dimethylphenol	11.25	369	1314	.57	UG/L	1
3)	Benzoic Acid	10.74	344	45	.03	UG/L	100
3)	Benzoic Acid	11.25	369	74	.05	UG/L	100
3)	Benzoic Acid	13.57	483	351	.26	UG/L	100
3)	Benzoic Acid	14.73	540	695	.51	UG/L	100
0)	4-Chloro-3-methylphenol	14.73	540	2800	1.69	UG/L	100
2)	*Acenaphthene-d10	16.45	625	202010	40.00	UG/L	72
[redacted]	2-Fluorobiphenyl	14.71	539	146724	42.81	UG/L	92
[redacted]	Dimethylphthalate	16.45	625	28176	8.12	UG/L	44
9)	Dimethylphthalate	17.25	664	2160	.62	UG/L	44
7)	2,6-Dinitrotoluene	16.45	625	25847	29.53	UG/L	28
2)	2,4,6-Tribromophenol	18.85	743	5344	18.25	UG/L	87
3)	*Phenanthrene-d10	20.74	836	175590	40.00	UG/L	100
5)	N-Nitrosodiphenylamine	18.85	743	302	.25	UG/L	100
.)	Di-n-butylphthalate	23.41	967	14600	4.88	UG/L	92
3)	*Chrysene-d12	28.65	1225	73769	40.00	UG/L	97
5)	Benzidine	25.87	1088	519	25.03	UG/L	100
3)	Terphenyl-d14	25.87	1088	26985	24.71	UG/L	92
1)	bis(2-Ethylhexyl)phthalate	29.85	1284	14504	15.24	UG/L	96
2)	*Perylene-d12	32.58	1418	42754	40.00	UG/L	93

* Compound is ISTD

OUT OF CONTROL Analyst GMM

CC Standard —	Internal Standard Problem —
Surrogate —	Blank Contamination —
Spike —	Surrogate Failure —
EPA Known —	Insufficient QC —
Replicate —	Contaminated Blank —

Reanalysis: Reextract Redigest
Scheduled: | YES | NO* |
*Complete Discrepancy Form

000360

Reextract

QUANT REPORT

perator ID: USER2 Quant Rev: 6 Quant Time: 891005 22:42
utput File: ^B2065::D1 Injected at: 891005 21:56
ata File: >B2065::DB Dilution Factor: 2.00000
ame: 541.035 50177.06
isc: 7002B 10/05/89PBM 200UL(4100/4200) + 8UL IS BTL# 4

D File: CONB78::D2
itle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ast Calibration: 891005 19:09

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	1,4-Dichlorobenzene-d4	7.55	187	87086	40.00	UG/L	92
3)	2-Fluorophenol	4.16	20	70903	52.98	UG/L 26	91
4)	Phenol-d5	7.39	179	86657	57.31	UG/L 29	100
7)	*Naphthalene-d8	11.23	368	267811	40.00	UG/L	91
8)	Nitrobenzene-d5	9.32	274	62538	47.38	UG/L 47	88
5)	Benzoic Acid	13.57	483	108	.15	UG/L	100
3)	Benzoic Acid	14.71	539	237	.33	UG/L	100
0)	4-Chloro-3-methylphenol	14.73	540	1284	1.49	UG/L	100
2)	*Acenaphthene-d10	16.44	624	108171	40.00	UG/L	93
7)	2-Fluorobiphenyl	14.73	540	66096	36.02	UG/L 36 Low	94
9)	Dimethylphthalate	16.44	624	15875	8.54	UG/L	44
7)	2,6-Dinitrotoluene	16.44	624	14309	30.53	UG/L	
0)	Fluorene	18.86	743	1354	1.08	UG/L	
2)	2,4,6-Tribromophenol	18.84	742	20769	132.45	UG/L 66	88
3)	*Phenanthrene-d10	20.73	835	101689	40.00	UG/L	100
5)	N-Nitrosodiphenylamine	18.86	743	940	1.35	UG/L	100
1)	Di-n-butylphthalate	23.39	966	2952	1.70	UG/L	93
3)	*Chrysene-d12	28.64	1224	42787	40.00	UG/L	94
5)	Benzidine	25.85	1087	347	28.85	UG/L	100
6)	Terphenyl-d14	25.85	1087	20096	31.73	UG/L 32 Low	89
0)	bis(2-Ethylhexyl)phthalate	29.86	1284	8163	14.79	UG/L	97
2)	*Perylene-d12	32.58	1418	25529	40.00	UG/L	93

* Compound is ISTD

OUT OF CONTROL Analyst

CC Standard
Surrogate
Spike
Blank/Known
Replicate
Hold Time Violation
Run Outside Batch
Standard Error
Initial/Cont QC
Contaminated Blank

Reanlysis/Reextract/Redigest Scheduled: YES / NO*

*Complete Discrepancy Form

PBM

QUANT REPORT

erator ID: USER2 Quant Rev: 6 Quant Time: 891005 01:31
utput File: ^B2045::D1 Injected at: 891005 00:45
ata File: >B2045::DB Dilution Factor: 2.00000
ime: 541.035 50177.06
sc: 7002B 10/04/89AWH 200UL(4100/4200) + 8UL IS BTL# 8

) File: CONB78::D2
tle: BNA ID FILE FOR THE 7002B (CONT. CAL.)
ast Calibration: 891004 19:17

2 BN surr low

	Compound	R.T.	Scan#	Area	Conc	Units	q	
1)	*1,4-Dichlorobenzene-d4	7.55	187	72897	40.00	UG/L	95	
)	2-Fluorophenol	4.16	20	60265	59.13	UG/L29	83	
)	Phenol-d5	7.39	179	72762	57.44	UG/L29	100	
7)	*Naphthalene-d8	11.25	369	239219	40.00	UG/L	89	
)	Nitrobenzene-d5	9.32	274	50728	46.00	UG/L46	84	
)	Benzoic Acid	13.57	483	68	.10	UG/L	100	
5)	Benzoic Acid	13.93	501	48	.07	UG/L	100	
3)	Benzoic Acid	14.73	540	227	.35	UG/L	100	
1)	-4-Chloro-3-methylphenol	14.73	540	976	1.18	UG/L	100	
2)	*Acenaphthene-d10	16.43	624	92217	40.00	UG/L	88	
7)	2-Fluorobiphenyl	14.70	539	56847	37.49	UG/L38	91	low
	Dimethylphthalate	16.43	624	13713	9.17	UG/L	44	
	2,4,6-Tribromophenol	18.85	743	14077	106.11	UG/L53	88	
3)	*Phenanthrene-d10	20.72	835	75416	40.00	UG/L	100	
5)	N-Nitrosodiphenylamine	18.85	743	569	1.10	UG/L	100	
)	Di-n-butylphthalate	23.38	966	2133	1.57	UG/L	94	
3)	*Chrysene-d12	28.63	1224	24821	40.00	UG/L	97	
6)	Terphenyl-d14	25.86	1088	10815	29.38	UG/L29	98	low
1)	bis(2-Ethylhexyl)phthalate	29.87	1285	4922	15.76	UG/L	94	
2)	*Perylene-d12	32.57	1418	12362	40.00	UG/L	95	

* Compound is ISTD

QUANT REPORT

Operator ID: USER2 Quant Rev: 6 Quant Time: 891005 23:35
Output File: ^B2066::D1 Injected at: 891005 22:50
Data File: >B2066::DB Dilution Factor: 2.00000
Name: 541.035 50178.06
Misc: 7002B 10/05/89PBM 200UL(4100/4200) + 8UL IS BTL# 5

MD File: CONB78::D2
Title: BNA ID FILE FOR THE 7002B (CONT. CAL.)
Last Calibration: 891005 19:09

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*1,4-Dichlorobenzene-d4	7.55	188	125312	40.00	UG/L	94
3)	2-Fluorophenol	4.17	22	159960	83.07	UG/L 42	91
4)	Phenol-d5	7.41	181	160161	73.60	UG/L 37	100
7)	*Naphthalene-d8	11.25	370	405018	40.00	UG/L	88
8)	Nitrobenzene-d5	9.32	275	67680	33.91	UG/L 34 Low	84
3)	Benzoic Acid	10.76	346	53	.06	UG/L	100
3)	Benzoic Acid	13.59	485	74	.07	UG/L	100
3)	Benzoic Acid	14.68	539	91	.08	UG/L	100
3)	Benzoic Acid	14.74	542	95	.09	UG/L	100
1)	4-Chloro-3-methylphenol	14.72	541	2029	1.55	UG/L	100
2)	*Acenaphthene-d10	16.45	626	174970	40.00	UG/L	93
7)	2-Fluorobiphenyl	14.72	541	120850	40.71	UG/L	
9)	Dimethylphthalate	16.45	626	25637	8.53	UG/L	
7)	2,6-Dinitrotoluene	16.45	626	22614	29.83	UG/L	28
0)	Fluorene	18.85	744	3622	1.79	UG/L	90
2)	2,4,6-Tribromophenol	18.85	744	51690	283.80	UG/L	92
3)	*Phenanthrene-d10	20.74	837	170547 HIGH	40.00	UG/L	100
5)	N-Nitrosodiphenylamine	18.85	744	2286	1.96	UG/L	100
1)	Di-n-butylphthalate	23.40	968	7792	2.68	UG/L	99
3)	*Chrysene-d12	28.65	1226	51531	40.00	UG/L	79
5)	Benzidine	25.88	1090	1401	96.71	UG/L	100
6)	Terphenyl-d14	25.86	1089	73651	96.55	UG/L	91
2)	*Perylene-d12	32.59	1420	24196	40.00	UG/L	92

* Compound is ISTD

OUT OF CONTROL

CC Standard —
Surrogate —
Spike —
Blank Spike —
Replicate —
Contaminated Blank —

Reanlysis Reextract Redigest
Scheduled:
Complete Discrepancy Form YES NO

PBM

QUANT REPORT

ector ID: USER2 Quant Rev: 6 Quant Time: 891005 02:25
utput File: ^B2046::D1 Injected at: 891005 01:39
ta File: >B2046::DB Dilution Factor: 2.00000
me: 541.035 50178.06
sc: 7002B 10/04/89AWH 200UL(4100/4200) + 8UL IS BTL# 9

File: CONB78::D2
tle: BNA ID FILE FOR THE 7002B (CONT. CAL.) 2 BN Surr out
ast Calibration: 891004 19:17

	Compound	R.T.	Scan#	Area	Conc	Units	q	
)	*1,4-Dichlorobenzene-d4	7.55	187	75825	40.00	UG/L	97	
)	Aniline	6.92	156	1050	.58	UG/L	73	
)	2-Fluorophenol	4.16	20	97514	91.98	UG/L46	84	
)	Phenol-d5	7.39	179	92672	70.33	UG/L35	100	
)	*Naphthalene-d8	11.23	368	248088	40.00	UG/L	89	
)	Nitrobenzene-d5	9.32	274	40926	35.78	UG/L36	83	low
)	Benzoic Acid	13.57	483	47	.07	UG/L	100	
)	Benzoic Acid	14.71	539	199	.29	UG/L	100	
)	4-Chloro-3-methylphenol	14.73	540	1181	1.38	UG/L	100	
)	*Acenaphthene-d10	16.43	624	99624	40.00	UG/L	91	
)	2-Fluorobiphenyl	14.73	540	66235	40.44	UG/L40	95	low
)	Dimethylphthalate	16.43	624	14747	9.13	UG/L	44	
)	2,6-Dinitrotoluene	16.43	624	13011	31.68	UG/L	28	
)	Fluorene	18.85	743	1905	1.55	UG/L	84	
)	2,4,6-Tribromophenol	18.85	743	25046	174.76	UG/L87	93	
)	*Phenanthrene-d10	20.72	835	85409	40.00	UG/L	100	
)	N-Nitrosodiphenylamine	18.85	743	986	1.68	UG/L	100	
)	Di-n-butylphthalate	23.40	967	4150	2.69	UG/L	96	
)	*Chrysene-d12	28.65	1225	24572	40.00	UG/L	87	
)	Benzidine	25.86	1088	605	86.34	UG/L	100	
)	Terphenyl-d14	25.86	1088	35200	96.61	UG/L97	92	
)	*Perylene-d12	32.59	1419	11248	40.00	UG/L	93	

Compound is ISTD

APPENDIX II D

CHAIN OF CUSTODY FORMS

541.051

SAIC Science Applications International Corporation An Employee-Owned Company

Chain of Custody Record

Date 9-14-89 Page 1 of 1

Shipment No. 14

Name John J King
Address 1 Sears Dr. Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Non-Halogenated Volatiles SW8030/8015	Ethylene Dibromide E504.1	Purgeables/Aromatics SW8020/602	Petroleum Hydrocarbons E418.1	Organochlorine Pesticides/PCBs E608	Metals (Total) As, Pb, Hg, Se and Barium E200.7; E200.8; E245.1; E270.2	E200.8 and E160.1	Common Anions and TDS A4500 and E160.1					Temperature °C	NO. OF CONTAINERS
49131	WTR	GW-1	9-13-89	1150	Site 13	X	X	X	X	X	X	X	X						6
132	WTR	GW-4	9-13-89	1354 1400	Site 13	X	X	X	X	X	X	X	X						10
133	WTR	GW-5	9-13-89	1758	Site 13	X	X	X	X	X	X	X	X						10
134	WTR	GW-7	9-13-89	1215	Site 13	X	X	X	X	X	X	X	X						10
49135	WTR	GW-2	9-13-89	1220	Site 13	X	X	X	X										7
49143	WTR	TB* 14			—	X	X	X											3
	WTR	CB* 14			—													X	1

Total Number of Containers: 47

Laboratory Name Ecology & Environment
Address 4285 Genesee St.
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Site 13 wells were very slow recharges. Only able to provide minimum volumes required to do analyses. Will provide Pesticides, Metals, Hardness, Common Ions and TDS for GW-2 at a later date if well fully recharges.

Temp of Cooler At Shipment 3°C

Record cooler blank (CB* 14) Temp

Upon Arrival At Lab 4 °C

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: John J King	9/14/89	Signature: John M. Steck	9-14-89
Printed Name:	Time: 1645	Printed Name: John M. Steck	Time: 16:45
Company:		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Tech., Oakridge, TN 37830
(615) 482 9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747 7899

San Diego
4224 Campus Point Building, [illegible]go, CA 92121
(619) 546-7418

000365

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Chain of Custody Record

Date 9-14-89 Page 1 of 1

Shipment No. 15

Name John King
Address 1 Sears Dr. Paramus NJ 07652
Phone Number 201 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-895-06-858-XX

Sampler (Signature) Vicki Rothman (Printed Name) Vicki Rothman

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeables/Aromatics SW 5030/8020	Petroleum Hydrocarbons - Carbons E 418.1	Arsenic/Selenium Kinetic	Metals (Dissolved) Hardness As, Pb, Ni + Se	Spec. Cond. E 120.1 Turb. E 180.1 Ext. E 150.2 E 375.2 E 130.1	Common Anions and TDS A 4500 Cond E 160.1	Purgeable Halocarbons Aromatics	Temperature °C	No. of Containers
49136	WTR	GW-11	9-14-89	1052	Site 10	X	X		X		X			25
49137	WTR	GW-12	9-14-89	1027	Site 10	X	X		X		X			4
49138	WTR	GW-10	9-14-89	1015	Site 10	X	X		X		X			5
49139	WTR	GW-13	9-14-89	1143	Site 10	X	X		X		X			5
49140	WTR	GW-9	9-14-89	0940	Site 10	X	X		X		X			5
49141	WTR	GW-14	9-14-89	0910	Site 10	X	X		X		X			5
49142	WTR	GW-8	9-14-89	0920	Site 10	X						X		2
49144	WTR	TB* 14/15			—	X							X	1
	WTR	CB* 14/15			—								X	1

Requested Parameters

Laboratory Name Ecology + Environment
Address 4285 Genesee St. Buffalo, NY 14225
Phone 716-631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Sample labels for Purgeables/Aromatics should be read SW 5030/8020 and be analyzed as SW 5030/8021.

temp of cooler at Shipment 40 °F

record cooler blank (CB 45) temp upon arrival at lab 4 °C

Total Number of Containers: 33

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-14-89	Signature: John M. Stack	9-14-89
Printed Name:	Time: 1645	Printed Name: JOHN M. STACK	Time: 1645
Company:		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Tpke., Oakridge, TN 37830
(615) 482 9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270 Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way, 538, Bellevue WA 98005
(206) 747 7899

San Diego
4224 Campus Point Building J, San Diego, CA 92121
(619) 546 7486

93000

366

(541.032)

Chain of Custody Record

(C-69)

Shipment No. 16

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Date 9-15-89 Page 1 of 1

Name Vicki Rothman
Address 1 Sears Dr. Paramus NJ 07652
Phone Number 201-599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) Vicki Rothman (Printed Name) Vicki Rothman

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Petroleum Hydrocarbons E418.1	Carbons (as TOC) E415.1	Metals (as Pb, Ni, Se and Boron) E200.7, E200.8, E239.2 E245.1, E270.2, E130.1	Common Anions and TDS as SAW 324 E160.1	Purgeable Halocarbons Aromatics (Cor 502.2 Cor 524.2)	Temperature °C	NO. OF CONTAINERS
49503	WTR	GW-15	9-15-89	0851	Site 9	X	X		X	X		5
4	WTR	GW-16	9-15-89	1040	Site 9	X	X		X	X		5
5	WTR	GW-17	9-15-89	1110	Site 9	X	X		X	X		5
6	WTR	GW-18	9-15-89	1148	Site 9	X	X		X	X		5
7	WTR	GW-19	9-15-89	0832	Site 9	X	X		X	X		5
49508	WTR	GW-20	9-15-89	1014	Site 9					X		2
49509	WTR	TB-16								X		1
	WTR	CB-16								X		1

Requested Parameters

Laboratory Name Ecology + Environment
Address 4285 Genesee St
Buffalo NY 14225
Phone 716-631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Temp. of Cooler at Shipment 3.5 °C

record cooler blank (Cor #16) temp upon arrival at lab. ∅ °C RM

Shipment Method: Lab Carrier

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-15-89	Signature: Marcia L. Meredith	9-15-89
Printed Name: Vicki Rothman	Time: 15:18	Printed Name: MARCIA MEREDITH	Time: 17:00
Company:		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time:	Printed Name:	Time:

Total Number of Containers:

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and

SAIC Location (circle)

Washington, DC
8400 Westpark Dr., McLean, VA 22102
(703) 734-2400

Oakridge
800 Oakridge Tech., Oakridge, TN 37830
(615) 482-9931

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
8876 Gate Boulevard, Suite 270, Golden, CO 80401
(303) 230-3054

Seattle
11808 Northup Way, Suite [illegible], Bellevue, WA 98005
(206) 747-3971

San Diego

A 101

4963000

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Chain of Custody Record

Date 9-16-87 Page 1 of 1

Name Vicki Rothman
Address 1 Seaus Dr. Paramus NJ 07652
Phone Number 1-201-599-0100
Project Manager BARRY LANGER
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-02-858-XX

Sampler (Signature) Vicki Rothman (Printed Name) Vicki Rothman

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters	No. of Containers
49545	WR	GW 21	9-16-87	0912	Site 7	X	2
49546	WR	GW 22	9-16-87	1150	Site 7	X	5
49547	WR	GW 23	9-16-87	1236	Site 7	X	5
49549	WR	GW 24 26	9-16-87	0920	Site 7	X	5
49548	WR	GW 25	9-16-87	1235	Site 7	X	5
49550	WR	TB-17				X	1
	WR	EB-17				X	1

Temperature °C

Total Number of Containers: 24

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Temp of Cooler at shipment 4 C°
record Cooler blank (CB-17) temp upon arrival at lab 4 C°.

Shipment Method: Lab Courier

Laboratory Name Ecology + Environment
Address 4285 Genesee St
Buffalo NY 14225
Phone 716-631-0360
Contact Name Bill Howard

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-16-87	Signature: John Stack	12:45
Printed Name: Vicki Rothman	Time: 15:37	Printed Name: John Stack	
Company:		Company: Ecology + Environment	9-16-87
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method number (not number only). Consult the proper CLP/SOW for method numbers. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, DC
8400 Westpark Dr., McLean, VA 22102
(703) 734 2400

Oakridge
800 Oakridge Tech., Oakridge, TN 37830
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Paramus
One Saint Paul Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way S38, Bellevue, WA 98005
(206) 747 7899

San Diego
4224 Campus Point Building 3, San Diego, CA 92121
(619) 535 7438

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541.034

Chain of Custody Record

Date 9-19-89 Page 1 of 1

Shipment No. 18

Name John Vanderslice
Address 1 Sears Dr Paramus NJ 07652
Phone Number 1-201-599-0100
Project Manager Barry Langer
Project Name NIAGARA FALLS IAP/ES/RI
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John E. Vanderslice (Printed Name) John E. Vanderslice

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: Ice-halogenation 624 Purgeable Halocarbons; Purgeable Aromatics SW-503E 8021; Petroleum Hydrocarbons E418.1; Extractable Priority Pollutants Exts; Metals (9) As, Pb, Hg, Se, and Hardness; E200.7, E200.8, E239.2 E245.1, E270.2 E130.1; Common Anions and TDS A425 + E160.1; Temperature °C	NO. OF CONTAINERS
49686	WTR	GW27	9-19-89	0850	site 8	X X X X * X X X X	4
87	WTR	GW28	9-19-89	0920	site 8	X X X X X X X X	6
88	WTR	GW29	9-19-89	0950	site 8	X X X X X X X X	8
89	WTR	GW30	9-19-89	1027	site 8	X X X X X X X X	7
90	WTR	GW31	9-19-89	1130	site 8	X X X X X X X X	8
91	WTR	GW32	9-19-89	1200	site 8	X X X X X X X X	8
49692	WTR	GW35	9-19-89	0915	site 8	X X X X X X X X	8
49693	WTR	TB * 18				X X	2
	WTR	CB * 18				X	1

Total Number of Containers: 52

Laboratory Name Ecology + Environment
Address 4285 Genesee St. Buffalo, NY 14225
Phone 716-631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

* 1/3 Sample Volume

temp of cooler at shipment 4 °C.
record Cooler blank (CB18) temp upon Arrival at LAB 4 °C.

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-19-89	Signature: John M. Stack	9/19/89
Printed Name: Vicki Rothman	Time: 15:57	Printed Name: JOHN M. STACK	Time: 15:57
Company:		Company: ECOLOGY + ENVIRONMENT	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time:	Printed Name:	Time:

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and [illegible] analyses [illegible]

SAIC Location (circle)

Washington, DC
8400 Westpark Dr., McLean, VA 22102
(703) 734-2500

Oakridge
800 Oakridge Tech Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
[illegible] Cole Boulevard Suite 270 Golden CO 80401
(303) 231-9011

Seattle
[illegible] Northup Way Suite [illegible] Bellevue, WA 98005
(206) 747-2900

San Diego
[illegible] Cole [illegible] Dr. San [illegible] CA 921[illegible]

GW00010

Science Applications International Corporation
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Chain of Custody Record

Date 9-20-89 Page 1 of 1

Shipment No.

Name John VanderSlice
Address 1 Sears Dr. Paramus
Phone Number 1-201-599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP/RIFS
Job/P.O. No. 1-B55-06-858-XX

Sampler (Signature) Vicki Rothman (Printed Name) Vicki Rothman

Requested Parameters

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Non-halogenated Volatile Organics 8015 SW5030/	Purgeable Halocarbons Aromatics SW5030/8021	Petroleum Hydrocarbons E418.1	Extractable Priority Pollutants E625	Metals+Hardness E200.7 As E206.2	Pb E239.2	Mercury E245.1 Se E270.2	Common Anions+TDS Cl, NO3, F, SO4 A429 E160.1	Temperature °C	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
50171	WTR	GW 34	9/20/89	0925	Site 8	X	X	-							4	
50173	WTR	GW 35	9/20/89	1135	Site 8	X	X	X	X	X			X		8	
50174	WTR	GW 36	9/20/89	1220	Site 8	X	X	X	X	X			X		8	
50172	WTR	GW 37	9/20/89	1100	Site 8		X								2	
50175	WTR	GW 38	9/20/89	1020	Site 8	X	X	X	X	X			X		8	
50176	WTR	GW 39	9/20/89	1040	Site 8	X	X	X	X	X			X		8	
50177	WTR	GW 40	9/20/89	1255	Site 8	X	X	X	X	X			X		8	temp. of Cooler at
50178	WTR	GW 41	9/20/89	0930	Site 8	X	X	X	X	X			X		8	shipment 4 °C.
50170	WTR	GW 28	9/20/89	1300	Site 8					X			X		2	record Cooler blank
																(CB#19) temp. upon
																arrival at Lab 4 °C
50179	WTR	TB #19				X	X								2	
	WTR	CB #19												X	1	

Laboratory Name Ecology + Environment
Address 4285 Genesse St
Buffalo, NY 14225
Phone 716-631-0360
Contact Name Bill Howard

Total Number of Containers: 59

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-20-89	Signature: John M. Stack	9-20-89
Printed Name: Vicki Rothman	Time: 1558	Printed Name: John M. Stack	Time: 15:58
Company:		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482 9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535 7438

000370

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Chain of Custody Record

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Date 9-21-89 Page 1 of 1

Shipment No. 20

Name John Vanderslice
Address 1 Sears Dr Paramus NJ 07652
Phone Number 201-599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP/RI/FS
Job/P.O. No. 1-895-06-858-XX

Sampler (Signature) [signature] (Printed Name) Scottie Staveau

Laboratory Name Ecology + Environment
Address 4275 Genesee St Buffalo NY 14225
Phone 716-631-0360
Contact Name Bill Howard

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	non-halogenated Sw8030 Wastile Organics 8015	Purgeable Halocarbons Aromatics Sw8030/8021	Petroleum Hydro-Carbons E418.1	Extractable Priority Pollutants E625	Metals+Hardness E/30.1 ICP E200.7 AS E200.9 PB E239.2 mercury E245.1 Se E270.2		Common Anions A4500 TOS E160.1 Cl, NO3, SO4, F								temperature °C	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
50313	WTR	GW 42	9-21-89	0845	Site 5	X	X														4	
50314	WTR	GW 43	9-21-89	0940	Site 5	X	X	X	X	X		X									8	
50315	WTR	GW 44	9-21-89	1020	Site 5	X	X	X	X	X		X									8	
50316	WTR	GW 45	9-21-89	1140	Site 5	X	X	X	X	X		X									8	
50317	WTR	GW 46	9-21-89	1159	Site 5	X	X	X	X	X		X									8	
50318	WTR	GW 47	9-21-89	1125	Site 5	X	X	X	X	X		X									8	
50319	WTR	GW 48	9-21-89	0900	Site 5	X	X	X	X	X		X									8	temp. of Cooler at shipment 4 °C.
50320	WTR	GW 18	9-21-89	1415	Site 9							X									1	record Cooler blank
50321	WTR	GW 22	9-21-89	1435	Site 7							X									1	(CB#20) temp upon
50322	WTR	GW 23	9-21-89	1435	Site 7							X									1	arrival at lab °C.
	WTR	CB#20				X	X														2	
50324	WTR	TB#20																		X	1	

Total Number of Containers: 58

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Vicki Rothman	9-21-89	Signature: John M. Stack	9-21-89
Printed Name: Vicki Rothman	Time: 15:35	Printed Name: JOHN M. STACK	Time: 15:35
Company: SAIC		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
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Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482-9031

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(201) 599 0100

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(303) 231-9094

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Chain of Custody Record

Date 9-22-89 Page 1 of 1

Shipment No. 2

Name John Vanderslice
Address 1 Sears Dr Paramus NJ 07652
Phone Number 201-599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP/RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) Sstaron (Printed Name) Susanne Staron

Laboratory Name Ecology + Environment
Address 4285 Genesee St
Buffalo NY 14225
Phone 716-631-0360
Contact Name Bill Howard

Laboratory No	Matrix	Sample No	Date	Time	Site Zone	Ethylene Dibromide E504.1	Purgeable Halocarbons Aromatics 8010/8020	Petroleum Hydrocarbons E418.1	Organochlorine Pesticides and PCBs E608	Extractable Priority Pollutants E625	metals + hardness E130.1 8151 E200.7	Arsenic E206.2 Mercury E245.2 Lead E239.2 Selenium E270.2	Cadmium Antimony E289.2 TDS E160.1 Chloride E325.3 Sulfate E375.4 Phosphate	Temperature °C	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
50325	WTR	GW 49	9-22-89	08:15	Site 3	X	X								4	
07	WTR	GW 50	9-22-89	10:20	Site 3	X	X	X	X	X	X		X		9	
50328	WTR	GW 51	9-22-89	09:05	Site 3	X	X	X	X	X	X		X		9	
50326	WTR	GW 52	9-22-89	09:45	Site 3	X			X						2 (3) TNM	
50329	WTR	GW 53	9-22-89	04:50	Site 3	X	X	X	X	X	X		X		9	
30	WTR	GW 54	9-22-89	11:07	Site 3	X	X	X	X	X	X		X		9	
31	WTR	GW 55	9-22-89	11:32	Site 3	X	X	X	X	X	X		X		9	
32	WTR	GW 56	9-22-89	08:25	Site 3	X	X	X	X	X	X		X		9	
50333	WTR	GW 57	9-22-89	12:00	Site 3	X	X	X	X	X	X		X		9	temp. of Cooler at Shipment 2 °C. record Cooler blank (CB-21) temp upon arrival at Lab 3 °C
50334 RE	WTR	CB#21												X	4	
50334	WTR	TB#21				X	X								2	

Total Number of Containers: 81

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Vicki Rothman (Signature)	9-22-89	(Signature)	9-22-89
Vicki Rothman (Printed Name)	Time	BRIAN BENSON (Printed Name)	Time
SAIC (Company)		E&E (Company)	
Relinquished by	Date	Received by	Date
(Signature)		(Signature)	
(Printed Name)	Time	(Printed Name)	Time

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling

SAIC Location (circle)

Washington, D.C.
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[illegible] San Diego CA 92121

000372

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Chain of Custody Record

Date 9-23-89 Page 1 of 1

Shipment No. 22

Name John Vanderslice
Address 1 Sears du Paramus NJ 07652
Phone Number 201-599-0100
Project Manager Barry Lanzer
Project Name Niagara Falls FAP / FTFS
Job/P.O. No. 12-30-8558-XX

Sampler (Signature) S. Shaw (Printed Name) Sutirio Stanbou

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters	NO. OF CONTAINERS
	WTP	Gw58	9-23-89	0710	Site 3	X X	2
	WTP	Gw61	9-23-89	1655	Site 3	X X X X X X X X	7
	WTP	Gw60	9-23-89	1700	Site 3	X X X X X X X	1
	WTP	Gw61	9-23-89	1900	Site 3	X X X X X X X	1
	WTP	Gw62	9-23-89	1210	Site 3	X X X X X X	8
	WTP	Gw63	9-23-89	0845	Site 3	X X X X X X X	7
	WTP	Gw64	9-23-89	0700	Site 3	X X X X X X X	7
	WTP	TBA22				X	1
	WTP	TBH22				X X	2

Temp of Cooler at Shipment 4 °C
received Cooler blank (CBH22) temp upon Arrival at Lab — °C

Total Number of Containers: 60

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Kati Pottmann	9-23-89	Signature: William H. Howard	9-23-89
Printed Name: Kati Pottmann	Time: 1710	Printed Name: William H. Howard	Time: 1454
Company: SAIC		Company: E+E	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

Laboratory Name: Clayton Environmental
Address: 1285 Genesee St.
Buffalo NY 14225
Phone: 716-631-0360
Contact Name: Lee Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

SAIC Location (circle)

Washington, D.C.
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(619) 535 7438

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Chain of Custody Record

Date 9-26-89 Page 1 of 1

Shipment No.

Name JOHN KING
Address 1 SEARS DR PARAMUS NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP/RIFS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) S. Stavrou (Printed Name) Soterios Stavrou

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Aromatics SW8020/8020	Ethylene Dibromide E504.1	Petroleum Hydrocarbons E418.1	Metals + Hardness A200.7, E130.1	Common Anions, TDS A429, E160.1	Chloride, Nitrate, Fluoride, Sulfate	Orthophosphate	Extractable Priority Pollutants E625	NO. OF CONTAINERS
50806	WTR	GW 65	9-26-89	08:45	Site 4	X	X							4
50807	WTR	GW 66	9-26-89	09:25	Site 4	X	X	X	X	X				7
50808	WTR	GW 67	9-26-89	09:47	Site 4	X	X	X	X	X				7
50809	WTR	GW 68	9-26-89	10:10	Site 4	X	X	X	X	X				7
50810	WTR	GW 69	9-26-89	11:16	Site 4	X	X	X	X	X				7
50811	WTR	GW 70	9-26-89	08:50	Site 4	X	X	X	X	X				7
50812	WTR	GW 71	9-26-89	11:42	Site 2	X		X	X	X				5
50813	WTR	GW 72	9-26-89	12:00	Site 2	X		X	X	X				5
50814	WTR	GW 73	9-26-89	11:20	Site 2	X								2
50805	WTR	GW 62	9-26-89	08:05	Site 3								X	1
	WTR	CB#23												1
50815	WTR	TB#23				X	X							2

Requested Parameters

Laboratory Name Ecology + Environment
Address 4285 Genesee St
Buffalo NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

temp of cooler at shipment 2 °C
iced cooler blank (CB#23) temp upon arrival at lab ___ °C

Total Number of Containers: 55

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: Soterios Stavrou	9-26-89	Signature: John M. Stack	9-26-89
Printed Name: Soterios Stavrou	Time	Printed Name: John M. Stack	Time 14:45 PM
Company: SAIC INC		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
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(703) 734-2500

Oakridge
800 Oakridge Trpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

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(206) 747-7899

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(619) 535-7438

000374

Chain of Custody Record

Science Applications International Corporation — An Employee-Owned Company

Date 9-26-89 (27th) Page 1 of 1

Shipment No. 24

Name JOHN KING
Address 1 SEARS DR PARAMUS NJ 07652
Phone Number (201) 599 0100
Project Manager Barry Langer
Project Name Niagara Falls IAP/RIFS
Job/P.O. No. 1-835-06-8X8-XX
Sampler (Signature) Soterios Stavrou (Printed Name) SOTERIOS STAVROU

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Aromatics SW8030/8020	Ethylene Dibromide Extract	Petroleum Hydrocarbons E418.1	25 Metals E200.7 Hardness E130.1 also	Arsenic E206.2, Lead E239.2 Mercury E245.1	Selenium E270.2	Common Anions A429 TOX Filter Chloride, Nitrate Fluoride, Sulfate Orthophosphate	1	NO. OF CONTAINERS.	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
51024		GW-74	9-27-89	08:15	Site 2	X								2	
51026		GW-75	9-27-89	09:45	Site 2	X		X	X			X		5	
51027		GW-76	9-27-89	10:00	Site 2	X		X	X			X		5	
51028		GW 77	9-27-89	09:20	Site 2	X		X	X			X		5	
51029		GW 78	9-27-89	08:30	Site 2	X		X	X			X		5	
51030		GW 79	9-27-89	08:20	Site 2	X		X	X			X		5	
51025		GW 80	9-27-89	10:45	Site 6	X	X							4	temp of cooler at shipment 0 oC
51031		GW 81	9-27-89	11:25	Site 6	X	X	X	X			X		7	record book blank
51032		GW 82	9-27-89	11:45	Site 6	X	X	X	X			X		7	(CB# 24) temp upon
51033		GW 83	9-27-89	11:10	Site 6	X	X	X	X			X		7	arrival at lab 3 oC
51034		GW 84	9-27-89	10:50	Site 6	X	X	X	X			X		7	
~~51033~~		CB #24	9-27-89	N/A	N/A									1	
51035		TB #24	9-27-89	N/A	N/A	X	X							2	

Laboratory Name Ecology + Environmental
Address 4285 Genesee St Buffalo NY 14225
Phone (716) 631 0360
Contact Name Bill Howard

Relinquished by Signature: Soterios Stavrou — Date 9-27-89 — Time
Printed Name: SOTERIOS STAVROU
Company:

Received by Signature: John M. Stack — Date 9-27-89 — Time 16:00PM
Printed Name: JOHN M. STACK
Company: Ecology + Environment

Relinquished by — Date — Time
Signature
Printed Name
Company

Received by — Date — Time
Signature
Printed Name
Company

Total Number of Containers: 62 ~~65~~ 55

Shipment Method:

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

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(615) 482-9931

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(201) 599-0100

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Chain of Custody Record

Date 9/28/89 Page 1 of 1

Shipment No. [redacted]25

Name JOHN KING
Address 1 SEARS DR PARAMUS NJ 07652
Phone Number (201) 599 0100
Project Manager Barry Lukev
Project Name Niagara Falls IAP/RIFS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) S. Stavrou (Printed Name) SOTERIOS STAVROU

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Aromatics SW5030/8020	Petroleum Hydrocarbons E418.1	25 Metals E200.7 Hardness E130.1 Arsenic E200.2, Land E239.2 Mercury E245.1 Selenium E270.2	Common Anions 4429 TDS E160.1 Chloride, Nitrate, Fluoride, Sulfate, Orthophosphate	NO. OF CONTAINERS
51568	WTR	GW85	9-28-89	08:15	Site 1	X				2
69	WTR	GW86	9-28-89	09:45	Site 1	X	X	X	X	5
70	WTR	GW87	9-28-89	09:45	Site 1	X	X	X	X	5
71	WTR	GW88	9-28-89	09:07	Site 1	X	X	X	X	5
72	WTR	GW89	9-28-89	10:05	Site 1	X	X	X	X	5
73	WTR	GW90	9-28-89	11:15	Site 1	X	X	X	X	5
74	WTR	GW91	9-28-89	11:35	Site 1	X	X	X	X	5
75	WTR	GW92	9-28-89	09:00	Site 1	X	X	X	X	5
51576	WTR	GW93	9-28-89	08:20	Site 1	X	X	X	X	5
	WTR	EB #24	N/A	N/A						1
51577		TB #25 RM	N/A	N/A		X				2 RM

Requested Parameters

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo NY 14225
Phone (716) 631 0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

temp of cooler at shipment 0 °C
second cooler blank (RB #25) temperature upon arrival at lab 3 °C

000376

Relinquished by	Date	Time	Received by	Date	Time
S. Stavrou	9-27-89	1625	John M. Stack	9-28-89	16:25
Signature			Signature		
SOTERIOS STAVROU			JOHN M. STACK		
Printed Name			Printed Name		
SAIC			Ecology & Environment		
Company			Company		
Relinquished by	Date	Time	Received by	Date	Time
Signature			Signature		
Printed Name			Printed Name		
Company			Company		

Total Number of Containers: 44

Shipment Method:

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

SAIC Location (circle)

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Date 9-29-89 Page 1 of 1

Shipment No. #27

Name JOHN KING
Address 1 SEARS DR PARAMUS NJ 07652
Phone Number (201) 599 0100
Project Manager Barry Lange
Project Name Niagara Falls TAP RIES
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) J Sloan (Printed Name) SOTERIOS STAVROU

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Aromatics SW 8020	Petroleum Hydrocarbons Extract		Metals Screen ICAP, As, Se, Hg E7062	Lead E239.2, Mercury E245.1	Selenium E270.2 Hardness E130.1		Aromatics 8020 TDS E160.1	Chloride, Nitrate Fluoride, Sulfate Orthophosphate				NO. OF CONTAINERS
	WTR	GW94	9-29-89	08:00	Site1	X												2
	WTR	GW95	9-27-89	09:05	Site1	X	X		X				X					5
	WTR	GW96	9-29-89	09:50	Site1	X	X		X				X					5
	WTR	GW97	9-29-89	09:30	Site1	X	X		X				X					5
		CB #27																1
		TB #27																1

Total Number of Containers: 19

Laboratory Name Enseky & Engineering
Address 4285 Genesee St
Buffalo NY 14225
Phone (716) 631 0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

temp at cooler at shipment ___ °C
received cooler blank (CB #27) temperature upon arrival at Lab ___ °C

Shipment Method:

Relinquished by	Date	Received by	Date
Signature: S Sloan	9-29-89	Signature: William H. Howard	9-29-89
Printed Name: Soterios Stavrou	Time: 1707	Printed Name: William H. Howard	Time: 1707
Company: SAIC		Company: E+E	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point Building 3, [illegible]ego, CA 92121
(619) 535 7430

4283000

INSTALLATION RESTORATION PROGRAM (IRP)

RI/FS

VOLUME IVD

Appendix F (Cont'd)

Niagara Falls International Airport
Niagara Falls, New York

Science Applications International Corporation (SAIC)
One Sears Drive
Paramus, New Jersey 07652

MAY 1991

Remedial Investigation/ Feasibility Study (RI/FS) Report 1987-1990

PREPARED FOR

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE RESERVE
ROBINS AIR FORCE BASE, GEORGIA 31098-6001

UNITED STATES AIR FORCE
HUMAN SYSTEMS DIVISION (AFSC)
IRP PROGRAM OFFICE (HSD/YAQI)
BROOKS AIR FORCE BASE, TEXAS 78235-5000

NIAGARA IAP RI/FS ITIR
VOLUME III
SURFACE WATER/SEDIMENT DATA

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APPENDICES

APPENDIX IIIA: Chain of Custody Forms.

INTRODUCTION

The Informal Technical Information Report (ITIR) for data generated from the sampling and analysis program at Niagara International Airport is organized into three volumes. Volume I contains all information pertaining to soil and well boring samples, including sample data for the drummed cuttings (reported in Appendix IB). Volume II reports all data for the groundwater samples, including the USGS well samples and samples taken from the bulk storage tanks containing development and purge water (reported in Appendix IIA and IIB, respectively). Surface water/sediment data is summarized in Volume III.

Each volume of the ITIR contains tables prepared in "Lotus 1-2-3" worksheet format, and identified alphabetically by type of information, subnumbered by table content, followed by an additional letter for each site. Included in each of the three volumes are tables summarizing the following information:

- Sample and QC cross references; These tables cross-reference field sample numbers, sample description and laboratory ID numbers (Tables B-1x), and quality control (QC) sample type and applicable and associated field samples (Tables B-2x). These tables also provide page references for the various types of analyses. All volatile organic compound analyses are grouped together (for example, for groundwater samples, methods SW5030/8020, SW5030/8021, SW5030/8015 and/or E504.1 are listed under the heading volatile/purgeable organics), as are general chemistry parameters. Only the first page number of multiple page tables is listed.

- Collection, extraction and/or analysis dates for all parameters: These sample tracking and holding time summary tables (C-1x, C-2x, C-3x, etc.) summarize all applicable analysis dates for each sample. In cases where more than one analysis is required for a specific analysis type, the latest analysis date is reported. For example, organic analysis by gas chromatography (GC) methods often require a primary and confirmation analysis-the later of the two analysis dates are reported. Similarly, metals are performed by inductively coupled plasma spectrophotometry (ICP) and graphite furnace atomic absorption (GFAA) methods, sometimes over several days - the latest analysis date is entered into the tables.

- Tabulated analytical results for all parameters for all environmental and field QC samples: These analytical results tables (D-1x, D-2x, D-3x, etc.) summarize all analytical results for all samples from a given site. If a specific site was not analyzed for a particular parameter, it is excluded from the tables (and from the numbering sequence). After the tables for each site, tables for any applicable trip blanks, field blanks and equipment wash blanks are presented. For example, in Volume

II, pesticide results for groundwater samples from sites 3 and 13 and the equipment washes are the only tables presented, and are numbered D-4a through D-4b. Surrogate recoveries are reported for each sample, where applicable, for GC analyses. For additional details on GC analyses, please refer to the QA/QC summary (given on the following pages) for Volume II.

- QC sample analysis summaries - laboratory QC: Analytical results for laboratory precision and accuracy samples, in the form of matrix replicates (MR), matrix spikes (MS), or matrix spike/matrix spike duplicate (MS/MSD) pairs are presented in Tables E-1, E-2, etc. Laboratory method blank data for each relevant analysis type are listed in Tables F-1, F-2, etc.

- Overall precision and accuracy summary: Based on the total number of replicates, spikes or MS/MSD analyses for a particular parameter, the "G" Tables summarize the overall range of relative percent deviation (RPD) or percent recovery achieved by the laboratory. This is compared to the control limits for the QC analysis to determine the number of QC analyses within and outside of the limits.

Each volume is numbered sequentially beginning with the first table in the volume and ending with the last page of the last appendix. Each volume is prefaced by a table of contents, this introduction section and a QA/QC summary specific for the data contained in that volume. Chain-of-custody forms are included in an appendix to each volume. In addition, the Table of Contents for each volume identifies what other information may be contained in an appendix (for example, as mentioned earlier, drummed cutting sample results are presented in Appendix IA.)

QA/QC SUMMARY
VOLUME III

A formal, documented QA review has not yet been completed on the data from Niagara Falls IAP; these results will be summarized in the final report. The following items, however, pertain to the overall project, and in particular the surface water/sediment data, and should be considered when reviewing the data contained in the ITIR. These issues often involve deviations from, or modifications to, the analytical and quality assurance/quality control protocols and procedures outlined in the Niagara IAP RI/FS Quality Assurance Project Plan (QAPP), Statement of Work (SOW) or Work Plan documents. In several cases, these modifications were made after consulting with OEHL project personnel and the resulting decisions were documented in a letter; these correspondence are included as Appendix IA of Volume I of the ITIR.

Field Activities

During surface/sediment sampling at Site 8, a new sampling point was added to the stream monitoring network. The decision to add another stream monitoring point was made shortly after the field team discovered an unusually high and turbid flow in the intermittent stream mouth of Site 8. the discharge appeared to originate from some unknown off-base source. The new stream sampling station was established at the point where the stream enters the base. Samples from this point were considered critical in any discussions attempting to correlate potential stream contamination to an off-base source.

Laboratory Activities

All gas chromatography analysis results are reported in the appropriate "D-Table" with the primary analysis result and confirmation analysis result reported side by side, separated by a slash. For example, a methylene chloride concentration of "5.7/4.3" indicates a primary or quantitation analysis result

of 5.7 ug/l and a confirmation analysis result of 4.3 ug/l. Similarly, surrogate compound recovery values, listed at the end of the table, represent the percent recovery in the primary/confirmation analyses. If a compound was detected in one analysis, but not in the other, it was not confirmed and therefore is not reported.

A method modification was implemented for surface water samples being analyzed, as per the OEHL SOW, for purgeable halocarbons and purgeable aromatics by EPA Method E601 and SW 846 Method SW5030/8020, respectively. The laboratory proposed analyzing these samples by SW5030/8021, a method which uses in series each of the individual detectors specified in the above methods. This was discussed with Major Philip Jung (see Appendix IA, Volume I, letter to Sam Taffinder dated June 8, 1989) and was considered acceptable. The individual methods (E601 and/or SW5030/8020) were used as necessary for confirmation analysis, or as an alternate primary method if better quality control criteria were achieved. The results are reported in two tables to maintain consistency with the requested analyses. Tables D-1x lists the purgeable halocarbon compounds, and Table D-2x lists the purgeable aromatic compounds; both tables combined include the total list of volatile organic compounds analyzed by Method SW5030/8021. The cross-reference tables refer to volatile organic compounds (SW5030/8021) and list page references for both D-1x and D-2x tables. In cases where only purgeable aromatics were requested for analysis at a particular site, this analysis was performed by Methods SW5030/8020.

In the OEHL Statement of Work, orthophosphate was included in the list of common anions to be analyzed by Method A429. After discussing the likelihood of this compound being present in the surface water samples, and considering the additional field effort required to obtain samples for this parameter (field filtration), Major Jung determined that analyzing for phosphate by Method A429, without performing the field filtration, would be adequate for the purposes of this field investigation. This is summarized in a letter to Mr. Sam Taffinder, dated August 29, 1989 (see Appendix IA).

The laboratory experienced difficulty in the analysis of one of the purgeable halocarbon compounds: 2-chloroethylvinyl ether. This compound was not detected in most of the standards analyzed with these samples, therefore the results are reported as "NF" (not found due to an analytical problem) for 2-choroethylvinyl ether.

Laboratory QC data was reported by the laboratory with the samples, and was generally identified by analysis date, batch number or sample number. These identifiers were enhanced by a preface indicating the general type of analysis (e.g., VO - volatile organic, SV - semivolatile organic, M - metals), and by a suffix indicating the type of QC sample (e.g., MB - method blank, MR - matrix replicate, MSD - matrix spike duplicate).

Control limits for surrogate recoveries, spike recoveries and replicate (or MS/MSD) RPD values are either laboratory generated, or in accordance with USEPA Contract Laboratory Program (CLP) method control limits. In all cases, the applicable control limit is reported along with the sample data.

Matrix spike/matrix spike duplicates for semivolatile analysis by SW846 Methods 3510/8270 did not include di-n-butyl phthalate as a spike compound. Although the QAPP includes this compound, it is no longer specified in the SW846 (3rd Edition) manual. Surface water samples and sediment samples were both analyzed by SW846 Method 8270.

At site 9, sediments were to be analyzed for metals by ICP (SW3050/6010) and lead by graphite furnace. No mercury was required, although the chain of custody forms requested it. When the laboratory was asked to cancel the mercury analysis - it was cancelled on the surface waters and not on the sediments. Therefore, mercury analysis was not performed on the surface waters as required.

Methylene chloride is reported as a detected, confirmed compound for almost all surface water samples and field QC samples. However, in all of the laboratory method blanks (primary and confirmation), methylene chloride was also detected. Results for both primary and confirmation analysis methods blanks are presented

in Table F-1 and cross-referenced to the applicable samples in Table B-2d. This is the only analysis for which both primary and confirmation analysis method blank results are reported, since it was necessary to demonstrate the likelihood of laboratory contamination being the source of the compound.

SYMBOLS/ABBREVIATIONS

NA - Not analyzed
N/A - Not applicable
* - Compound present below measurable detection limit
E - Estimated value, compound quantitated outside calibration range but within linear range.
OC - Value not within control limits
J - Estimated concentration below the method detection limit
NR - Not reported
MB - Method blank
MR - Matrix replicate
MS - Matrix spike
MSD - Matrix spike duplicate
RPD - Relative percent difference
MDL - Method detection limit

Other, additional symbols may be used which are defined on the specific table where they occur.

ANALYSIS AND METHODS SUMMARIES
TABLES A-1 THROUGH A-2

Table A-1

Analytical Methods*, Holding Times and Detection Limits
SURFACE WATER & SEDIMENT SAMPLES

Parameter	Matrix	Method Number*	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
ORGANICS						
Volatile Organic Compounds	SW	SW5030/8021	ug/L	14 Days**	see Table A-1b	see Table A-1b
	SD	SW8240	mg/Kg	14 Days	see Table A-1c	see Table A-1c
Purgeable Aromatic Organics	SW	SW5030/8020	ug/L	14 Days**	see Table A-1a	see Table A-1a
Non-halogenated Volatile Organics	SW	SW5030/8015	ug/L	14 Days**	see Table A-1d	see Table A-1d
Organochlorine Pesticides/PCB	SW	E608	ug/L	7 Days for Extraction 40 Days for Analysis	see Table A-1e	see Table A-1e
Semivolatile Organic Compounds	SW	E625	ug/L	7 Days for Extraction/ 40 Days for Analysis	see Table A-1f	see Table A-1f
	SD	SW3550/SW8270	mg/Kg	7 Days for Extraction/ 40 Days for Analysis	see Table A-1f	see Table A-1f
INORGANICS						
Petroleum Hydrocarbons	SW	E418.1	mg/L	28 Days	1.0 mg/L	0.5 mg/L
	SD	SW3550/E418.1	mg/Kg	28 Days	5 mg/Kg	2 mg/L

SW = Surface Water
SD = Sediment

Table A-1(continued)

Analytical Methods*, Holding Times and Detection Limits
SURFACE WATER & SEDIMENT SAMPLES

Parameter	Matrix	Method Number	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
INORGANICS						
Metal Screen(25 metals)	SW	E200.7	mg/L	6 Months	see Table A-1g	see Table A-1g
	SD	SW3050/SW6010	mg/Kg	6 Months	see Table A-1g	see Table A-1g
Mercury	SW	E245.1	mg/L	28 Days	0.0002 mg/L	0.00014 mg/L
	SD	SW7471	mg/Kg	28 Days	0.1 mg/Kg	0.00014 mg/L
Lead	SW	E239.2	mg/L	6 Months	0.005 mg/L	0.0008 mg/L
	SD	SW3050/7421	mg/Kg	6 Months	0.50 mg/kg	0.0008 mg/L
Arsenic	SW	E206.2	mg/L	6 Months	0.005 mg/L	0.00195 mg/L
Selenium	SW	E270.2	mg/L	6 Months	0.005 mg/L	0.00186mg/L

SW = Surface Water
SD = Sediment

Table A-1(continued)

Analytical Methods*, Holding Times and Detection Limits
SURFACE WATER & SEDIMENT SAMPLES

Parameter	Matrix	Method Number	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
COMMON ANIONS						
Chloride	SW	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Fluoride	SW	A429	mg/L	28 Days	0.1 mg/L	0.1 mg/L
Sulfate	SW	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Nitrate	SW	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Orthophosphate	SW	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Total dissolved Solids	SW	E160.1	mg/L	7 Days	1 mg/L	N/A
Hardness	SW	E130.1	mg/L	6 Months	1 mg/L	N/A

NOTE *: The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020
(USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136,
Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis
of Water and Wastes, 40 CFR136,Appendix C
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,
SW846, 3rd Edition (USEPA, 1986).

NOTE **: Volatile organic holding time is 14 days for aqueous samples preserved with HCl
to pH<2. If not preserved, holding time is 7 days.

SW = Surface Water

Table A-1a

Method Detection Limits/Instrument Detection Limits
Purgeable Aromatic Organics - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Chlorobenzene	0.3	0.27
1,2-Dichlorobenzene	1.0	0.92
1,3-Dichlorobenzene	0.7	0.66
1,4-Dichlorobenzene	0.7	0.64
Benzene (See Note)	0.3	0.24
Total Xylenes	1.0	0.72
Toluene	0.3	0.29
Ethylbenzene	0.3	0.25

Table A-1b

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds; Purgeable Halocarbon Compounds
-Aqueous-

Compound	MDL (ug/L)	IDL (ug/L)
Carbon Tetrachloride	0.3	0.26
1,2-Dichloroethane	0.4	0.37
1,1,1-Trichloroethane	0.4	0.31
1,1-Dichloroethane	0.5	0.44
1,1,2-Trichloroethane	0.5	0.40
1,1,2,2-Tetrachloroethane	2.5	2.54
Chloroethane	0.8	0.61
2-chloroethylvinyl ether	10	NR
Chloroform	0.4	0.38
1,1-Dichloroethene	0.8	0.65
trans-1,2-Dichloroethene	0.3	0.27
1,2-Dichloropropane	0.4	0.34
trans-1,3-Dichloropropene	0.4	0.36
cis-1,3-Dichloropropene	0.5	0.47
Methylene Chloride	0.8	0.73

Table A-1b (continued)

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds; Purgeable Halocarbon Compounds
-Aqueous-

Compound	MDL (ug/L)	IDL (ug/L)
Chloromethane	0.8	0.63
Bromomethane	0.8	0.61
Bromoform	0.5	0.41
Bromodichloromethane	0.5	0.32
Fluorotrichloromethane	2.0	0.62
Dichlorodifluoromethane	2.0	0.98
Chlorodibromomethane	0.4	0.36
Tetrachloroethene	0.8	0.57
Trichloroethene	1	1.09
Chlorobenzene	0.4	0.31
1,3-Dichlorobenzene	0.3	0.24
1,2-Dichlorobenzene	0.3	0.29
1,4-Dichlorobenzene	0.3	0.26

Table A-1c

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds - Sediment

8240 Compounds	MDL (mg/Kg)	IDL (mg/L)
Chloromethane	0.010	0.00441
Bromomethane	0.010	0.00492
Vinyl Chloride	0.010	0.00309
Chloroethane	0.010	0.00591
Methylene Chloride	0.005	0.00370
Acetone	0.010	0.00940
Carbon Disulfide	0.005	0.00290
1,1-Dichloroethene	0.005	0.00276
1,1-Dichloroethane	0.005	0.00238
trans-1,2-Dichloroethene	0.005	0.00260
Chloroform	0.005	0.00284
1,2-Dichloroethane	0.005	0.00235
2-Butanone	0.010	0.00630
1,1,1-Trichloroethane	0.005	0.00290
Carbon Tetrachloride	0.005	0.00320
Vinyl Acetate	0.010	0.00510
Bromodichloromethane	0.005	0.00260
1,2-Dichloropropane	0.005	0.00330
trans-1,3-Dichloropropene	0.005	0.00360
Trichloroethene	0.005	0.00290
Dibromochloromethane	0.005	0.00260
1,1,2-Trichloroethane	0.005	0.00450
Benzene	0.005	0.00320

Table A-1c (continued)

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds - Sediment

8240 Compounds	MDL (mg/Kg)	IDL (mg/L)
cis-1,3-Dichloropropene	0.005	0.00470
2-Chloroethylvinyl ether	0.010	0.00530
Bromoform	0.005	0.00400
4-Methyl-2-Pentanone	0.010	0.00980
2-Hexanone	0.010	0.00600
Tetrachloroethene	0.005	0.00380
1,1,2,2-Tetrachloroethane	0.005	0.00500
Toluene	0.005	0.00410
Chlorobenzene	0.005	0.00420
Ethylbenzene	0.005	0.00360
Styrene	0.005	0.00440
Total Xylenes	0.005	0.00300
1,2-Dichlorobenzene	0.005	NR
1,3-Dichlorobenzene	0.005	NR
1,4-Dichlorobenzene	0.005	NR
Trichlorofluoromethane	0.010	NR

NR - Not reported

Table A-1d

Method Detection Limits/Instrument Detection Limits
Non-Halogenated Volatile Organics (SW5030/8015)
- Aqueous -

Parameter	MDL (ug/L)	IDL (ug/L)
Ethanol	100	107
Diethyl Ether	10	2.4
Methyl Ethyl Ketone	10	21*
Methyl Isobutyl Ketone	10	44*

* 10 ug/L is visually obtainable for MEK and MIBK low level contamination and carryover caused variability in recovery values (thus affecting the statistical IDL).

Table A-1e

Method Detection Limits/Instrument Detection Limits
Pesticides & PCB Compounds - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Aldrin	0.025	0.01
a-BHC	0.025	0.01
b-BHC	0.025	0.01
g-BHC	0.025	0.02
d-BHC	0.025	0.02
Chlordane	0.20	0.10
4,4'-DDD	0.05	0.01
4,4'-DDE	0.05	0.02
4,4'-DDT	0.10	0.01
Dieldrin	0.05	0.02
Endosulfan I	0.05	0.01
Endosulfan II	0.05	0.01
Endosulfan sulfate	0.10	0.01
Endrin	0.05	0.01
Endrin aldehyde	0.10	NR
Heptachlor	0.025	0.02
Heptachlor epoxide	0.05	0.02
Toxaphene	1.00	0.75
Methoxychlor	0.50	0.20
PCB-1016	0.50	0.02
PCB-1221	0.50	0.20
PCB-1232	0.50	0.01
PCB-1242	0.50	0.08
PCB-1248	0.50	0.08
PCB-1254	0.50	0.20
PCB-1260	0.50	0.10

NR - Not reported

Table A-1f

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds

Compound	MDL (ug/L) Surface water	MDL (mg/Kg) Sediment	IDL (ug/L)
bis(2-chloroethyl)ether	10	0.33	4.8
1,3-Dichlorobenzene	10	0.33	4.5
1,4-Dichlorobenzene	10	0.33	4.2
1,2-Dichlorobenzene	10	0.33	4.4
bis(2-chloroisopropyl)ether	10	0.33	6.1
N-Nitroso-di-propylamine	10	0.33	5.4
Hexachloroethane	10	0.33	2.4
Nitrobenzene	10	0.33	2.8
Isophorone	10	0.33	2.2
bis(2-chloroethoxy)methane	10	0.33	1.5
1,2,4-Trichlorobenzene	10	0.33	5.6
Naphthalene	10	0.33	2.2
Hexachlorobutadiene	10	0.33	9.5
Hexachlorocyclopentadiene	10	0.33	2.6
2-Chloronaphthalene	10	0.33	1.5
Dimethyl phthalate	10	0.33	2.4
Acenaphthylene	10	0.33	2.4
Fluorene	10	0.33	2.1
Acenaphthene	10	0.33	2.2
2,4-Dinitrotoluene	10	0.33	1.4
2,6-Dinitrotoluene	10	0.33	3.6
Diethylphthalate	10	0.33	2.5
4-Chlorophenyl phenyl ether	10	0.33	3.9
N-Nitrosodiphenylamine	10	0.33	2.7
4-Bromophenyl phenyl ether	10	0.33	3.3

Table A-1f (continued)

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds

Compound	MDL (ug/L) Surface water	MDL (mg/Kg) Sediment	IDL (ug/L)
Hexachlorobenzene	10	0.33	2.4
Phenanthrene	10	0.33	2.7
Anthracene	10	0.33	2.3
Di-n-Butyl phthalate	10	0.33	5.6
Fluoranthene	10	0.33	6.0
Benzidine	50	1.60	19.5
Pyrene	10	0.33	8.8
Butyl benzyl phthalate	10	0.33	5.4
3,3'-Dichlorobenzidine	20	0.66	8.8
Benzo(a)anthracene	10	0.33	1.3
Bis(2-ethylhexyl)phthalate	10	0.33	8.0
Chrysene	10	0.33	1.7
Di-n-octyl phthalate	10	0.33	8.7
Benzo(b)fluoranthene	10	0.33	4.2
Benzo(k)fluoranthene	10	0.33	6.4
Benzo(a)pyrene	10	0.33	2.4
Indeno(1,2,3-cd)pyrene	10	0.33	5.1
Dibenzo(a,h)anthracene	10	0.33	4.3
Benzo(g,h,i)perylene	10	0.33	3.2
Phenol	10	0.33	3.7
2-Chlorophenol	10	0.33	2.7
2-Nitrophenol	10	0.33	3.2
2,4-Dimethyphenol	10	0.33	3.2
2,4-Dichlorophenol	10	0.33	5.4

Table A-1f (continued)

Method Detection Limit/Instrument Detection Limits
Semivolatile Organic Compounds

Compound	MDL (ug/L) Surface water	MDL (mg/Kg) Sediment	IDL (ug/L)
4-Chloro-3-methylphenol	10	0.33	2.0
2,4,6-Trichlorophenol	10	0.33	4.1
2,4-Dinitrophenol	50	1.60	2.3
4-Nitrophenol	50	1.60	2.3
4,6-Dinitro-2-methylphenol	50	1.60	2.4
Pentachlorophenol	50	1.60	19.0
Benzyl alcohol	10	0.33	4.9
2-Methylphenol	10	0.33	5.2
4-Methylphenol	10	0.33	1.8
Benzoic acid	50	1.60	23.3
4-Chloroaniline	10	0.33	3.3
2-Methylnaphthalene	10	0.33	2.0
2,4,5-Trichlorophenol	50	1.60	6.5
2-Nitroaniline	50	1.60	2.2
3-Nitroaniline	50	1.60	7.5
Dibenzofuran	10	0.33	2.5
4-Nitroaniline	50	1.60	1.1

Table A-1g

Method Detection Limits/Instrument Detection Limits
Metals

Parameter	Surface Water EPA Method	Surface Water MDL (mg/L)	Sediment EPA Method	Sediment MDL (mg/Kg)	Sediment IDL (mg/L)
Aluminum	E200.7	0.1	SW6010	20.0	0.043
Antimony	E200.7	0.06	SW6010	12.0	0.033
Arsenic	E200.7	0.05	SW6010	5.0	NR
Arsenic	E206.2	0.005	SW6010	NR	0.00195
Barium	E200.7	0.01	SW6010	2.0	0.002
Beryllium	E200.7	0.002	SW6010	0.4	0.002
Boron	E200.7	0.01	SW6010	6.0	NR
Cadmium	E200.7	0.005	SW6010	1.0	0.003
Calcium	E200.7	0.20	SW6010	10.0	0.104
Chromium	E200.7	0.010	SW6010	2.0	0.005
Cobalt	E200.7	0.010	SW6010	2.0	0.008
Copper	E200.7	0.010	SW6010	2.0	0.003
Iron	E200.7	0.025	SW6010	5.0	0.009
Lead	E200.7	0.05	SW6010	10.0	0.008
Lead	E239.2	0.005	SW7421	NR	0.008
Magnesium	E200.7	0.20	SW6010	10.0	0.098
Manganese	E200.7	0.005	SW6010	1.0	0.001
Mercury	E245.1	0.0002	SW7471	0.1	0.00014
Molybdenum	E200.7	0.010	SW6010	5.0	NR
Nickel	E200.7	0.015	SW6010	3.0	0.004
Potassium	E200.7	0.4	SW6010	100.0	0.381
Selenium	E200.7	0.100	SW6010	10.0	NR
Selenium	E270.2	0.005	SW6010	NR	0.00186
Silicon	E200.7	0.020	SW6010	60.0	NR
Silver	E200.7	0.01	SW6010	2.0	0.004
Sodium	E200.7	0.200	SW6010	100.0	0.094
Thallium	E200.7	0.100	SW6010	16.0	0.0021
Vanadium	E200.7	0.01	SW6010	2.0	0.006
Zinc	E200.7	0.01	SW6010	2.0	0.005

NR - Not reported

Table A-2

Analytical Methods, Quality Control Checks and Total Number of Surface Water/Sediment Analyses
SURFACE WATER/SEDIMENT SAMPLES SUMMARY

Parameter	Matrix	Analytical Method	Reporting Units	Number of Sample Analyses	Trip Blanks	Field Blanks	Field Replicates	Method Blanks	Matrix Replicates	Matrix/Method Spikes	MS/MSD Analysis	*Total Analysis
ORGANICS												
Volatile Organic Compounds	SW	SW5030/8021	ug/L	9	2	3	1	6	0	0	4	25
	SD	SW8240	mg/Kg	10	0	0	1	4	0	0	4	19
Purgeable Aromatic Organics	SW	SW5030/8020	ug/L	9	2	3	1	2	0	0	4	21
Non-halogenated Volatile Organics	SW	SW5030/8015	ug/L	3	1	1	1	1	0	0	2	9
Organochlorine Pesticides/PCBs	SW	E608	ug/L	3	0	0	1	1	0	0	1	6
Semivolatile Organic Compounds	SW	E625	ug/L	6	0	0	1	1	0	0	2	10
	SD	SW3550/SW8270	mg/Kg	10	0	0	1	3	0	0	2	16
INORGANICS												
Petroleum Hydrocarbons	SW	E418.1	mg/L	9	0	0	1	4	0	2	0	18
	SD	SW3550/E418.1	mg/Kg	10	0	0	1	0	2	3	0	16
Metal Screen(25 metals)	SW	E200.7	mg/L	9	0	0	1	4	2	2	0	18
	SD	SW3050/SW6010	mg/Kg	10	0	0	1	4	2	2	0	19
Mercury	SW	E245.1	mg/L	6	0	0	1	1	3	3	0	14
	SD	SW7471	mg/Kg	10	0	0	1	2	1	1	0	15
Lead	SW	E239.2	mg/L	9	0	0	1	2	3	3	0	18
	SD	SW3050/7421	mg/Kg	2	0	0	0	1	1	1	0	5
Arsenic	SW	E206.2	mg/L	9	0	0	1	2	3	3	0	18
Selenium	SW	E270.2	mg/L	9	0	0	1	2	3	3	0	18

SW = Surface Water
SD = Sediment

Table A-2(continued)

Analytical Methods, Quality Control Checks and Total Number of Surface Water/Sediment Analyses
SURFACE WATER/SEDIMENT SAMPLES SUMMARY

Parameter	Matrix	Analytical Method	Reporting Units	Number of Sample Analyses	Trip Blanks	Field Blanks	Field Replicates	Method Blanks	Matrix Replicates	Matrix/Method Spikes	MS/MSD Analysis	*Total Analysis
Common Anions	SW	A429	mg/L	9	0	0	1	1	1	1	0	13
Hardness	SW	E130.1	mg/L	9	0	0	1	0	3	0	0	13
Total Dissolved Solids	SW	E160.1	mg/L	9	0	0	1	0	3	0	0	13

*The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020
(USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136,
Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis
of Water and Wastes, 40 CFR136,Appendix C
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,
SW846, 3rd Edition (USEPA, 1986).

SW = Surface Water

CROSS REFERENCES

TABLES B-1a THROUGH B-2f

Table B-1a
Site Specific Cross Reference
SITE 3

Field Sample ID	Sample Description	Matrix	Laboratory ID	Page(s)				
				Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
SW-6	Field Blank	Aqueous	51554	37, 57, 63	40	40	43	46
SW-7	3SW-4	Surface Water	51555	37, 49, 59	40, 74	40, 73	43, 89	46, 95
SW-8	3SW-2	Surface Water	51556	37, 49, 59	40, 74	40, 73	43, 89	46, 95
SW-9	3SW-5	Surface Water	51557	37, 49, 59	40, 74	40, 73	43, 89	46, 95
SW-10	3SW-5 (Dupl.)	Surface Water	51558	37, 49, 59	40, 74	40, 73	43, 89	46, 95
TB-26	Trip Blank	Aqueous	51559	37, 55, 62, 71	40	40	43	46
SD-7	3SD-4	Sediment	51564	37, 64	40, 77	40	43, 90	46
SD-8	3SD-2	Sediment	51565	37, 64	40, 77	40	43, 90	46
SD-9	3SD-5	Sediment	51566	37, 64	40, 77	40	43, 90	46
SD-10	3SD-5 (Dupl.)	Sediment	51567	37, 64	40, 77	40	43, 90	46

Table 8-1b
Site Specific Cross Reference
SITE 8

Field Sample ID	Sample Description	Matrix	Laboratory ID	Page(s)				
				Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
SW-1	Field Blank	Aqueous	51550	38, 57, 63, 72	41	41	44	47
SW-2	8SW-4	Surface Water	51551	38, 51, 60, 70	41, 80	41	44, 91	47, 96
SW-3	8SW-5	Surface Water	51552	38, 51, 60, 70	41, 80	41	44, 91	47, 96
SW-4	8SW-6	Surface Water	51553	38, 51, 60, 70	41, 80	41	44, 91	47, 96
TB-26	Trip Blank	Aqueous	51559	38, 55, 62, 71	41	41	44	47
SD-2	8SD-4	Sediment	51360	38, 66	41, 83	41	44, 92	47
SD-3	8SD-5	Sediment	51561	38, 66	41, 83	41	44, 92	47
SD-4	8SD-6	Sediment	51562	38, 66	41, 83	41	44, 92	47
SD-5	8SD-3	Sediment	51563	38, 66	41, 83	41	44, 92	47

Table B-1c
Site Specific Cross Reference
SITE 9

Field Sample ID	Sample Description	Matrix	Laboratory ID	Page(s)				
				Volatile/Purgeable Organics	Semivolatile Organics	Pesticides/ PCBs	Metals/ TPH	General Chemistry
SW-11	Field Blank	Aqueous	51609	39, 57, 63	42	42	45	48
SW-12	9SW-1	Surface Water	51610	39, 53, 61	42	42	45, 93	48, 97
SW-13	9SW-2	Surface Water	51611	39, 53, 61	42	42	45, 93	48, 97
SW-14	9SW-3	Surface Water	51612	39, 53, 61	42	42	45, 93	48, 97
TB-28	Trip Blank	Aqueous	51613	39, 55, 62	42	42	45	48
SD-12	9SD-1	Sediment	51619	39, 69	42, 86	42	45, 94	48
SD-13	9SD-2	Sediment	51620	39, 69	42, 86	42	45, 94	48
SD-14	9SD-3	Sediment	51621	39, 69	42, 86	42	45, 94	48

Table B-2a
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
TB-26	Volatile Organics (SW5030/8021)	55,62	8	SW-1 SW-2 SW-3 SW-4
	Volatile Organics (SW5030/8021) Non-halogenated Volatile Organics (SW5030/8015)	55,62 71	3	SW-6 SW-7 SW-8 SW-9 SW-10
TB-28	Volatile Organics (SW5030/8021)	55,62	9	SW-12 SW-13 SW-14

Table B-2b
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
SW-1	Volatile Organics (SW5030/8021)	57,63	8	SW-1
	Non-halogenated Volatile Organics (SW5030/8015)	72		SW-2
				SW-3
				SW-4
				TB-26
SW-6	Volatile Organics (SW5030/8021)	57,63	3	SW-6
				SW-7
				SW-8
				SW-9
				SW-10
SW-11	Volatile Organics (SW5030/8021)	57,63	9	SW-12
				SW-13
				SW-14
				TB-28

Table B-2c
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID	
SW-10	Volatile Organics (SW5030/8021)	49,59	8	SW-1	(Volatiles Only)
	Semivolatile Organics	74		SW-2	
	Total Petroleum Hydrocarbons	89		SW-3	
	Metals, As, Pb, Hg, Se	89		SW-4	
	Common Anions	95			
	Total Dissolved Solids	95	3	SW-6	(Volatiles Only)
	Hardness	95		SW-7	
				SW-8	
				SW-9	
			9	SW-11	(Volatiles Only)
				SW-12	(excluding Semivolatiles)
				SW-13	(excluding Semivolatiles)
				SW-14	(excluding Semivolatiles)
	Pesticides/PCBs	73	3	SW-7	
				SW-8	
				SW-9	

Table B-2c (continued)
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
SD-10	Volatile Organics (SW8240)	64	8	SD-2
	Semivolatile Organics	77		SD-3
	Total Petroleum Hydrocarbons	90		SD-4
	Metals, Hg	90		SD-5
			3	SD-7
				SD-8
				SD-9
			9	SD-12
				SD-13
				SD-14

Table B-2d
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
M457MB	As, Se, Hg, Pb	128	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
M1025MB	Mercury	129	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
I0929MB	Anions	130	8	SW-2
				SW-3
				SW-4
			9	SW-12
				SW-13
				SW-14
			3	SW-7
				SW-8
				SW-9
				SW-10

Table B-2d (continued)
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
M456MB	Metals	128	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
M477MB	Metals	129	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
P01011MB	Purgeable Aromatic Organics (SW5030/8020)	117	8	SW-1
				SW-2
				SW-3
				SW-4
			3	SW-6
				SW-7
				SW-8
				SW-9
				SW-10
				TB-26

Table B-2d (continued)
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
VO1011MB	Volatile Organics (SW5030/8021) primary	115	8	SW-1
				SW-2
				SW-3
				SW-4
			3	SW-6
				SW-7
				SW-8
				SW-9
				SW-10
				TB-26
VO1010MB	Volatile Organics (SW5030/8021) confirmation	115	8	SW-1
				SW-2
				SW-3
				SW-4
			3	SW-6
VO1011MB	Volatile Organics (SW5030/8021) confirmation	115	3	SW-7
				SW-8
				SW-9
				SW-10
				TB-26
ED1003MB	Non-halogenated Volatile Organics (SW5030/8015)	120	8	SW-1
				SW-2
				SW-3
				SW-4
				TB-26

Table B-2d (continued)
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
PP1004MB	Pesticides/PCB	121	3	SW-7
				SW-8
				SW-9
				SW-10
SV1003MB1	Semivolatile Organics	122	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
SV1003MB2, SV1003MB3	Semivolatile Organics	125	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
V01009MB	Volatile Organics (SW8240)	118	8	SD-2
				SD-3
				SD-4
			3	SD-7
				SD-8
				SD-9
				SD-10

Table B-2d (continued)
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
VO1011MB1	Volatile Organics (SW8240)	118	8	SD-5
M470MB	As, Se, Pb	128	9	SW-12 SW-13 SW-14
M469MB	Metals	128	9	SW-12 SW-13 SW-14
PO1012MB	Purgeable Aromatic Organics (SW5030/8020)	117	9	SW-11 SW-12 SW-13 SW-14 TB-28
VO1012MB	Volatile Organics (SW5030/8021) primary	115	9	SW-11
VO1013MB	Volatile Organics (SW5030/8021) primary	115	9	SW-12 SW-13 SW-14 TB-28
VO1012MB	Volatile Organics (SW5030/8021) confirmation	115	9	SW-11 SW-12 SW-13 SW-14 TB-28
M471MB	Hg, Pb	129	9	SD-12 SD-13 SD-14

Table B-2d (continued)
QC Sample Cross Reference
METHOD BLANKS

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
M472MB	Metals	129	9	SD-12 SD-13 SD-14
VO1010MB	Volatile Organics (SW8240)	118	9	SD-12 SD-13
VO1011MB2	Volatile Organics (SW8240)	118	9	SD-14
SV1011MB	Semivolatile Organics	125	9	SD-12 SD-13 SD-14

Table B-2e
QC Sample Cross Reference
MATRIX REPLICATE/MATRIX SPIKE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
PH51562MR	Total Petroleum Hydrocarbons	110	9	SD-12
				SD-13
				SD-14
			8	SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
PH51565MS	Total Petroleum Hydrocarbons	109	8	SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
PH51560MR/ PH47080MS	Total Petroleum Hydrocarbons	110	8	SD-2
I51571MR	Total Dissolved Solids	112	8	SW-8
				SW-9
				SW-10

Table B-2e (continued)
QC Sample Cross Reference
MATRIX REPLICATE/MATRIX SPIKE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
I51556MR	Total Dissolved Solids	112	8	SW-7
			3	SW-2
				SW-3
				SW-4
I51558MR	Hardness	114	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
M51558MR/MS	As, Se, Hg, Pb, Metals	105	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
PH1025MS	Total Petroleum Hydrocarbons	105	8	SW-2
				SW-3
				SW-4

Table B-2e (continued)
QC Sample Cross Reference
MATRIX REPLICATE/MATRIX SPIKE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
I51569MR/ I51555MS	Anions	111	9	SW-12
				SW-13
				SW-14
			8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
M50622MR/MS	Metals	108	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
I51615MR	Total Dissolved Solids	113	9	SW-12
				SW-13
				SW-14

Table B-2e (continued)
QC Sample Cross Reference
MATRIX REPLICATE/MATRIX SPIKE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
I51612MR	Hardness	111	9	SW-13 SW-14
I50333MR	Hardness	113	9	SW-12
M51615MR/MS	As, Se, Pb, Hg	107	9	SW-12 SW-13 SW-14
M50332MR/MS	Metals	106	9	SW-12 SW-13 SW-14
PH1027MS	Total Petroleum Hydrocarbons	106	9	SW-14
M51621MR/MS	Metals, Pb	108	9	SD-12 SD-13 SD-14
M52237MR/MS	Hg	109	9	SD-12 SD-13 SD-14
PH51515MS	Total Petroleum Hydrocarbons	110	9	SD-12 SD-13 SD-14

Table B-2f
QC Sample Cross Reference
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
PO51555MS/MSD	Purgeable Aromatic Organics (SW5030/8020)	99	8	SW-1
				SW-2
				SW-3
				SW-4
			3	SW-6
				SW-7
				SW-8
				SW-9
				SW-10
				TB-26
VO51555MS/MSD	Volatile Organics (SW5030/8021)	98	8	SW-1
				SW-2
				SW-3
				SW-4
			3	SW-6
				SW-7
				SW-8
				SW-9
				SW-10
				TB-26
ED51550MS/MSD	Non-halogenated Volatile Organics (SW5030/8015)	101	8	SW-1
				SW-2
				SW-3
				SW-4
				TB-26

Table B-2f (continued)
QC Sample Cross Reference
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
PP51557MS	Pesticides/PCB	102	3	SW-7
				SW-8
				SW-9
				SW-10
SV51555MS/MSD	Semivolatile Organics	103	8	SW-2
				SW-3
				SW-4
			3	SW-7
				SW-8
				SW-9
				SW-10
SV50282MS	Semivolatile Organics	104	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10

Table B-2f (continued)
QC Sample Cross Reference
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

QC Sample ID	Analysis	Page(s)	Applicable Samples	
			Site	Field ID
VO51561MS/MSD	Volatile Organics (SW8240)	100	8	SD-2
				SD-3
				SD-4
				SD-5
			3	SD-7
				SD-8
				SD-9
				SD-10
PO51615MS/MSD	Purgeable Aromatic Organics (SW5030/8020)	99	9	SW-11
				SW-12
				SW-13
				SW-14
				TB-28
VO51609MS/MSD	Volatile Organics (SW5030/8021)	98	9	SW-11
				SW-12
				SW-13
				SW-14
				TB-28
VO51621MS/MSD	Volatile Organics (SW8240)	100	9	SD-12
				SD-13
				SD-14
SV52396MS	Semivolatile Orgenics	104	9	SD-12
				SD-13
				SD-14

SAMPLING TRACKING

TABLES C-1a THROUGH C-4c

Table C-1a

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 3

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			Volatile Organic Compounds (SW8240)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-6	09/28/89	14 days	10/11/89	13 days	14 days	10/11/89	13 days	14 days	NA	NA	14 days	NA	NA
SW-7	09/28/89	14 days	10/11/89	13 days	14 days	10/11/89	13 days	14 days	NA	NA	14 days	NA	NA
SW-8	09/28/89	14 days	10/11/89	13 days	14 days	10/11/89	13 days	14 days	NA	NA	14 days	NA	NA
SW-9	09/28/89	14 days	10/11/89	13 days	14 days	10/11/89	13 days	14 days	NA	NA	14 days	NA	NA
SW-10	09/28/89	14 days	10/12/89	14 days	14 days	10/12/89	14 days	14 days	NA	NA	14 days	NA	NA
TB-26	09/28/89	14 days	10/12/89	14 days	14 days	10/12/89	14 days	14 days	NA	NA	14 days	NA	NA
SD-7	09/28/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	11 days
SD-8	09/28/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	11 days
SD-9	09/28/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	11 days
SD-10	09/28/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	11 days

Table C-1b

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 8

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			Volatile Organic Compounds (SW8240)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-1	09/27/89	14 days	10/11/89	14 days	14 days	10/11/89	14 days	14 days	10/03/89	6 days	14 days	NA	NA
SW-2	09/27/89	14 days	10/11/89	14 days	14 days	10/11/89	14 days	14 days	10/03/89	6 days	14 days	NA	NA
SW-3	09/27/89	14 days	10/11/89	14 days	14 days	10/11/89	14 days	14 days	10/03/89	6 days	14 days	NA	NA
SW-4	09/27/89	14 days	10/11/89	14 days	14 days	10/11/89	14 days	14 days	10/03/89	6 days	14 days	NA	NA
TB-26	09/28/89	14 days	10/12/89	14 days	14 days	10/12/89	14 days	14 days	10/03/89	6 days	14 days	NA	NA
SD-2	09/27/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	12 days
SD-3	09/27/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	12 days
SD-4	09/27/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/09/89	12 days
SD-5	09/27/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/11/89	14 days

Table C-1c

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 9

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021)			Purgeable Aromatic Organics (SW5030/8020)			Non-halogenated Volatile Organics (SW5030/8015)			Volatile Organic Compounds (SW8240)		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-11	09/29/89	14 days	10/12/89	13 days	14 days	10/12/89	13 days	14 days	NA	NA	14 days	NA	NA
SW-12	09/29/89	14 days	10/13/89	14 days	14 days	10/13/89	14 days	14 days	NA	NA	14 days	NA	NA
SW-13	09/29/89	14 days	10/13/89	14 days	14 days	10/13/89	14 days	14 days	NA	NA	14 days	NA	NA
SW-14	09/29/89	14 days	10/13/89	14 days	14 days	10/12/89	13 days	14 days	NA	NA	14 days	NA	NA
TB-28	09/29/89	14 days	10/13/89	14 days	14 days	10/12/89	13 days	14 days	NA	NA	14 days	NA	NA
SD-12	09/29/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/10/89	11 days
SD-13	09/29/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/10/89	11 days
SD-14	09/29/89	14 days	NA	NA	14 days	NA	NA	14 days	NA	NA	14 days	10/11/89	12 days

Table C-2a

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 3

		Semivolatile Organics						Pesticides/PCBs					
Field Sample ID	Sampling Date	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
SW-6	09/28/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SW-7	09/28/89	7 days	10/03/89	5 days	40 days	10/25/89	27 days	7 days	10/04/89	6 days	40 days	10/10/89	12 days
SW-8	09/28/89	7 days	10/03/89	5 days	40 days	10/25/89	27 days	7 days	10/04/89	6 days	40 days	10/10/89	12 days
SW-9	09/28/89	7 days	10/03/89	5 days	40 days	10/25/89	27 days	7 days	10/04/89	6 days	40 days	10/10/89	12 days
SW-10	09/28/89	7 days	10/03/89	5 days	40 days	10/25/89	27 days	7 days	10/04/89	6 days	40 days	10/10/89	12 days
TB-26	09/28/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SD-7	09/28/89	14 days	10/03/89	5 days	40 days	10/23/89	25 days	14 days	NA	NA	40 days	NA	NA
SD-8	09/28/89	14 days	10/03/89	5 days	40 days	10/25/89	27 days	14 days	NA	NA	40 days	NA	NA
SD-9	09/28/89	14 days	10/03/89	5 days	40 days	10/25/89	27 days	14 days	NA	NA	40 days	NA	NA
SD-10	09/28/89	14 days	10/03/89	5 days	40 days	10/25/89	27 days	14 days	NA	NA	40 days	NA	NA

Table C-2b

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 8

Field Sample ID	Sampling Date	Semivolatile Organics						Pesticides/PCBs					
		Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
SW-1	09/27/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SW-2	09/27/89	7 days	10/03/89	6 days	40 days	10/25/89	28 days	7 days	NA	NA	40 days	NA	NA
SW-3	09/27/89	7 days	10/03/89	6 days	40 days	10/25/89	28 days	7 days	NA	NA	40 days	NA	NA
SW-4	09/27/89	7 days	10/03/89	6 days	40 days	10/25/89	28 days	7 days	NA	NA	40 days	NA	NA
TB-26	09/27/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SD-2	09/27/89	14 days	10/03/89	6 days	40 days	10/23/89	26 days	14 days	NA	NA	40 days	NA	NA
SD-3	09/27/89	14 days	10/03/89	6 days	40 days	10/23/89	26 days	14 days	NA	NA	40 days	NA	NA
SD-4	09/27/89	14 days	10/03/89	6 days	40 days	10/23/89	26 days	14 days	NA	NA	40 days	NA	NA
SD-5	09/27/89	14 days	10/03/89	6 days	40 days	10/23/89	26 days	14 days	NA	NA	40 days	NA	NA

Table C-2c

Sample Tracking of Analysis Dates and Required Holding Times
Semivolatile Organic/Pesticides/PCBs Analysis
SITE 9

Field Sample ID	Sampling Date	Semivolatile Organics						Pesticides/PCBs					
		Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time	Extraction Hold Time	Extract Date	Elapsed Time	Analysis Hold Time	Analysis Date	Elasped Time
SW-11	09/29/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SW-12	09/29/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SW-13	09/29/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SW-14	09/29/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
TB-28	09/29/89	7 days	NA	NA	40 days	NA	NA	7 days	NA	NA	40 days	NA	NA
SD-12	09/29/89	14 days	10/11/89	12 days	40 days	10/27/89	28 days	14 days	NA	NA	40 days	NA	NA
SD-13	09/29/89	14 days	10/11/89	12 days	40 days	10/27/89	28 days	14 days	NA	NA	40 days	NA	NA
SD-14	09/29/89	14 days	10/11/89	12 days	40 days	10/31/89	32 days	14 days	NA	NA	40 days	NA	NA

Table C-3a

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 3

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-6	09/28/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SW-7	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
SW-8	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
SW-9	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
SW-10	09/28/89	6 months	11/30/89	63 days	28 days	10/25/89	27 days	28 days	10/26/89	28 days
TB-26	09/28/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SD-7	09/28/89	6 months	11/10/89	43 days	28 days	10/25/89	27 days	28 days	10/13/89	15 days
SD-8	09/28/89	6 months	11/10/89	43 days	28 days	10/25/89	27 days	28 days	10/13/89	15 days
SD-9	09/28/89	6 months	11/10/89	43 days	28 days	10/25/89	27 days	28 days	10/13/89	15 days
SD-10	09/28/89	6 months	11/10/89	43 days	28 days	10/25/89	27 days	28 days	10/13/89	15 days

Table C-3b

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 8

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-1	09/27/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SW-2	09/27/89	6 months	11/30/89	64 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
SW-3	09/27/89	6 months	11/30/89	64 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
SW-4	09/27/89	6 months	11/30/89	64 days	28 days	10/25/89	28 days	28 days	10/25/89	28 days
TB-26	09/27/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SD-2	09/27/89	6 months	11/10/89	44 days	28 days	10/25/89	28 days	28 days	10/09/89	12 days
SD-3	09/27/89	6 months	11/10/89	44 days	28 days	10/25/89	28 days	28 days	10/13/89	16 days
SD-4	09/27/89	6 months	11/10/89	44 days	28 days	10/25/89	28 days	28 days	10/13/89	16 days
SD-5	09/27/89	6 months	11/10/89	44 days	28 days	10/25/89	28 days	28 days	10/13/89	16 days

Table C-3c

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 9

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-11	09/29/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SW-12	09/29/89	6 months	11/30/89	62 days	28 days	NA	NA	28 days	10/26/89	27 days
SW-13	09/29/89	6 months	11/30/89	62 days	28 days	NA	NA	28 days	10/26/89	27 days
SW-14	09/29/89	6 months	11/30/89	62 days	28 days	NA	NA	28 days	10/27/89	28 days
TB-28	09/29/89	6 months	NA	NA	28 days	NA	NA	28 days	NA	NA
SD-12	09/29/89	6 months	12/01/89	63 days	28 days	10/27/89	28 days	28 days	10/13/89	14 days
SD-13	09/29/89	6 months	12/01/89	63 days	28 days	10/27/89	28 days	28 days	10/13/89	14 days
SD-14	09/29/89	6 months	12/01/89	63 days	28 days	10/27/89	28 days	28 days	10/13/89	14 days

Table C-4a

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 3

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-6	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SW-7	09/28/89	7 days	10/04/89	6 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
SW-8	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
SW-9	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
SW-10	09/28/89	7 days	10/05/89	7 days	2 days	09/29/89	1 day	6 months	11/08/89	41 days
TB-26	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-7	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-8	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-9	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-10	09/28/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4b

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 8

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-1	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SW-2	09/27/89	7 days	10/04/89	7 days	2 days	09/29/89	2 days	6 months	11/08/89	42 days
SW-3	09/27/89	7 days	10/04/89	7 days	2 days	09/29/89	2 days	6 months	11/08/89	42 days
SW-4	09/27/89	7 days	10/04/89	7 days	2 days	09/29/89	2 days	6 months	11/08/89	42 days
TB-26	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-2	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-3	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-4	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-5	09/27/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

Table C-4c

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 9

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-11	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SW-12	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	1 day	6 months	11/10/89	42 days
SW-13	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	1 day	6 months	11/13/89	45 days
SW-14	09/29/89	7 days	10/06/89	7 days	2 days	09/29/89	1 day	6 months	11/13/89	45 days
TB-26	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-12	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-13	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA
SD-14	09/29/89	7 days	NA	NA	2 days	NA	NA	6 months	NA	NA

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

ANALYTICAL RESULTS FOR

ENVIRONMENTAL SAMPLES

TABLES D-1a THROUGH D-8c

Table D-1a

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50	< 2.50	< 2.50
Chloroethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10.0	NF	NF	NF	NF
Chloroform	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	1.2/3.6	1.0/2.4	1.0/2.8	0.9/2.4
Chloromethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.00	< 2.00	< 2.00	< 2.00
Dichlorodifluoromethane	2.0	< 2.00	< 2.00	< 2.00	< 2.00
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Trichloroethene	1	< 1.00	< 1.00	< 1.00	< 1.00

NF = Not found due to an analytical problem

Table D-1a (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
Surrogates:					
Bromochloromethane	62-140	119/102	115/105	115/92	149oc/93
1-chloro-2-bromopropane	73-127	99/105	100/104	94/100	113/101
1,4-dichloropropane	64-136	104/124	102/119	100/117	102/123

Table D-1b

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50	< 2.50
Chloroethane	0.8	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10.0	NF	NF	NF
Chloroform	0.4	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	1.6/2.9	1.4/3.2	1.5/2.6
Chloromethane	0.8	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.00	< 2.00	< 2.00
Dichlorodifluoromethane	2.0	< 2.00	< 2.00	< 2.00
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80
Trichloroethene	1	< 1.00	< 1.00	< 1.00

NF = Not found due to an analytical problem.

Table D-1b (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
Surrogates:				
Bromochlomethane	62-140	115/97	109/88	117/84
1-Chloro-2-bromopropane	73-127	107/98	106/91	104/98
1,4-Dichloropropane	64-136	106/114	108/106	114/141oc

Table D-1c

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9 Surface Waters

Field Sample ID		SW-12	SW-13	SW-14
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	92/98	74/84	42/56
1,1-Dichloroethane	0.5	3.3/5.0	3.0/4.7	2.5/3.9
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50	< 2.50
Chloroethane	0.8	< 0.80	< 0.80	< 0.80
2-chloroetylvinyl ether	10.0	NF	NF	NF
Chloroform	0.4	< 0.40	0.59/0.80	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	4.7/8.9	4.3/8.6	< 0.80
Chloromethane	0.8	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.00	< 2.00	< 2.00
Dichlorodifluoromethane	2.0	< 2.00	< 2.00	< 2.00
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80
Trichloroethene	1.0	3.6/2.2	2.7/1.9	1.5/1.2

NF = Not found due to an analytical problem

Table D-1c (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9 Surface Waters

Field Sample ID		SW-12	SW-13	SW-14
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
Surrogates:				
Bromochloromethane	62-140	103/126	100/123	104/103
1-Chloro-2bromopropane	73-127	102/129	97/131oc	96/108
1,4-Dichloropropane	64-136	92/150oc	91/154oc	89/217oc

Table D-1d

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		TB-26	TB-28
Sample Matrix		Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50
Chloroethane	0.8	< 0.80	< 0.80
2-chloroethylvinyl ether	10.0	NF	NF
Chloroform	0.4	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50
Methylene Chloride	0.8	1.0/2.3	< 0.80
Chloromethane	0.8	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.00	< 2.00
Dichlorodifluoromethane	2.0	< 2.00	< 2.00
Chlorodibromomethane	0.4	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80
Trichloroethene	1	< 1.00	< 1.00

NF = Not found due to an analytical problem

Table D-1d (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		TB-26	TB-28
Sample Matrix		Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30
Surrogates:			
Bromochloromethane	62-140	96/95	90/103
1-hloro-2bromopropane	73-127	79/95	89/101
1,4-Dichloropropane	64-136	79/113	80/103

Table D-1e

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Field Blanks

Field Sample ID		SW-6	SW-1	SW-11
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40
1,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40
1,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50
1,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50	< 2.50
Chloroethane	0.8	< 0.80	< 0.80	< 0.80
2-chloroethylvinyl ether	10.0	NF	NF	NF
Chloroform	0.4	< 0.40	< 0.40	< 0.40
1,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80
trans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40
trans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40
cis-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50
Methylene Chloride	0.8	3.7/4.1	3.9/5.4	4.7/3.3
Chloromethane	0.8	< 0.80	< 0.80	< 0.80
Bromomethane	0.8	< 0.80	< 0.80	< 0.80
Bromoform	0.5	< 0.50	< 0.50	< 0.50
Bromodichloromethane	0.5	< 0.50	< 0.50	< 0.50
Fluorotrichloromethane	2.0	< 2.00	< 2.00	< 2.00
Dichlorodifluoromethane	2.0	< 2.00	< 2.00	< 2.00
Chlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40
Tetrachloroethene	0.8	< 0.80	< 0.80	< 0.80
Trichloroethene	1	< 1.00	< 1.00	< 1.00

NF = Not found due to an analytical problem

Table D-1e (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Field Blanks

Field Sample ID		SW-6	SW-1	SW-11
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30
Surrogates:				
Bromochloromethane	62-140	119/78	135/96	114/94
1-hloro-2-bromopropane	73-127	101/87	105/95	110/94
1,4-Dichloropropane	64-136	108/123	106/81	96/96

Table D-2a

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	< 0.30	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	96	98	98	97/87

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2b

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.30	< 0.30	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	< 0.30
Surrogate:				
a,a,a-Trifluorotoluene	69-129	98	101	101

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2c

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 9 Surface Waters

Field Sample ID		SW-12	SW-13	SW-14
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70
1,4-Dichlorobenzene	0.7	< 0.70	< 0.70	< 0.70
Benzene (See Note)	0.3	< 0.30	< 0.30	< 0.30
Total Xylenes	1.0	< 1.0	< 1.0	< 1.0
Toluene	0.3	< 0.30	< 0.30	< 0.30
Ethylbenzene	0.3	< 0.30	< 0.30	< 0.30
Surrogate:				
a,a,a-Trifluorotoluene	69-129	101/94	93/98	97

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2d

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
TRIP BLANKS

Field Sample ID		TB-26	TB-28
Sample Matrix		Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30
Surrogates:			
a,a,a-Trifluorotoluene	69-149	91/96	97

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2e

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Field Blanks

Field Sample ID		SW-6	SW-1	SW-11
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30
Surrogates:				
a,a,a-Trifluorotoluene	69-129	100	102	100

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-3a

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 3 Sediments

Field Sample ID		SD-7	SD-8	SD-9	SD-10
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		18	27	34	28
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chloromethane	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Bromomethane	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Vinyl Chloride	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Chloroethane	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Methylene Chloride	0.005	0.011	0.0096	0.018	0.0097
Acetone	0.010	0.016	0.026	0.018	0.018
Carbon Disulfide	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,1-Dichloroethene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,1-Dichloroethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
trans-1,2-Dichloroethene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Chloroform	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,2-Dichloroethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
2-Butanone	0.010	< 0.012	< 0.014	< 0.015	< 0.014
1,1,1-Trichloroethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Carbon Tetrachloride	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Vinyl Acetate	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Bromodichloromethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,2-Dichloropropane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
trans-1,3-Dichloropropene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Trichloroethene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Dibromochloromethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,1,2-Trichloroethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Benzene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069

* Compound present below measurable detection limit.

Table D-3a (continued)

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 3 Sediments

Field Sample ID		SD-7	SD-8	SD-9	SD-10
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		18	27	34	28
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
cis-1,3-Dichloropropene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
2-Chloroethylvinyl ether	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Bromoform	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
4-Methyl-2-Pentanone	0.010	< 0.012	< 0.014	< 0.015	< 0.014
2-Hexanone	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Tetrachloroethene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,1,2,2-Tetrachloroethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Toluene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Chlorobenzene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Ethylbenzene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Styrene	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Total Xylenes	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
1,2-Dichlorobenzene	0.010	< 0.012	< 0.014	< 0.015	< 0.014
1,3-Dichlorobenzene	0.010	< 0.012	< 0.014	< 0.015	< 0.014
1,4-Dichlorobenzene	0.010	< 0.012	< 0.014	< 0.015	< 0.014
Trichlorofluoromethane	0.005	< 0.0061	< 0.0068	< 0.0076	< 0.0069
Surrogates:					
1,2-Dichloroethane-d4	70-121	107	91	112	84
Toluene-d8	81-117	116	94	111	88
4-Bromofluorobenzene	74-121	107	82	120	92

Table D-3b

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 8 Sediments

Field Sample ID		SD-2	SD-3	SD-4	SD-5
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		34	33	31	42
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chloromethane	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Bromomethane	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Vinyl Chloride	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Chloroethane	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Methylene Chloride	0.005	0.012	0.0075	0.010	< 0.0086
Acetone	0.010	0.079	0.018	0.025	0.050
Carbon Disulfide	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,1-Dichloroethene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,1-Dichloroethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
trans-1,2-Dichloroethene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Chloroform	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086*
1,2-Dichloroethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
2-Butanone	0.010	< 0.015	< 0.015	< 0.014	< 0.017
1,1,1-Trichloroethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Carbon Tetrachloride	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Vinyl Acetate	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Bromodichloromethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,2-Dichloropropane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
trans-1,3-Dichloropropene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Trichloroethene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Dibromochloromethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,1,2-Trichloroethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Benzene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086

* Compound present below measurable detection limit.

Table D-3b (continued)

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 8 Sediments

Field Sample ID		SD-2	SD-3	SD-4	SD-5
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		34	33	31	42
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
cis-1,3-Dichloropropene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
2-Chloroethylvinyl ether	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Bromoform	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
4-Methyl-2-Pentanone	0.010	< 0.015	< 0.015	< 0.014	< 0.017
2-Hexanone	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Tetrachloroethene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,1,2,2-Tetrachloroethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Toluene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Chlorobenzene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Ethylbenzene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Styrene	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Total Xylenes	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
1,2-Dichlorobenzene	0.010	< 0.015	< 0.015	< 0.014	< 0.017
1,3-Dichlorobenzene	0.010	< 0.015	< 0.015	< 0.014	< 0.017
1,4-Dichlorobenzene	0.010	< 0.015	< 0.015	< 0.014	< 0.017
Trichlorofluoromethane	0.005	< 0.0076	< 0.0075	< 0.0072	< 0.0086
Surrogates:					
1,2-Dichloroethane-d4	70-121	100	92	98	109
Toluene-d8	81-117	97	103	106	106
4-Bromofluorobenzene	74-121	90	88	93	88

* Compound present below measurable detection limit.

Table D-3c

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 9 Sediments

Field Sample ID		SD-12	SD-13	SD-14
Sample Matrix		Sediment	Sediment	Sediment
Percent Moisture (%)		72	48	75
Compound	MDL (mg/Kg) Wet Wt. Control Limits	Results (mg/Kg) Dry Wt. Surrogate % Recovery	Results (mg/Kg) Dry Wt. Surrogate % Recovery	Results (mg/Kg) Dry Wt. Surrogate % Recovery
Chloromethane	0.010	< 0.036	< 0.019	< 0.040
Bromomethane	0.010	< 0.036	< 0.019	< 0.040
Vinyl Chloride	0.010	< 0.036	< 0.019	< 0.040
Chloroethane	0.010	< 0.036	< 0.019	< 0.040
Methylene Chloride	0.005	0.036	0.019	< 0.020
Acetone	0.010	0.143	0.042	0.076
Carbon Disulfide	0.005	< 0.018	< 0.010	< 0.020
1,1-Dichloroethene	0.005	< 0.018	< 0.010	< 0.020
1,1-Dichloroethane	0.005	0.089	0.023	< 0.020*
trans-1,2-Dichloroethene	0.005	< 0.018	< 0.010	< 0.020
Chloroform	0.005	< 0.018	< 0.010	< 0.020
1,2-Dichloroethane	0.005	< 0.018	< 0.010	< 0.020
2-Butanone	0.010	< 0.036	< 0.019	< 0.040
1,1,1-Trichloroethane	0.005	< 0.018	< 0.010	< 0.020
Carbon Tetrachloride	0.005	< 0.018	< 0.010	< 0.020
Vinyl Acetate	0.010	< 0.036	< 0.019	< 0.040
Bromodichloromethane	0.005	< 0.018	< 0.010	< 0.020
1,2-Dichloropropane	0.005	< 0.018	< 0.010	< 0.020
trans-1,3-Dichloropropene	0.005	< 0.018	< 0.010	< 0.020
Trichloroethene	0.005	< 0.018	< 0.010	< 0.020
Dibromochloromethane	0.005	< 0.018	< 0.010	< 0.020
1,1,2-Trichloroethane	0.005	< 0.018	< 0.010	< 0.020
Benzene	0.005	< 0.018	< 0.010	< 0.020

* Compound present below measurable detection limit.

Table D-3c (continued)

Organic Analysis Results: Volatile Organic Compounds (SW8240)
SITE 9 Sediments

Field Sample ID		SD-12	SD-13	SD-14
Sample Matrix		Sediment	Sediment	Sediment
Percent Moisture (%)		72	48	75
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
cis-1,3-Dichloropropene	0.005	< 0.018	< 0.010	< 0.020
2-Chloroethylvinyl ether	0.010	< 0.036	< 0.019	< 0.040
Bromoform	0.005	< 0.018	< 0.010	< 0.020
4-Methyl-2-Pentanone	0.010	< 0.036	< 0.019	< 0.040
2-Hexanone	0.010	< 0.036	< 0.019	< 0.040
Tetrachloroethene	0.005	< 0.018	< 0.010	< 0.020
1,1,2,2-Tetrachloroethane	0.005	< 0.018	< 0.010	< 0.020
Toluene	0.005	< 0.018	< 0.010	< 0.020
Chlorobenzene	0.005	< 0.018	< 0.010	< 0.020
Ethylbenzene	0.005	< 0.018	< 0.010	< 0.020
Styrene	0.005	< 0.018	< 0.010	< 0.020
Total Xylenes	0.005	< 0.018	< 0.010	< 0.020
1,2-Dichlorobenzene	0.010	< 0.036	< 0.019	< 0.040
1,3-Dichlorobenzene	0.010	< 0.036	< 0.019	< 0.040
1,4-Dichlorobenzene	0.010	< 0.036	< 0.019	< 0.040
Trichlorofluoromethane	0.005	< 0.018	< 0.010	<0.020
Surrogates:				
1,2-Dichloroethane-d4	70-121	117	110	103
Toluene-d8	81-117	104	103	106
4-Bromofluorobenzene	74-121	87	86	96

* Compound present below measurable detection limit.

Table D-4a

Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
SITE 8 Surface waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
Parameter	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Ethanol	100	< 100	< 100	< 100
Diethyl Ether	10	< 10	< 10	< 10
Methyl Ethyl Ketone	10	< 10	< 10	< 10
Methyl Isobutyl Ketone	10	< 10	< 10	< 10

Table D-4b

Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
TRIP BLANKS

Field Sample ID	TB-26
Sample Matrix	Aqueous

Parameter	MDL (ug/L)	Results (ug/L)
Ethanol	100	< 100
Diethyl Ether	10	< 10
Methyl Ethyl Ketone	10	< 10
Methyl Isobutyl Ketone	10	< 10

Table D-4c

Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
FIELD BLANKS

Field Sample ID	SW-1
Sample Matrix	Aqueous

Parameter	MDL (ug/L)	Results (ug/L)
Ethanol	100	< 100
Diethyl Ether	10	< 10
Methyl Ethyl Ketone	10	< 10
Methyl Isobutyl Ketone	10	< 10

Table D-5
Pesticides and PCBs Analysis Results
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Aldrin	0.025	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.025	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.20	< 0.50	< 0.50	< 0.50	< 0.50
4,4'-DDD	0.05	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDE	0.05	< 0.10	< 0.10	< 0.10	< 0.10
4,4'-DDT	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dieldrin	0.05	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan I	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	< 0.10	< 0.10	< 0.10	< 0.10
Endosulfan sulfate	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Endrin	0.05	< 0.10	< 0.10	< 0.10	< 0.10
Endrin aldehyde	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor	0.025	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	1.00	< 1.00	< 1.00	< 1.00	< 1.00
Methoxychlor	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1016	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1221	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1232	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1242	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1248	0.50	< 0.50	< 0.50	< 0.50	< 0.50
PCB-1254	0.50	< 1.00	< 1.00	< 1.00	< 1.00
PCB-1260	0.50	< 1.00	< 1.00	< 1.00	< 1.00
Surrogates:					
Dibutylchlorendate	25-154	108	96	109	180oc

Table D-6a
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10	< 10	< 10	< 10
1,3-Dichlorobenzene	10	< 10	< 10	< 10	< 10
1,4-Dichlorobenzene	10	< 10	< 10	< 10	< 10
1,2-Dichlorobenzene	10	< 10	< 10	< 10	< 10
bis(2-chloroisopropyl)ether	10	< 10	< 10	< 10	< 10
N-Nitroso-di-propylamine	10	< 10	< 10	< 10	< 10
Hexachloroethane	10	< 10	< 10	< 10	< 10
Nitrobenzene	10	< 10	< 10	< 10	< 10
Isophorone	10	< 10	< 10	< 10	< 10
bis(2-chloroethoxy)methane	10	< 10	< 10	< 10	< 10
1,2,4-Trichlorobenzene	10	< 10	< 10	< 10	< 10
Naphthalene	10	< 10	< 10	< 10	< 10
Hexachlorobutadiene	10	< 10	< 10	< 10	< 10
Hexachlorocyclopentadiene	10	< 10	< 10	< 10	< 10
2-Chloronaphthalene	10	< 10	< 10	< 10	< 10
Dimethyl phthalate	10	< 10	< 10	< 10	< 10
Acenaphthylene	10	< 10	< 10	< 10	< 10
Fluorene	10	< 10	< 10	< 10	< 10
Acenaphthene	10	< 10	< 10	< 10	< 10
2,4-Dinitrotoluene	10	< 10	< 10	< 10	< 10
2,6-Dinitrotoluene	10	< 10	< 10	< 10	< 10
Diethylphthalate	10	< 10	< 10	< 10	< 10
4-Chlorophenyl phenyl ether	10	< 10	< 10	< 10	< 10
N-Nitrosodiphenylamine	10	< 10	< 10	< 10	< 10
4-Bromophenyl phenyl ether	10	< 10	< 10	< 10	< 10

Table D-6a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	< 10	< 10	< 10	< 10
Phenanthrene	10	< 10	< 10	< 10	< 10
Anthracene	10	< 10	< 10	< 10	< 10
Di-n-Butyl phthalate	10	< 10*	< 10	< 10	< 10
Fluoranthene	10	< 10	< 10	< 10	< 10
Benzidine	50	< 50	< 50	< 50	< 50
Pyrene	10	< 10	< 10	< 10	< 10
Butyl benzyl phthalate	10	< 10*	< 10	< 10	< 10
3,3'-Dichlorobenzidine	20	< 20	< 20	< 20	< 20
Benzo(a)anthracene	10	< 10	< 10	< 10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10*	< 10*	< 10*	< 10*
Chrysene	10	< 10	< 10	< 10	< 10
Di-n-octyl phthalate	10	< 10	< 10	< 10	< 10
Benzo(b)fluoranthene	10	< 10	< 10	< 10	< 10
Benzo(k)fluoranthene	10	< 10	< 10	< 10	< 10
Benzo(a)pyrene	10	< 10	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10	< 10
Benzo(g,h,i)perylene	10	< 10	< 10	< 10	< 10
Phenol	10	< 10	< 10	< 10	< 10
2-Chlorophenol	10	< 10	< 10	< 10	< 10
2-Nitrophenol	10	< 10	< 10	< 10	< 10
2,4-Dimethyphenol	10	< 10	< 10	< 10	< 10
2,4-Dichlorophenol	10	< 10	< 10	< 10	< 10

Table D-6a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Surface Waters

Field Sample ID		SW-7	SW-8	SW-9	SW-10
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10	< 10	< 10	< 10
2,4,6-Trichlorophenol	10	< 10	< 10	< 10	< 10
2,4-Dinitrophenol	50	< 50	< 50	< 50	< 50
4-Nitrophenol	50	< 50	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	50	< 50	< 50	< 50	< 50
Pentachlorophenol	50	< 50	< 50	< 50	< 50
Benzyl alcohol	10	< 10	< 10	< 10	< 10
2-Methylphenol	10	< 10	< 10	< 10	< 10
4-Methylphenol	10	< 10	< 10	< 10	< 10
Benzoic acid	50	< 50	< 50	< 50	< 50
4-Chloroaniline	10	< 10	< 10	< 10	< 10
2-Methylnaphthalene	10	< 10	< 10	< 10	< 10
2,4,5-Trichlorophenol	50	< 50	< 50	< 50	< 50
2-Nitroaniline	50	< 50	< 50	< 50	< 50
3-Nitroaniline	50	< 50	< 50	< 50	< 50
Dibenzofuran	10	< 10	< 10	< 10	< 10
4-Nitroaniline	50	< 50	< 50	< 50	< 50
Surrogates:					
Nitrobenzene-d5	35-114	72	65	81	73
2-Fluorobiphenyl	43-116	81	71	83	81
Terphenyl-d14	33-141	86	77	84	81
2-Fluorophenol	10-94	63	42	48	59
Phenol-d5	10-94	50	33	32	48
2,4,6-Tribromophenol	10-123	32	46	48	80

* Compound present below measurable detection limit.

Table D-6b
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Sediments

Field Sample ID		SD-7	SD-8	SD-9	SD-10
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		18	27	34	28
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	0.33	< 0.450	< 0.450	< 0.500	< 0.490
1,3-Dichlorobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
1,4-Dichlorobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
1,2-Dichlorobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
bis(2-chloroisopropyl)ether	0.33	< 0.450	< 0.450	< 0.500	< 0.490
N-Nitroso-di-propylamine	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Hexachloroethane	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Nitrobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Isophorone	0.33	< 0.450	< 0.450	< 0.500	< 0.490
bis(2-chloroethoxy)methane	0.33	< 0.450	< 0.450	< 0.500	< 0.490
1,2,4-Trichlorobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Naphthalene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Hexachlorobutadiene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Hexachlorocyclopentadiene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2-Chloronaphthalene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Dimethyl phthalate	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Acenaphthylene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Fluorene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Acenaphthene	0.33	< 0.450	< 0.450	< 0.500*	< 0.490
2,4-Dinitrotoluene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,6-Dinitrotoluene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Diethylphthalate	0.33	< 0.450	< 0.450	< 0.500	< 0.490
4-Chlorophenyl phenyl ether	0.33	< 0.450	< 0.450	< 0.500	< 0.490
N-Nitrosodiphenylamine	0.33	< 0.450	< 0.450	< 0.500	< 0.490
4-Bromophenyl phenyl ether	0.33	< 0.450	< 0.450	< 0.500	< 0.490

Table D-6b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Sediments

Field Sample ID		SD-7	SD-8	SD-9	SD-10
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		18	27	34	28
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Phenanthrene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Anthracene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Di-n-Butyl phthalate	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490*
Fluoranthene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490*
Benzidine	1.60	< 2.000	< 2.200	< 2.400	< 2.200
Pyrene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Butyl benzyl phthalate	0.33	< 0.450	< 0.450	< 0.500	< 0.490
3,3'-Dichlorobenzidine	0.66	< 0.800	< 0.900	< 1.000	< 0.920
Benzo(a)anthracene	0.33	< 0.450*	< 0.450	< 0.500*	< 0.490
Bis(2-ethylhexyl)phthalate	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490*
Chrysene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Di-n-octyl phthalate	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Benzo(b)fluoranthene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Benzo(k)fluoranthene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Benzo(a)pyrene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Indeno(1,2,3-cd)pyrene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Dibenzo(a,h)anthracene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Benzo(g,h,i)perylene	0.33	< 0.450*	< 0.450*	< 0.500*	< 0.490
Phenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2-Chlorophenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2-Nitrophenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,4-Dimethyphenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,4-Dichlorophenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490

Table D-6b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 3 Sediments

Field Sample ID		SD-7	SD-8	SD-9	SD-10
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		18	27	34	28
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,4,6-Trichlorophenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,4-Dinitrophenol	1.60	< 2.000	< 2.200	< 2.400	< 2.200
4-Nitrophenol	1.60	< 2.000	< 2.200	< 2.400	< 2.200
4,6-Dinitro-2-methylphenol	1.60	< 2.000	< 2.200	< 2.400	< 2.200
Pentachlorophenol	1.60	< 2.000	< 2.200	< 2.400	< 2.200
Benzyl alcohol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2-Methylphenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
4-Methylphenol	0.33	< 0.450	< 0.450	< 0.500	< 0.490
Benzoic acid	1.60	< 2.000	< 2.200	< 2.400	< 2.200
4-Chloroaniline	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2-Methylnaphthalene	0.33	< 0.450	< 0.450	< 0.500	< 0.490
2,4,5-Trichlorophenol	1.60	< 2.000	< 2.200	< 2.400	< 2.200
2-Nitroaniline	1.60	< 2.000	< 2.200	< 2.400	< 2.200
3-Nitroaniline	1.60	< 2.000	< 2.200	< 2.400	< 2.200
Dibenzofuran	0.33	< 0.450	< 0.450	< 0.500	< 0.490
4-Nitroaniline	1.60	< 2.000	< 2.200	< 2.400	< 2.200
Surrogates:					
Nitrobenzene-d5	23-120	88	88	80	68
2-Fluorobiphenyl	30-115	104	98	96	86
Terphenyl-d14	18-137	76	88	80	74
2-Fluorophenol	24-113	96	90	80	73
Phenol-d5	24-113	118oc	107	87	74
2,4,6-Tribromophenol	19-122	42	81	68	61

* Compound present below measurable detection limits.

Table D-6c
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10	< 10	< 10
1,3-Dichlorobenzene	10	< 10	< 10	< 10
1,4-Dichlorobenzene	10	< 10	< 10	< 10
1,2-Dichlorobenzene	10	< 10	< 10	< 10
bis(2-chloroisopropyl)ether	10	< 10	< 10	< 10
N-Nitroso-di-propylamine	10	< 10	< 10	< 10
Hexachloroethane	10	< 10	< 10	< 10
Nitrobenzene	10	< 10	< 10	< 10
Isophorone	10	< 10	< 10	< 10
bis(2-chloroethoxy)methane	10	< 10	< 10	< 10
1,2,4-Trichlorobenzene	10	< 10	< 10	< 10
Naphthalene	10	< 10	< 10	< 10
Hexachlorobutadiene	10	< 10	< 10	< 10
Hexachlorocyclopentadiene	10	< 10	< 10	< 10
2-Chloronaphthalene	10	< 10	< 10	< 10
Dimethyl phthalate	10	< 10	< 10	< 10
Acenaphthylene	10	< 10	< 10	< 10
Fluorene	10	< 10	< 10	< 10
Acenaphthene	10	< 10	< 10	< 10
2,4-Dinitrotoluene	10	< 10	< 10	< 10
2,6-Dinitrotoluene	10	< 10	< 10	< 10
Diethylphthalate	10	< 10	< 10	< 10
4-Chlorophenyl phenyl ether	10	< 10	< 10	< 10
N-Nitrosodiphenylamine	10	< 10	< 10	< 10
4-Bromophenyl phenyl ether	10	< 10	< 10	< 10

Table D-6c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	10	< 10	< 10	< 10
Phenanthrene	10	< 10	< 10	< 10
Anthracene	10	< 10	< 10	< 10
Di-n-Butyl phthalate	10	< 10*	< 10*	< 10*
Fluoranthene	10	< 10	< 10	< 10
Benzidine	50	< 50	< 50	< 50
Pyrene	10	< 10	< 10	< 10
Butyl benzyl phthalate	10	< 10	< 10	< 10
3,3'-Dichlorobenzidine	20	< 20	< 20	< 20
Benzo(a)anthracene	10	< 10	< 10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10*	< 10*	< 10*
Chrysene	10	< 10	< 10	< 10
Di-n-octyl phthalate	10	< 10	< 10	< 10
Benzo(b)fluoranthene	10	< 10	< 10	< 10
Benzo(k)fluoranthene	10	< 10	< 10	< 10
Benzo(a)pyrene	10	< 10	< 10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10
Benzo(g,h,i)perylene	10	< 10	< 10	< 10
Phenol	10	< 10	< 10	< 10
2-Chlorophenol	10	< 10	< 10	< 10
2-Nitrophenol	10	< 10	< 10	< 10
2,4-Dimethyphenol	10	< 10	< 10	< 10
2,4-Dichlorophenol	10	< 10	< 10	< 10

Table D-6c (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Surface Waters

Field Sample ID		SW-2	SW-3	SW-4
Sample Matrix		Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10	< 10	< 10
2,4,6-Trichlorophenol	10	< 10	< 10	< 10
2,4-Dinitrophenol	50	< 50	< 50	< 50
4-Nitrophenol	50	< 50	< 50	< 50
4,6-Dinitro-2-methylphenol	50	< 50	< 50	< 50
Pentachlorophenol	50	< 50	< 50	< 50
Benzyl alcohol	10	< 10	< 10	< 10
2-Methylphenol	10	< 10	< 10	< 10
4-Methylphenol	10	< 10	< 10	< 10
Benzoic acid	50	< 50	< 50	< 50
4-Chloroaniline	10	< 10	< 10	< 10
2-Methylnaphthalene	10	< 10	< 10	< 10
2,4,5-Trichlorophenol	50	< 50	< 50	< 50
2-Nitroaniline	50	< 50	< 50	< 50
3-Nitroaniline	50	< 50	< 50	< 50
Dibenzofuran	10	< 10	< 10	< 10
4-Nitroaniline	50	< 50	< 50	< 50
Surrogates:				
Nitrobenzene-d5	35-114	70	89	95
2-Fluorobiphenyl	43-116	66	78	102
Terphenyl-d14	33-141	60	64	92
2-Fluorophenol	10-94	41	40	46
Phenol-d5	10-94	38	32	37
2,4,6-Tribromophenol	10-123	70	70	70

* Compound present below measurable detection limit.

Table D-6d
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Sediment

Field Sample ID		SD-2	SD-3	SD-4	SD-5
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		34	33	31	42
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	0.33	< 0.500	< 0.490	< 0.480	< 0.570
1,3-Dichlorobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
1,4-Dichlorobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
1,2-Dichlorobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
bis(2-chloroisopropyl)ether	0.33	< 0.500	< 0.490	< 0.480	< 0.570
N-Nitroso-di-propylamine	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Hexachloroethane	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Nitrobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Isophorone	0.33	< 0.500	< 0.490	< 0.480	< 0.570
bis(2-chloroethoxy)methane	0.33	< 0.500	< 0.490	< 0.480	< 0.570
1,2,4-Trichlorobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Naphthalene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Hexachlorobutadiene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Hexachlorocyclopentadiene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2-Chloronaphthalene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Dimethyl phthalate	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Acenaphthylene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Fluorene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Acenaphthene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4-Dinitrotoluene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,6-Dinitrotoluene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Diethylphthalate	0.33	< 0.500	< 0.490	< 0.480	< 0.570
4-Chlorophenyl phenyl ether	0.33	< 0.500	< 0.490	< 0.480	< 0.570
N-Nitrosodiphenylamine	0.33	< 0.500	< 0.490	< 0.480	< 0.570
4-Bromophenyl phenyl ether	0.33	< 0.500	< 0.490	< 0.480	< 0.570

Table D-6d (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Sediments

Field Sample ID		SD-2	SD-3	SD-4	SD-5
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		34	33	31	42
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Phenanthrene	0.33	< 0.500	< 0.490	< 0.480	< 0.570*
Anthracene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Di-n-Butyl phthalate	0.33	< 0.500*	< 0.490*	< 0.480*	< 0.570*
Fluoranthene	0.33	< 0.500*	< 0.490*	< 0.480*	< 0.570*
Benzidine	1.60	< 2.400	< 2.400	< 2.300	< 2.800
Pyrene	0.33	< 0.500*	< 0.490*	< 0.480*	< 0.570*
Butyl benzyl phthalate	0.33	< 0.500	< 0.490	< 0.480	< 0.570
3,3'-Dichlorobenzidine	0.66	< 1.000	< 0.980	< 0.960	< 1.100
Benzo(a)anthracene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Bis(2-ethylhexyl)phthalate	0.33	< 0.500*	< 0.490*	< 0.480*	< 0.570*
Chrysene	0.33	< 0.500	< 0.490	< 0.480	< 0.570*
Di-n-octyl phthalate	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Benzo(b)fluoranthene	0.33	< 0.500	< 0.490*	< 0.480*	< 0.570*
Benzo(k)fluoranthene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Benzo(a)pyrene	0.33	< 0.500	< 0.490	< 0.480	< 0.570*
Indeno(1,2,3-cd)pyrene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Dibenzo(a,h)anthracene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Benzo(g,h,i)perylene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Phenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2-Chlorophenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2-Nitrophenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4-Dimethyphenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4-Dichlorophenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570

Table D-6d (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 8 Sediments

Field Sample ID		SD-2	SD-3	SD-4	SD-5
Sample Matrix		Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)		34	33	31	42
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4,6-Trichlorophenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4-Dinitrophenol	1.60	< 2.400	< 2.400	< 2.300	< 2.800
4-Nitrophenol	1.60	< 2.400	< 2.400	< 2.300	< 2.800
4,6-Dinitro-2-methylphenol	1.60	< 2.400	< 2.400	< 2.300	< 2.800
Pentachlorophenol	1.60	< 2.400	< 2.400	< 2.300	< 2.800
Benzyl alcohol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2-Methylphenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
4-Methylphenol	0.33	< 0.500	< 0.490	< 0.480	< 0.570
Benzoic acid	1.60	< 2.400	< 2.400	< 2.300	< 2.800
4-Chloroaniline	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2-Methylnaphthalene	0.33	< 0.500	< 0.490	< 0.480	< 0.570
2,4,5-Trichlorophenol	1.60	< 2.400	< 2.400	< 2.300	< 2.800
2-Nitroaniline	1.60	< 2.400	< 2.400	< 2.300	< 2.800
3-Nitroaniline	1.60	< 2.400	< 2.400	< 2.300	< 2.800
Dibenzofuran	0.33	< 0.500	< 0.490	< 0.480	< 0.570
4-Nitroaniline	1.60	< 2.400	< 2.400	< 2.300	< 2.800
Surrogates:					
Nitrobenzene-d5	23-120	30	76	52	78
2-Fluorobiphenyl	30-115	44	90	60	86
Terphenyl-d14	18-137	42	76	50	72
2-Fluorophenol	24-113	33	84	63	81
Phenol-d5	24-113	46	95	75	100
2,4,6-Tribromophenol	19-122	18oc	62	42	46

* Compound present below measurable detection limits.

Table D-6e
Organic Analysis Results: Semivolatile Organic Compounds
Site 9 Sediment

Field Sample ID		SD-12	SD-13	SD-14
Sample Matrix		Sediment	Sediment	Sediment
Percent Moisture (%)		72	48	75
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	0.33	< 1.200	< 0.640	< 1.300
1,3-Dichlorobenzene	0.33	< 1.200	< 0.640	< 1.300
1,4-Dichlorobenzene	0.33	< 1.200	< 0.640	< 1.300
1,2-Dichlorobenzene	0.33	< 1.200	< 0.640	< 1.300
bis(2-chloroisopropyl)ether	0.33	< 1.200	< 0.640	< 1.300
N-Nitroso-di-propylamine	0.33	< 1.200	< 0.640	< 1.300
Hexachloroethane	0.33	< 1.200	< 0.640	< 1.300
Nitrobenzene	0.33	< 1.200	< 0.640	< 1.300
Isophorone	0.33	< 1.200	< 0.640	< 1.300
bis(2-chloroethoxy)methane	0.33	< 1.200	< 0.640	< 1.300
1,2,4-Trichlorobenzene	0.33	< 1.200	< 0.640	< 1.300
Naphthalene	0.33	< 1.200	< 0.640	< 1.300
Hexachlorobutadiene	0.33	< 1.200	< 0.640	< 1.300
Hexachlorocyclopentadiene	0.33	< 1.200	< 0.640	< 1.300
2-Chloronaphthalene	0.33	< 1.200	< 0.640	< 1.300
Dimethyl phthalate	0.33	< 1.200	< 0.640	< 1.300
Acenaphthylene	0.33	< 1.200	< 0.640	< 1.300
Fluorene	0.33	< 1.200	< 0.640	< 1.300
Acenaphthene	0.33	< 1.200	< 0.640	< 1.300
2,4-Dinitrotoluene	0.33	< 1.200	< 0.640	< 1.300
2,6-Dinitrotoluene	0.33	< 1.200	< 0.640	< 1.300
Diethylphthalate	0.33	< 1.200	< 0.640	< 1.300
4-Chlorophenyl phenyl ether	0.33	< 1.200	< 0.640	< 1.300
N-Nitrosodiphenylamine	0.33	< 1.200	< 0.640	< 1.300
4-Bromophenyl phenyl ether	0.33	< 1.200	< 0.640	< 1.300

Table D-6e (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 9 Sediments

Field Sample ID		SD-12	SD-13	SD-14
Sample Matrix		Sediment	Sediment	Sediment
Percent Moisture (%)		72	48	75
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	0.33	< 1.200	< 0.640	< 1.300
Phenanthrene	0.33	< 1.200*	< 0.640*	< 1.300*
Anthracene	0.33	< 1.200	< 0.640	< 1.300
Di-n-Butyl phthalate	0.33	< 1.200*	< 0.640*	< 1.300*
Fluoranthene	0.33	< 1.200*	< 0.640*	< 1.300*
Benzidine	1.60	< 5.200	< 3.100	< 6.400
Pyrene	0.33	< 1.200*	< 0.640*	< 1.300
Butyl benzyl phthalate	0.33	< 1.200	< 0.640	< 1.300
3,3'-Dichlorobenzidine	0.66	< 2.400	< 1.300	< 2.600
Benzo(a)anthracene	0.33	< 1.200	< 0.640	< 1.300
Bis(2-ethylhexyl)phthalate	0.33	3.400	1.200	2.500
Chrysene	0.33	< 1.200	< 0.640	< 1.300
Di-n-octyl phthalate	0.33	< 1.200	< 0.640	< 1.300
Benzo(b)fluoranthene	0.33	< 1.200	< 0.640	< 1.300
Benzo(k)fluoranthene	0.33	< 1.200	< 0.640	< 1.300
Benzo(a)pyrene	0.33	< 1.200*	< 0.640	< 1.300
Indeno(1,2,3-cd)pyrene	0.33	< 1.200	< 0.640	< 1.300
Dibenzo(a,h)anthracene	0.33	< 1.200	< 0.640	< 1.300
Benzo(g,h,i)perylene	0.33	< 1.200	< 0.640	< 1.300
Phenol	0.33	< 1.200	< 0.640	< 1.300
2-Chlorophenol	0.33	< 1.200	< 0.640	< 1.300
2-Nitrophenol	0.33	< 1.200	< 0.640	< 1.300
2,4-Dimethyphenol	0.33	< 1.200	< 0.640	< 1.300
2,4-Dichlorophenol	0.33	< 1.200	< 0.640	< 1.300

Table D-6e (continued)
Organic Analysis Results: Semivolatile Organic Compounds
Site 9 Sediments

Field Sample ID		SD-12	SD-13	SD-14
Sample Matrix		Sediment	Sediment	Sediment
Percent Moisture (%)		72	48	75
	MDL (mg/Kg) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	0.33	< 1.200	< 0.640	< 1.300
2,4,6-Trichlorophenol	0.33	< 1.200	< 0.640	< 1.300
2,4-Dinitrophenol	1.60	< 5.700	< 3.100	< 6.400
4-Nitrophenol	1.60	< 5.700	< 3.100	< 6.400
4,6-Dinitro-2-methylphenol	1.60	< 5.700	< 3.100	< 6.400
Pentachlorophenol	1.60	< 5.700	< 3.100	< 6.400
Benzyl alcohol	0.33	< 1.200	< 0.640	< 1.300
2-Methylphenol	0.33	< 1.200	< 0.640	< 1.300
4-Methylphenol	0.33	< 1.200	< 0.640	< 1.300
Benzoic acid	1.60	< 5.700	< 3.100	< 6.400
4-Chloroaniline	0.33	< 1.200	< 0.640	< 1.300
2-Methylnaphthalene	0.33	< 1.200	< 0.640	< 1.300
2,4,5-Trichlorophenol	1.60	< 5.700	< 3.100	< 6.400
2-Nitroaniline	1.60	< 5.700	< 3.100	< 6.400
3-Nitroaniline	1.60	< 5.700	< 3.100	< 6.400
Dibenzofuran	0.33	< 1.200	< 0.640	< 1.300
4-Nitroaniline	1.60	< 5.700	< 3.100	< 6.400
Surrogates:				
Nitrobenzene-d5	23-120	82	82	56
2-Fluorobiphenyl	30-115	100	110	66
Terphenyl-d14	18-137	90	98	56
2-Fluorophenol	24-113	95	84	62
Phenol-d5	24-113	108	92	81
2,4,6-Tribromophenol	19-122	83	80	70

* Compound present below measurable detection limits.

Table D-7a
Inorganic Analysis Results: Metals, TPH
SITE 3 Surface Waters

Field Sample ID			SW-7	SW-8	SW-9	SW-10
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	< 0.100	0.168	< 0.100	< 0.100
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	0.052	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Barium	Ba	0.01	0.075	0.079	0.071	0.075
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.102	0.111	0.085	0.085
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Calcium	Ca	0.20	204	226	199	196
Chromium	Cr	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cobalt	Co	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Copper	Cu	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Iron	Fe	0.025	0.144	0.338	0.108	0.134
Lead	Pb	0.05	< 0.050	< 0.050	< 0.050	< 0.050
Lead (E239.2)	Pb	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Magnesium	Mg	0.20	56.5	41.1	41.8	43.9
Manganese	Mn	0.005	0.033	0.054	0.069	0.017
Mercury (E245.1)	Hg	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Molybdenum	Mo	0.010	< 0.010	0.014	0.013	< 0.010
Nickel	Ni	0.015	< 0.015	< 0.015	< 0.015	< 0.015
Potassium	K	0.4	3.31	3.08	2.94	3.16
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	3.77	3.87	3.65	3.78
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	35.2	34.5	32.7	34.1
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	< 0.010	0.014	< 0.010	0.014
Zinc	Zn	0.01	1.32	0.978	0.551	0.566
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table D-7b
Inorganic Analysis Results: Metals, TPH
SITE 3 Sediments

Field Sample ID			SD-7	SD-8	SD-9	SD-10
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)			18	27	34	28
Parameter	Code	MDL (mg/L) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Aluminum	Al	10.0	2620	5260	3790	2940
Antimony	Sb	6.0	< 0.732	< 8.22	< 9.09	< 8.33
Arsenic	As	5.0	< 6.10	< 6.85	< 7.58	< 6.94
Barium	Ba	1.0	228	111	30.4	21.1
Beryllium	Be	0.2	< 0.244	< 0.274	< 0.303	< 0.278
Boron	B	1.0	35.6	71.5	19.2	18.3
Cadmium	Cd	0.5	3.45	4.36	1.25	1.09
Calcium	Ca	50.0	891	692	14500	67.2
Chromium	Cr	1.0	3.06	6.32	5.76	3.28
Cobalt	Co	1.0	4.35	11.3	2.29	< 1.39
Copper	Cu	1.0	9.29	6.99	4.92	4.07
Iron	Fe	2.5	11300	23000	6480	6150
Lead	Pb	5.0	13.8	23.4	11.4	< 6.94
Lead (SW7421)	Pb	0.5	NR	NR	NR	NR
Magnesium	Mg	50.0	44400	15800	5240	12800
Manganese	Mn	0.5	26.9	22.8	189	351
Mercury (SW7471)	Hg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	Mo	1.0	< 1.22	< 1.37	< 1.52	1.39
Nickel	Ni	1.5	8.24	12.5	9.38	7.35
Potassium	K	50.0	368	636	497	454
Selenium	Se	10.0	< 12.2	< 13.7	< 15.2	< 13.9
Silicon	Si	100.0	388	505	547	164
Silver	Ag	1.0	< 1.22	< 1.37	< 1.52	< 1.39
Sodium	Na	50.0	108	1210	135	81.9
Thallium	Tl	10.0	< 12.2	< 13.7	< 15.2	< 13.9
Vanadium	V	1.0	5.23	11.2	3.77	5.25
Zinc	Zn	1.0	872	19.2	1070	743
Total Petroleum Hydrocarbons	TPH	5.0	< 6.1	< 6.8	82	22

NR = Not Required

Table D-7c
Inorganic Analysis Results: Metals, TPH
SITE 8 Surface Waters

Field Sample ID			SW-2	SW-3	SW-4
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.874	1.86	0.894
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	< 0.005	< 0.005	< 0.005
Barium	Ba	0.01	0.037	0.045	0.032
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.726	0.743	0.638
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005
Calcium	Ca	0.20	599	589	560
Chromium	Cr	0.010	< 0.010	< 0.010	< 0.010
Cobalt	Co	0.010	< 0.010	< 0.010	< 0.010
Copper	Cu	0.010	< 0.010	< 0.010	< 0.010
Iron	Fe	0.025	1.55	3.50	1.67
Lead	Pb	0.05	< 0.050	< 0.050	< 0.050
Lead (E239.2)	Pb	0.005	< 0.005	0.011	0.005
Magnesium	Mg	0.20	162	171	160
Manganese	Mn	0.005	0.093	0.180	0.099
Mercury (E245.1)	Hg	0.0002	< 0.0002	< 0.0002	< 0.0002
Molybdenum	Mo	0.010	< 0.010	< 0.010	< 0.010
Nickel	Ni	0.015	< 0.015	< 0.015	< 0.015
Potassium	K	0.4	22.8	24.0	21.2
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.200	4.39	5.90	4.24
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	261	265	259
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	< 0.010	< 0.010	< 0.010
Zinc	Zn	0.01	0.051	0.143	0.060
Total Petroleum Hydrocarbons	TPH	1.0	1.6	< 1.0	< 1.0

Table D-7d
Inorganic Analysis Results: Metals, TPH
SITE 8 Sediment

Field Sample ID			SD-2	SD-3	SD-4	SD-5
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)			34	33	31	42
Parameter	Code	MDL (mg/L) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Aluminum	Al	10.0	6180	5960	17800	5140
Antimony	Sb	6.0	< 9.09	< 8.96	< 8.70	< 10.3
Arsenic	As	5.0	< 7.58	< 7.46	< 7.25	< 8.62
Barium	Ba	1.0	65.8	48.2	112	37.4
Beryllium	Be	0.2	< 0.303	< 0.298	0.322	< 0.345
Boron	B	1.0	38.5	33.4	116	25.7
Cadmium	Cd	0.5	1.39	1.46	3.96	3.16
Calcium	Ca	50.0	52600	5140	1480	3910
Chromium	Cr	1.0	7.52	22.2	22.5	136
Cobalt	Co	1.0	5.11	4.69	12.1	< 1.72
Copper	Cu	1.0	8.44	9.52	20.3	48.1
Iron	Fe	2.5	11600	9890	36100	7810
Lead	Pb	5.0	21.1	80.9	25.9	63.3
Lead (SW7421)	Pb	10.0	NR	NR	NR	NR
Magnesium	Mg	50.0	13.4	12.3	8670	1830
Manganese	Mn	0.5	283	273	519	81.0
Mercury (SW7471)	Hg	0.1	< 0.2	< 0.1	< 0.1	< 0.2
Molybdenum	Mo	1.0	< 1.52	< 1.49	< 1.45	< 1.72
Nickel	Ni	1.5	16.8	16.1	31.4	12.5
Potassium	K	50.0	1360	1400	3280	836
Selenium	Se	10.0	< 15.2	< 14.9	< 14.5	< 17.2
Silicon	Si	100.0	577	591	370	714
Silver	Ag	1.0	< 1.52	< 1.49	< 1.45	< 1.72
Sodium	Na	50.0	265	304	354	< 0.345
Thallium	Tl	10.0	< 15.2	< 14.9	< 14.5	< 17.2
Vanadium	V	1.0	11.1	8.46	32.5	22.6
Zinc	Zn	1.0	291	358	354	722
Total Petroleum Hydrocarbons	TPH	5.0	24	63	36	190

NR = Not Required

Table D-7e
Inorganic Analysis Results: Metals, TPH
SITE 9 Surface Waters

Field Sample ID			SW-12	SW-13	SW-14
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	0.188	0.320	0.147
Antimony	Sb	0.06	< 0.060	< 0.060	< 0.060
Arsenic	As	0.05	< 0.050	< 0.050	< 0.050
Arsenic (E206.2)	As	0.005	< 0.005	< 0.005	< 0.005
Barium	Ba	0.01	0.091	0.099	0.093
Beryllium	Be	0.002	< 0.002	< 0.002	< 0.002
Boron	B	0.01	0.206	0.241	0.250
Cadmium	Cd	0.005	< 0.005	< 0.005	< 0.005
Calcium	Ca	0.05	159	166	162
Chromium	Cr	0.010	< 0.010	< 0.010	< 0.010
Cobalt	Co	0.010	< 0.010	< 0.010	< 0.010
Copper	Cu	0.010	< 0.010	< 0.010	< 0.010
Iron	Fe	0.025	0.272	0.456	0.279
Lead	Pb	0.05	< 0.050	< 0.050	< 0.050
Lead (E239.2)	Pb	0.005	< 0.005	< 0.005	< 0.005
Magnesium	Mg	0.20	59.2	61.0	58.8
Manganese	Mn	0.005	0.069	0.100	0.110
Mercury (E245.1)	Hg	0.0002	NA	NA	NA
Molybdenum	Mo	0.010	< 0.010	< 0.010	< 0.010
Nickel	Ni	0.015	< 0.015	< 0.015	< 0.015
Potassium	K	0.4	7.74	8.08	7.15
Selenium	Se	0.100	< 0.100	< 0.100	< 0.100
Selenium (E270.2)	Se	0.005	< 0.005	< 0.005	< 0.005
Silicon	Si	0.020	4.48	4.86	4.89
Silver	Ag	0.01	< 0.010	< 0.010	< 0.010
Sodium	Na	0.200	80.1	84.1	78.4
Thallium	Tl	0.100	< 0.100	< 0.100	< 0.100
Vanadium	V	0.01	< 0.010	< 0.010	< 0.010
Zinc	Zn	0.01	0.728	0.638	0.372
Total Petroleum Hydrocarbons	TPH	1.0	< 1.0	< 1.0	< 1.0

Table D-7f
Inorganic Analysis Results: Metals, TPH
SITE 9 Sediments

Field Sample ID			SD-12	SD-13	SD-14
Sample Matrix			Sediment	Sediment	Sediment
Percent Moisture (%)			72	48	75
Parameter	Code	MDL (mg/L) Wet Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.	Results (mg/Kg) Dry Wt.
Aluminum	Al	10.0	16100	6620	21300
Antimony	Sb	6.0	< 21.4	< 11.5	< 24.0
Arsenic	As	5.0	< 17.8	< 9.62	< 20.0
Barium	Ba	1.0	135	47.7	157
Beryllium	Be	0.2	< 0.714	< 0.385	< 0.800
Boron	B	1.0	121	60.2	176
Cadmium	Cd	0.5	3.36	< 0.962	2.82
Calcium	Ca	50.0	20000	7650	3440
Chromium	Cr	1.0	32.3	12.8	39.8
Cobalt	Co	1.0	7.75	2.89	11.8
Copper	Cu	1.0	24.4	9.92	30.0
Iron	Fe	2.5	24100	9310	29700
Lead	Pb	5.0	32.3	19.6	47.6
Lead (SW7421)	Pb	0.5	26	NA	29
Magnesium	Mg	50.0	6610	40.4	8900
Manganese	Mn	0.5	482	306	724
Mercury (SW7471)	Hg	0.1	1.5	0.6	1.4
Molybdenum	Mo	1.0	< 3.57	< 1.92	< 4.00
Nickel	Ni	1.5	33.8	11.7	38.7
Potassium	K	50.0	2310	1060	3330
Selenium	Se	10.0	< 35.7	< 19.2	< 40.0
Silicon	Si	100.0	2830	1470	3140
Silver	Ag	1.0	< 3.57	< 1.92	< 4.00
Sodium	Na	50.0	500	306	632
Thallium	Tl	10.0	< 35.7	< 19.2	< 40.0
Vanadium	V	1.0	29.7	13.1	35.3
Zinc	Zn	1.0	5570	1480	4580
Total Petroleum Hydrocarbons	TPH	5.0	70	120	240

Table D-8a
General Chemistry Analysis Results
SITE 3 Surface Waters

Field Sample ID			SW-7	SW-8	SW-9	SW-10
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	800	740	720	680
Anions:	Fluoride	0.1	0.68	0.66	0.65	0.64
	Chloride	0.5	57	67	59	63
	Nitrate-Nitrogen	0.5	< 0.50	0.65	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	250	260	240	250
Hardness		1.0	620	580	590	570

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-8b
General Chemistry Analysis Results
SITE 8 Surface Waters

Field Sample ID			SW-2	SW-3	SW-4
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	3300	3200	3300
Anions:	Fluoride	0.1	5.7	0.59	0.59
	Chloride	0.5	400	380	460
	Nitrate-Nitrogen	0.5	0.77	0.75	0.83
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	1700	1700	1700
Hardness		1.0	1900	2100	2000

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-8c
General Chemistry Analysis Results
SITE 9 Surface Waters

Field Sample ID			SW-12	SW-13	SW-14
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter		MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Total Dissolved Solids		1.0	980	110	960
Anions:	Fluoride	0.1	0.63	0.63	0.62
	Chloride	0.5	150	160	160
	Nitrate-Nitrogen	0.5	< 0.50	< 0.50	< 0.50
	Phosphate*	0.5	< 0.50	< 0.50	< 0.50
	Sulfate	0.5	330	350	330
Hardness		1.0	660	680	660

* Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

PRECISION/ACCURACY RESULTS

TABLES E-1 THROUGH E-8

Table E-1
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	VO51555MS	VO51555MSD		VO51609MS	VO51609MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	80	85	6.1	105	100	4.9	80-120	20
1,2-Dichloroethane	85	90	5.7	115	100	14	82-124	20
1,1,1-Trichloroethane	80	90	12	105	100	4.9	80-117	20
1,1-Dichloroethane	75 OC	90	18	105	100	4.9	80-120	20
1,1,2-Trichloroethane	90	90	0.0	110	105	4.7	80-120	20
1,1,2,2-Tetrachloroethane	80	80	0.0	100	105	4.9	80-120	20
Chloroethane	60 OC	70 OC	15	73 OC	68 OC	5.8	80-120	20
Chloroform	85	90	5.7	120	105	13	58-124	20
1,1-Dichloroethene	60 OC	70 OC	15	85	80 OC	6.1	84-189	20
trans-1,2-Dichloroethene	70 OC	80	13	105	95	10	80-120	20
1,2-Dichloropropane	80	85	6.1	105	100	4.9	80-120	20
total-1,3-Dichloropropene	82	85	3.6	110	105	2.3	80-120	20
Methylene Chloride	60 OC	60 OC	0	100	90	10.5	80-120	20
Chloromethane	43 OC	50 OC	15	60 OC	60 OC	0	80-120	20
Bromomethane	60 OC	70 OC	15	73 OC	68 OC	5.8	80-120	20
Bromoform	80	85	6.1	105	105	0	80-120	20
Bromodichloromethane	90	90	0	115	105	9.1	80-120	20
Fluorotrichloromethane	60 OC	65 OC	8.0	80	80	0	80-120	20
Chlorodibromomethane	85	90	5.7	110	105	4.7	75-123	20
Tetrachloroethene	85	90	5.7	110	100	9.5	74-127	20
Trichloroethene	80	90	12	105	95	10	68-115	20
Chlorobenzene	80	82	2.5	103	108	4.8	80-120	20
1,3-Dichlorobenzene	80	82	2.5	100	105	4.9	80-120	20
1,2-Dichlorobenzene	82	88	7.0	103	105	2.4	71-127	20
1,4-Dichlorobenzene	90	92	2.2	110	115	4.4	80-120	20
Vinyl Chloride	50	60	18	70	75	6.9	28-163	20

Table E-2

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO51555MS	PO51555MSD		PO51615MS	PO51615MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	85	90	5.7	98	98	0.0	80-120	20
1,2-Dichlorobenzene	88	92	4.4	105	105	0.0	71-127	20
1,3-Dichlorobenzene	85	90	5.7	98	98	0.0	80-120	20
1,4-Dichlorobenzene	92	98	6.3	105	108	2.4	80-120	20
Benzene	80	85	6.1	105	46	81 OC	41-154	20
Toluene	80	90	12	100	75 OC	29 OC	80-120	20
Ethylbenzene	80	90	12	100	100	0.0	80-120	20

Table E-3
Matrix Spike/Matrix Spike Duplicate Results: Volatile Organic Compounds (SW8240)

Laboratory ID	VO51561MS	VO51561MSD		VO51621MS	VO51621MSD			
Sample Matrix	Sediment	Sediment		Sediment	Sediment			
Parameter	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
1,1-Dichloroethene	74	75	1	72	84	15	59-172	22
Trichloroethene	86	89	3	93	100	7	62-137	24
Chlorobenzene	92	98	6	104	103	1	60-133	21
Toluene	98	94	4	102	104	2	59-139	21
Benzene	92	97	5	99	102	3	64-142	21
Surrogates:								
1,2-Dichloroethane-d4	94	94	N/A	NR	NR	N/A	70-121	N/A
Toluene-d8	105	101	N/A	NR	NR	N/A	81-117	N/A
4-Bromofluorobenzene	98	82	N/A	NR	NR	N/A	74-121	N/A

NR = Not reported.

Table E-4

Matrix Spike/Matrix Spike Duplicate Results
Non-Halogenated Volatile Organics (SW5030/8015);

Laboratory	ED51550MS	ED51550MSD			
Sample Matrix	Aqueous	Aqueous			
	Results	Results		Control Limits	
Compound	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
Ethanol	122	143 OC	16	75-125	25
Diethyl Ether	104	103	1.0	75-125	25
Methyl Ethyl Ketone	104	108	3.8	75-125	25
Methyl Isobutyl Ketone	100	102	2.0	75-125	25

Table E-5
Matrix Spike/Matrix Spike Duplicate Results
Pesticides and PCBs

Laboratory ID	PP51557MS				
Sample Matrix	Aqueous	Aqueous			
Parameter	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Lindane	83	NA	N/A	47-137	50
Heptachlor	92	NA	N/A	49-133	31
Aldrin	73	NA	N/A	47-131	43
Dieldrin	84	NA	N/A	43-133	38
Endrin	97	NA	N/A	46-142	45
4,4'-DDT	106	NA	N/A	31-157	50
Surrogate:					
Dibutylchlorendate	73	NA	N/A	25-154	N/A

Table E-6a

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds - Aqueous

Laboratory ID	SV51555MS	SV51555MSD			
Sample Matrix	Aqueous	Aqueous			
	Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	58	60	3	39-98	28
Acenaphthene	71	74	4	46-118	31
2,4-Dinitrotoluene	71	79	11	24-96	38
Pyrene	88	83	6	26-127	31
N-Nitroso-di-n-propylamine	57	62	8	41-116	38
1,4-Dichlorobenzene	54	58	7	36-97	28
Pentachlorophenol	3 OC	8 OC	91 OC	9-103	50
Phenol	42	48	13	12-89	42
2-Chlorophenol	52	74	35	27-123	40
4-Chloro-3-methylphenol	68	85	22	23-97	42
4-Nitrophenol	42	72	53 OC	10-80	50
Surrogates:					
Nitrobenzene-d5	68	73	N/A	35-114	N/A
2-Fluorobiphenyl	71	74	N/A	30-115	N/A
Terphenyl-d14	84	81	N/A	18-137	N/A
2-Fluorophenol	43	59	N/A	24-113	N/A
Phenol-d5	43	57	N/A	24-113	N/A
2,4,6-Tribromophenol	42	65	N/A	19-122	N/A

Table E-6b

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds - Sediment

Laboratory ID	SV50282MS			SV52396MS				
Sample Matrix	Sediment	Sediment		Sediment	Sediment			
	Results	Results		Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	55	NA	N/A	92	NA	N/A	38-107	23
Acenaphthene	54	NA	N/A	104	NA	N/A	31-137	19
2,4-Dinitrotoluene	51	NA	N/A	95 OC	NA	N/A	28-89	47
Pyrene	67	NA	N/A	122	NA	N/A	35-142	36
N-Nitroso-di-n-propylamine	74	NA	N/A	80	NA	N/A	41-126	38
1,4-Dichlorobenzene	52	NA	N/A	80	NA	N/A	28-104	27
Pentachlorophenol	57	NA	N/A	81	NA	N/A	17-109	47
Phenol	55	NA	N/A	88	NA	N/A	26-90	35
2-Chlorophenol	52	NA	N/A	82	NA	N/A	25-102	50
4-Chloro-3-methylphenol	65	NA	N/A	101	NA	N/A	26-103	33
4-Nitrophenol	43	NA	N/A	196 OC	NA	N/A	11-114	50
Surrogates:								
Nitrobenzene-d5	42	NA	N/A	88	NA	N/A	23-120	N/A
2-Fluorobiphenyl	45	NA	N/A	110	NA	N/A	30-115	N/A
Terphenyl-d14	55	NA	N/A	102	NA	N/A	18-137	N/A
2-Fluorophenol	39	NA	N/A	75	NA	N/A	24-113	N/A
Phenol-d5	54	NA	N/A	92	NA	N/A	24-113	N/A
2,4,6-Tribromophenol	73	NA	N/A	95	NA	N/A	19-122	N/A

Table E-7a

Matrix Replicate/Matrix Spike Results: Metals, TPH - Aqueous

oratory ID mple Matrix Parameter	Code	51558 Aqueous Original (mg/L)	M51558MR Aqueous Replicate (mg/L)	RPD	M51558MS Spike Recovery (%)	Aqueous Original (mg/L)	Aqueous Replicate (mg/L)	RPD	PH1025MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
minum	Al	<0.100	<0.100	0.0	93	NA	NA	N/A	NA	75-125	20
timony	Sb	<0.060	<0.060	0.0	91	NA	NA	N/A	NA	75-125	20
senic	As	<0.050	<0.050	0.0	79	NA	NA	N/A	NA	75-125	20
senic(E206.2)	As	<0.005	<0.005	0.0	102	NA	NA	N/A	NA	75-125	20
rium	Ba	0.075	0.073	2.7	102	NA	NA	N/A	NA	75-125	20
yllium	Be	<0.002	<0.002	0.0	93	NA	NA	N/A	NA	75-125	20
ron	B	0.085	0.076	11	101	NA	NA	N/A	NA	75-125	20
dmium	Cd	<0.005	<0.005	0.0	95	NA	NA	N/A	NA	75-125	20
lcium	Ca	196	198	1.0	NS	NA	NA	N/A	NA	75-125	20
romium	Cr	<0.010	<0.010	0.0	106	NA	NA	N/A	NA	75-125	20
balt	Co	<0.010	<0.010	0.0	101	NA	NA	N/A	NA	75-125	20
pper	Cu	<0.010	<0.010	0.0	101	NA	NA	N/A	NA	75-125	20
on	Fe	0.134	0.107	22 OC	89	NA	NA	N/A	NA	75-125	20
ad(E239.2)	Pb	<0.005	<0.005	0.0	92	NA	NA	N/A	NA	75-125	20
ad	Pb	<0.050	<0.050	0.0	92	NA	NA	N/A	NA	75-125	20
gnesium	Mg	43.9	42.8	2.5	NS	NA	NA	N/A	NA	75-125	20
nganese	Mn	NA	NA	N/A	101	NA	NA	N/A	NA	75-125	20
rcury(E245.1)	Hg	0.017	0.016	6.0	110	NA	NA	N/A	NA	80-120	20
lybdenum	Mo	0.011	<0.010	200 OC	103	NA	NA	N/A	NA	75-125	20
ckel	Ni	<0.015	<0.015	0.0	99	NA	NA	N/A	NA	75-125	20
assium	K	3.16	2.84	11	NS	NA	NA	N/A	NA	75-125	20
enium	Se	<0.100	<0.100	0.0	89	NA	NA	N/A	NA	75-125	20
lenium(E270.2)	Se	<0.005	<0.005	0.0	76	NA	NA	N/A	NA	75-125	20
licon	Si	3.78	3.79	0.3	NS	NA	NA	N/A	NA	75-125	20
lver	Ag	<0.010	<0.010	0.0	95	NA	NA	N/A	NA	75-125	20
dium	Na	34.1	33.8	0.9	NS	NA	NA	N/A	NA	75-125	20
allium	Tl	<0.100	<0.100	0.0	103	NA	NA	N/A	NA	75-125	20
nadium	V	0.014	<0.010	200 OC	102	NA	NA	N/A	NA	75-125	20
nc	Zn	0.566	0.569	0.5	97	NA	NA	N/A	NA	75-125	20
tal Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	115	75-125	20

NS = Not Spiked

000105

Table E-7a (continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH - Aqueous

Laboratory ID / Sample Matrix		50332 Aqueous	M50332MR Aqueous		M50332MS Spike				PH1027MS Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Aqueous Original (mg/L)	Aqueous Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	108	NA	NA	N/A	NA	75-125	20
Antimony	Sb	<0.060	<0.060	-	108	NA	NA	N/A	NA	75-125	20
Arsenic	As	<0.050	<0.050	-	83	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	<0.005	<0.005	-	180	NA	NA	N/A	NA	75-125	20
Barium	Ba	<0.010	<0.010	-	111	NA	NA	N/A	NA	75-125	20
Beryllium	Be	<0.002	<0.002	-	95	NA	NA	N/A	NA	75-125	20
Boron	B	0.029	<0.010	200 OC	107	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	<0.005	<0.005	-	100	NA	NA	N/A	NA	75-125	20
Calcium	Ca	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Chromium	Cr	<0.010	<0.010	-	103	NA	NA	N/A	NA	75-125	20
Cobalt	Co	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Copper	Cu	<0.010	<0.010	-	103	NA	NA	N/A	NA	75-125	20
Iron	Fe	<0.025	<0.025	-	99	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	<0.005	<0.005	-	107	NA	NA	N/A	NA	75-125	20
Lead	Pb	<0.050	<0.050	-	101	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Manganese	Mn	<0.005	<0.005	-	105	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	<0.0002	<0.0002	-	116	NA	NA	N/A	NA	80-120	20
Molybdenum	Mo	<0.010	<0.010	-	114	NA	NA	N/A	NA	75-125	20
Nickel	Ni	<0.015	<0.015	-	107	NA	NA	N/A	NA	75-125	20
Potassium	K	<0.400	<0.400	-	NS	NA	NA	N/A	NA	75-125	20
Selenium	Se	<0.100	<0.100	-	101	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	<0.005	<0.005	-	84	NA	NA	N/A	NA	75-125	20
Silicon	Si	0.195	0.116	51 OC	NS	NA	NA	N/A	NA	75-125	20
Silver	Ag	<0.010	<0.010	-	97	NA	NA	N/A	NA	75-125	20
Sodium	Na	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Thallium	Tl	<0.100	<0.100	-	111	NA	NA	N/A	NA	75-125	20
Vanadium	V	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Zinc	Zn	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	84	75-125	20

NS = Not Spiked

Table E-6a

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds - Aqueous

Laboratory ID	SV51555MS	SV51555MSD			
Sample Matrix	Aqueous	Aqueous			
	Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	58	60	3	39-98	28
Acenaphthene	71	74	4	46-118	31
2,4-Dinitrotoluene	71	79	11	24-96	38
Pyrene	88	83	6	26-127	31
N-Nitroso-di-n-propylamine	57	62	8	41-116	38
1,4-Dichlorobenzene	54	58	7	36-97	28
Pentachlorophenol	3 OC	8 OC	91 OC	9-103	50
Phenol	42	48	13	12-89	42
2-Chlorophenol	52	74	35	27-123	40
4-Chloro-3-methylphenol	68	85	22	23-97	42
4-Nitrophenol	42	72	53 OC	10-80	50
Surrogates:					
Nitrobenzene-d5	68	73	N/A	35-114	N/A
2-Fluorobiphenyl	71	74	N/A	30-115	N/A
Terphenyl-d14	84	81	N/A	18-137	N/A
2-Fluorophenol	43	59	N/A	24-113	N/A
Phenol-d5	43	57	N/A	24-113	N/A
2,4,6-Tribromophenol	42	65	N/A	19-122	N/A

Table E-6b

Matrix Spike/Matrix Spike Duplicate Results
Semivolatile Organic Compounds - Sediment

Laboratory ID	SV50282MS			SV52396MS				
Sample Matrix	Sediment	Sediment		Sediment	Sediment			
	Results	Results		Results	Results		Control Limits	
Parameter	(% Recovery)	(% Recovery)	RPD	(% Recovery)	(% Recovery)	RPD	(% Recovery)	RPD
1,2,4-Trichlorobenzene	55	NA	N/A	92	NA	N/A	38-107	23
Acenaphthene	54	NA	N/A	104	NA	N/A	31-137	19
2,4-Dinitrotoluene	51	NA	N/A	95 OC	NA	N/A	28-89	47
Pyrene	67	NA	N/A	122	NA	N/A	35-142	36
N-Nitroso-di-n-propylamine	74	NA	N/A	80	NA	N/A	41-126	38
1,4-Dichlorobenzene	52	NA	N/A	80	NA	N/A	28-104	27
Pentachlorophenol	57	NA	N/A	81	NA	N/A	17-109	47
Phenol	55	NA	N/A	88	NA	N/A	26-90	35
2-Chlorophenol	52	NA	N/A	82	NA	N/A	25-102	50
4-Chloro-3-methylphenol	65	NA	N/A	101	NA	N/A	26-103	33
4-Nitrophenol	43	NA	N/A	196 OC	NA	N/A	11-114	50
Surrogates:								
Nitrobenzene-d5	42	NA	N/A	88	NA	N/A	23-120	N/A
2-Fluorobiphenyl	45	NA	N/A	110	NA	N/A	30-115	N/A
Terphenyl-d14	55	NA	N/A	102	NA	N/A	18-137	N/A
2-Fluorophenol	39	NA	N/A	75	NA	N/A	24-113	N/A
Phenol-d5	54	NA	N/A	92	NA	N/A	24-113	N/A
2,4,6-Tribromophenol	73	NA	N/A	95	NA	N/A	19-122	N/A

Table E-7a

Matrix Replicate/Matrix Spike Results: Metals, TPH - Aqueous

ıboratory ID ıple Matrix		51558 Aqueous	M51558MR Aqueous		M51558MS Spike	Aqueous	Aqueous		PH1025MS Spike	Control Limits	
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
uminum	Al	<0.100	<0.100	0.0	93	NA	NA	N/A	NA	75-125	20
ıtimony	Sb	<0.060	<0.060	0.0	91	NA	NA	N/A	NA	75-125	20
senic	As	<0.050	<0.050	0.0	79	NA	NA	N/A	NA	75-125	20
senic(E206.2)	As	<0.005	<0.005	0.0	102	NA	NA	N/A	NA	75-125	20
ırium	Ba	0.075	0.073	2.7	102	NA	NA	N/A	NA	75-125	20
ryllium	Be	<0.002	<0.002	0.0	93	NA	NA	N/A	NA	75-125	20
ron	B	0.085	0.076	11	101	NA	NA	N/A	NA	75-125	20
ıdmium	Cd	<0.005	<0.005	0.0	95	NA	NA	N/A	NA	75-125	20
ılcium	Ca	196	198	1.0	NS	NA	NA	N/A	NA	75-125	20
ıromium	Cr	<0.010	<0.010	0.0	106	NA	NA	N/A	NA	75-125	20
ıbalt	Co	<0.010	<0.010	0.0	101	NA	NA	N/A	NA	75-125	20
ıpper	Cu	<0.010	<0.010	0.0	101	NA	NA	N/A	NA	75-125	20
on	Fe	0.134	0.107	22 OC	89	NA	NA	N/A	NA	75-125	20
ad(E239.2)	Pb	<0.005	<0.005	0.0	92	NA	NA	N/A	NA	75-125	20
ad	Pb	<0.050	<0.050	0.0	92	NA	NA	N/A	NA	75-125	20
ıgnesium	Mg	43.9	42.8	2.5	NS	NA	NA	N/A	NA	75-125	20
ınganese	Mn	NA	NA	N/A	101	NA	NA	N/A	NA	75-125	20
rcury(E245.1)	Hg	0.017	0.016	6.0	110	NA	NA	N/A	NA	80-120	20
lybdenum	Mo	0.011	<0.010	200 OC	103	NA	NA	N/A	NA	75-125	20
ckel	Ni	<0.015	<0.015	0.0	99	NA	NA	N/A	NA	75-125	20
tassium	K	3.16	2.84	11	NS	NA	NA	N/A	NA	75-125	20
lenium	Se	<0.100	<0.100	0.0	89	NA	NA	N/A	NA	75-125	20
lenium(E270.2)	Se	<0.005	<0.005	0.0	76	NA	NA	N/A	NA	75-125	20
ilicon	Si	3.78	3.79	0.3	NS	NA	NA	N/A	NA	75-125	20
ilver	Ag	<0.010	<0.010	0.0	95	NA	NA	N/A	NA	75-125	20
dium	Na	34.1	33.8	0.9	NS	NA	NA	N/A	NA	75-125	20
ıallium	Tl	<0.100	<0.100	0.0	103	NA	NA	N/A	NA	75-125	20
ınadium	V	0.014	<0.010	200 OC	102	NA	NA	N/A	NA	75-125	20
nc	Zn	0.566	0.569	0.5	97	NA	NA	N/A	NA	75-125	20
tal Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	115	75-125	20

NS = Not Spiked

Table E-7a (continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH - Aqueous

Laboratory ID		50332	M50332MR		M50332MS				PH1027MS		
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike	Control Limits	
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	(% Recovery)	RPD
Aluminum	Al	<0.100	<0.100	-	108	NA	NA	N/A	NA	75-125	20
Antimony	Sb	<0.060	<0.060	-	108	NA	NA	N/A	NA	75-125	20
Arsenic	As	<0.050	<0.050	-	83	NA	NA	N/A	NA	75-125	20
Arsenic(E206.2)	As	<0.005	<0.005	-	180	NA	NA	N/A	NA	75-125	20
Barium	Ba	<0.010	<0.010	-	111	NA	NA	N/A	NA	75-125	20
Beryllium	Be	<0.002	<0.002	-	95	NA	NA	N/A	NA	75-125	20
Boron	B	0.029	<0.010	200 OC	107	NA	NA	N/A	NA	75-125	20
Cadmium	Cd	<0.005	<0.005	-	100	NA	NA	N/A	NA	75-125	20
Calcium	Ca	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Chromium	Cr	<0.010	<0.010	-	103	NA	NA	N/A	NA	75-125	20
Cobalt	Co	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Copper	Cu	<0.010	<0.010	-	103	NA	NA	N/A	NA	75-125	20
Iron	Fe	<0.025	<0.025	-	99	NA	NA	N/A	NA	75-125	20
Lead(E239.2)	Pb	<0.005	<0.005	-	107	NA	NA	N/A	NA	75-125	20
Lead	Pb	<0.050	<0.050	-	101	NA	NA	N/A	NA	75-125	20
Magnesium	Mg	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Manganese	Mn	<0.005	<0.005	-	105	NA	NA	N/A	NA	75-125	20
Mercury(E245.1)	Hg	<0.0002	<0.0002	-	116	NA	NA	N/A	NA	75-125	20
Molybdenum	Mo	<0.010	<0.010	-	114	NA	NA	N/A	NA	80-120	20
Nickel	Ni	<0.015	<0.015	-	107	NA	NA	N/A	NA	75-125	20
Potassium	K	<0.400	<0.400	-	NS	NA	NA	N/A	NA	75-125	20
Selenium	Se	<0.100	<0.100	-	101	NA	NA	N/A	NA	75-125	20
Selenium(E270.2)	Se	<0.005	<0.005	-	84	NA	NA	N/A	NA	75-125	20
Silicon	Si	0.195	0.116	51 OC	NS	NA	NA	N/A	NA	75-125	20
Silver	Ag	<0.010	<0.010	-	97	NA	NA	N/A	NA	75-125	20
Sodium	Na	<0.200	<0.200	-	NS	NA	NA	N/A	NA	75-125	20
Thallium	Tl	<0.100	<0.100	-	111	NA	NA	N/A	NA	75-125	20
Vanadium	V	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Zinc	Zn	<0.010	<0.010	-	106	NA	NA	N/A	NA	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	84	75-125	20

NS = Not Spiked

Table E-7a (continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH - Aqueous

aboratory ID ample Matrix		51615 Aqueous	M51615MR Aqueous		M51615MS Spike		
Parameter	Code	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
luminum	Al	NA	NA	N/A	NA	75-125	20
ntimony	Sb	NA	NA	N/A	NA	75-125	20
rsenic	As	NA	NA	N/A	NA	75-125	20
rsenic(E206.2)	As	<0.005	<0.005	-	78	75-125	20
arium	Ba	NA	NA	N/A	NA	75-125	20
eryllium	Be	NA	NA	N/A	NA	75-125	20
oron	B	NA	NA	N/A	NA	75-125	20
admium	Cd	NA	NA	N/A	NA	75-125	20
alcium	Ca	NA	NA	N/A	NA	75-125	20
hromium	Cr	NA	NA	N/A	NA	75-125	20
obalt	Co	NA	NA	N/A	NA	75-125	20
opper	Cu	NA	NA	N/A	NA	75-125	20
ron	Fe	NA	NA	N/A	NA	75-125	20
ead(E239.2)	Pb	<0.005	<0.005	-	95	75-125	20
ead	Pb	NA	NA	N/A	NA	75-125	20
agnesium	Mg	NA	NA	N/A	NA	75-125	20
anganese	Mn	NA	NA	N/A	NA	75-125	20
ercury(E245.1)	Hg	<0.0002	<0.0002	-	110	80-120	20
olybdenum	Mo	NA	NA	N/A	NA	75-125	20
ickel	Ni	NA	NA	N/A	NA	75-125	20
otassium	K	NA	NA	N/A	NA	75-125	20
elenium	Se	NA	NA	N/A	NA	75-125	20
elenium(E270.2)	Se	<0.005	<0.005	-	55 OC	75-125	20
ilicon	Si	NA	NA	N/A	NA	75-125	20
ilver	Ag	NA	NA	N/A	NA	75-125	20
odium	Na	NA	NA	N/A	NA	75-125	20
hallium	Tl	NA	NA	N/A	NA	75-125	20
anadium	V	NA	NA	N/A	NA	75-125	20
inc	Zn	NA	NA	N/A	NA	75-125	20
otal Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	75-125	20

NS = Not Spiked

Table E-7b

Matrix Replicate/Matrix Spike Results: Metals, TPH - Sediment

Laboratory ID Sample Matrix Parameter	Code	50622 Sediment Original (mg/Kg)	M50622MR Sediment Replicate (mg/Kg)	RPD	M50622MS Spike Recovery (%)	51621 Sediment Original (mg/Kg)	M51621MR Sediment Replicate (mg/Kg)	RPD	M51621MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	5650	4740	17.5	NS	21,300	16,900	23	NC	75-125	30
Antimony	Sb	<6.0	<6.0	0.0	30 OC	<24.0	<24.0	0.0	40 OC	75-125	30
Arsenic	As	<5.0	<5.0	0.0	78	<20.0	<20.0	0.0	73 OC	75-125	30
Barium	Ba	41.6	371	160 OC	77	157	126	22	97	75-125	30
Beryllium	Be	<0.20	<0.20	0.0	92	<0.800	<0.800	0.0	94	75-125	30
Boron	B	NA	NA	N/A	NA	176	83.6	71 OC	60 OC	75-125	30
Cadmium	Cd	1.28	1.08	16.9	87	2.82	<2.00	200 OC	91	75-125	30
Calcium	Ca	845	819	3.1	NS	3,440	2,740	23	NS	75-125	30
Chromium	Cr	8.29	7.41	11.2	99	39.8	32.1	21	92	75-125	30
Cobalt	Co	3.92	3.55	9.9	92	11.8	7.36	46 OC	91	75-125	30
Copper	Cu	3.66	2.53	3.0	81	30.0	23.6	24	91	75-125	30
Iron	Fe	11800	10600	10.7	NS	29,700	25,000	17	NC	75-125	30
Lead(7421)	Pb	NA	NA	N/A	NA	29	25	15	75	75-125	30
Lead	Pb	9.85	5.33	59.8 OC	99	47.6	40.8	15	89	75-125	30
Magnesium	Mg	954	845	12.1	NS	8,900	7,180	21	NS	75-125	30
Manganese	Mn	223	241	7.8	148 OC	724	596	19	83	75-125	30
Mercury(7421)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Molybdenum	Mo	NA	NA	N/A	NA	<4.00	<4.00	0.0	84	75-125	30
Nickel	Ni	8.41	7.27	14.5	94	38.7	34.5	11	98	75-125	30
Potassium	K	693	525	27.6	NS	3,330	2,610	24	NS	75-125	30
Selenium	Se	NA	NA	N/A	NA	<40	<40	0.0	90	75-125	30
Silicon	Si	NA	NA	N/A	NA	3,140	3,190	1.6	NS	75-125	30
Silver	Ag	<1.00	<1.00	0.0	24 OC	<4.00	<4.00	0.0	62 OC	75-125	30
Sodium	Na	<20.0	20.0	0.0	NS	632	440	36 OC	NS	75-125	30
Thallium	Tl	NA	NA	N/A	NA	<40	<40	0.0	102	75-125	30
Vanadium	V	15.4	13.2	15.4	90	35.3	29.6	18	92	75-125	30
Zinc	Zn	30.4	29.2	4.0	88	4,580	3,590	24	NC	75-125	30
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	NA	NA	NA	N/A	NA	46-142	28

NS = Not Spiked
NC = Sample amount greater than 4x the spike amount, no recovery calculated

Table E-7b (continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH - Sediment

Laboratory ID Sample Matrix Parameter	Code	Sediment Original (mg/Kg)	Sediment Replicate (mg/Kg)	RPD	M51565MS Spike Recovery (%)	52237 Sediment Original (mg/Kg)	M52237MR Sediment Replicate (mg/Kg)	RPD	M52237MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Antimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Arsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Barium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Beryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Boron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Cadmium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Calcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Chromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Cobalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Copper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Iron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Lead(7421)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Lead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Magnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Manganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Mercury(7421)	Hg	NA	NA	N/A	NA	<0.1	<0.1	-	88	75-125	30
Molybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Nickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Potassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Selenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Silicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Silver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Sodium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Thallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Vanadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Zinc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
Total Petroleum Hydrocarbons	TPH	NA	NA	N/A	100	NA	NA	N/A	NA	46-142	28

NS = Not Spiked

Table E-7b (continued)

Matrix Replicate/Matrix Spike Results: Metals, TPH - Sediment

aboratory ID ample Matrix		51562 Sediment	PH51562MR Sediment		PH51515MS Spike	51560 Sediment	PH51560MR Sediment		PH47080MS Spike	Control Limits	
Parameter	Code	Original (mg/Kg)	Replicate (mg/Kg)	RPD	Recovery (%)	Original (mg/Kg)	Replicate (mg/Kg)	RPD	Recovery (%)	(% Recovery)	RPD
luminum	Al	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ntimony	Sb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
rsenic	As	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
arium	Ba	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
eryllium	Be	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
oron	B	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
admium	Cd	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
alcium	Ca	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
hromium	Cr	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
obalt	Co	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
opper	Cu	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ron	Fe	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ead(7421)	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ead	Pb	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
agnesium	Mg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
anganese	Mn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ercury(7421)	Hg	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
olybdenum	Mo	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ickel	Ni	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
otassium	K	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
elenium	Se	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ilicon	Si	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
ilver	Ag	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
odium	Na	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
hallium	Tl	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
anadium	V	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
inc	Zn	NA	NA	N/A	NA	NA	NA	N/A	NA	75-125	30
otal Petroleum Hydrocarbons	TPH	<7.2	<7.2	-	99	24	57	81 OC	71	46-142	28

IS = Not Spiked

Table E-8

Matrix Replicate/Matrix Spike Results: General Chemistry

boratory ID mple Matrix Parameter	51569 Aqueous Original (mg/L)	151569MR Aqueous Replicate (mg/L)	RPD	151555MS Spike Recovery (%)	51612 Aqueous Original (mg/L)	151612MR Aqueous Replicate (mg/L)	RPD	MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
tal Dissolved Solids	NA	NA	N/A	NA	NA	NA	N/R	NA	ND/R	ND/R
ions: Fluoride	0.69	0.70	1.4	NA	NA	NA	N/R	NA	69-135	14.5
Chloride	34	34	0.0	103	NA	NA	N/R	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/R	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/R	NA	ND/R	ND/R
Sulfate	170	170	0.0	100	NA	NA	N/R	NA	71-124	11
tal Hardness	NA	NA	N/A	NA	660	660	0	NA	ND/R	ND/R

Table E-8 (continued)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID / Sample Matrix / Parameter	51571 Aqueous Original (mg/L)	I51571MR Aqueous Replicate (mg/L)	RPD	Spike Recovery (%)	51556 Aqueous Original (mg/L)	I51556MR Aqueous Replicate (mg/L)	RPD	Spike Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	580	520	10.9	NA	800	820	2.5	NA	ND/R	ND/R
Anions: Fluoride	NA	NA	N/A	NA	NA	NA	N/R	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	NA	NA	N/R	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/R	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	NA	NA	N/R	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	NA	NA	N/R	NA	71-124	11
Total Hardness	NA	NA	N/A	NA	NA	NA	N/R	NA	ND/R	ND/R

ND/R = Not defined or reported by the laboratory; control limits unavailable.

Table E-8 (continued)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID		50333	I50333MR			51615	51615MR				
Sample Matrix		Aqueous	Aqueous		Spike	Aqueous	Aqueous		Spike		
Parameter		Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids		NA	NA	N/A	NA	3200	3100	3.2	NA	ND/R	ND/R
Anions:	Fluoride	NA	NA	N/A	NA	NA	NA	N/R	NA	69-135	14.5
	Chloride	NA	NA	N/A	NA	NA	NA	N/R	NA	46-114	12.6
	Nitrate-Nitrogen	NA	NA	N/A	NA	NA	NA	N/R	NA	67-125	12.3
	Phosphate	NA	NA	N/A	NA	NA	NA	N/R	NA	ND/R	ND/R
	Sulfate	NA	NA	N/A	NA	NA	NA	N/R	NA	71-124	11
Total Hardness		800	800	0	NA	NA	NA	N/R	NA	ND/R	ND/R

ND/R = Not defined or reported by the laboratory; control limits unavailable.

Table E-8 (continued)

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID	51558	151558MR				
Sample Matrix	Aqueous	Aqueous		Spike		
Parameter	Original (mg/L)	Replicate (mg/L)	RPD	Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	N/A	NA	ND/R	ND/R
Anions: Fluoride	NA	NA	N/A	NA	69-135	14.5
Chloride	NA	NA	N/A	NA	46-114	12.6
Nitrate-Nitrogen	NA	NA	N/A	NA	67-125	12.3
Phosphate	NA	NA	N/A	NA	ND/R	ND/R
Sulfate	NA	NA	N/A	NA	71-124	11
Total Hardness	570	550	3.6	NA	ND/R	ND/R

ND/R = Not defined or reported by the laboratory; control limits unavailable.

METHOD BLANK RESULTS

TABLES F-1 THROUGH F-8

Table F-1

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

ield Sample ID ample Matrix		VO1011MB Aqueous Primary	VO1011MB Aqueous Conf.	VO1010MB Aqueous Conf.	VO1012MB Aqueous Primary	VO1013MB Aqueous Primary	VO1012MB Aqueous Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
arbon Tetrachloride	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
,2-Dichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
,1,1-Trichloroethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
,1-Dichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
,1,2-Trichloroethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
,1,2,2-Tetrachloroethane	2.5	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50	< 2.50
hloroethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
-chloroethylvinyl ether	10	NF	NF	NF	NF	NF	NF
hloroform	0.4	1.8	0.75	0.40	0.57	0.70	< 0.40
,1-Dichloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
rans-1,2-Dichloroethene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
,2-Dichloropropane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
rans-1,3-Dichloropropene	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
is-1,3-Dichloropropene	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
ethylene Chloride	0.8	11	5.1	5.8	5.9	6.2	1.2
hloromethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
romomethane	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
romoform	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
romodichloromethane	0.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
luorotrichloromethane	2.0	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
ichlorodifluoromethane	2.0	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
hlorodibromomethane	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
etrachloroethene	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
richloroethene	1	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00

Table F-1 (continued)
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		VO1011MB	VO1011MB	VO1010MB	VO1012MB	VO1013MB	VO1012MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
Chlorobenzene	0.4	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,3-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,2-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
1,4-Dichlorobenzene	0.3	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Surrogates:							
Bromochloromethane	62-140	100	97	95	82	100	100
1-Chloro-2-bromopropane	73-127	100	98	103	77	100	100
1,4-Dichloropropane	64-136	100	179 OC	38 OC	79	100	100

NF = Not found in standard due to analytical problem.

Table F-2

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
METHOD BLANKS

Field Sample ID		PO1011MB	PO1012MB
Sample Matrix		Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30
Surrogate:			
a,a,a-Trifluorotoluene	69-129	100	101

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table F-3

Organic Analysis Results: Volatile Organic Compounds
METHOD BLANKS

ield Sample ID		VO1009MB	VO1011MB1	VO1010MB	VO1011MB2
ample Matrix		Sediment	Sediment	Sediment	Sediment
	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
hloromethane	0.010	<0.010	<0.010	<0.010	<0.010
romomethane	0.010	<0.010	<0.010	<0.010	<0.010
inyl Chloride	0.010	<0.010	<0.010	<0.010	<0.010
hloroethane	0.010	<0.010	<0.010	<0.010	<0.010
ethylene Chloride	0.005	<0.005	<0.005	<0.005	<0.005
cetone	0.010	<0.010*	0.010	<0.010*	<0.010
arbon Disulfide	0.005	<0.005	<0.005	<0.005	<0.005
,1-Dichloroethene	0.005	<0.005	<0.005	<0.005	<0.005
,1-Dichloroethane	0.005	<0.005	<0.005	<0.005	<0.005
rans-1,2-Dichloroethene	0.005	<0.005	<0.005	<0.005	<0.005
hloroform	0.005	<0.005	<0.005	<0.005	<0.005
,2-Dichloroethane	0.005	<0.005	<0.005	<0.005	<0.005
-Butanone	0.010	<0.010	<0.010	<0.010	<0.010
,1,1-Trichloroethane	0.005	<0.005	<0.005	<0.005	<0.005
arbon Tetrachloride	0.005	<0.005	<0.005	<0.005	<0.005
inyl Acetate	0.010	<0.010	<0.010	<0.010	<0.010
romodichloromethane	0.005	<0.005	<0.005	<0.005	<0.005
,2-Dichloropropane	0.005	<0.005	<0.005	<0.005	<0.005
rans-1,3-Dichloropropene	0.005	<0.005	<0.005	<0.005	<0.005
richloroethene	0.005	<0.005	<0.005	<0.005	<0.005
ibromochloromethane	0.005	<0.005	<0.005	<0.005	<0.005
,1,2-Trichloroethane	0.005	<0.005	<0.005	<0.005	<0.005
enzene	0.005	<0.005	<0.005	<0.005	<0.005

* Compound present below measurable detection limit.

Table F-3 (continued)

Organic Analysis Results: Volatile Organic Compounds
METHOD BLANKS

eld Sample ID		VO1009MB	VO1011MB1	VO1010MB	VO1011MB2
ımple Matrix		Sediment	Sediment	Sediment	Sediment
	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
is-1,3-Dichloropropene	0.005	<0.005	<0.005	<0.005	<0.005
-Chloroethylvinyl ether	0.010	<0.010	<0.010	<0.010	<0.010
-omoform	0.005	<0.005	<0.005	<0.005	<0.005
-Methyl-2-Pentanone	0.010	<0.010	<0.010	<0.010	<0.010
-Hexanone	0.010	<0.010	<0.010	<0.010	<0.010
etrachloroethene	0.005	<0.005	<0.005	<0.005	<0.005
,1,2,2-Tetrachloroethane	0.005	<0.005	<0.005	<0.005	<0.005
oluene	0.005	<0.005	<0.005	<0.005	<0.005
ılorobenzene	0.005	<0.005	<0.005	<0.005	<0.005
thylbenzene	0.005	<0.005	<0.005	<0.005	<0.005
tyrene	0.005	<0.005	<0.005	<0.005	<0.005
otal Xylenes	0.005	<0.005	<0.005	<0.005	<0.005
,2-Dichlorobenzene	0.010	NR	NR	NR	NR
,3-Dichlorobenzene	0.010	NR	NR	NR	NR
,4-Dichlorobenzene	0.010	NR	NR	NR	NR
richlorofluoromethane	0.005	NR	NR	NR	NR
urrogates:					
,2-Dichloroethane-d4	70-121	94	100	100	103
oluene-d8	81-117	106	128 OC	96	102
-Bromofluorobenzene	74-121	112	106	88	100

NR = Not reported.

Table F-4
Organic Analysis Results: Non-Halogenated Volatile Organics (SW5030/8015);
METHOD BLANKS

Field Sample ID		ED1003MB
Sample Matrix		Aqueous
Parameter	MDL (ug/L)	Results (ug/L)
Ethanol	100	< 100
Diethyl Ether	10	< 10
Methyl Ethyl Ketone	10	< 10
Methyl Isobutyl Ketone	10	< 10

Table F-5
Pesticides and PCBs Analysis Results
METHOD BLANKS

Field Sample ID		PP1004MB
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
Aldrin	0.025	< 0.05
a-BHC	0.025	< 0.05
b-BHC	0.025	< 0.05
g-BHC	0.025	< 0.05
d-BHC	0.025	< 0.05
Chlordane	0.20	< 0.50
4,4'-DDD	0.05	< 0.10
4,4'-DDE	0.05	< 0.10
4,4'-DDT	0.10	< 0.10
Dieldrin	0.05	< 0.10
Endosulfan I	0.05	< 0.05
Endosulfan II	0.05	< 0.10
Endosulfan sulfate	0.10	< 0.10
Endrin	0.05	< 0.10
Endrin aldehyde	0.10	< 0.10
Heptachlor	0.025	< 0.05
Heptachlor epoxide	0.05	< 0.05
Toxaphene	1.00	< 1.00
Methoxychlor	0.50	< 0.50
PCB-1016	0.50	< 0.50
PCB-1221	0.50	< 0.50
PCB-1232	0.50	< 0.50
PCB-1242	0.50	< 0.50
PCB-1248	0.50	< 0.50
PCB-1254	0.50	< 1.00
PCB-1260	0.50	< 1.00
Surrogate:		
Dibutylchlorendate	25-154	78

Table F-6a

Organic Analysis Results: Semivolatile Organic Compounds

METHOD BLANKS

Field Sample ID		SV1003MB1
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
bis(2-chloroethyl)ether	10	< 10
1,3-Dichlorobenzene	10	< 10
1,4-Dichlorobenzene	10	< 10
1,2-Dichlorobenzene	10	< 10
bis(2-chloroisopropyl)ether	10	< 10
N-Nitroso-di-propylamine	10	< 10
Hexachloroethane	10	< 10
Nitrobenzene	10	< 10
Isophorone	10	< 10
bis(2-chloroethoxy)methane	10	< 10
1,2,4-Trichlorobenzene	10	< 10
Naphthalene	10	< 10
Hexachlorobutadiene	10	< 10
Hexachlorocyclopentadiene	10	< 10
2-Chloronaphthalene	10	< 10
Dimethyl phthalate	10	< 10
Acenaphthylene	10	< 10
Fluorene	10	< 10
Acenaphthene	10	< 10
2,4-Dinitrotoluene	10	< 10
2,6-Dinitrotoluene	10	< 10
Diethylphthalate	10	< 10
4-Chlorophenyl phenyl ether	10	< 10
N-Nitrosodiphenylamine	10	< 10
4-Bromophenyl phenyl ether	10	< 10

Table F-6a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV1003MB1
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
Hexachlorobenzene	10	< 10
Phenanthrene	10	< 10
Anthracene	10	< 10
Di-n-Butyl phthalate	10	< 10
Fluoranthene	10	< 10
Benzidine	50	< 50
Pyrene	10	< 10
Butyl benzyl phthalate	10	< 10
3,3'-Dichlorobenzidine	20	< 20
Benzo(a)anthracene	10	< 10
Bis(2-ethylhexyl)phthalate	10	< 10*
Chrysene	10	< 10
Di-n-octyl phthalate	10	< 10
Benzo(b)fluoranthene	10	< 10
Benzo(k)fluoranthene	10	< 10
Benzo(a)pyrene	10	< 10
Indeno(1,2,3-cd)pyrene	10	< 10
Dibenzo(a,h)anthracene	10	< 10
Benzo(g,h,i)perylene	10	< 10
Phenol	10	< 10
2-Chlorophenol	10	< 10
2-Nitrophenol	10	< 10
2,4-Dimethyphenol	10	< 10
2,4-Dichlorophenol	10	< 10

Table F-6a (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV1003MB1
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
4-Chloro-3-methylphenol	10	< 10
2,4,6-Trichlorophenol	10	< 10
2,4-Dinitrophenol	50	< 50
4-Nitrophenol	50	< 50
4,6-Dinitro-2-methylphenol	50	< 50
Pentachlorophenol	50	< 50
Benzyl alcohol	10	< 10
2-Methylphenol	10	< 10
4-Methylphenol	10	< 10
Benzoic acid	50	< 50
4-Chloroaniline	10	< 10
2-Methylnaphthalene	10	< 10
2,4,5-Trichlorophenol	50	< 50
2-Nitroaniline	50	< 50
3-Nitroaniline	50	< 50
Dibenzofuran	10	< 10
4-Nitroaniline	50	< 50
Surrogates:		
Nitrobenzene-d5	35-114	67
2-Fluorobiphenyl	43-116	74
Terphenyl-d14	33-141	80
2-Fluorophenol	10-94	50
Phenol-d5	10-94	37
2,4,6-Tribromophenol	10-123	79

* Compound present below measurable detection limit.

Table F-6b

Organic Analysis Results: Semivolatile Organic Compounds

METHOD BLANKS

Field Sample ID		SV1003MB2	SV1003MB3	SV1011MB
Sample Matrix		Sediment	Sediment	Sediment
	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
bis(2-chloroethyl)ether	0.33	<0.330	<0.330	<0.330
1,3-Dichlorobenzene	0.33	<0.330	<0.330	<0.330
1,4-Dichlorobenzene	0.33	<0.330	<0.330	<0.330
1,2-Dichlorobenzene	0.33	<0.330	<0.330	<0.330
bis(2-chloroisopropyl)ether	0.33	<0.330	<0.330	<0.330
N-Nitroso-di-propylamine	0.33	<0.330	<0.330	<0.330
Hexachloroethane	0.33	<0.330	<0.330	<0.330
Nitrobenzene	0.33	<0.330	<0.330	<0.330
Isophorone	0.33	<0.330	<0.330	<0.330
bis(2-chloroethoxy)methane	0.33	<0.330	<0.330	<0.330
1,2,4-Trichlorobenzene	0.33	<0.330	<0.330	<0.330
Naphthalene	0.33	<0.330	<0.330	<0.330
Hexachlorobutadiene	0.33	<0.330	<0.330	<0.330
Hexachlorocyclopentadiene	0.33	<0.330	<0.330	<0.330
2-Chloronaphthalene	0.33	<0.330	<0.330	<0.330
Dimethyl phthalate	0.33	<0.330	<0.330	<0.330
Acenaphthylene	0.33	<0.330	<0.330	<0.330
Fluorene	0.33	<0.330	<0.330	<0.330
Acenaphthene	0.33	<0.330	<0.330	<0.330
2,4-Dinitrotoluene	0.33	<0.330	<0.330	<0.330
2,6-Dinitrotoluene	0.33	<0.330	<0.330	<0.330
Diethylphthalate	0.33	<0.330	<0.330	<0.330
4-Chlorophenyl phenyl ether	0.33	<0.330	<0.330	<0.330
N-Nitrosodiphenylamine	0.33	<0.330	<0.330	<0.330
4-Bromophenyl phenyl ether	0.33	<0.330	<0.330	<0.330

Table F-6b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV1003MB2	SV1003MB3	SV1011MB
Sample Matrix		Sediment	Sediment	Sediment
	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Hexachlorobenzene	0.33	<0.330	<0.330	<0.330
Phenanthrene	0.33	<0.330	<0.330	<0.330
Anthracene	0.33	<0.330	<0.330	<0.330
Di-n-Butyl phthalate	0.33	<0.330*	<0.330	<0.330*
Fluoranthene	0.33	<0.330	<0.330	<0.330
Benzidine	1.60	<1.600	<1.600	<1.600
Pyrene	0.33	<0.330	<0.330	<0.330
Butyl benzyl phthalate	0.33	<0.330	<0.330	<0.330
3,3'-Dichlorobenzidine	0.66	<0.660	<0.660	<0.660
Benzo(a)anthracene	0.33	<0.330	<0.330	<0.330
Bis(2-ethylhexyl)phthalate	0.33	0.400	<0.330*	<0.330*
Chrysene	0.33	<0.330	<0.330	<0.330
Di-n-octyl phthalate	0.33	<0.330	<0.330	<0.330
Benzo(b)fluoranthene	0.33	<0.330	<0.330	<0.330
Benzo(k)fluoranthene	0.33	<0.330	<0.330	<0.330
Benzo(a)pyrene	0.33	<0.330	<0.330	<0.330
Indeno(1,2,3-cd)pyrene	0.33	<0.330	<0.330	<0.330
Dibenzo(a,h)anthracene	0.33	<0.330	<0.330	<0.330
Benzo(g,h,i)perylene	0.33	<0.330	<0.330	<0.330
Phenol	0.33	<0.330	<0.330	<0.330
2-Chlorophenol	0.33	<0.330	<0.330	<0.330
2-Nitrophenol	0.33	<0.330	<0.330	<0.330
2,4-Dimethyphenol	0.33	<0.330	<0.330	<0.330
2,4-Dichlorophenol	0.33	<0.330	<0.330	<0.330

Table F-6b (continued)
Organic Analysis Results: Semivolatile Organic Compounds
METHOD BLANKS

Field Sample ID		SV1003MB2	SV1003MB3	SV1011MB
Sample Matrix		Sediment	Sediment	Sediment
	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)	Results (mg/Kg)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
4-Chloro-3-methylphenol	0.33	<0.330	<0.330	<0.330
2,4,6-Trichlorophenol	0.33	<0.330	<0.330	<0.330
2,4-Dinitrophenol	1.60	<1.600	<1.600	<1.600
4-Nitrophenol	1.60	<1.600	<1.600	<1.600
4,6-Dinitro-2-methylphenol	1.60	<1.600	<1.600	<1.600
Pentachlorophenol	1.60	<1.600	<1.600	<1.600
Benzyl alcohol	0.33	<0.330	<0.330	<0.330
2-Methylphenol	0.33	<0.330	<0.330	<0.330
4-Methylphenol	0.33	<0.330	<0.330	<0.330
Benzoic acid	1.60	<1.600	<1.600	<1.600
4-Chloroaniline	0.33	<0.330	<0.330	<0.330
2-Methylnaphthalene	0.33	<0.330	<0.330	<0.330
2,4,5-Trichlorophenol	1.60	<1.600	<1.600	<1.600
2-Nitroaniline	1.60	<1.600	<1.600	<1.600
3-Nitroaniline	1.60	<1.600	<1.600	<1.600
Dibenzofuran	0.33	<0.330	<0.330	<0.330
4-Nitroaniline	1.60	<1.600	<1.600	<1.600
Surrogates:				
Nitrobenzene-d5	23-120	72	64	- OC
2-Fluorobiphenyl	30-115	86	70	4 OC
Terphenyl-d14	18-137	72	64	62
2-Fluorophenol	24-113	76	63	3 OC
Phenol-d5	24-113	98	77	19 OC
2,4,6-Tribromophenol	19-122	80	63	55

* Compound present below measurable detection limits.

Table F-7a
Inorganic Analysis Results: Metals, TPH
METHOD BLANKS

Field Sample ID			M457MB	M456MB	M470MB	M469MB
Sample Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.1	NA	<0.100	NA	<0.100
Antimony	Sb	0.06	NA	<0.060	NA	<0.060
Arsenic	As	0.05	NA	<0.050	NA	<0.050
Arsenic (E206.2)	As	0.005	<0.005	NA	<0.005	NA
Barium	Ba	0.01	NA	<0.010	NA	<0.010
Beryllium	Be	0.002	NA	<0.002	NA	<0.002
Boron	B	0.01	NA	0.061	NA	0.497
Cadmium	Cd	0.005	NA	<0.005	NA	<0.005
Calcium	Ca	0.20	NA	<0.002	NA	<0.200
Chromium	Cr	0.010	NA	<0.010	NA	<0.010
Cobalt	Co	0.010	NA	<0.010	NA	<0.010
Copper	Cu	0.010	NA	<0.010	NA	<0.010
Iron	Fe	0.025	NA	<0.025	NA	<0.025
Lead	Pb	0.05	NA	<0.050	NA	<0.050
Lead (E239.2)	Pb	0.005	<0.005	NA	<0.005	NA
Magnesium	Mg	0.20	NA	<0.200	NA	<0.200
Manganese	Mn	0.005	NA	<0.005	NA	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002	NA	NA	NA
Molybdenum	Mo	0.010	NA	<0.010	NA	<0.010
Nickel	Ni	0.015	NA	<0.015	NA	<0.015
Potassium	K	0.4	NA	<0.400	NA	<0.400
Selenium	Se	0.100	NA	<0.100	NA	<0.100
Selenium (E270.2)	Se	0.005	<0.005	NA	<0.005	NA
Silicon	Si	0.01	NA	0.092	NA	0.032
Silver	Ag	0.01	NA	<0.010	NA	<0.010
Sodium	Na	0.20	NA	<0.200	NA	<0.200
Thallium	Tl	0.10	NA	<0.100	NA	<0.100
Vanadium	V	0.01	NA	<0.010	NA	<0.010
Zinc	Zn	0.01	NA	<0.010	NA	<0.010

Table F-7b
Inorganic Analysis Results: Metals, TPH
METHOD BLANKS

Field Sample ID			M1025MB	M477MB	M471MB	M472MB
Sample Matrix			Sediment	Sediment	Sediment	Sediment
Percent Moisture (%)						
Parameter	Code	MDL (mg/Kg)	Results (mg/Kg)	Results (mg/L)	Results (mg/Kg)	Results (mg/L)
Aluminum	Al	10.0	NA	<0.100	NA	<0.100
Antimony	Sb	6.0	NA	<0.060	NA	<0.060
Arsenic	As	5.0	NA	<0.050	NA	<0.050
Barium	Ba	1.0	NA	<0.010	NA	<0.010
Beryllium	Be	0.2	NA	<0.002	NA	<0.002
Boron	B	1.0	NA	<0.010	NA	0.202
Cadmium	Cd	0.5	NA	<0.005	NA	<0.005
Calcium	Ca	50.0	NA	<0.002	NA	<0.200
Chromium	Cr	1.0	NA	<0.010	NA	<0.010
Cobalt	Co	1.0	NA	<0.010	NA	<0.010
Copper	Cu	1.0	NA	<0.010	NA	<0.010
Iron	Fe	2.5	NA	<0.025	NA	<0.025
Lead	Pb	5.0	NA	<0.050	NA	<0.050
Lead (SW7421)	Pb	0.5	NA	NA	< 0.005 (mg/L)	NA
Magnesium	Mg	50.0	NA	<0.200	NA	<0.200
Manganese	Mn	0.5	NA	<0.005	NA	<0.005
Mercury (E245.1)	Hg	0.1	<0.1	NA	<0.1	NA
Molybdenum	Mo	1.0	NA	<0.010	NA	<0.010
Nickel	Ni	1.5	NA	<0.015	NA	<0.015
Potassium	K	50.0	NA	<0.400	NA	<0.400
Selenium	Se	10.0	NA	<0.100	NA	<0.100
Silicon	Si	100.0	NA	<0.030	NA	0.040
Silver	Ag	1.0	NA	<0.010	NA	<0.010
Sodium	Na	50.0	NA	<0.200	NA	<0.200
Thallium	Tl	10.0	NA	<0.100	NA	<0.100
Vanadium	V	1.0	NA	<0.010	NA	<0.010
Zinc	Zn	1.0	NA	<0.010	NA	<0.010

Table F-8
General Chemistry Analysis Results
METHOD BLANKS

Field Sample ID			10929MB
Sample Matrix			Aqueous
	Parameter	MDL (mg/L)	Results (mg/L)
Anions:	Fluoride	0.1	<0.10
	Chloride	0.5	<0.50
	Nitrate-Nitrogen	0.5	<0.50
	Phosphate	0.5	<0.50
	Sulfate	0.5	<0.50

QC SUMMARIES

TABLES G-1a THROUGH G-4

Table G-1a
QC Summary: Precision and Accuracy
Volatile Organic Compounds(SW5030/8021)
Purgeable Halocarbon Compounds

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Carbon Tetrachloride	4	80-105	80-120	4	0	2	4.9-6.1	20	2	0
1,2-Dichloroethane	4	85-115	82-124	4	0	2	5.7-14	20	2	0
1,1,1-Trichloroethane	4	80-105	80-117	4	0	2	4.9-12	20	2	0
1,1-Dichloroethane	4	75-105	80-120	3	1	2	4.9-18	20	2	0
1,1,2-Trichloroethane	4	90-110	80-120	4	0	2	0-4.7	20	2	0
1,1,2,2-Tetrachloroethane	4	80-105	80-120	4	0	2	0-4.9	20	2	0
Chloroethane	4	60-73	80-120	0	4	2	5.8-15	20	2	0
Chloroform	4	85-120	58-124	4	0	2	5.7-13	20	2	0
1,1-Dichloroethane	4	60-85	84-189	1	3	2	6.1-15	20	2	0
trans-1,2-Dichloroethane	4	70-105	80-120	3	1	2	10-13	20	2	0
1,2-Dichloropropane	4	80-105	80-120	4	0	2	4.9-6.1	20	2	0
total-1,3-Dichloropropene	4	82-110	80-120	4	0	2	2.3-3.6	20	2	0
Methylene Chloride	4	60-100	80-120	2	2	2	0-10.5	20	2	0
Chloromethane	4	43-60	80-120	0	4	2	0-15	20	2	0
Bromomethane	4	60-73	80-120	0	4	2	5.8-15	20	2	0
Bromoform	4	80-105	80-120	4	0	2	0-6.1	20	2	0
Bromodichloromethane	4	90-115	80-120	4	0	2	0-9.1	20	2	0
Fluorotrichloromethane	4	60-80	80-120	2	2	2	0-8.0	20	2	0
Chlorodibromomethane	4	85-110	75-123	4	0	2	4.7-5.7	20	2	0
Tetrachloroethane	4	85-110	74-127	4	0	2	5.7-9.5	20	2	0
Trichloroethane	4	80-105	68-115	4	0	2	10-12	20	2	0
Vinyl Chloride	4	50-75	28-163	4	0	2	6.9-18	20	2	0
Chlorobenzene	4	80-108	80-120	4	0	2	2.5-4.8	20	2	0
1,3-Dichlorobenzene	4	80-105	80-120	4	0	2	2.5-4.9	20	2	0
1,2-Dichlorobenzene	4	82-105	71-127	4	0	2	2.4-7.0	20	2	0
1,4-Dichlorobenzene	4	90-115	80-120	4	0	2	2.2-4.4	20	2	0
Total	104			83	21	52			52	0

Table G-1b
QC Summary: Precision and Accuracy
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Chlorobenzene	4	85-98	80-120	4	0	2	0-5.7	20	2	0
1,2-Dichlorobenzene	4	88-105	71-127	4	0	2	0-4.4	20	2	0
1,3-Dichlorobenzene	4	85-98	80-120	4	0	2	0-5.7	20	2	0
1,4-Dichlorobenzene	4	92-108	80-120	4	0	2	2.4-6.3	20	2	0
Benzene	4	46-105	41-154	4	0	2	6.1-81	20	1	1
Toluene	4	75-100	80-120	3	1	2	12-29	20	1	1
Ethylbenzene	4	80-100	80-120	4	0	2	0-12	20	2	0
Total	28			27	1	14			12	2

Table G-1c
QC Summary: Precision and Accuracy
Non-halogenated Volatile Organic Compounds(SW5030/8015);

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Ethanol	2	122-143	75-125	1	1	1	16	25	1	0
Diethyl Ether	2	103-104	75-125	2	0	1	1.0	25	1	0
Methyl Ethyl Ketone	2	104-108	75-125	2	0	1	3.8	25	1	0
Methyl Isobutyl Ketone	2	100-102	75-125	2	0	1	2.0	25	1	0
Total	8			7	1	4			4	0

Table G-1d
QC Summary: Precision and Accuracy
Pesticides and PCB's

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Lindane	1	83	47-137	1	0	NA	NA	50	N/A	N/A
Heptachlor	1	92	49-133	1	0	NA	NA	31	N/A	N/A
Aldrin	1	73	47-131	1	0	NA	NA	43	N/A	N/A
Dieldrin	1	84	43-133	1	0	NA	NA	38	N/A	N/A
Endrin	1	97	46-142	1	0	NA	NA	45	N/A	N/A
4,4-DDT	1	106	31-157	1	0	NA	NA	50	N/A	N/A
Total	6			6	0	NA			N/A	N/A

Table G-1e
QC Summary: Precision and Accuracy
Semivolatile Volatile Organic Compounds(SW3510/8270)

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
1,2,4-Trichlorobenzene	2	58-60	39-98	2	0	1	3	28	1	0
Acenaphthene	2	71-74	46-118	2	0	1	4	31	1	0
2,4-Dinitrotoluene	2	71-79	24-96	2	0	1	11	38	1	0
Pyrene	2	83-88	26-127	2	0	1	6	31	1	0
N-Nitroso-di-n-propylamine	2	57-62	41-116	2	0	1	8	38	1	0
1,4-Dichlorobenzene	2	54-58	36-97	2	0	1	7	28	1	0
Pentachlorophenol	2	3-8	9-103	0	2	1	91	50	0	1
Phenol	2	42-48	12-89	2	0	1	13	42	1	0
2-Chlorophenol	2	52-74	27-123	2	0	1	35	40	1	0
4-Chloro-3-methylphenol	2	68-85	23-97	2	0	1	22	42	1	0
4-Nitrophenol	2	42-72	10-80	2	0	1	53	50	0	1
Total	22			20	2	11			9	2

Table G-1f
QC Summary: Precision and Accuracy
Metals, TPH

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Aluminum	2	93-108	75-125	2	0	2	0	20	2	0
Antimony	2	91-108	75-125	2	0	2	0	20	2	0
Arsenic	2	79-83	75-125	2	0	2	0	20	2	0
Arsenic(E2062)	3	78-180	75-125	3	0	3	0	20	3	0
Barium	2	102-111	75-125	2	0	2	0-2.7	20	2	0
Beryllium	2	93-95	75-125	2	0	2	0	20	2	0
Boron	2	101-107	75-125	2	0	2	11-200	20	1	1
Cadmium	2	95-100	75-125	2	0	2	0	20	2	0
Calcium	NS	NS	75-125	NS	NS	2	0-1.0	20	2	0
Chromium	2	103-106	75-125	2	0	2	0	20	2	0
Cobalt	2	101-106	75-125	2	0	2	0	20	2	0
Copper	2	101-103	75-125	2	0	2	0	20	2	0
Iron	2	89-99	75-125	2	0	2	0-22	20	1	1
Lead(E239.2)	3	92-107	75-125	3	0	3	0	20	3	0
Lead	2	92-101	75-125	2	0	2	0	20	2	0
Magnesium	NS	NS	75-125	NS	NS	2	0-2.5	20	2	0
Manganese	2	101-105	75-125	2	0	1	0	20	1	0
Mercury(E245.1)	3	110-116	75-125	3	0	3	0-6	20	3	0
Molybdenum	2	103-114	75-125	2	0	2	0-200	20	1	1
Nickel	2	99-107	75-125	2	0	2	0	20	2	0
Potassium	NS	NS	75-125	NS	NS	2	0-11	20	2	0
Selenium	2	89-101	75-125	2	0	2	0	20	2	0
Selenium(E290.2)	3	55-84	75-125	2	1	3	0	20	3	0
Silicon	NS	NS	75-125	NS	NS	2	0.3-51	20	1	1
Silver	2	95-97	75-125	2	0	2	0	20	2	0
Sodium	NS	NS	75-125	NS	NS	2	0-0.9	20	2	0
Thallium	2	103-111	75-125	2	0	2	0	20	2	0
Vanadium	2	102-106	75-125	2	0	2	0-200	20	1	1
Zinc	2	97-106	75-125	2	0	2	0-0.5	20	2	0
Total Petroleum Hydrocarbons	2	84-115	75-125	2	0	NA	NA	20	NA	NA
Total	54			53	1	61			56	5

Table G-1g
QC Summary: Precision and Accuracy
General Chemistry

Parameter	Accuracy: Total Number Analyses	Accuracy: Percent Recovery Ranges	Accuracy: Control Limits	Accuracy: Number Within Control Limits	Accuracy: Number Outside Control Limits	Precision: Total Number Analyses	Precision: RPD Ranges	Precision: Control Limits	Precision: Number Within Control Limits	Precision: Number Outside Control Limits
Total Dissolved Solids	Spike Analyses Not Performed for this Parameter - Not Applicable					3	2.5-10.9	ND/R	3	0
Anions: Fluoride	0	NA	69-135	0	0	1	1.4	14.5	1	0
Chloride	1	103	46-114	1	0	1	0	12.6	1	0
Nitrate-Nitrogen	0	NA	67-125	0	0	0	NA	12.3	0	0
Phosphate	0	NA	ND/R	0	0	0	NA	ND/R	0	0
Sulfate	1	100	71-124	1	0	1	0	ND/R	1	0
Total Hardness	Spike Analyses Not Performed for this Parameter - Not Applicable					3	0-3.6	ND/R	3	0
Total	2			2	0	9			9	0

ND/R = Not defined or reported by the laboratory; statistical control limits unavailable. For the purpose of estimating precision and accuracy, a guideline of RPD < 25 and recovery between 75-125 percent was used as control limits.

Table G-2a
QC Summary: Precision and Accuracy
Volatile Organic Compounds (SW8240)
Sediment

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Volatile Organic Compounds										
1,1-Dichloroethene	4	72-84	59-172	4	0	2	1-5	0-22	2	0
Trichloroethene	4	86-100	62-137	4	0	2	3-7	0-24	2	0
Chlorobenzene	4	92-104	60-133	4	0	2	1-6	0-21	2	0
Toluene	4	94-104	59-139	4	0	2	2-4	0-21	2	0
Benzene	4	92-102	64-142	4	0	2	3-5	0-21	2	0
Total	20			20	0	10			10	0

Table G-2b
QC Summary: Precision and Accuracy
Semivolatile Organic Compounds Method (SW3550/8270)
Sediment

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Semivolatile Organic Compounds										
1,2,4-Trichlorobenzene	2	55-92	38-107	2	0	NA	NA	0-23	N/A	N/A
Acenaphthene	2	54-104	31-137	2	0	NA	NA	0-19	N/A	N/A
2,4-Dinitrotoluene	2	51-95	28- 89	1	1	NA	NA	0-47	N/A	N/A
Pyrene	2	67-122	35-142	2	0	NA	NA	0-36	N/A	N/A
N-Nitroso-di-n-propylamine	2	74-80	41-126	2	0	NA	NA	0-38	N/A	N/A
1,4-Dichlorobenzene	2	52-80	28-104	2	0	NA	NA	0-27	N/A	N/A
Pentachlorophenol	2	57-81	17-109	2	0	NA	NA	0-47	N/A	N/A
Phenol	2	55-88	26- 90	2	0	NA	NA	0-35	N/A	N/A
2-Chlorophenol	2	52-82	25-102	2	0	NA	NA	0-50	N/A	N/A
4-Chloro-3-methylphenol	2	65-101	26-103	2	0	NA	NA	0-33	N/A	N/A
4-Nitrophenol	2	43-196	11-114	1	1	NA	NA	0-50	N/A	N/A
	22			20	2	NA			N/A	N/A

Table G-2c
QC Summary: Precision and Accuracy
Metals, TPHC - Sediment

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Aluminum	NS	NS	NS	NS	NS	2	17.5-23	0-30	2	0
Antimony	2	30-40	75-125	0	2	2	0	0-30	2	0
Arsenic	2	73-78	75-125	1	1	2	0	0-30	2	0
Barium	2	77-97	75-125	2	0	2	22-160	0-30	1	1
Beryllium	2	92-94	75-125	2	0	2	0	0-30	2	0
Boron	1	60	75-125	0	1	1	71	0-30	0	1
Cadmium	2	87-91	75-125	2	0	2	16.9-200	0-30	1	1
Calcium	NS	NS	NS	NS	NS	2	3.1-23	0-30	2	0
Chromium	2	92-99	75-125	2	0	2	11.2-21	0-30	2	0
Cobalt	2	91-92	75-125	2	0	2	9.9-46	0-30	1	1
Copper	2	81-91	75-125	2	0	2	3.0-2.4	0-30	2	0
Iron	NS	NS	NS	NS	NS	2	10.7-17	0-30	2	0
Lead (7421)	1	75	75-125	1	0	1	15	0-30	1	0
Lead	2	89-99	75-125	2	0	2	15-59.8	0-30	1	1
Magnesium	NS	NS	NS	NS	NS	2	12.1-21	0-30	2	0
Manganese	2	83-148	75-125	1	1	2	7.8-19	0-30	2	0
Mercury(7471)	1	88	75-125	1	0	1	0	0-30	1	0
Molybdenum	1	84	75-125	1	0	1	0	0-30	1	0
Nickel	2	94-98	75-125	2	0	2	11-14.5	0-30	2	0
Potassium	NS	NS	NS	NS	NS	2	24-27.6	0-30	2	0
Selenium	1	90	75-125	1	0	1	0	0-30	1	0
Silicon	NS	NS	NS	NS	NS	1	1.6	0-30	1	0
Silver	2	24-62	75-125	0	2	2	0	0-30	2	0
Sodium	NS	NS	NS	NS	NS	2	0-36	0-30	1	1
Thallium	1	102	75-125	1	0	1	0	0-30	1	0
Vanadium	2	90-92	75-125	2	0	2	15.4-18	0-30	2	0
Zinc	1	88	75-125	1	0	2	4-24	0-30	2	0
Total Petroleum Hydrocarbons	3	71-100	46-142	3	0	2	0-81	0-28	1	1
Total	36			29	7	49			42	7

Table G-3a
QC Summary: Surrogate Recoveries - Surface Waters
Volatiles - (SW5030/8021 and SW5030/8020)

Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Volatile Halocarbons Analyses					
Bromochloromethane	15	90-149	62-140	14	1
1-Chloro-2-bromopropane	15	79-113	73-127	15	0
1,4-Dichloropropane	15	79-114	64-136	15	0
Purgeable Aromatic Analyses					
a,a,a-Trifluorotoluene	15	91-102	69-129	15	0
Total	60			59	1

Note: These surrogate recoveries include only those reported for the primary analyses.

Table G-3b
QC Summary: Surrogate Recoveries - Surface Waters
(Pesticides/PCBs and Semivolatile Organics)

Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Pesticides/PCB Analyses					
Dibutylchlorendate	4	96-180	25-154	3	1
Semivolatile Organic Compounds					
Nitrobenzene-d5	7	65-95	35-114	7	0
2-Fluorobiphenyl	7	66-102	43-116	7	0
Terphenyl-d14	7	60-92	33-141	7	0
2-Fluorophenol	7	40-63	10-94	7	0
Phenol-d5	7	32-50	10-94	7	0
2,4,6-Tribromophenol	7	32-80	10-123	7	0
Total	46			45	1

Table G-4
QC Summary: Surrogate Recoveries - Sediments

arameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
olatile Organic ompounds					
1,2-Dichloroethane-d4	11	84-117	70-121	11	0
Toluene-d8	11	88-111	81-117	11	0
4-Bromofluorobenzene	11	82-120	74-121	11	0
emivolatile Organic ompounds					
Nitrobenzene-d5	11	30-88	23-120	11	0
2-Fluorobiphenyl	11	44-110	30-115	11	0
Terphenyl-d14	11	42-88	18-137	11	0
2-Fluorophenol	11	33-96	24-113	11	0
Phenol-d5	11	46-118	24-113	10	1
2,4,6-Tribromophenol	11	18-83	19-122	10	1
otal	99			97	2

APPENDIX III A

CHAIN OF CUSTODY FORMS

SAIC Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 9-28-89 Page 1 of 2

Shipment No. 26

Name John J King
Address 1 Sears Dr Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Non-Halogenated Volatiles SW 5030/9015	Purgeable Halocarbons/Aromatics SW 5030/8021	Petroleum Hydrocarbons E418.1	Organochlorine Pest + PCB's E608	Extnc Priority Pollutants E625	Total Metals (23) As, Pb, Hg, Sb and Hardness E200.7;	E206.2; E239.2; E245.1;	E270.2 and E130.1	Common Anions (Chloride, Nitrate, Fluoride, Sulfate) Orthophosphate) and TDS A429 and E160.1						°C Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
51555-0	WTR	SW-1	9/27/89	1341	Site 8	X	X														4	SW-7 has an extra 80oz bottle
51555-1	WTR	SW-2	9/27/89	1345	Site 8	X	X	X		X	X		X								8	for lab QA/QC
51555-2	WTR	SW-3	9/27/89	1412	Site 8	X	X	X		X	X		X								8	Run Common Anions
51555-3	WTR	SW-4	9/27/89	1435	Site 8	X	X	X		X	X		X								8	→Broken VOA Vial
51555-4	WTR	SW-6	9/28/89	1250	Site 3		X														2	Temperature of cooler at ship-
51555-5	WTR	SW-7	9/28/89	1310	Site 3		X	X	X	X	X		X								7	ment 0 °C
51555-6	WTR	SW-8	9/28/89	1347	Site 3		X	X	X	X	X		X								6	
51555-7	WTR	SW-9	9/28/89	1315	Site 3		X	X	X	X	X		X								6	Temperature of Cooler Blank (CB #26)
51555-8	WTR	SW-10	9/28/89	1315	Site 3		X	X	X	X	X		X								6	upon arrival at lab 0 °C
51555-9	WTR	TB-26	9/28/89	—	—	X	X														2	
	WTR	CB-26	9/28/89	—	—															X	1	

Relinquished by: John J King — Date 9/28/89 — Time 1625
Printed Name: John J King
Company: SAIC

Received by: John M. Stack — Date 9-28-89 — Time 16:25
Printed Name: JOHN M. STACK
Company: Ecology + Environment

Relinquished by — Signature — Printed Name — Company — Date — Time

Received by — Signature — Printed Name — Company — Date — Time

Total Number of Containers: 57

Shipment Method: Lab Courier

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not divide [illegible]

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734-2500

Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup W[illegible] Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) [illegible]

Science Applications International Corporation
An Employee-Owned Company

Chain of Custody Record

Date 9-28-89 Page 2 of 2

Shipment No. 26

Name John J King
Address 1 Sears Dr Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Lacger
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-458-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Volatile Organic Compounds SW5030/8240	Petroleum Hydrocarbons SW3550/E418.1	Metal Screen (23 Total) SW3050/6010a	Lead & Mercury SW3050/7420 & 7471	Semivolatile Organics SW3550/8270	Soil Moisture Content ASTM D2216	NO. OF CONTAINERS
51560	Soil/Sed	SD-2	9-27-89	1345	Site 8	+	+	+	+	+	+	3
61	"	SD-3	9-27-89	1412	Site 8	+	+	+	+	+	+	3
62	"	SD-4	9-27-89	1435	Site 8	+	+	+	+	+	+	3
63	"	SD-5	9-27-89	1615	Site 8	+	+	+	+	+	+	3
64	"	SD-7	9-28-89	1400	Site 3	+	+	+	+	+	X	3
65	"	SD-8	9-28-89	1344	Site 3	+	+	+	+	+	X	3
66	"	SD-9	9-28-89	1315	Site 3	+	+	+	+	+	X	3
51567	"	SD-10	9-28-89	1315	Site 3	+	+	+	+	+	X	3

do not analyze for TPH unless ok per R Stasik 10-2-89

add Fe50,1cb per R Stasik 10-3-89

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Total Number of Containers: 80 81

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: John J King	9/28/89	Signature: John M. Stack	9-28-89
Printed Name: John J King	Time: 1625	Printed Name: John M. STACK	Time: 16:27
Company: SAIC		Company: Ecology + Environment	
Relinquished by	Date	Received by	Date
Signature		Signature	
Printed Name	Time	Printed Name	Time
Company		Company	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Tnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1676 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747-7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) 535-7438

11461

541,043

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Chain of Custody Record

Date 9-29-89 Page 1 of 2

Shipment No. 28

Name John J King
Address 1 Sears Dr. Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-836-06-856-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone
51609	WTR	SW-11	9-29-89	1030	Site 9
10	WTR	SW-12	9-29-89	1114	Site 9
11	WTR	SW-13	9-29-89	1055	Site 9
51612	WTR	SW-14	9-29-89	1035	Site 9
51613		TB #28			
		CB #28			

Requested Parameters

Laboratory No.	Organic Halocarbons/Aromatics SW8010/8020	Petroleum Hydrocarbons E418.1	Metals (Total) As, Pb, Hg; Scan Hardness; E239.2; E245.1; E270.2; E130.1	Common Anions (Chloride, Nitrate, Fluoride, Sulfate, Orthophosphate); and TDS A429 and E160.1	Temperature °C	NO. OF CONTAINERS
51609	X					2
10	X	X	X	X		5
11	X	X	X	X		5
51612	X	X	X	X		5
51613	X					1
					X	1

do not analyzed for Hg
Phone Rita Stark per Rita 10/2/89 mw
should have been analyzed for Hg

Laboratory Name Ecology & Environment
Address 4265 Genesee St
Buffalo, NY 14225
Phone (716) 631-0560
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Temp of Cooler At Shipment 1 °C
Temp of Cooler at Blank (CB #28) upon Arrival at lab 0 °C

Total Number of Containers:

Shipment Method: Lab Courier

Relinquished by	Date	Received by	Date
Signature: John J King	9-29-89	Signature: William H. Howard	9-29-89
Printed Name: John J King	Time: 1707	Printed Name: William H. Howard	Time: 1707
Company: SAIC		Company: E&E	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734-2500

Oakridge
800 Oakridge Trnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup W[redacted] Bellevue, WA 98005
(206) 747-[redacted]

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121

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Chain of Custody Record

Date 9-29-89 Page 2 of 2

Shipment No. 24

Name John J King
Address 1 Sears Dr Paramus NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Volatile Organic Compounds SW5030/8240	Petroleum Hydrocarbons SW3550/E418.1	Metal Screen (23 Metals) SW3050/6010	Lead and Mercury SW3050/7420 and SW7471	Semi-Volatile Organics SW3550/8270	Soil Moisture ASTM D2216	NO. OF CONTAINERS
51619	Sediment	SD-12	9-29-89	1114	Site 9	X	X	X	X	X	X	3
20	Sediment	SD-13	9-29-89	1055	Site 9	X	X	X	X	X	X	3
51621	Sediment	SD-14	9-29-89	1035	Site 9	X	X	X	X	X	X	3

Requested Parameters

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS

Relinquished by
Signature John J King
Printed Name
Company
Date 9/29/89
Time 1707

Received by
Signature William H. Howard
Printed Name
Company E+E
Date
Time

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 28

Shipment Method: Lab Courier

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling loc[illegible] not [illegible]vidu[illegible]

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Turnpk., Oakridge, TN 37830
(615) 482-9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599-0100

Denver
1626 Cole Boulevard, Suite 210, Golden, CO 80401
(303) 231-9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747 7899

San Diego
4224 Campus Point, Building 3, San Diego, CA 92121
(619) [illegible]18

Installation Restoration Program

RI/FS Informal Technical Information Report

Niagara Falls International Airport, Niagara Falls, New York

August 1990

Volume IV
Additional RI Data

Prepared by:
Science Applications International Corporation
One Sears Drive, Paramus, New Jersey 07652
SAIC Project No. 1-835-06-858-XX

Prepared for:
United States Air Force
Human Systems Division (AFSC)
IRP Program Office (HSD/YAQI)
Brooks Air Force Base, Texas 78235-5500
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NIAGARA IAP RI/FS SUPPLEMENTAL ITIR

VOLUME IV

DATA FROM ADDITIONAL RI FIELD EFFORT

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APPENDICES

Appendix IVA - Chain of Custody Forms

INTRODUCTION

This Informal Technical Information Report (ITIR) Supplemental Volume IV presents data generated from the additional RI field effort at Niagara International Airport. This volume follows the general format of Volume I through III and includes data for groundwater and surface water samples collected at Sites 7, 9 and 13 during April, 1990.

This volume of the ITIR contains tables prepared in "Lotus 1-2-3" worksheet format, and identified alphabetically by type of information, subnumbered by table content, followed by an additional letter for each site. Included are tables summarizing the following information:

- Sample and QC cross references; These tables cross-reference field sample numbers, sample description and laboratory ID numbers (Tables B-1x), and quality control (QC) sample type and applicable and associated field samples (Tables B-2x). These tables also provide page references for the various types of analyses. All volatile organic compound analyses are grouped together (for example, methods SW5030/8020 and SW5030/8021 are listed under the heading volatile/purgeable organics), as are general chemistry parameters. Only the first page number of multiple page tables is listed.

- Collection, extraction and/or analysis dates for all parameters: These sample tracking and holding time summary tables (C-1x, C-2x, C-3x, etc.) summarize all applicable analysis dates for each sample. In cases where more than one analysis is required for a specific analysis type, the latest analysis date is reported. For example, organic analysis by gas chromatography (GC) methods often require a primary and confirmation analysis; the later of the two analysis dates are reported. Similarly, metals are performed by inductively coupled plasma spectrophotometry (ICP) and graphite furnace atomic absorption (GFAA) methods, sometimes over several days - the latest analysis date is entered into the tables.

- Tabulated analytical results for all parameters for all environmental and field QC samples: These analytical results tables (D-1x, D-2x, D-3x) summarize all analytical results for all samples from a given site. If a specific site was not analyzed for a particular parameter, it is excluded from the tables (and from the numbering sequence). After the tables for each site, tables for any applicable trip blanks, field blanks and equipment wash blanks are presented. Surrogate recoveries are reported for each sample, where applicable, for GC analyses. For additional details on GC analyses, please refer to the QA/QC summary (given on the following pages).

- QC sample analysis summaries - laboratory QC: Analytical results for laboratory precision and accuracy samples, in the form of matrix replicates (MR), matrix spikes (MS), or matrix spike/matrix spike duplicate (MS/MSD) pairs are presented in Tables E-1, E-2, etc. Laboratory method blank data for each relevant analysis type are listed in Tables F-1, F-2, etc.

- Overall precision and accuracy summary: Based on the total number of replicates, spikes or MS/MSD analyses for a particular parameter, the "G" Tables summarize the overall range of relative percent deviation (RPD) or percent recovery achieved by the laboratory. This is compared to the control limits for the QC analysis to determine the number of QC analyses within and outside of the limits.

This volume is numbered sequentially beginning with the first table in the volume and ending with the last page of the appendix. It is prefaced by a table of contents, this introduction section and a QA/QC summary. Chain-of-custody forms are included in the appendix (Appendix IV A).

QA/QC SUMMARY

A formal, documented QA review has not yet been completed on this data set from the additional RI effort at Niagara IAP; these results will be summarized in the final report. The following items, however, should be considered when reviewing the data contained in the ITIR. These issues may involve deviations from, or modifications to, the analytical and quality assurance/quality control protocols and procedures outlined in the Niagara IAP RI/FS Quality Assurance Project Plan (QAPP), Statement of Work (SOW) or Work Plan documents.

Laboratory Activities

All gas chromatography analysis results are reported in the appropriate "D-Table" with the primary analysis result and confirmation analysis result reported side by side, separated by a slash. For example, a methylene chloride concentration of "5.7/4.3" indicates a primary or quantitation analysis result of 5.7 ug/l and a confirmation analysis result of 4.3 ug/l. Similarly, surrogate compound recovery values, listed at the end of the table, represent the percent recovery in the primary/confirmation analyses. If a compound was detected in one analysis, but not in the other, it was not confirmed and therefore is not reported.

A method modification was implemented for groundwater samples being analyzed, as per the OEHL SOW, for purgeable halocarbons and purgeable aromatics by EPA Method E601 and SW 846 Method SW5030/8020, respectively. The laboratory proposed analyzing these samples by SW5030/8021, a method which uses in series each of the individual detectors specified in the above methods. This was discussed with Major Philip Jung (see Appendix IA, Volume I, letter to Sam Taffinder, dated June 8, 1989) and was considered acceptable. The individual methods (E601 and/or SW5030/8020) were used as necessary for confirmation analysis, or as an alternate primary method if better quality control criteria were achieved. The results are reported in two tables to maintain consistency with the requested analyses. Table D-1x lists the purgeable halocarbon compounds, and the Table D-2x lists the purgeable aromatic compounds; both table combined include the total list of volatile organic compounds analyzed by Method SW5030/8021. The cross-reference tables refer to volatile organic compounds

(SW5030/8021) and list page references for both D-1x and D-2x tables. In cases where only purgeable aromatics were requested for analysis at a particular site, this analysis was performed by Methods SW5030/8020.

In the OEHL Statement of Work, orthophosphate was included in the list of common anions to be analyzed by Method A429. After discussing the likelihood of this compound being present in the groundwater, and considering the additional field effort required to obtain samples for this parameter (field filtration), Major Jung determine that analyzing for phosphate by Method A429, without performing the field filtration, would be adequate for the purposes of this field investigation. This is summarized in a letter to Mr. Sam Taffinder, dated August 29, 1989 (see Appendix IA).

Methylene chloride is reported as a detected, confirmed compound for almost all groundwater samples and field QC samples. However, methylene chloride is also detected in all but two of the laboratory method blanks (primary and confirmation). Results for both primary and confirmation analysis method blanks are presented in Table F-1 and cross-referenced to the applicable samples in Table B-2e. This is the only analysis for which both primary and confirmation analysis method blank results are reported, since it was necessary to demonstrate the likelihood of laboratory contamination being the source of the compound.

Laboratory QC data was reported by the laboratory with the samples, and was generally identified by analysis date, batch number or sample number. These identifiers were enhanced by a preface indicating the general type of analysis (e.g., VO = volatile organic, M = metals), and by a suffix indicating the type of QC sample (e.g., MB = method blank, MR = matrix replicate, MSD = matrix spike duplicate).

Surrogate recoveries are reported with the sample data for volatile organics/purgeable halocarbons (Table D-1x) and purgeable aromatics (Table D-2x). Surrogate compounds are not included in the confirmation analyses for purgeable halocarbons. Where surrogate recoveries were reported for confirmation analysis of purgeable aromatics, the primary and confirmation analyses results are separated by a slash.

Arsenic, lead and selenium were not analyzed by ICP (EPA Method 200.7). Only data from the graphite furnace analyses (EPA Methods E206.2, E239.2 and E270.2, respectively) were reported. In addition, thallium was analyzed by the graphite furnace method (E279.2) and not ICP.

SYMBOLS/ABBREVIATIONS

NA	-	Not analyzed
N/A	-	Not applicable
*	-	Compound present below measurable detection limit
OC	-	Value not within control limits
J	-	Estimated concentration below the method detection limit
NR	-	Not reported
MB	-	Method blank
MR	-	Matrix replicate
MS	-	Matrix spike
MSD	-	Matrix spike duplicate
RPD	-	Relative percent difference
MDL	-	Method detection limit

Other, additional symbols may be used which are defined on the specific table where they occur.

ANALYSIS AND METHOD SUMMARIES

TABLES A-1 THROUGH A-2

Table A-1

Analytical Methods*, Holding Times and Detection Limits
WATER SAMPLES

Parameter	Method Number*	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
ORGANICS					
Volatile Organic Compounds	SW5030/8021	ug/L	14 Days**	see Table A-1a	see Table A-1a
Purgeable Aromatic Organics	SW5030/8020	ug/L	14 Days**	see Table A-1b	see Table A-1b
INORGANICS					
Petroleum Hydrocarbons	E418.1	mg/L	28 Days	1.0 mg/L	0.5 mg/L
Metal Screen(25 metals)	E200.7	mg/L	6 Months	see Table A-1c	see Table A-1c
Mercury	E245.1	mg/L	28 Days	0.0002 mg/L	0.00014 mg/L
Lead	E239.2	mg/L	6 Months	0.001 mg/L	0.0008 mg/L

NR - Not reported

Table A-1 (continued)

Analytical Methods*, Holding Times and Detection Limits
WATER SAMPLES

Parameter	Method Number	Reporting Units	Holding Time	Method Detection Limit	Instrument Detection Limit
INORGANICS					
Arsenic	E206.2	mg/L	6 Months	0.005 mg/L	0.00195 mg/L
Selenium	E270.2	mg/L	6 Months	0.005 mg/L	0.00186mg/L
COMMON ANIONS					
Chloride	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Fluoride	A429	mg/L	28 Days	0.1 mg/L	0.1 mg/L
Sulfate	A429	mg/L	28 Days	0.5 mg/L	0.5 mg/L
Nitrate	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Orthophosphate	A429	mg/L	2 Days	0.5 mg/L	0.5 mg/L
Total dissolved Solids	E160.1	mg/L	7 Days	1 mg/L	N/A
Hardness	E130.1	mg/L	6 Months	1 mg/L	N/A

NOTE *: The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020
(USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136,
Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis
of Water and Wastes, 40 CFR136,Appendix C
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods,
SW846, 3rd Edition (USEPA, 1986).

NOTE **: Volatile organic holding time is 14 days for aqueous samples preserved with HCl
to pH<2. If not preserved, holding time is 7 days.

Table A-1a

Method Detection Limits/Instrument Detection Limits
Volatile Organic Compounds; Purgeable Halocarbon Compounds
-Aqueous-

Compound	MDL (ug/L)	IDL (ug/L)	Compound	MDL (ug/L)	IDL (ug/L)
Carbon Tetrachloride	0.3	0.26	Chloromethane	0.8	0.63
1,2-Dichloroethane	0.4	0.37	Bromomethane	0.8	0.61
1,1,1-Trichloroethane	0.4	0.31	Bromoform	0.5	0.41
1,1-Dichloroethane	0.5	0.44	Bromodichloromethane	0.5	0.32
1,1,2-Trichloroethane	0.5	0.40	Fluorotrichloromethane	2.0	0.62
1,1,2,2-Tetrachloroethane	2.5	2.54	Dichlorodifluoromethane	2.0	0.98
Chloroethane	0.8	0.61	Chlorodibromomethane	0.4	0.36
2-chloroethylvinyl ether	10	NR	Tetrachloroethene	0.8	0.57
Chloroform	0.4	0.38	Trichloroethene	1	1.09
1,1-Dichloroethene	0.8	0.65	Chlorobenzene	0.4	0.31
trans-1,2-Dichloroethene	0.3	0.27	1,3-Dichlorobenzene	0.3	0.24
1,2-Dichloropropane	0.4	0.34	1,2-Dichlorobenzene	0.3	0.29
trans-1,3-Dichloropropene	0.4	0.36	1,4-Dichlorobenzene	0.3	0.26
cis-1,3-Dichloropropene	0.5	0.47			
Methylene Chloride	0.8	0.73			

NR = Not Reported

Table A-1b

Method Detection Limits/Instrument Detection Limits
Purgeable Aromatic Organics - Aqueous

Compound	MDL (ug/L)	IDL (ug/L)
Chlorobenzene	0.3	0.27
1,2-Dichlorobenzene	1.0	0.92
1,3-Dichlorobenzene	0.7	0.66
1,4-Dichlorobenzene	0.7	0.64
Benzene	0.3	0.24
Total Xylenes	1.0	0.72
Toluene	0.3	0.29
Ethylbenzene	0.3	0.25

Table A-1c

Method Detection Limits/Instrument Detection Limits
Metals - Aqueous

Parameter	EPA Method	MDL (mg/L)	IDL (mg/L)
Aluminum	E200.7	0.2	0.043
Antimony	E200.7	0.065	0.033
Arsenic	E200.7	0.05	NR
Arsenic	E206.2	0.001	NR
Barium	E200.7	0.01	0.002
Beryllium	E200.7	0.002	0.002
Boron	E200.7	0.01	NR
Cadmium	E200.7	0.005	0.003
Calcium	E200.7	0.50	0.104
Chromium	E200.7	0.015	0.005
Cobalt	E200.7	0.010	0.008
Copper	E200.7	0.015	0.003
Iron	E200.7	0.025	0.009
Lead	E200.7	0.05	0.008
Lead	E239.2	0.001	0.0008
Magnesium	E200.7	0.50	0.098
Manganese	E200.7	0.005	0.001
Mercury	E245.1	0.0002	0.00014
Molybdenum	E200.7	0.010	NR
Nickel	E200.7	0.015	0.004
Potassium	E200.7	0.5	0.381
Selenium	E200.7	0.100	NR
Selenium	E270.2	0.001	NR
Silicon	E200.7	0.025	NR
Silver	E200.7	0.01	0.004
Sodium	E200.7	0.500	0.094
Thallium	E279.2	0.002	NR
Vanadium	E200.7	0.01	0.006
Zinc	E200.7	0.01	0.005

NR - Not reported

Table A-2

Analytical Methods, Quality Control Checks and Total Number of Analyses
WATER SAMPLES SUMMARY

Parameter	Analytical Method*	Reporting Units	Number of Sample Analyses	Trip Blanks	Field Blanks	Equipment Washes	Field Replicates	Subtotal Environmental Samples
ORGANICS								
Volatile Organic Compounds	SW5030/8021	ug/L	11	4	4	4	2	25
Purgeable Aromatic Organics	SW5030/8020	ug/L	11 (1)	4 (1)	4 (1)	4 (1)	2 (1)	25 (1)
INORGANICS								
Petroleum Hydrocarbons	E418.1	mg/L	1	0	0	1	0	2
Metal Screen(25 metals)	E200.7	mg/L	1	0	0	1	0	2
Mercury	E245.1	mg/L	4	0	0	1	0	5
Lead	E239.2	mg/L	1	0	0	1	0	2
Arsenic	E206.2	mg/L	1	0	0	1	0	2
Selenium	E270.2	mg/L	1	0	0	1	0	2
Common Anions	A429	mg/L	1	0	0	1	0	2
Hardness	E130.1	mg/L	1	0	0	1	0	2
Total Dissolved Solids	E160.1	mg/L	1	0	0	1	0	2

(1) This number includes samples analyzed for purgeable aromatics only (by SW5030/8020) as well as those samples analyzed for purgeable aromatics as part of method SW 5030/8021.

Table A-2 (continued)
Analytical Methods, Quality Control Checks and Total Number of Analyses
WATER SAMPLES SUMMARY

Parameter	Analytical Method*	Reporting Units	Method Blanks	Matrix Replicates	Matrix/Method Spikes	MS/MSD Analysis	Total Analyses(2)
ORGANICS							
Volatile Organic Compounds	SW5030/8021	ug/L	11	0	0	8	44
Purgeable Aromatic Organics	SW5030/8020	ug/L	9	0	0	8	42
INORGANICS							
Petroleum Hydrocarbons	E418.1	mg/L	0	0	0	0	2
Metal Screen(25 metals)	E200.7	mg/L	1	1	1	0	5
Mercury	E245.1	mg/L	1	0	0	0	6
Lead	E239.2	mg/L	1	0	0	0	3
Arsenic	E206.2	mg/L	1	0	0	0	3
Selenium	E270.2	mg/L	1	0	0	0	3
Common Anions	A429	mg/L	0	0	0	0	2
Hardness	E130.1	mg/L	0	1	0	0	3
Total Dissolved Solids	E160.1	mg/L	0	0	0	0	2

* The methods cited are from the following sources: "E" Methods
Methods for chemical analysis of water and wastes, EPA Manual 600/4-79-020 (USEPA, 1983-with additions)
Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40CFR 136, Appendix A
Inductively Coupled Plasma-Atomic Emissions Spectrometer method for Trace Elements Analysis of Water and Wastes, 40 CFR13
"SW" Methods
Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW846, 3rd Edition (USEPA, 1986).
(2) Including subtotal from previous page.

CROSS REFERENCES

TABLE B-1a THROUGH B-2g

Table B-1a
Site Specific Cross Reference
SITE 7

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Page(s) Metals/ TPHC	Page(s) General Chemistry
GW-108	Trip Blank	EE-90-72811	22,34,43	NA	NA
GW-109	Field Blank	EE-90-72812	22,36,44	NA	NA
GW-110	MW-7-3	EE-90-72813	22,28,40	25,46	27,49
GW-111	Equip. Wash Blank	EE-90-72814	22,38,45	25,48	27,50

Table B-1b
Site Specific Cross Reference
SITE 9

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Page(s) Metals/ TPHC	Page(s) General Chemistry
GW-112	Trip Blank	EE-90-72919	23,34,43	NA	NA
GW-113	Field Blank	EE-90-72920	23,36,44	NA	NA
GW-114	Equip. Wash Blank	EE-90-72921	23,38,45	NA	NA
GW-115	MW-9-3	EE-90-72922	23,30,41	NA	NA
GW-116	MW-9-5	EE-90-72923	23,30,41	NA	NA
GW-117	MW-9-6	EE-90-72924	23,30,41	NA	NA
GW-118	MW-9-7	EE-90-72925	23,30,41	NA	NA
GW-119	MW-9-6, duplicate	EE-90-72926	23,30,41	NA	NA
GW-120	Trip Blank	EE-90-72991	23,34,43	NA	NA
GW-121	Field Blank	EE-90-72992	23,36,44	NA	NA
GW-122	Equip. Wash Blank	EE-90-72993	23,38,45	NA	NA
GW-123	MW-9-8	EE-90-72994	23,30,41	NA	NA
GW-124	MW-9-9	EE-90-72995	23,30,41	NA	NA
SW-15	9SW-3	EE-90-72815	NA	26,47	NA
SW-16	9SW-2	EE-90-72816	NA	26,47	NA
SW-17	9SW-1	EE-90-72817	NA	26,47	NA

Table B-1c
Site Specific Cross Reference
SITE 13

Field Sample ID	Sample Description	Laboratory ID	Page(s) Volatile/Purgeable Organics	Page(s) Metals/ TPHC	Page(s) General Chemistry
GW-100	Field Blank	EE-90-72626	24,36,44	NA	NA
GW-101	Trip Blank	EE-90-72627	24,34,43	NA	NA
GW-102	MW-13-1	EE-90-72628	24,32,42	NA	NA
GW-103	MW-13-2	EE-90-72629	24,32,42	NA	NA
GW-104	MW-13-4	EE-90-72630	24,32,42	NA	NA
GW-105	MW-13-3	EE-90-72631	24,32,42	NA	NA
GW-106	MW-13-4, duplicate	EE-90-72632	24,32,42	NA	NA
GW-107	Equip. Wash Blank	EE-90-72633	24,38,45	NA	NA

Table B-2a
QC Sample Cross Reference
TRIP BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-108	Volatile Organics (SW5030/8021)	22,34,43	7	GW-109 GW-110 GW-111
GW-112	Volatile Organics (SW5030/8021)	23,34,43	9	GW-113 GW-114 GW-115 GW-116 GW-117 GW-118 GW-119
GW-120	Volatile Organics (SW5030/8021)	23,34,43	9	GW-121 GW-122 GW-123 GW-124
GW-101	Volatile Organics (SW5030/8021)	24,34,43	13	GW-100 GW-102 GW-103 GW-104 GW-105 GW-106 GW-107

Table B-2b
QC Sample Cross Reference
FIELD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-109	Volatile Organics (SW5030/8021)	22,36,44	7	GW-108 GW-110 GW-111
GW-113	Volatile Organics (SW5030/8021)	23,36,44	9	GW-112 GW-114 GW-115 GW-116 GW-117 GW-118 GW-119
GW-121	Volatile Organics (SW5030/8021)	23,36,44	9	GW-120 GW-122 GW-123 GW-124
GW-100	Volatile Organics (SW5030/8021)	24,36,44	13	GW-101 GW-102 GW-103 GW-104 GW-105 GW-106 GW-107

Table B-2c
QC Sample Cross Reference
EQUIPMENT WASH BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-111	Volatile Organics (SW5030/8021)	22,38,45	7	GW-108 (volatiles only)
	Metals As, Se, Hg, Pb	25,48		GW-109 (volatiles only)
	TPH	25,48		GW-110
	TDS, Anions, Hardness	27,50		
			9	SW-15 (Hg only)
				SW-16 (Hg only)
				SW-17 (Hg only)
GW-114	Volatile Organics (SW5030/8021)	23,38,45	9	GW-112
				GW-113
				GW-115
				GW-116
				GW-117
				GW-118
				GW-119
GW-122	Volatile Organics (SW5030/8021)	23,38,45	9	GW-120
				GW-121
				GW-123
				GW-124
GW-107	Volatile Organics (SW5030/8021)	24,38,45	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-106

Table B-2d
QC Sample Cross Reference
FIELD DUPLICATES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
GW-106	Volatile Organics (SW5030/8021)	24,32,42	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-107
GW-119	Volatile Organics (SW5030/8021)	23,30,41	9	GW-112
				GW-113
				GW-114
				GW-115
				GW-116
				GW-117
				GW-118
				GW-119
				GW-120
				GW-121
				GW-122
				GW-123
				GW-124
			7	GW-108
				GW-109
				GW-110
				GW-111

Table B-2e
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
P00419MB-1	Purgeable Aromatics (primary)	61	7	GW-108 GW-109 GW-110 GW-111
V00419MB-1	Volatile Organics (primary)	57	7	GW-108 GW-109 GW-110 GW-111
P00419MB-2	Purgeable Aromatics (primary)	61	9	GW-112 GW-113 GW-114 GW-115 GW-116 GW-118 GW-119
V00419MB-2	Volatile Organics (primary)	57	9	GW-112 GW-113 GW-114 GW-115 GW-116 GW-118 GW-119
P00423MB-1	Purgeable Aromatics (primary)	61	9	GW-120 GW-121 GW-122 GW-123 GW-124

Table B-2e (continued)
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
VO0423MB-1	Volatile Organics (primary)	57	9	GW-120
				GW-121
				GW-122
				GW-123
				GW-124
PO0417MB	Purgeable Aromatics (primary)	61	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-106
				GW-107
VO0417MB	Volatile Organics (primary)	57	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-106
				GW-107
PO0423MB-2	Purgeable Aromatics (primary)	61	9	GW-117
VO0423MB-2	Volatile Organics (primary)	59	9	GW-117

Table B-2e (continued)
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
P00417MB	Purgeable Aromatics (Confirmation)	61	7	GW-110
V00417MB	Volatile Organics (Confirmation)	57	7	GW-108 GW-110
V00419MB-1	Volatile Organics (Confirmation)	57	7	GW-109 GW-111
P00424MB	Purgeable Aromatics (Confirmation)	61	9	GW-123
V00420MB	Volatile Organics (Confirmation)	59	9	GW-120 GW-121 GW-122 GW-123 GW-124
V00419MB-2	Volatile Organics (Confirmation)	57	9	GW-113 GW-114 GW-116
V00423MB	Volatile Organics (Confirmation)	59	9	GW-115 GW-117
P00423MB	Purgeable Aromatics (Confirmation)	61	9	GW-113 GW-114 GW-115 GW-117 GW-118 GW-119

Table B-2e (continued)
QC Sample Cross Reference
LAB METHOD BLANKS

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
V00416MB	Volatile Organics (Confirmation)	59	13	GW-100 GW-101 GW-102 GW-103 GW-104 GW-105 GW-106 GW-107
P00416MB	Purgeable Aromatics (Confirmation)	61	13	GW-105
M920MB	Metals	62	7	GW-110 GW-111
M360MB	Metals	62	7	GW-110 GW-111

Table B-2f
QC Sample Cross Reference
LAB REPLICATE/MATRIX SPIKE SAMPLES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
I72814MR	Common Anions	56	7	GW-110 GW-111
I76639MR	Hardness	56	7	GW-110 GW-111
M207MR/MS	Metals	55	7	GW-110 GW-111

Table B-2g
QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
PO72812MS/MSD	Purgeable Aromatics	53	7	GW-108
				GW-109
				GW-110
				GW-111
VO72812MS/MSD	Volatile Organics	51	7	GW-108
				GW-109
				GW-110
				GW-111
PO72922MS/MSD	Purgeable Aromatics	53	9	GW-112
				GW-113
				GW-114
				GW-115
				GW-116
				GW-117
				GW-118
				GW-119
VO72922MS/MSD	Volatile Organics	51	9	GW-112
				GW-113
				GW-114
				GW-115
				GW-116
				GW-117
				GW-118
				GW-119
PO72992MS/MSD	Purgeable Aromatics	54	9	GW-120
				GW-121
				GW-122
				GW-123
				GW-124

Table B-2g (continued)
QC Sample Cross Reference
LAB MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

QC Sample ID	Analysis	Page(s)	--Applicable Samples-- Site	Field ID
VO72992MS/MSD	Volatile Organics	52	9	GW-120
				GW-121
				GW-122
				GW-123
				GW-124
PO72629MS/MSD	Purgeable Aromatics	54	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-106
				GW-107
VO72629MS/MSD	Volatile Organics	52	13	GW-100
				GW-101
				GW-102
				GW-103
				GW-104
				GW-105
				GW-106
				GW-107

SAMPLE TRACKING

TABLES C-1a THROUGH C-3a

Table C-1a

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 7

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021) Hold Time	Analysis Date	Elapsed Time	Purgeable Aromatic Organics (SW5030/8020) Hold Time	Analysis Date	Elapsed Time
GW-108	04/17/90	14 days	04/19/90	2 days	14 days	04/19/90	2 days
GW-109	04/17/90	14 days	04/19/90	2 days	14 days	04/19/90	2 days
GW-110	04/17/90	14 days	04/19/90	2 days	14 days	04/19/90	2 days
GW-111	04/17/90	14 days	04/20/90	3 days	14 days	04/19/90	2 days

Table C-1b

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 9

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021) Hold Time	Analysis Date	Elapsed Time	Purgeable Aromatic Organics (SW5030/8020) Hold Time	Analysis Date	Elapsed Time
GW-112	04/18/90	14 days	04/19/90	1 day	14 days	04/19/90	1 day
GW-113	04/18/90	14 days	04/19/90	1 day	14 days	04/23/90	5 days
GW-114	04/18/90	14 days	04/19/90	1 day	14 days	04/23/90	5 days
GW-115	04/18/90	14 days	04/23/90	5 days	14 days	04/23/90	5 days
GW-116	04/18/90	14 days	04/19/90	1 day	14 days	04/19/90	1 day
GW-117	04/18/90	14 days	04/23/90	5 days	14 days	04/23/90	5 days
GW-118	04/18/90	14 days	04/19/90	1 day	14 days	04/23/90	5 days
GW-119	04/18/90	14 days	04/19/90	1 day	14 days	04/23/90	5 days
GW-120	04/19/90	14 days	04/23/90	4 days	14 days	04/23/90	4 days
GW-121	04/19/90	14 days	04/23/90	4 days	14 days	04/23/90	4 days
GW-122	04/19/90	14 days	04/23/90	4 days	14 days	04/23/90	4 days
GW-123	04/19/90	14 days	04/23/90	4 days	14 days	04/24/90	5 days
GW-124	04/19/90	14 days	04/23/90	4 days	14 days	04/23/90	4 days

Table C-1c

Sample Tracking of Analysis Dates and Required Holding Times
Volatile/Purgeable Organic Analysis
SITE 13

Field Sample ID	Sampling Date	Volatile Organics (SW5030/8021) Hold Time	Analysis Date	Elapsed Time	Purgeable Aromatic Organics (SW5030/8020) Hold Time	Analysis Date	Elapsed Time
GW-100	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-101	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-102	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-103	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-104	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-105	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-106	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days
GW-107	04/13/90	14 days	04/17/90	4 days	14 days	04/17/90	4 days

Table C-2a

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 7

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-110	04/17/90	6 months	06/08/90	52 days	28 days	04/19/90	2 days	28 days	05/08/90	21 days
GW-111	04/17/90	6 months	06/08/90	52 days	28 days	04/19/90	2 days	28 days	05/08/90	21 days

Table C-2b

Sample Tracking of Analysis Dates and Required Holding Times
Inorganic Analysis
SITE 9

Field Sample ID	Sampling Date	Metals			Mercury			Total Petroleum Hydrocarbons		
		Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
SW-15	04/17/90	NA	NA	NA	28 days	04/19/90	2 days	NA	NA	NA
SW-16	04/17/90	NA	NA	NA	28 days	04/19/90	2 days	NA	NA	NA
SW-17	04/17/90	NA	NA	NA	28 days	04/19/90	2 days	NA	NA	NA

Table C-3a

Sample Tracking of Analysis Dates and Required Holding Times
General Chemistry
SITE 7

Field Sample ID	Sampling Date	Total Dissolved Solids			Common Anions			Hardness		
		Hold Time	Analysis Date	Elapsed Time	Hold Time*	Analysis Date	Elapsed Time	Hold Time	Analysis Date	Elapsed Time
GW-110	04/17/90	7 days	04/21/90	4 days	2 days	04/19/90	2 days	6 months	06/07/90	51 days
GW-111	04/17/90	7 days	04/21/90	4 days	2 days	04/19/90	2 days	6 months	06/07/90	51 days

*NOTE: Hold time for nitrate, phosphate = 48 hours; chloride, fluoride, and sulfate = 28 days.

ANALYTICAL RESULTS FOR ENVIRONMENTAL SAMPLES

TABLES D-1a THROUGH D-4b

Table D-1a

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 7

Field Sample ID		GW110
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30
1,2-Dichloroethane	0.4	<0.40
1,1,1-Trichloroethane	0.4	<0.40
1,1-Dichloroethane	0.5	<0.50
1,1,2-Trichloroethane	0.5	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5
Chloroethane	0.8	<0.80
2 Chloroethylvinyl ether	10	<10
Chloroform	0.4	<0.40
1,1-Dichloroethene	0.8	<0.80
trans-1,2-Dichloroethene	0.3	<0.30
1,2-Dichloropropane	0.4	<0.40
trans-1,3-Dichloropropene	0.4	<0.40
cis-1,3-Dichloropropene	0.5	<0.50
Methylene Chloride	0.8	<0.80
Chloromethane	0.8	<0.80
Bromomethane	0.8	<0.80
Bromoform	0.5	<0.50
Bromodichloromethane	0.5	<0.50
Fluorotrichloromethane	2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0
Chlorodibromomethane	0.4	<0.40
Tetrachloroethene	0.8	<0.80
Trichloroethene	1	<1.0

Table D-1a (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 7

Field Sample ID		GW110
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80
Chlorobenzene (See Note)	0.4	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30
Surrogates:		
Bromochloromethane	62-140	92
1-Chloro-2-bromopropane	73-127	99
1,4-Dichloropropane	64-136	87

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1b

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9

Field Sample ID		GW115	GW116	GW117	GW118	GW119	GW123	GW124
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	<0.80	1.0/1.0	2.1/3.1	<0.80	<0.80	2.7/2.6	2.5/1.9
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table D-1b (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 9

Field Sample ID		GW115	GW116	GW117	GW118	GW119	GW123	GW124
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:								
Bromochloromethane	62-140	70	103	93	101	100	104	104
1-Chloro-2-bromopropane	73-127	88	104	103	112	102	105	104
1,4-Dichloropropane	64-136	87	99	92	108	95	108	106

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1c
Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 13

Field Sample ID		GW102	GW103	GW104	GW105	GW106
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<3.0	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	1.6/2.4	<4.0	1.4/1.3
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<5.0	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<5.0	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<25	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<8.0	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<100	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<8.0	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	4.1/*	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<5.0	<0.50
Methylene Chloride	0.8	<0.8	<0.8	2.0/2.3	24/45	3.4/1.7
Chloromethane	0.8	<0.80	<0.80	<0.80	<8.0	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<8.0	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<5.0	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<5.0	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<20	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<20	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<8.0	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	14/18	<1.0

* - The cis- and trans- isomers co-elute on the confirmation column. Total 1,2-dichloroethene was present in the confirmation analysis.

Table D-1c (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
Site 13

Field Sample ID		GW102	GW103	GW104	GW105	GW106
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	450/580	6.3/14
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<4.0	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<3.0	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<3.0	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	3.1/**	<0.30
Surrogates:						
Bromochloromethane	62-140	98	93	96	92	73
1-Chloro-2-bromopropane	73-127	99	94	100	85	75
1,4-Dichloropropane	64-136	108	100	108	96	79

** - This compound was confirmed from method SW8020 results.

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1d

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		GW108	GW112	GW120	GW101
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	4.4/4.1	<0.80	2.9/3.7	1.1/1.8
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0

Table D-1d (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
TRIP BLANKS

Field Sample ID		GW108	GW112	GW120	GW101
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Surrogates:					
Bromochloromethane	62-140	89	100	102	94
1-Chloro-2-bromopropane	73-127	94	107	109	89
1,4-Dichloropropane	64-136	88	106	104	93

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1e

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
FIELD BLANKS

Field Sample ID		GW109	GW113	GW121	GW100
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	0.57/0.38	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	4.4/5.1	5.4/7.4	7.7/9.5	3.1/5.4
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0

Table D-1e (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
FIELD BLANKS

Field Sample ID		GW109	GW113	GW121	GW100
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Surrogates:					
Bromochloromethane	62-140	103	100	101	102
1-Chloro-2-bromopropane	73-127	106	100	101	96
1,4-Dichloropropane	64-136	106	102	101	101

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-1f

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW111	GW114	GW122	GW107
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	2.7/4.1	4.4/7.3	7.5/8.1	5.3/2.3
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0

Table D-1f (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
EQUIPMENT WASH BLANKS

Field Sample ID		GW111	GW114	GW122	GW107
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80
Chlorobenzene (See Note)	0.4	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Surrogates:					
Bromochloromethane	62-140	99	87	104	80
1-Chloro-2-bromopropane	73-127	100	90	110	80
1,4-Dichloropropane	64-136	103	88	105	83

Note: These compounds are measured by both of the detectors used in method SW5030/8021. The values reported here were measured using an HECD. The compounds are also reported on Table D-2x for the values measured using a PID.

Table D-2a

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 7

Field Sample ID		GW110
Sample Matrix		Aqueous
	MDL (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery
Chlorobenzene	0.3	<6.0
1,2-Dichlorobenzene	1.0	<20
1,3-Dichlorobenzene	0.7	<14
1,4-Dichlorobenzene	0.7	<14
Benzene (See Note)	0.3	460/830
Total Xylenes	1.0	850/1100
Toluene	0.3	260/490
Ethylbenzene	0.3	190/330
Surrogate:		
a,a,a-Trifluorotoluene	69-129	88/102

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2b

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 9

Field Sample ID Sample Matrix		GW115 Aqueous	GW116 Aqueous	GW117 Aqueous	GW118 Aqueous	GW119 Aqueous	GW123 Aqueous	GW124 Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	72/56	<0.30	69/66	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	9.4/1.8	<1.0	9.0/5.8	<1.0	<1.0
Toluene	0.3	0.44/0.23J	<0.30	0.32/0.28J	<0.30	0.56/1.4	0.56/0.46	<0.30
Ethylbenzene	0.3	<0.30	<0.30	11/7.3	<0.30	10/20	<0.30	<0.30
Surrogate:								
a,a,a-Trifluorotoluene	69-129	95/83	97	96/92	102/83	102/336	100/18	100

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2c

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
Site 13

Field Sample ID		GW102	GW103	GW104	GW105	GW106
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	1.3/0.36	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	1.1/0.62	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	2.6/2.9	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	1.7/0.72	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	3.5/1.7	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	0.65/0.61	<0.30
Surrogate:						
a,a,a-Trifluorotoluene	69-129	96	98	100	102/70	91

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2d

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
TRIP BLANKS

Field Sample ID		GW108	GW112	GW120	GW101
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	101	103	104	94

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2e

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
FIELD BLANKS

Field Sample ID		GW109	GW113	GW121	GW100
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	0.58/0.70	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	99	100/89	99	95

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-2f

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
EQUIPMENT WASH BLANKS

Field Sample ID		GW111	GW114	GW122	GW107
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	0.51/0.27J	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30
Surrogate:					
a,a,a-Trifluorotoluene	69-129	102	99/96	101	95

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table D-3a
Inorganic Analysis Results: Metals, TPH
SITE 7

Field Sample ID			GW110
Sample Matrix			Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)
Aluminum	Al	0.2	0.610
Antimony	Sb	0.065	<0.065
Arsenic	As	0.05	NR
Arsenic (E206.2)	As	0.001	0.0037
Barium	Ba	0.01	0.052
Beryllium	Be	0.002	<0.002
Boron	B	0.01	0.160
Cadmium	Cd	0.005	<0.005
Calcium	Ca	0.50	89.0
Chromium	Cr	0.015	<0.015
Cobalt	Co	0.010	<0.010
Copper	Cu	0.015	0.017
Iron	Fe	0.025	4.80
Lead	Pb	0.05	NR
Lead (E239.2)	Pb	0.001	0.0064
Magnesium	Mg	0.50	45.0
Manganese	Mn	0.005	0.600
Mercury (E245.1)	Hg	0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010
Nickel	Ni	0.015	<0.015
Potassium	K	0.5	0.680
Selenium	Se	0.100	NR
Selenium (E270.2)	Se	0.001	<0.001
Silicon	Si	0.025	5.70
Silver	Ag	0.01	<0.010
Sodium	Na	0.500	8.60
Thallium (E279.2)	Tl	0.002	<0.002
Vanadium	V	0.01	<0.010
Zinc	Zn	0.01	0.086
Total Petroleum Hydrocarbons	TPH	1.1	45

NR = Not Reported

Table D-3b

Inorganic Analysis Results: Metals, TPH
SITE 9

Field Sample ID			SW-15	SW-16	SW-17
Sample Matrix			Aqueous	Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.2	NA	NA	NA
Antimony	Sb	0.06	NA	NA	NA
Arsenic	As	0.05	NA	NA	NA
Arsenic (E206.2)	As	0.005	NA	NA	NA
Barium	Ba	0.01	NA	NA	NA
Beryllium	Be	0.002	NA	NA	NA
Boron	B	0.01	NA	NA	NA
Cadmium	Cd	0.005	NA	NA	NA
Calcium	Ca	0.50	NA	NA	NA
Chromium	Cr	0.010	NA	NA	NA
Cobalt	Co	0.010	NA	NA	NA
Copper	Cu	0.010	NA	NA	NA
Iron	Fe	0.025	NA	NA	NA
Lead	Pb	0.05	NA	NA	NA
Lead (E239.2)	Pb	0.005	NA	NA	NA
Magnesium	Mg	0.50	NA	NA	NA
Manganese	Mn	0.005	NA	NA	NA
Mercury (E245.1)	Hg	0.0002	0.00036	0.0004	0.001
Molybdenum	Mo	0.010	NA	NA	NA
Nickel	Ni	0.015	NA	NA	NA
Potassium	K	0.5	NA	NA	NA
Selenium	Se	0.100	NA	NA	NA
Selenium (E270.2)	Se	0.005	NA	NA	NA
Silicon	Si	0.025	NA	NA	NA
Silver	Ag	0.01	NA	NA	NA
Sodium	Na	0.500	NA	NA	NA
Thallium (E279.2)	Tl	0.100	NA	NA	NA
Vanadium	V	0.01	NA	NA	NA
Zinc	Zn	0.01	NA	NA	NA
Total Petroleum Hydrocarbons	TPH	1.0	NA	NA	NA

Table D-3c
Inorganic Analysis Results: Metals, TPH
EQUIPMENT WASH BLANKS

Field Sample ID			GW111
Sample Matrix			Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)
Aluminum	Al	0.2	<0.20
Antimony	Sb	0.065	<0.065
Arsenic	As	0.05	NR
Arsenic (E206.2)	As	0.001	<0.001
Barium	Ba	0.01	<0.01
Beryllium	Be	0.002	<0.002
Boron	B	0.01	0.084
Cadmium	Cd	0.005	<0.005
Calcium	Ca	0.50	0.740
Chromium	Cr	0.015	<0.015
Cobalt	Co	0.010	<0.010
Copper	Cu	0.015	<0.015
Iron	Fe	0.025	<0.025
Lead	Pb	0.05	NR
Lead (E239.2)	Pb	0.001	<0.001
Magnesium	Mg	0.50	<0.50
Manganese	Mn	0.005	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002
Molybdenum	Mo	0.010	<0.010
Nickel	Ni	0.015	<0.015
Potassium	K	0.5	<0.500
Selenium	Se	0.100	NR
Selenium (E270.2)	Se	0.001	<0.001
Silicon	Si	0.025	0.260
Silver	Ag	0.01	<0.010
Sodium	Na	0.500	<0.500
Thallium (E279.2)	Tl	0.002	<0.002
Vanadium	V	0.01	<0.010
Zinc	Zn	0.01	<0.010
Total Petroleum Hydrocarbons	TPH	1.1	<1.1

NR = Not Reported

Table D-4a

General Chemistry Analysis Results
SITE 7

Field Sample ID			GW110
Sample Matrix			Aqueous
Parameter		MDL (mg/L)	Results (mg/L)
Total Dissolved Solids		10	390
Anions:	Fluoride	0.1	2.5
	Chloride	0.5	9.0
	Nitrate-Nitrogen	0.5	<0.5
	Phosphate*	0.5	<0.5
	Sulfate	0.5	0.93
Total Hardness		1.0	350

*Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

Table D-4b

General Chemistry Analysis Results
EQUIPMENT WASH BLANKS

Field Sample ID			GW111
Sample Matrix			Aqueous
Parameter		MDL (mg/L)	Results (mg/L)
Total Dissolved Solids		10	19
Anions:	Fluoride	0.1	<0.1
	Chloride	0.5	<0.5
	Nitrate-Nitrogen	0.5	<0.5
	Phosphate*	0.5	<0.5
	Sulfate	0.5	<0.5
Total Hardness		1.0	<1.0

*Orthophosphate was determined on samples which were not filtered in the field prior to preservation.

PRECISION/ACCURACY RESULTS

TABLES E-1 THROUGH E-4

Table E-1
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	VO72812MS	VO72812MSD		VO72922MS	VO72922MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	105	100	4.9	86	87	1.1	80-120	20
1,2-Dichloroethane	120	115	4.3	100	105	4.9	82-124	20
1,1,1-Trichloroethane	105	100	4.9	86	87	1.1	80-117	20
1,1-Dichloroethane	100	95	5.1	82	83	1.2	80-120	20
1,1,2-Trichloroethane	130 OC	110	17	107	113	5.4	80-120	20
1,1,2,2-Tetrachloroethane	135 OC	125 OC	7.7	110	121 OC	9.5	80-120	20
Chloroethane	95	90	5.4	76 OC	75 OC	1.3	80-120	20
Chloroform	110	105	4.7	92	94	2.1	58-124	20
1,1-Dichloroethene	85	80 OC	6.1	68 OC	69 OC	1.4	84-189	20
trans-1,2-Dichloroethene	95	90	5.4	77 OC	77 OC	0	80-120	20
1,2-Dichloropropane	110	105	4.7	90	94	4.3	80-120	20
total-1,3-Dichloropropene	132 OC	110	18	103	110	6.6	80-120	20
Methylene Chloride	80	75 OC	6.5	71 OC	73 OC	2.8	80-120	20
Chloromethane	49 OC	48 OC	2.1	37 OC	37 OC	0	80-120	20
Bromomethane	70 OC	65 OC	7.4	56 OC	54 OC	1.8	80-120	20
Bromoform	130 OC	125 OC	3.9	112	130 OC	14.9	80-120	20
Bromodichloromethane	125 OC	115	8.3	102	108	5.7	80-120	20
Fluorotrichloromethane	75 OC	70 OC	6.9	60 OC	60 OC	0	80-120	20
Chlorodibromomethane	120	110	8.7	101	110	8.5	75-123	20
Tetrachloroethene	110	100	9.5	91	94	3.2	74-127	20
Trichloroethene	110	105	4.7	89	91	2.2	68-115	20
Vinyl Chloride	80	75	6.4	63	62	1.6	28-163	20
Chlorobenzene	55 OC	48 OC	14	87	90	3.3	80-120	20
1,3-Dichlorobenzene	95	85	11	75 OC	78 OC	3.9	80-120	20
1,2-Dichlorobenzene	110	100	9.5	84	91	8.0	71-127	20
1,4-Dichlorobenzene	120	110	8.7	95	100	5.1	80-120	20

Table E-1 (continued)
Matrix Spike/Matrix Spike Duplicate Results:
Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds

Laboratory ID	VO72992MS	VO72992MSD		VO72629MS	VO72629MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results (% Recovery)	Results (% Recovery)	RPD	Results (% Recovery)	Results (% Recovery)	RPD	Control Limits (% Recovery)	RPD
Carbon Tetrachloride	100	100	0	105	105	0	80-120	20
1,2-Dichloroethane	110	110	0	110	110	0	82-124	20
1,1,1-Trichloroethane	100	100	0	105	105	0	80-117	20
1,1-Dichloroethane	95	95	0	100	105	4.9	80-120	20
1,1,2-Trichloroethane	105	105	0	115	110	4.4	80-120	20
1,1,2,2-Tetrachloroethane	110	115	4.4	120	110	8.7	80-120	20
Chloroethane	80	75 OC	6.5	95	95	0	80-120	20
Chloroform	105	105	0	110	110	0	58-124	20
1,1-Dichloroethene	95	75 OC	24 OC	90	90	0	84-189	20
trans-1,2-Dichloroethene	95	90	5.4	100	95	5.1	80-120	20
1,2-Dichloropropane	100	100	0	105	105	0	80-120	20
total-1,3-Dichloropropene	103	105	1.9	115	113	1.8	80-120	20
Methylene Chloride	85	85	0	95	95	0	80-120	20
Chloromethane	34 OC	32 OC	6.1	55 OC	55 OC	0	80-120	20
Bromomethane	60 OC	60 OC	0	75 OC	75 OC	0	80-120	20
Bromoform	110	110	0	120	115	4.3	80-120	20
Bromodichloromethane	110	110	0	115	115	0	80-120	20
Fluorotrichloromethane	65 OC	65 OC	0	85	80	6.1	80-120	20
Chlorodibromomethane	105	105	0	115	110	4.4	75-123	20
Tetrachloroethene	105	105	0	110	110	0	74-127	20
Trichloroethene	105	105	0	110	115	4.4	68-115	20
Vinyl Chloride	60	55	8.7	85	85	0	28-163	20
Chlorobenzene	100	95	5.1	105	105	0	80-120	20
1,3-Dichlorobenzene	95	93	2.1	95	95	0	80-120	20
1,2-Dichlorobenzene	110	100	9.5	105	105	0	71-127	20
1,4-Dichlorobenzene	120	120	0	120	120	0	80-120	20

Table E-2

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO72812MS	PO72812MSD		PO72922MS	PO72922MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	105	100	4.9	100	97	3.0	80-120	20
1,2-Dichlorobenzene	115	105	9.9	105	104	1.0	71-127	20
1,3-Dichlorobenzene	110	105	4.7	104	101	2.9	80-120	20
1,4-Dichlorobenzene	120	110	8.7	110	109	0.9	80-120	20
Benzene	105	95	10	97	93	4.2	41-154	20
Toluene	105	95	10	99	96	3.1	80-120	20
Ethylbenzene	100	95	5.1	95	93	2.1	80-120	20

Table E-2 (continued)

Matrix Spike/Matrix Spike Duplicate Results
Volatile Organic Compounds(SW5030/8020)
Purgeable Aromatic Organics

Laboratory I.D.	PO72992MS	PO72992MSD		PO72629MS	PO72629MSD			
Sample Matrix	Aqueous	Aqueous		Aqueous	Aqueous			
Compound	Results % Recovery	Results % Recovery	RPD	Results % Recovery	Results % Recovery	RPD	Control Limits (% Recovery)	RPD
Chlorobenzene	95	95	0	100	100	0	80-120	20
1,2-Dichlorobenzene	105	105	0	110	110	0	71-127	20
1,3-Dichlorobenzene	105	105	0	105	105	0	80-120	20
1,4-Dichlorobenzene	110	110	0	115	120	4.3	80-120	20
Benzene	95	95	0	100	100	0	41-154	20
Toluene	95	95	0	100	100	0	80-120	20
Ethylbenzene	95	95	0	100	100	0	80-120	20

Table E-3

Matrix Replicate/Matrix Spike Results: Metals, TPH

Laboratory ID Sample Matrix Parameter	Code	M207 Aqueous Original (mg/L)	M207MR Aqueous Replicate (mg/L)	RPD	M207MS Spike Recovery (%)	Control Limits (% Recovery)	RPD
Aluminum	Al	NA	NA	-	NA	75-125	20
Antimony	Sb	ND	ND	0	98	75-125	20
Arsenic	As	NA	NA	-	NA	75-125	20
Arsenic(E206.2)	As	NA	NA	-	NA	75-125	20
Barium	Ba	NA	NA	-	NA	75-125	20
Beryllium	Be	ND	ND	0	96	75-125	20
Boron	B	NA	NA	-	NA	75-125	20
Cadmium	Cd	ND	ND	0	106	75-125	20
Calcium	Ca	NA	NA	-	NA	75-125	20
Chromium	Cr	ND	ND	0	95	75-125	20
Cobalt	Co	NA	NA	-	NA	75-125	20
Copper	Cu	0.056	0.053	5.5	98	75-125	20
Iron	Fe	NA	NA	-	NA	75-125	20
Lead(E239.2)	Pb	ND	ND	0	96	75-125	20
Lead	Pb	NA	NA	-	NA	75-125	20
Magnesium	Mg	NA	NA	-	NA	75-125	20
Manganese	Mn	NA	NA	-	NA	75-125	20
Mercury(E245.1)	Hg	NA	NA	-	NA	80-120	20
Molybdenum	Mo	NA	NA	-	NA	75-125	20
Nickel	Ni	0.021	ND	200 OC	100	75-125	20
Potassium	K	NA	NA	-	NA	75-125	20
Selenium	Se	NA	NA	-	NA	75-125	20
Selenium(E270.2)	Se	NA	NA	-	NA	75-125	20
Silicon	Si	NA	NA	-	NA	75-125	20
Silver	Ag	ND	ND	0	100	75-125	20
Sodium	Na	NA	NA	-	NA	75-125	20
Thallium	Tl	NA	NA	-	NA	75-125	20
Vanadium	V	NA	NA	-	NA	75-125	20
Zinc	Zn	0.300	0.290	3.4	94	75-125	20
Total Petroleum Hydrocarbons	TPH	NA	NA	-	NA	75-125	20

Table E-4

Matrix Replicate/Matrix Spike Results: General Chemistry

Laboratory ID Sample Matrix Parameter	72814 Aqueous Original (mg/L)	I72814MR Aqueous Replicate (mg/L)	RPD	Spike Recovery (%)	76639 Aqueous Original (mg/L)	I76639MR Aqueous Replicate (mg/L)	RPD	Spike Recovery (%)	Control Limits (% Recovery)	RPD
Total Dissolved Solids	NA	NA	-	NA	NA	NA	-	N/A	ND/R	ND/R
Anions: Flouride	ND	ND	0	NA	NA	NA	-	NA	69-135	14.5
Chloride	ND	ND	0	NA	NA	NA	-	NA	46-114	12.6
Nitrate-Nitrogen	ND	ND	0	NA	NA	NA	-	NA	67-125	12.3
Phosphate	ND	ND	0	NA	NA	NA	-	NA	ND/R	ND/R
Sulfate	ND	ND	0	NA	NA	NA	-	NA	71-124	11
Total Hardness	NA	NA	-	NA	350	340	2.9	N/A	ND/R	ND/R

ND/R - Not defined or reported by the laboratory; control limits unavailable.

METHOD BLANK RESULTS

TABLES F-1 THROUGH F-3

Table F-1

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V00419MB-1	V00419MB-2	V00423MB-1	V00417MB	V00419MB	V00417MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Analysis Type		Primary	Primary	Primary	Primary	Conf.	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	<0.8	<0.8	2.1	4.4	1.3	3.3
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table F-1 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		VO0419MB-1	VO0419MB-2	VO0423MB-1	VO0417MB	VO0419MB	VO0417MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Analysis Type		Primary	Primary	Primary	Primary	Conf.	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:							
Bromochloromethane	62-140	100	100	100	100	100	100
1-Chloro-2-bromopropane	73-127	100	100	100	100	100	100
1,4-Dichloropropane	64-136	100	100	100	100	100	100

Table F-1 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V00420MB	V00423MB-2	V00419MB-2	V00423MB	V00416MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Analysis Type		Conf.	Primary	Conf.	Conf.	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Carbon Tetrachloride	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1,1-Trichloroethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Chloroethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
2 Chloroethylvinyl ether	10	<10	<10	<10	<10	<10
Chloroform	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
trans-1,2-Dichloroethene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloropropane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
cis-1,3-Dichloropropene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Methylene Chloride	0.8	2.0	2.1	1.3	3.4	3.3
Chloromethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromomethane	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Bromoform	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Bromodichloromethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50
Fluorotrichloromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dichlorodifluoromethane	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chlorodibromomethane	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
Tetrachloroethene	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Trichloroethene	1	<1.0	<1.0	<1.0	<1.0	<1.0

Table F-1 (continued)

Organic Analysis Results: Volatile Organic Compounds (SW5030/8021)
Purgeable Halocarbon Compounds
METHOD BLANKS

Field Sample ID		V00420MB	V00423MB-2	V00419MB-2	V00423MB	V00416MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Analysis Type		Conf.	Primary	Conf.	Conf.	Conf.
	MDL (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Vinyl Chloride	0.8	<0.80	<0.80	<0.80	<0.80	<0.80
Chlorobenzene	0.4	<0.40	<0.40	<0.40	<0.40	<0.40
1,3-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
1,4-Dichlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogates:						
Bromochloromethane	62-140	100	100	100	100	100
1-Chloro-2-bromopropane	73-127	100	100	100	100	100
1,4-Dichloropropane	64-136	100	100	100	100	100

Table F-2

Organic Analysis Results: Purgeable Aromatic Organics (SW5030/8020)
METHOD BLANKS

Field Sample ID		P00419MB-1	P00419MB-2	P00423MB-1	P00417MB	P00417MB	P00424MB	P00423MB-2	P00423MB	P00416MB
Sample Matrix		Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Analysis Type		Primary Results	Primary Results	Primary Results	Primary Results	Conf. Results	Conf. Results	Primary Results	Conf. Results	Conf. Results
	MDL (ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Compound	Control Limits	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery	Surrogate % Recovery
Chlorobenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
1,4-Dichlorobenzene	0.7	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Benzene (See Note)	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Total Xylenes	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	0.32	<0.30	<0.30	<0.30
Ethylbenzene	0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Surrogate:										
a,a,a-Trifluorotoluene	69-129	100	100	100	100	100	100	100	100	100

Note: Benzene and Trichlorethylene co-elute on the column used for primary analysis, therefore, value may be biased.

Table F-3
Inorganic Analysis Results: Metals
METHOD BLANKS

Field Sample ID			M920MB	M360MB
Sample Matrix			Aqueous	Aqueous
Parameter	Code	MDL (mg/L)	Results (mg/L)	Results (mg/L)
Aluminum	Al	0.2	NA	<0.200
Antimony	Sb	0.065	<0.065	NA
Arsenic	As	0.05	NR	NA
Arsenic (E206.2)	As	0.001	<0.001	NA
Barium	Ba	0.01	NA	<0.010
Beryllium	Be	0.002	<0.002	NA
Boron	B	0.01	NA	<0.010
Cadmium	Cd	0.005	<0.005	NA
Calcium	Ca	0.50	NA	<0.500
Chromium	Cr	0.015	<0.015	NA
Cobalt	Co	0.010	NA	<0.010
Copper	Cu	0.015	<0.015	NA
Iron	Fe	0.025	NA	<0.025
Lead	Pb	0.05	NR	NA
Lead (E239.2)	Pb	0.001	<0.001	NA
Magnesium	Mg	0.50	NA	<0.500
Manganese	Mn	0.005	NA	<0.005
Mercury (E245.1)	Hg	0.0002	<0.0002	NA
Molybdenum	Mo	0.010	NA	<0.010
Nickel	Ni	0.015	<0.015	NA
Potassium	K	0.5	NA	<0.500
Selenium	Se	0.100	NR	NA
Selenium (E270.2)	Se	0.001	<0.001	NA
Silicon	Si	0.025	NA	<0.025
Silver	Ag	0.01	<0.010	NA
Sodium	Na	0.50	NA	<0.500
Thallium (E279.2)	Tl	0.002	<0.002	NA
Vanadium	V	0.01	NA	<0.010
Zinc	Zn	0.01	<0.010	NA

QC SUMMARY

TABLES G-1a THROUGH G-2a

Table G-1a
QC Summary: Precision and Accuracy
Volatile Organic Compounds(SW5030/8021)
Purgeable Halocarbon Compounds

	Accuracy					Precision				
Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Carbon Tetrachloride	8	86-105	80-120	8	0	4	0-4.9	20	4	0
1,2-Dichloroethane	8	100-120	82-124	8	0	4	0-4.9	20	4	0
1,1,1-Trichloroethane	8	86-105	80-117	8	0	4	0-4.9	20	4	0
1,1-Dichloroethane	8	82-105	80-120	8	0	4	0-5.1	20	4	0
1,1,2-Trichloroethane	8	105-130	80-120	7	1	4	0-17	20	4	0
1,1,2,2-Tetrachloroethane	8	110-135	80-120	5	3	4	4.4-9.5	20	4	0
Chloroethane	8	75-95	80-120	5	3	4	0-6.5	20	4	0
Chloroform	8	92-110	58-124	8	0	4	0-4.7	20	4	0
1,1-Dichloroethane	8	68-95	84-189	4	4	4	0-24	20	3	1
trans-1,2-Dichloroethane	8	77-100	80-120	6	2	4	0-5.4	20	4	0
1,2-Dichloropropane	8	90-110	80-120	8	0	4	0-4.7	20	4	0
total-1,3-Dichloropropene	8	103-132	80-120	7	1	4	1.8-18	20	4	0
Methylene Chloride	8	71-95	80-120	5	3	4	0-6.5	20	4	0
Chloromethane	8	32-55	80-120	0	8	4	0-6.1	20	4	0
Bromomethane	8	54-75	80-120	0	8	4	0-7.4	20	4	0
Bromoform	8	110-130	80-120	5	3	4	0-14.9	20	4	0
Bromodichloromethane	8	102-125	80-120	7	1	4	0-8.3	20	4	0
Fluorotrichloromethane	8	60-85	80-120	2	6	4	0-6.9	20	4	0
Chlorodibromomethane	8	101-120	75-123	8	0	4	0-8.7	20	4	0
Tetrachloroethane	8	91-110	74-127	8	0	4	0-9.5	20	4	0
Trichloroethane	8	89-115	68-115	8	0	4	0-4.7	20	4	0
Vinyl Chloride	8	55-85	28-163	8	0	4	0-8.7	20	4	0
Chlorobenzene	8	48-105	80-120	6	2	4	0-14	20	4	0
1,3-Dichlorobenzene	8	75-95	80-120	6	2	4	0-11	20	4	0
1,2-Dichlorobenzene	8	84-110	71-127	8	0	4	0-9.5	20	4	0
1,4-Dichlorobenzene	8	95-120	80-120	8	0	4	0-8.7	20	4	0
Total	208			161	47	104			103	1

Table G-1b
QC Summary: Precision and Accuracy
Purgeable Aromatic Organics (SW5030/8020)

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Chlorobenzene	8	95-105	80-120	8	0	4	0-4.9	20	4	0
1,2-Dichlorobenzene	8	104-115	71-127	8	0	4	0-9.9	20	4	0
1,3-Dichlorobenzene	8	101-110	80-120	8	0	4	0-4.7	20	4	0
1,4-Dichlorobenzene	8	109-120	80-120	8	0	4	0-8.7	20	4	0
Benzene	8	93-105	41-154	8	0	4	0-10	20	4	0
Toluene	8	95-105	80-120	8	0	4	0-10	20	4	0
Ethylbenzene	8	93-100	80-120	8	0	4	0-5.1	20	4	0
Total	56			56	0	28			28	0

Table G-1c
QC Summary: Precision and Accuracy
Metals, TPH

Parameter	Accuracy					Precision				
	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits	Total Number Analyses	RPD Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Aluminum	0	-	75-125	-	-	0	-	20	-	-
Antimony	1	98	75-125	1	0	1	0	20	1	0
Arsenic	0	-	75-125	-	-	0	-	20	-	-
Arsenic(E2062)	0	-	75-125	-	-	0	-	20	-	-
Barium	0	-	75-125	-	-	0	-	20	-	-
Beryllium	1	96	75-125	1	0	1	0	20	1	0
Boron	0	-	75-125	-	-	0	-	20	-	-
Cadmium	1	106	75-125	1	0	1	0	20	1	0
Calcium	0	-	75-125	-	-	0	-	20	-	-
Chromium	1	95	75-125	1	0	1	0	20	1	0
Cobalt	0	-	75-125	-	-	0	-	20	-	-
Copper	1	98	75-125	1	0	1	5.5	20	1	0
Iron	0	-	75-125	-	-	0	-	20	-	-
Lead(E239.2)	1	96	75-125	1	0	1	0	20	1	0
Lead	0	-	75-125	-	-	0	-	20	-	-
Magnesium	0	-	75-125	-	-	0	-	20	-	-
Manganese	0	-	75-125	-	-	0	-	20	-	-
Mercury(E245.1)	0	-	75-125	-	-	0	-	20	-	-
Molybdenum	0	-	75-125	-	-	0	-	20	-	-
Nickel	1	100	75-125	1	0	1	200	20	0	1
Potassium	0	-	75-125	-	-	0	-	20	-	-
Selenium	0	-	75-125	-	-	0	-	20	-	-
Selenium(E290.2)	0	-	75-125	-	-	0	-	20	-	-
Silicon	0	-	75-125	-	-	0	-	20	-	-
Silver	1	100	75-125	1	0	1	0	20	1	0
Sodium	0	-	75-125	-	-	0	-	20	-	-
Thallium	0	-	75-125	-	-	0	-	20	-	-
Vanadium	0	-	75-125	-	-	0	-	20	-	-
Zinc	1	94	75-125	1	0	1	3.4	20	1	0
Total Petroleum Hydrocarbons	0	-	75-125	-	-	0	-	20	-	-
Total	9			9	0	9			8	1

Table G-1d
QC Summary: Precision and Accuracy
General Chemistry

Parameter	Accuracy: Total Number Analyses	Accuracy: Percent Recovery Ranges	Accuracy: Control Limits	Accuracy: Number Within Control Limits	Accuracy: Number Outside Control Limits	Precision: Total Number Analyses	Precision: RPD Ranges	Precision: Control Limits	Precision: Number Within Control Limits	Precision: Number Outside Control Limits
Total Dissolved Solids	Spike Analyses Not Performed for this Parameter - Not Applicable					0	NA	ND/R	NA	0
Anions: Fluoride	0	NA	69-135	NA	NA	1	0	14.5	1	0
Chloride	0	NA	46-114	NA	NA	1	0	12.6	1	0
Nitrate-Nitrogen	0	NA	67-125	NA	NA	1	0	12.3	1	0
Phosphate	0	NA	ND/R	NA	NA	1	0	ND/R	1	0
Sulfate	0	NA	71-124	NA	NA	1	0	ND/R	1	0
Total Hardness	Spike Analyses Not Performed for this Parameter - Not Applicable					1	2.9	ND/R	1	0
Total						6			6	0

ND/R = Not defined or reported by the laboratory; statistical control limits unavailable. For the purpose of estimating precision and accuracy, a guideline of RPD < 25 and recovery between 75-125 percent was used as control limits.

Table G-2a
QC Summary: Surrogate Recoveries - Volatile/Purgeable Organic Analyses
(SW5030/8021 and SW5030/8020)

Parameter	Total Number Analyses	Percent Recovery Ranges	Control Limits	Number Within Control Limits	Number Outside Control Limits
Volatile Halocarbons Analyses					
Bromochoromethane	25	70-104	62-140	25	0
1-Chloro-2-bromopropane	25	75-112	73-127	25	0
1,4-Dichloropropane	25	79-108	64-136	25	0
Purgeable Aromatic Analyses					
a,a,a-Trifluorotoluene	25	88-104	69-129	25	0
Total	100			100	0

Note: These surrogate recoveries include only those reported for the primary analyses.

APPENDIX IV A

CHAIN OF CUSTODY FORMS

1241 14

Chain of Custody Record

Science Applications International Corporation
An Employee-Owned Company

Date 4/13/90 Page 1 of 1

Shipment No. #1A

Name John Vanderslice
Address One Sears Dr. Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager B. Langer
Project Name NFIAP RI/FS
Job/P.O. No. 1-835-06-858-10

Sampler (Signature) John E. Vanderslice (Printed Name) John Vanderslice

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purgeable Halocarbons / Aromatics SW5030/8021												Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
72626	wtr	GW-100	4/13/90	3:00	Site 13	X	—												2	
27	wtr	GW-101		3:10		X													2	Temp of CB 1A 4 °C at shipment
28	wtr	GW-102		3:20		X													2	
29	wtr	GW-103		3:30		X													2	
72630	wtr	GW-104		3:40		X													2	
31	wtr	GW-105		3:50		X													2	
32	wtr	GW-106		4:00		X	—												2	
33	wtr	GW-107	↓	4:10	↓	X	—												2	
72634	wtr	CB-1A	4/13/90	4:20	—													X	1	Temp. of CB 1A upon Rec. at Lab ___ °C

Laboratory Name Ecology & Environment
Address 4285 Genessee St.
Buffalo, NY 14225
Phone ~~716~~ (716) 631-0360
Contact Name Bill Howard

Total Number of Containers: 15

Relinquished by: John E. Vanderslice — Signature — John Vanderslice — Printed Name — SAIC — Company — Date 4/13/90 — Time 5:53

Received by: John M. Stack — Signature — John M. Stack — Printed Name — Ecology + Environment — Company — Date — Time

Relinquished by — Signature — Printed Name — Company — Date — Time

Received by — Signature — Printed Name — Company — Date — Time

Shipment Method:

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

Oakridge
800 Oakridge Turnpk., Oakridge, TN 37830
(615) 482 9031

Paramus
One Sears Drive, Paramus, NJ 07652
(201) 599 0100

Denver
1626 Cole Boulevard, Suite 270, Golden, CO 80401
(303) 231 9094

Seattle
13400B Northup Way, S38, Bellevue, WA 98005
(206) 747 7899

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(619) 535 7438

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2986

(9000.700-540)

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Date 4-17-90 Page 1 of 1

Shipment 2 of 2

Name John J King
Address One Sears Dr Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Lanyer
Project Name Niagara IAP RI/FS
Job/P.O. No. 1-835-06-850-XX

Sampler (Signature) John J King (Printed Name) John J King

Requested Parameters

Laboratory No	Matrix	Sample No.	Date	Time	Site/Zone	Target Analytes/Analytes 8010/8021	Petroleum Hydrocarbons E418.1	Mercury Only E245.1	Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
72811	Water	GW-108	4-17-90	—	Site 7	X				2	Temperature of CB2A at
12	"	GW-109	4-17-90	1120	Site 7	X				2	shipment = 3°C
13	"	GW-110	4-17-90	1150	Site 7	X	X			5	
72814	"	GW-111	4-17-90	1132	Site 7	X	X			5	VOA labels should read less
											than 2pH
72815	Water	SW-15	4-17-90	1230	Site 9			X		1	
72816	"	SW-16	4-17-90	1230	Site 9			X		1	
72817	"	SW-17	4-17-90	1230	Site 9			X		1	
											Temperature of CB2A at
72818	Water	CB-2A	4-17-90	—	—				X	1	upon receipt by lab 34° 3.1°C
											4° 5°C

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

Relinquished by: John J King — Date 4/17/90 — Time 1536
Printed Name: John J King
Company: SAIC

Received by: J. Hendricks — Date 4-17-90 — Time 3:35 PM
Printed Name
Company

Relinquished by
Signature
Printed Name
Company
Date
Time

Received by
Signature
Printed Name
Company
Date
Time

Total Number of Containers: 18

Shipment Method: Drop Off

Instructions

1. Fill out form completely except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

SAIC Location (circle)

Washington, D.C.
8400 Westpark Dr., McLean, VA 22102
(703) 734 2500

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Paramus
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Denver
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Seattle
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Date 4-18-90 Page 1 of 1

Shipment No. 3A

Name John J King
Address One Sears Dr Paramus, NJ 07652
Phone Number (201) 599-0100
Project Manager Barry Laager
Project Name Niagara Falls IAP RIFS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Purg Halocarbons/Aromatics SW5030/8021	Temperature	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
7219	Water	GW-112	4-18-90	1309	Site 9			2	Temperature of CB-3A at shipment 3 °C
20	"	GW-113	"	1309	"			2	
21	"	GW-114	"	1438	"			2	
22	"	GW-115	"	1504	"			2	
23	"	GW-116	"	1317	"			2	
24	"	GW-117	"	1445	"			2	
25	"	GW-118	"	1338	"			2	
7229 26 MM	"	GW-119	"	1445	"			2	
~~Trip Blank~~	Water	CB-3A	4-18-90	—	—			1	
									Temperature of CB-3A at upon receipt 34 °F °C

Requested Parameters

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Howard

Relinquished by	Date	Received by	Date
Signature: John J King	4-18-90	Signature: [illegible] Ann	4-18-90
Printed Name: John J King	Time: 1827	Printed Name:	Time: 1827
Company: SAIC		Company:	
Relinquished by	Date	Received by	Date
Signature:		Signature:	
Printed Name:	Time	Printed Name:	Time
Company:		Company:	

Total Number of Containers: 17

Shipment Method: Drop Off

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually

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(619) 546 7438

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Date 4-19-90 Page 1 of 1

TWW. 950 SAA 5 WATERS

Shipment # 43A

Name John J King
Address One Sears Dr Paramus, NJ
Phone Number (201) 599-0100
Project Manager Barry Langer
Project Name Niagara Falls IAP RI/FS
Job/P.O. No. 1-835-06-858-XX

Sampler (Signature) John J King (Printed Name) John J King

Laboratory No.	Matrix	Sample No.	Date	Time	Site/Zone	Requested Parameters: Purg Hx Locations/Aromatics SW 5030/8021	Temperature	No. of Containers	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
72991	Water	GW-120	4-19-90	—	Site 9	X		2	Temperature of CB-4A at shipment 3°C
72992	"	GW-121	"	1046	"	X		2	
72993	"	GW-122	"	1049	"	X		2	
72994	"	GW-123	"	1058	"	X		2	
72995	"	GW-124	"	1109	"	X		2	
					"				
—	Water	CB-4A	4-19-90	—	—		X	1	
									Temperature of CB-4A upon receipt 4 °C

000071

Relinquished by: John J King (Signature) / John J King (Printed Name) / SAIC (Company) — Date 4-19-90 — Time 1642

Received by: M Burnett (Signature) / M. BURNETT (Printed Name) / E+E (Company) — Date 4-19-90 — Time 1642

Relinquished by: (Signature) / (Printed Name) / (Company) — Date — Time

Received by: (Signature) / (Printed Name) / (Company) — Date — Time

Total Number of Containers: 11

Shipment Method: Drop Off

Instructions

1. Fill out form completly except for shaded areas (lab use only).
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Request analyses using EPA method method numbers only. Consult the project QAPP for instructions. Complete as shown.
4. Reference all field QC samples to the applicable site or zone.
5. Note all applicable preservatives.
6. Group all sample containers and requested analyses from one sampling location together. Do not list individually.

Laboratory Name Ecology & Environment
Address 4285 Genesee St
Buffalo, NY 14225
Phone (716) 631-0360
Contact Name Bill Havard

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INSTALLATION RESTORATION PROGRAM (IRP)

RI/FS

VOLUME IVE

Appendix G

Niagara Falls International Airport
Niagara Falls, New York

Science Applications International Corporation (SAIC)
One Sears Drive
Paramus, New Jersey 07652

MAY 1991

Remedial Investigation/ Feasibility Study (RI/FS) Report 1987-1990

PREPARED FOR

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE RESERVE
ROBINS AIR FORCE BASE, GEORGIA 31098-6001

UNITED STATES AIR FORCE
HUMAN SYSTEMS DIVISION (AFSC)
IRP PROGRAM OFFICE (HSD/YAQI)
BROOKS AIR FORCE BASE, TEXAS 78235-5000

APPENDIX G. PUBLIC HEALTH RISK EVALUATION PROCESS AND SUMMARY OF BASELINE RISK ASSESSMENT

G.1 INTRODUCTION

Risk Assessment is an essential component of the Remedial Investigation Feasibility Study (RI/FS) process at hazardous waste sites. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP: the regulation that implements CERCLA), require that actions selected to remedy hazardous waste sites be protective of human health and the environment. An overview of risk assessment in the RI/FS process is presented in the NCP and in the EPA manual Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA 1988b). A baseline risk assessment is conducted as part of the RI to assess site conditions in the absence of remedial actions. As part of the FS process, risk assessment is used to evaluated the acceptability of proposed remedial actions and as a tool in the development of remediation objectives (target cleanup levels).

A preliminary baseline public health risk assessment has been conducted for waste sites under evaluation at Niagara Falls IAP. The public health risk assessment at Niagara Falls IAP examines the presence and release of chemicals from the sites under investigation, the observed levels of the compounds in the environment, the potential routes of exposure to human receptors, and the likelihood of adverse health effects following contact with contaminated environmental media. A detailed overview of the assessment methods used is presented in the following discussion. The focus of this evaluation is not an absolute assessment of the risks of exposure to the chemicals present at the sites under investigation. Rather, this evaluation is an assessment of the relative magnitude of anticipated health problems that may be associated with exposure to chemicals detected at the site. The intention is to determine if there is a significant threat to human health and to assess the need for further site remediation.

G.2 OVERVIEW OF METHODS

The general approach to public health risk evaluation of exposure to chemical contaminants has been well-established. The National Research Council (NRC) prepared a comprehensive overview of the structure of this assessment (NRC 1983) that has become the foundation for subsequent EPA guidance. The Human Health Evaluation Manual and the Environmental Evaluation Manual (USEPA 1989a,b) provide a detailed presentation of the risk assessment process. These documents are the Agency's key guidance on risk assessment under the Superfund Program. As specified by EPA, the public health evaluation process may be divided into four fundamental component analyses: (1) data evaluation and hazard identification, (2) exposure assessment, (3) toxicity or hazard assessment, and (4) risk characterization. These analyses are briefly described in the following sections.

G.2.1 Data Evaluation and Hazard Identification

The first step in the risk assessment process is to obtain and evaluate all available data on contaminants present at the sites under investigation. The objective is to organize the data into a form appropriate for the baseline risk assessment. Once the preliminary data set has been obtained and sorted by environmental medium, the following evaluation steps should be completed:

- Evaluate the analytical methods used to determine if results are appropriate for use in quantitative risk assessment.
- Evaluate the quality of data with respect to sample quantitation and detection limits.
- Examine laboratory qualifiers assigned to monitoring data and evaluate potential QA/QC problems.
- Evaluate the quality of data with respect to blanks, and tentatively identified compounds (TICs).
- Summarize information on background concentrations of chemicals and compare with observed levels of site-related contamination.
- Identify chemicals of potential concern: develop a data set that may be appropriately used in the risk assessment process.
- If appropriate, further limit the number of chemicals to be used as the subject of the risk assessment.

From the full listing of all chemicals identified at a waste site or facility, a subset is identified that is of sufficient quality to be used in risk assessment. It may be impractical to evaluate all chemicals that have passed through QA/AC review. Representative "highest risk" compounds may be selected on the basis of: (1) quantities present at the site; (2) extent of environmental contamination, toxicity, or hazardousness; and (3) mobility and persistence of the chemical in the environment. This final step is specified as optional by EPA, and does not improve the quality or accuracy of the risk assessment. It is suggested as a device for facilitating the risk assessment process when time and resources prohibit the evaluation of the full (and often complex) data set.

G.2.2 Exposure Assessment

G.2.2.1 Overview of Exposure Assessment Process

The objectives of the exposure assessment are to: (1) delineate exposure pathways; (2) identify receptors at risk; and (3) measure or estimate for each receptor the intensity, duration, and frequency of the exposure. Critical to the exposure assessment is a quantification of the releases of contaminants of concern to each environmental medium (from all sources at the waste site) and an assessment of the transport and transformation of the subject compounds. The results of these analyses provide data on the

magnitude and extent of contamination. Both monitoring data and environmental transport modeling typically are used in the exposure assessment.

EPA has specified that actions at hazardous waste sites should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land-use conditions (USEPA 1989a). EPA defines the reasonable maximum exposure as the highest exposure that is reasonably expected to occur at a site. RMEs are estimated for individual pathways, and combined across exposure routes if appropriate.

Once receptors at risk are identified, environmental concentrations at points of exposure must be determined or projected. In the evaluation of Niagara Falls IAP, exposure concentrations are based completely on the results of site monitoring. No transport modeling has been used. Representative concentrations for use in risk assessment are taken as the arithmetic mean of the sampling results. "Not detected" results were treated as one half the limit of detection and included in calculation of the arithmetic mean.

Dose estimates (in mg/kg/day) are developed for each chemical of concern using the representative environmental concentrations (i.e., mean values). Estimates of dose are needed in the risk characterization and are generally determined as follows:

$$\text{Dose} = C \times \frac{CR \times EFD \times ABS}{BW \times AT}$$

Where

C = Chemical concentration in the environmental medium under evaluation.

CR = Contact rate; the amount of contaminated medium contacted per unit time or event.

EFD = Exposure frequency and duration; how long and often exposure occurs.

ABS = Absorption factor

BW = Body weight; the average over the exposure period.

and,

AT = Averaging time; the period over which exposure is averaged.

The equation above is used to derive estimates of subchronic or chronic dose (lifetime assumed to be 70 years). The chronic dose estimate based on mean concentrations in environmental samples (arithmetic mean) was used as the basis of the risk characterization at all sites under investigation.

G.2.2.2 Exposure Assessment for Niagara Falls IAP

Potentially Exposed Populations

The present and future land uses for the Base are projected to remain at current status. Niagara Falls IAP will be maintained by the Air Force, and is projected to retain its current function. Residential use of the Base is not a projected in the future.

There are three potentially exposed receptor groups at Niagara Falls IAP: 1) adult Base personnel (occupational exposure); 2) adults Base personnel participating in recreational activities (Site 8); and 3) visiting children, ages three through twelve, playing near the ballfields at Site 8. The adult workers would include office personnel and maintenance workers. Recreational exposure would include adults jogging and/or playing baseball on the facility and playing children (i.e., in the play ground located east of Site 8). The most sensitive exposure receptors group would be the children.

Adults (Base personnel: at all sites) and children (at Site 8) were the focus of the soil exposure assessment (i.e. ingestion and inhalation of particulates). With regard to drinking water consumption, the Base and surrounding community are served by a municipal water supply. There is no complete exposure pathway for ingestion exposure of Base personnel or the general public to contaminants in groundwater beneath Niagara Falls IAP waste sites. However, to provide an additional measure of the significance of the observed levels of groundwater contamination, drinking water exposures to groundwater were estimated "as if" Base personnel actually used the groundwater in the vicinity of each site as a potable supply.

The receptor groups noted above are evaluated to estimate increased risk of occupational, and/or recreational exposures (See Section 4). Current and future conditions were evaluated in terms of a no-action remedial alternative. The representative groups and the projected risks to human health may be used as indicators to establish the need for remedial action or additional site investigation. Particularly high risk activities are discussed in order to support effective remedial strategies and risk management options.

Identification of Exposure Pathways

Exposure pathways and contaminated media are identified and used to project exposure of receptor population to site contaminants. Characterization of each contaminant pathway consists of five elements. These are:

- Identify potential receptor populations.
- Characterize source and mechanism of chemical release to the environment.

- o Identify environmental transport media for release.
- o Identify exposure points where a receptor populations may come in contact with the contaminated media.
- o Characterize exposure routes at the exposure point.

Exposure profiles for each area and receptor group are provided in Table G-1.

At Niagara Falls IAP, receptor populations and pathways for soil exposure include: 1) adults whose activity would bring them into contact with contaminated soils (i.e., inhalation of particulates and indirect ingestion through skin contact and touching the mouth); and 2) children who visit the recreational facilities at Niagara Falls IAP (3-12 years) and may ingest soils and inhale particulates through play activities. The soil exposure scenarios would take place for approximately five months per year for adults and four months per year for children (i.e., late April through the end of August or early September: Niagara Falls IAP, 1990). Outdoor activities (i.e., baseball, playground activities) normally occur during the summer months. Therefore, four months to five months is a conservative assumption for yearly soil exposure.

Although dermal contact is considered a potential route of exposure for soils, risks to human health via this pathway have not been quantified. Several points of importance should be noted with regard to the exclusion of dermal absorption from the risk assessment. First and most importantly, this pathway is anticipated to contribute only a small fraction to the overall intake/dose experienced by receptors via inadvertent ingestion exposure of small quantities of dust/soil. Secondly, insufficient data are available to meaningfully project percutaneous absorption for the chemicals found in soils (i.e., chemical-specific absorption factors have not been developed by EPA). Third, verified toxicity measures are not available for the dermal exposure route. EPA does not advocate use of unadjusted oral reference doses (RfDs) or cancer slope factors (CSFs) for dermal absorption. Because of these issues, only a qualitative discussion of this exposure route is provided.

As noted above, Base personnel are the receptors included in the hypothetical evaluation of exposure to groundwater. This receptor group would include on-site maintenance workers and office personnel. The risk assessment of exposure to groundwater may be considered a hypothetical future use scenario. Note however, that chemicals in groundwater are assumed to be conservative i.e., that no transport or transformation occurs to reduce the currently observed concentrations. As such, the evaluation is clearly an extremely conservative, upper bound assessment.

The pathways and points of exposure are summarized in Table G-1. Soil/sediments, the atmosphere, and groundwater are the environmental media of concern. Food is not an exposure source for this study because no food items are grown on the Base. The following human exposure routes considered in the exposure estimations were:

- o Incidental ingestion of contaminated soils and dust
- o Ingestion of contaminated groundwater

TABLE G-1

NIAGARA FALLS IAP
EXPOSURE PROFILES FOR RECEPTOR GROUPS

RECEPTOR GROUP	EXPOSURE POINT	EXPOSURE PATHWAY AND ROUTE	TIME OF EXPOSURE	TYPE OF EVALUATION
Adults (20 year exposure period)	Site 1 - Groundwater Site 2 - Groundwater Site 3 - Groundwater, Soil Site 4 - Groundwater, Soil Site 5 - Groundwater, Soil Site 6 - Groundwater Site 7 - Groundwater, Soil Site 8 - Groundwater, Soil/Sediment, Air Site 9 - Groundwater, Soil Site 10 - Groundwater, Soil Site 11 - Soil Site 12 - Soil Site 13 - Groundwater, Soil	- Hypothetical ingestion of groundwater - Ingestion of soils and dust - Inhalation of particulates - Dermal absorp.	- Future - Current and Future - Current and Future - Current and Future	Quantitative Quantitative Quantitative Qualitative
Children (3-12 years)	Site 8 - Soil, Air	- Inadvertent ingestion of soils and dust - Inhalation of particulates - Dermal absorp.	- Current and Future - Current and Future - Current and Future	Quantitative Quantitative Qualitative

- o Inhalation of airborne particulates
- o Dermal contact with soils and dust.

Exposure to onsite surface water is not considered in the baseline risk assessment. The reason is that there is no plausible exposure pathway (even hypothetical exposure) for receptor groups under evaluation. Surface water on the Base however, may serve as a sink at some locations, for contaminants transported in runoff on groundwater from waste sites. Insufficient data are available to adequately evaluate the extent to which the waste sites under investigation contribute to levels of site-related chemicals in surface water. Of particular importance is the need to examine the transport of chemicals offsite via the surface water pathways. Release of contaminants to the Cayuga Creek may be of potential concern to the general public living offsite in the vicinity of Niagara Falls IAP.

Soil Ingestion

Adults and children may inadvertently ingest soils and dusts while outdoors. Estimations of soil ingestion rates were based on previous human soil consumption research. Binder et al. (1986), Walter et al. (1980), Cooper (1957), Charney et al. (1980), and Clausing et al. (1987) have performed child and adult soil ingestion investigations. Based on the observed behavior, adults and children were estimated to ingest 100 mg/day of soil. Due to the nature of the activities associated with children at play, they may have a higher soil ingestion rate. For this soil exposure scenario, a value of 200 mg/day was used. EPA has adopted these values as standard soil ingestion rates in the absence of site-specific information (USEPA 1989). The assumptions used for all exposure scenarios are provided in Table G-2.

Inhalation of Particulates

At Site 8, inhalation exposure to suspended particulates was included in the baseline risk assessment. Given the presence of a jogging tract, playground, and baseball field, this route of exposure was considered a pathway of concern. Monitoring data are not available on levels of site-related chemicals in the atmosphere in the vicinity of Site 8. Therefore, a screening level desktop model was use to projected ambient atmospheric concentrations. The inspired air is assumed to contain an atmospheric concentration of suspended particulates equal to 130 ug/m3. (Data were obtained from a location approximately two miles away. The value used is the maximum 24 hour concentration. See AFRES 1989) The concentration of subject chemicals in the air (CA) was determined as (CS) x (CTSP) where CS is the mean concentration in landfill soil and CTSP is the mean atmospheric level of total suspended particulates (method presented in USEPA 1984).

Groundwater Ingestion

The Base and surrounding community is provided with municipal water and groundwater is not currently used for domestic purposes. To provide an assessment of the onsite groundwater quality, it was assumed Base personnel ingest 1 liter of groundwater per workday. The arithmetic average of the concentrations of contaminants detected in the groundwater samples was used

as a conservative estimate in the exposure assessment. The assumptions used for the ingestion models are included in Table G-2.

G.2.2.3 Comparison with Applicable or Relevant and Appropriate Requirements

Once the baseline concentrations of subject chemicals have been determined at the waste sites, these levels are compared to applicable or relevant and appropriate requirements (ARARs). CERCLA of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 requires the selection of remedial actions at Superfund hazardous waste sites that are protective of human health and the environment, cost-effective, and technologically and administratively feasible. Section 121 of CERCLA specifies that response action must be undertaken in compliance with ARARs established in Federal and state environmental laws.

In the revised National Contingency Plan (NCP: 55 FR 8666) and the guidance document CERCLA Compliance with Other Laws Manual (USEPA 1988), several different types of requirements are identified with which Superfund remedial actions must comply: (1) ambient or chemical-specific requirements, (2) action-specific requirements, and (3) location-specific requirements. Because situations at CERCLA sites vary widely, EPA cannot categorically specify requirements that will be ARARs for every NPL site. ARARs can only be identified on a site-specific basis (i.e., established in connection with the characteristics of the particular site, the chemicals present at the site, and the remedial alternatives suggested by the circumstances of the site).

According to the guidance presented in the revised NCP, protectiveness (i.e., the ability to protect human health and the environment) means that a given remedial alternative meets or exceeds ARARs, or other risk-based levels established through a risk assessment when ARARs do not exist or are waived. In the NCP and in the guidance manual on CERCLA compliance with other laws (55 FR 8666, USEPA 1988a, 1989d), EPA specifies that when ARARs are not available for a given chemical, or where such ARARs are not sufficient to be protective, health advisory levels should be identified or developed in order to ensure that a remedy is protective.

For carcinogenic effects, these health advisory or cleanup levels are to be selected such that the total risk of all contaminants falls within the acceptable range of 10^{-4} to 10^{-6}. Although the 10^{-6} risk level is identified by EPA as a "point of departure" in evaluating the results of risk assessment, the revised NCP clearly indicates that the 10^{-4} level is the upper bound of the acceptable range (55 FR 8666). In cases where noncarcinogenic effects are a concern, EPA specifies that cleanup should be based on acceptable levels of exposure as determined by the EPA reference doses (RfDs), taking into account the effects of multiple contaminants and multiple exposure pathways at the site.

Therefore, chemical-specific ARARs serve two primary purposes: (1) requirements that must be met by a selected remedial alternative (unless a waiver is obtained), and (2) as a basis for establishing appropriate cleanup levels. The public health risk assessment of a given remedial action alternative characterizes the actual risk of exposure of human receptors to contaminants under investigation. For carcinogens, risk characterization yields a

TABLE G-2
NIAGARA FALLS IAP
EXPOSURE ASSUMPTIONS

VARIABLE	VALUE	NOTE
Adults: Ingestion of Soils		
Exposure period [years]	20	(a)
Body Weight [kg]	70	(b)
Soil Ingestion Rate [mg/day]	100	(c)
Number of Days per Week	2(3)	(d)
Number of Weeks per Year	20	(e)
Children: Ingestion of Soils		
Exposed period [years]	9	(f)
Body Weight [kg]	25	(b)
Soil Ingestion Rate [mg/day]	200	(c)
Number of Days per Week	5	(e)
Number of Weeks per Year	16	(e)
Adults: Inhalation of Particulates		
Exposure period [years]	20	(a)
Body Weight [kg]	70	(b)
Particulate Inhalation Rate: [m^3/hr]	3	(b)
Total suspended particulates [ug/m^3]	130	(g)
Number of Days per Week	2(3)	(d)
Number of Weeks per Year	20	(e)

(a) Best professional judgement: Twenty years was considered a reasonable length of time base personnel will be assigned to Niagara Falls AFRF. For the occupational scenario involing ingestion of water a normal work week (5 days per year; 50 weeks per year) was used with a reduced water intake of 1 liter per day (2 liters is the residential consumption rate).

TABLE G-2 (cont.)

VARIABLE	VALUE	NOTE
Children: Inhalation of Particulates		
Exposure period [years]	9	(f)
Body Weight [kg]	25	(b)
Particulate Inhalation Rate: [m^3/hr]	4.2	(b)
Total suspended particulates [ug/m^3]	130	(g)
Number of Days per Week	5	(e)
Number of Weeks per Year	16	(e)
Adults: Ingestion of Water		
Exposure period [years]	20	(a)
Body Weight [kg]	70	(b)
Water Ingestion Rate [L/day]	1	(a)
Number of Days per Week	5	(a)
Number of Weeks per Year	50	(a)

(b) U.S. EPA. 1989. Exposure Factors Handbook. Office of Health and Environmental Assessment. EPA/600/8-89/043

(c) U.S. EPA. 1989. Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002.

(d) Best professional judgement: Occupational scenarios were estimated using two contact days per week and recreational scenarios were estimated using three contact days per week.

(e) Niagara Falls AFRF. 1990. Personal communication between Bill Niver (Niagara Falls AFRF) and Marguerite Carpenter (SAIC).

(f) Best professional judgement: The age group which regularly uses a playground area was considered to be between 3 to 12 years.

(g) AFRES. 1989.

probabilistic estimate of the additional lifetime risk of cancer in the exposed individual or the incidence of new cases of cancer in populations. For noncarcinogens, exposure levels or doses for all subject compounds are evaluated to determine levels or doses if these exceed EPA RfDs. When an ARAR is available for all subject compounds of concern, and the ARARs are determined to be protective, these requirements become the chemical-specific cleanup goals. However, as noted above, when ARARs are found not to be protective or are not available, the results of the risk assessment (i.e., health advisory levels) are used to establish the more stringent target cleanup goals.

Thus, the requirement that a remedial alternative meet chemical-specific ARARs does not ensure that the proposed alternative is protective, and thereby potentially acceptable. This can be determined only by: (1) evaluating the combined carcinogenic risk associated with the ARAR limits for all chemicals at a given site (assuming additivity of effect in the absence of data on synergism or antagonism); (2) establishing that ARARs do not exceed USEPA RfDs for noncarcinogenic effects, and are sufficiently protective when multiple chemicals are present; (3) determining whether environmental effects (in addition to human health considerations) are adequately addressed by the ARARs; and (4) evaluating whether the ARARs adequately cover all significant pathways of human exposure identified in the baseline risk assessment. EPA has provided guidance on evaluating multiple exposure to chemicals (carcinogenic and noncarcinogenic effects) and on establishing acceptable exposure levels when no ARARs exist (USEPA 1986c, 1989a).

Table G-3 provides a listing of chemical-specific ARARs for all chemicals under investigation at Niagara Falls IAP.

G.2.3 Toxicity Assessment

The objectives of the toxicity or hazard assessment are to evaluate the inherent toxicity of the compounds under investigation, and to identify and select toxicological measures for use in evaluating the significance of the exposure. In the development of these toxicological measures, available dose-response data are reviewed on the adverse effects to human and nonhuman receptors. Dose-response assessments for noncarcinogens provide an estimate of the no-observable-adverse-effect level (NOAEL) or lowest-observable-adverse-effect level (LOAEL). For carcinogenic compounds, the dose-response assessment yields estimates of probability or range of probabilities under which a carcinogenic effect will occur at a specified level of exposure.

In conducting an assessment of risk of exposure to chemicals released from waste sites, several toxicity measures of importance may be identified:

- RfDs for oral exposure - acceptable intake values for subchronic and chronic exposure (noncarcinogenic effects)
- RfDs for inhalation exposure - acceptable intake values for subchronic and chronic exposure (noncarcinogenic effects)
- Carcinogenic potency factors for oral exposure

TABLE G-3 WATER QUALITY ARARs AND DRINKING WATER HEALTH ADVISORIES FOR CHEMICALS AT NIAGARA FALLS IAP

CHEMICAL	MCLs(a) (UG/L)	MCLGs(b) (UG/L)	FWQC-HH (c) HUMAN HEALTH: ADJUSTED FOR DRINKING WATER ONLY (UG/L)	FWQC-A (c) FRESHWATER ACUTE VALUE: AQUATIC LIFE (UG/L)	FWQC-C (c) FRESHWATER CHRONIC VALUE: AQUATIC LIFE (UG/L)	NEW YORK STATE WATER QUALITY REGULATIONS(n) (UG/L)	FEDERAL DRINKING WATER HEALTH ADVISORIES (k) ONE-DAY 10 KG(k) (UG/L)	TEN-DAY 10 KG(k) (UG/L)	LONGER-TERM 70-KG(m) (UG/L)	LIFETIME HEALTH ADVISORY (UG/L)
INORGANICS										
Antimony			146	9000	1600					
Arsenic	50	50[e]	0.025[f]	360	190	25	50	50	50	50
Barium	1000	5000[e]				1000	510	510	1800	1500
Beryllium			3.9	130	5.3					
Cadmium	10	5[e]	10	3.9	1.1	10	43	43	5	5
Chromium (III)			179000	1700	210					
Chromium (VI)	50	100[e]	50	16	11	50	1400	1400	240	120
Copper	1300[d]	1300[e]	1000[g]	18	12	1000				
Iron	300[q]				1000	300				
Lead	50	0[e]	50	82	3.2	25			20 ug/day	
Manganese	50[q]					300				
Mercury	2	2[e]	10	2.4	0.012	2	1.58	1.58	1.58	1.1
Nickel			15.4	1800	96		1000	1000	100	150
Selenium	10	50[d,e]	10	260	35	20				
Silver	50		50	4.1	0.12	50				
Thallium			17.8	1400	40					
Vanadium										
Zinc	5000		5000[g]	320	47	5000				

a. Maximum Contaminant Levels established under the Safe Drinking Water Act.
b. Maximum Contaminant Level Goal established under the Safe Drinking Water Act.
c. Federal Ambient Water Quality Criteria (FWQC) for human health and aquatic life established under the Clean Water Act.
d. Proposed MCL.
e. Proposed MCLG.
f. FWQC-HH for human health corresponding to the 10^{-6} risk level.
g. Criterion established based on taste and odor effects (organoleptic), not human health effects.
h. Maximum Contaminant Level for total trihalomethanes: the sum concentration of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
i. FWQC-HH for halomethanes as a class of compounds corresponding to the 10^{-6} risk level. Methylene chloride (dichloromethane) is a member of this class.
j. Federal Drinking Water Health Advisories are not ARARs but values to be considered (TBC) in evaluating the significance of observed levels of contamination in drinking water supplies. Information obtained from USEPA (1986, 1987a,b,c).
k. Drinking Water Health Advisory for a 10 kg child.
m. Drinking Water Health Advisory for a 70 kg adult.
n. New York State quality standards for class GA groundwaters. Federal MCLs are adopted by the state if state requirements have not been developed, or if MCLs are more stringent.
p. New York State groundwater quality standard: "Not detectable".
q. Secondary Maximum Contaminant Level(SMCL) established under the Safe Drinking Water Act - not an ARAR.

TABLE G-3 (CONT'D) WATER QUALITY ARARs AND DRINKING WATER HEALTH ADVISORIES FOR CHEMICALS AT NIAGARA FALLS IAP

CHEMICAL	MCLs(a) (UG/L)	MCLGs(b) (UG/L)	FWQC-HH (c) HUMAN HEALTH: ADJUSTED FOR DRINKING WATER ONLY (UG/L)	FWQC-A (c) FRESHWATER ACUTE VALUE: AQUATIC LIFE (UG/L)	FWQC-C (c) FRESHWATER CHRONIC VALUE: AQUATIC LIFE (UG/L)	NEW YORK STATE WATER QUALITY REGULATIONS(n) (UG/L)	FEDERAL DRINKING WATER HEALTH ADVISORIES (k) ONE-DAY 10 KG(k) (UG/L)	TEN-DAY 10 KG(k) (UG/L)	LONGER-TERM 70-KG(m) (UG/L)	LIFETIME HEALTH ADVISORY (UG/L)
ORGANICS										
Acetone										
Benzene	5	0	0.67[f]	5300		ND (p)	235	235		
Bis(2-Ethylhexyl) phthalate			21000	940	3	4200				
Chlorobenzene	100[d]	100[e]	488	250	50	100	4300	4300	4300	300
1,2-Dichlorobenzene	600[d]	600[e]	470	1120	763	600	8930	8930	8930	620
1,4-Dichlorobenzene	75	75[e]	470	1120	763	75	10700	10700	10700	75
1,1-Dichloroethane										
1,2-Dichloroethane	5	0	0.94[f]	118000	20000	5	740	740	740	
Cis-1,2-Dichloro-ethylene	70[d]	70[e]				70	4000	1000	3500	70
Trans-1,2-Dichloro-ethylene	100[d]	100[e]		11600		100	20000	1430	1430	70
Ethylbenzene	700[d]	700[e]	2400	32000		700	32000	32000	3400	680
Methyl Ethyl Ketone							75000	7500	2500	170
Methylene Chloride			0.19[i]	11000			13300	1500		
Toluene	2000[d]	2000[e]	15000	17500		2000	21500	3460	3460	2420
1,1,1-Trichloro ethane	200	200	19000			200	140000	35000	35000	200
Trichloroethene	5	0	2.8[f]	45000	21900	5				
Vinyl Chloride	2	0				2	2600	2600	46	
Xylenes	10000[d]	5000[e]				10000	12000	7800	7800	400

a. Maximum Contaminant Levels established under the Safe Drinking Water Act.
b. Maximum Contaminant Level Goal established under the Safe Drinking Water Act.
c. Federal Ambient Water Quality Criteria (FWQC) for human health and aquatic life established under the Clean Water Act.
d. Proposed MCL.
e. Proposed MCLG.
f. FWQC-HH for human health corresponding to the 10^{-6} risk level.
g. Criterion established based on taste and odor effects (organoleptic), not human health effects.
h. Maximum Contaminant Level for total trihalomethanes: the sum concentration of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.
i. FWQC-HH for halomethanes as a class of compounds corresponding to the 10^{-6} risk level. Methylene chloride (dichloromethane) is a member of this class.
j. Federal Drinking Water Health Advisories are not ARARs but values to be considered (TBC) in evaluating the significance of observed levels of contamination in drinking water supplies. Information obtained from USEPA (1986, 1987a,b,c).
k. Drinking Water Health Advisory for a 10 kg child.
m. Drinking Water Health Advisory for a 70 kg adult.
n. New York State quality standards for class GA groundwaters. Federal MCLs are adopted by the state if state requirements have not been developed, or if MCLs are more stringent.
p. New York State groundwater quality standard: "Not detectable".

- Carcinogenic potency factors for inhalation exposure.

The RfDs and potency factors for oral exposure are the toxicity measures needed in the assessment for Niagara Falls IAP. Long-term (i.e., chronic) exposure and health risk is the focus of the evaluation at all sites.

The primary sources of information for these data is the Integrated Risk Information System (IRIS) data base. IRIS is a computer-housed catalog of EPA risk assessment and risk management information for chemical substances. Data in the IRIS system is regularly reviewed and updated monthly. If toxicity measures are not available on IRIS, EPA recommends use of the EPA ORD Health Effects Assessment Summary Tables (HEAST: FY 1990. USEPA 1989c) as the second most current source of information. SAIC has on-line access to the IRIS Data Base and receives the quarterly HEAST publications from EPA ORD. Therefore, the risk assessment is based on the most up-to-date EPA-approved toxicity measures available for waste site evaluation.

A summary of the toxicity measures used in the evaluation of the waste sites at Niagara Falls IAP is presented in Table G-4. Toxicity measures for chronic oral exposure are used in the baseline risk assessment. However, the table provides a comprehensive list of RfDs (chronic and subchronic when available), carcinogenic potency factors (oral and inhalation routes), weight of evidence ratings, and sources of information. Toxicity profiles for each chemical evaluated in the baseline risk assessment are also included in this appendix.

G.2.4 Risk Characterization

The last step in the baseline public health evaluation is risk characterization. This is the process of integrating the results of the exposure and hazard (toxicity) assessment (i.e., of comparing estimates of dose with appropriate toxicological endpoints to determine the likelihood of adverse effects in exposed populations). It is common practice to consider risk characterization separately for carcinogenic and noncarcinogenic effects. This is due to a fundamental difference in the way organisms typically respond following exposure to carcinogenic or noncarcinogenic agents. For noncarcinogenic effects, toxicologists recognize the existence of a threshold of exposure below which there is only a very small likelihood of adverse health impacts in an exposed individual. Exposure to carcinogenic compounds, however, is not thought to be characterized by the existence of a threshold. Rather, all levels of exposure are considered to carry a risk of adverse effect.

The procedure for calculating risk associated with exposure to carcinogenic compounds has been established by EPA (USEPA 1986b,c; USEPA 1989a). A non-threshold, dose-response model is used to calculate a carcinogenic potency factor (which mathematically is the slope of the dose-response curve) for each chemical. To derive an estimate of risk, the carcinogenic potency factor (q_1* - defined below) is then multiplied by the estimated chronic daily dose experienced by the exposed individual:

TABLE G-4. TOXICITY MEASURES FOR WASTE SITE EVALUATION: INGESTION AND INHALATION PATHWAYS

COMPOUND	Noncarcinogenic Effects Oral Route (mg/kg/day) RfD-S(a)	RfD-C(b)	Source (Oral)	Noncarcinogenic Effects Inhalation Route (mg/kg/day) RfD-S(a)	RfD-C(b)	Source (Inhal.)	Noncarcinogenic Effect of Concern	Carcinogenic Potency Factor (q1*): Oral Exposure (mg/kg/day)-1	Source (Oral)	Carcinogenic Potency Factor (q1*): Inhalation Exposure (mg/kg/day)-1	Source (Inhal.)
INORGANICS											
Antimony	4.00E-04	4.00E-04	d	--	--		Heart, Lung				
Arsenic	1.00E-03	1.00E-03	d	--	1.00E-03	d,m	Skin, Lung	1.75E+00 [A] f	c,d	5.00E+01 [A]	d
Barium	5.00E-02	5.00E-02	d	1.00E-03	1.00E-04	d	Fetotoxicity				
Beryllium	5.00E-03	5.00E-03	d	5.00E-03	5.00E-03	d,n	Lung, Skin, Heart	4.30E+00 [B2]	c	8.40E+00 [B2]	d
Boron	9.00E-02	9.00E-02	d,	--	--		CNS, GI Tract, Skin				
Cadmium	--	5.00E-04	d	--	5.00E-04	d,m	Kidney			6.10E+00 [B1]	d
Chromium	2.00E-02	5.00E-03	d,m,n	2.00E-02	5.00E-03	d,m,n	Skin				
Cobalt	--	--		--	--		Thyroid, Heart				
Copper	3.70E-02	3.70E-02	d,e	--	3.70E-02	d,e,m	GI Tract, Blood				
Lead	--	1.40E-03	d,u	--	1.40E-03	d,m	CNS, Kidney				
Manganese	5.00E-01	2.00E-01	d	3.00E-04	3.00E-04	d	CNS, Reproductive				
Mercury	3.00E-04	3.00E-04	d	3.00E-04	3.00E-04	d,m	CNS				
Nickel	2.00E-02	2.00E-02	c,d	--	2.00E-02	c,d,m	Skin, Lung				
Silver	--	3.00E-03	c	--	--		Liver, Kidney, CNS				
Thallium	7.00E-04	7.00E-05	d	--	--		Liver, Kidney, CNS				
Vanadium	7.00E-03	7.00E-03	d,	--	--		Respiratory Effects				
Zinc	2.00E-01	2.00E-01	d	--	2.00E-01	d,m	Anemia				
ORGANICS											
Acetone	--	1.00E-01	d	--	--		Liver, Kidney				
Benzene	--	3.60E-04	y	--	--		Hematopoietic Sys.	2.90E-02 [A]	d	2.90E-02 [A]	d
Bis(2-ethylhexyl)phthalate	2.00E-02	2.00E-02	d	2.00E-02	2.00E-02	d,m	Liver	1.40E-02 [B2]	d,v	1.40E-02 [B2]	d,m
2-Butanone	5.00E-01	5.00E-02	d	9.00E-01	9.00E-02	d	CNS, Fetotoxicity				
Chlorobenzene	2.00E-01	2.00E-02	d	5.00E-02	5.00E-03	d	Liver, Kidney				
1,2-Dichlorobenzene	9.00E-01	9.00E-02	d	4.00E-01	4.00E-02	d	Liver, Kidney, CNS				
1,3-Dichlorobenzene	9.00E-01	9.00E-02	d,h	4.00E-01	4.00E-02	d,u	Liver, Kidney, CNS				
1,4-Dichlorobenzene	9.00E-01	9.00E-02	d,h	4.00E-01	4.00E-02	d,u	Liver, Kidney, CNS	2.40E-02 [B2]	d	2.40E-02 [B2]	d,m
Dichlorodifluoromethane	9.00E-01	2.00E-01	d	--	--		Liver, Lung				
1,1-Dichloroethane	1.00E+00	1.00E-01	d	1.00E+00	1.00E-01	d	Liver, Kidney, CNS	9.10E-02 [B2]	d	9.10E-02 [B2]	d,m
1,2-Dichloroethane	1.00E+00	1.00E-01	d,k	1.00E+00	1.00E-01	d,p	Liver, Kidney, CNS	9.10E-02 [B2]	d	9.10E-02 [B2]	d
1,2-Dichloroethylene	9.00E-03	9.00E-03	d,g	--	--		Liver, Kidney, CNS				
Ethylbenzene	1.00E+00	1.00E-01	d	--	--		Skin, Liver, Kidney				
Methylene Chloride	6.00E-02	6.00E-02	d	6.00E-02	6.00E-02	d,m	Liver, Kidney, CNS	7.50E-03 [B2]		4.70E-07 [B2]	d
2-Methylnaphthalene	4.00E-03	4.00E-03	d,x	--	--		Skin				
Naphthalene	4.00E-03	4.00E-03	d	--	--		Eye, Blood				
Phenanthrene	4.00E-03	4.00E-03	d,x	--	--		Skin				
Pyrene	4.00E-03	4.00E-03	d,x	--	--		Skin				
Toluene	4.00E-01	3.00E-01	d	2.00E+00	2.00E+00	d	CNS				
1,1,1-Trichloroethane	9.00E-01	9.00E-02	d,	3.00E+00	3.00E-01	d	CNS, Lung, Kidney				
Trichloroethylene	1.00E-01	1.00E-02	d,j	1.00E-01	1.00E-02	c,s,m	Liver, Kidney, CNS	1.10E-02 [B2]	d	1.70E-02 [B2]	d
Vinyl Chloride	--	1.30E-03	w	--	--		Blood, Liver, CNS	2.30E+00 [A]	d	2.95E-01 [A]	d
Xylenes	4.00E+00	2.00E+00	d	7.00E-01	4.00E-01	d,t	CNS				

a. RfD—Reference dose for subchronic (short-term) exposure.
b. RfD—Reference dose for chronic (long-term) exposure.
c. IRIS DATA BASE
d. USEPA ORD Health Effects Assessment Summary Tables (HEAST) FY 1989.
e. RfD derived from the USEPA drinking water standard as listed in USEPA 1989 HEAST 2nd Quarter report.
f. Carcinogenic Potency Factor currently under review by EPA (IRIS Data Base). However, a unit risk factor is provided in IRIS: 5E-05 per ug/l. Potency Factor used was derived from this unit risk factor assuming ingestion of 2 liters of water per day by a 70 kg adult.
g. In the absence of toxicity data, the RfDs for 1,1-Dichloroethylene have been adopted for 1,2-Dichloroethylene.
h. In the absence of toxicity data, the RfDs for 1,2-Dichlorobenzene have been adopted for this compound.
j. In the absence of toxicity data, the RfDs for PCE have been adopted for TCE.
k. In the absence of toxicity data, the RfDs for 1,1-Dichloroethane have been adopted for 1,2-Dichloroethane.
m. RfDs or potency factors for the oral exposure route have been used in the absence of toxicity data for the inhalation route.
n. References doses for hexavalent chromium, oral route.
p. In the absence of toxicity data, the reference dose for 1,1-dichloroethane is used for 1,2-dichloroethane.
s. In the absence of toxicity data, the reference dose for tetrachloroethylene is used for trichloroethylene.
t. Toxicity measures presented are for mixed xylenes.
u. In the absence of toxicity data, the reference dose for 1,2-dichlorobenzene is used for this compound.
v. In the absence of toxicity data, the potency factor for benzo(a)pyrene has been adopted for this compound.
w. Reference dose for vinyl chloride was derived from the EPA ODW longer-term drinking water health advisory.
x. In the absence of toxicity data, the RfDs for naphthalene have been adopted for this compound.
y. RfD for chronic exposure to 70 kg adult derived from EPA ADI of 0.025 mg/day. Drinking Water Criteria Document for Benzene (USEPA 1985, EPA Office of Drinking Water).

$$Risk = CDI \times q_1^*$$

where

Risk = Upper bound estimate of the excess lifetime cancer risk to an individual (unitless probability).

CDI = Chronic daily dose averaged over a 70 year period (mg/kg body weight/day)

and,

q_1^* = 95% upper-bound estimate of the slope of the dose-response curve $(mg/kg\ body\ weight/day)^{-1}$

The slope factor q_1^* is used to convert estimates of daily intake or dose averaged over a lifetime, to incremental excess risk of an individual developing cancer. EPA notes that use of this equation assumes that the dose-response relationship is linear in the low-dose portion of the multistage model dose-response curve (USEPA 1989a: A linearized multistage dose response model is most commonly used by EPA in deriving the slope estimates.) Given this assumption, the slope factor is a constant and risk is directly proportional to intake.

EPA indicates that use of the linear equation (above) for risk estimation is valid only at risk levels $< 1 \times 10^{-2}$. The Agency recommends use of the following equation (based on the "one-hit" model of carcinogenesis) as an alternative at sites where exposure and intakes are projected to be quite high, and risk levels may exceed 1×10^{-2}.

$$Risk = 1 - \exp(-CDI \times q_1^*)$$

In evaluating risk of exposure to more than one carcinogen, the risk measure for each compound may be summed (in the absence of information on antagonistic or synergistic effects) to provide an overall estimate of total carcinogenic risk (USEPA 1989a).

$$Risk_T = \sum_{i=1}^{n} Risk_i$$

where

$Risk_T$ = The combined excess lifetime cancer risk across chemical carcinogens.

and,

$Risk_i$ = The risk estimate for the i^{th} chemical of n chemicals under evaluation.

This is conducted for each source of environmental release, associated exposure pathway, and receptor group at risk of exposure. Population risks are derived by multiplying the overall risk level (summed for all subject chemicals) by the number of people exposed. This would yield a measure of the additional incidence of developing cancer (i.e., additional number of new cases) in the exposed population over a lifetime (i.e., 70 years) of exposure.

The traditionally accepted practice of evaluating exposure to noncarcinogenic compounds has been to experimentally determine a NOAEL and to divide this by a safety factor to establish an acceptable human dose, for example, acceptable daily intake or RfD (NRC 1983). The RfD is then compared to the average daily dose experienced by the exposed population to obtain a measure of concern for adverse noncarcinogenic effects:

$$HQ = \frac{Dose}{RfD}$$

where

HQ = Hazard Quotient: potential for adverse noncarcinogenic effects

Dose = average daily dose for subchronic or chronic exposure (mg/kg body weight/day)

and,

RfD = acceptable intake for subchronic or chronic exposure (mg/kg body weight/day)

Dose and the RfD are expressed in the same units and are based upon common exposure periods (i.e., chronic, subchronic, or shorter-term). If HQ is > 1, then there may be potential for adverse noncarcinogenic effects at the given exposure/dose level. Guidelines for evaluating exposure to mixtures of noncarcinogens is presented by EPA (USEPA 1986b, USEPA 1989a). Essentially, this involves summing the hazard quotient (ratios of daily dose/RfD) for all chemicals under evaluation. If the sum of these ratios, called the Hazard Index (HI) is > 1, then there is the potential for adverse noncarcinogenic effects. Under these circumstances, EPA recommends segregating the compounds into groups of like or common toxicological effects, and again to evaluate

the potential for manifestation of the various adverse health effects identified.

G.2.5 Evaluation of Uncertainty

It is important to emphasize that the baseline risk assessment is primarily a decision making tool for use in assessing the need for remedial action. The results of risk assessments are presented in terms of the potential for adverse effects based upon a number of very conservative assumptions.

Some discussion of the uncertainties associated with each step in the risk assessment has been provided in the body of the report (Section 4). The uncertainties in each component of the risk assessment process are compounded in the overall calculation to yield final estimates with wide uncertainty ranges. For example, if an estimate of the average daily dose for a compound has an uncertainty range a factor of 10 above and below the point estimate used in the exposure assessment, then the uncertainty range for the final estimated health effect must be at least that large.

The sources of uncertainty may be site-related (i.e. limited data are available), or may be associated with the assumptions and procedures used during the risk assessment. If limited data are available, one sample with an extreme concentration (high or low) may bias the exposure estimates. With a small data set that cannot meaningfully be evaluated statistically, it is very difficult to identify and eliminate anomalous results.

The assessment of groundwater contamination hypothetically assumed that Base personnel actually use water with the contaminant levels present; a very conservative assumption considering the entire area is on municipal water. Soil exposure was evaluated assuming all soil ingested was derived from the contaminated sites. This is a very conservative assumption. The 100 mg per day (adults) inadvertent soil ingestion rate established by EPA is a default value for all sources of soil and dust ingested each day. One hundred milligrams of soil is just a small amount of dust. However, it is unlikely that Base personnel engaged in routine, nonsite-related activities would spend sufficient time at Sites 1 through 13 to be exposed even to this quantity of soil. It was also assumed that the body absorbs 100% of every contaminant ingested (in both the water and soil media), a very conservative assumption.

The final quantitative measures of the potential for adverse affects must be recognized as point estimates within a distribution of potential outcomes. The estimates of the potential for human health effects at Niagara Falls IAP are necessarily uncertain. However, the use reasonable maximum exposure assumptions (as recommended by EPA: USEPA 1989) in this study, ensures a conservative estimate of risk which is protective of human health.

G.3 SUMMARY OF THE BASELINE RISK ASSESSMENT: NIAGARA FALLS IAP

This section provides a summary of the results of the baseline risk assessment at Niagara Falls IAP. A site by site discussion of results has previously been presented. The evaluation presented here compares results across sites for each environmental medium and exposure pathway under evaluation. A summary is provided of the results of cancer risk assessment and the assessment of the potential for adverse noncarcinogenic effects. In addition, sites are identified where chemicals in groundwater or surface water exceed Federal or state applicable or relevant and appropriate requirements (ARARs).

G.3.1 Hypothetical Exposure of Base Personnel to Groundwater

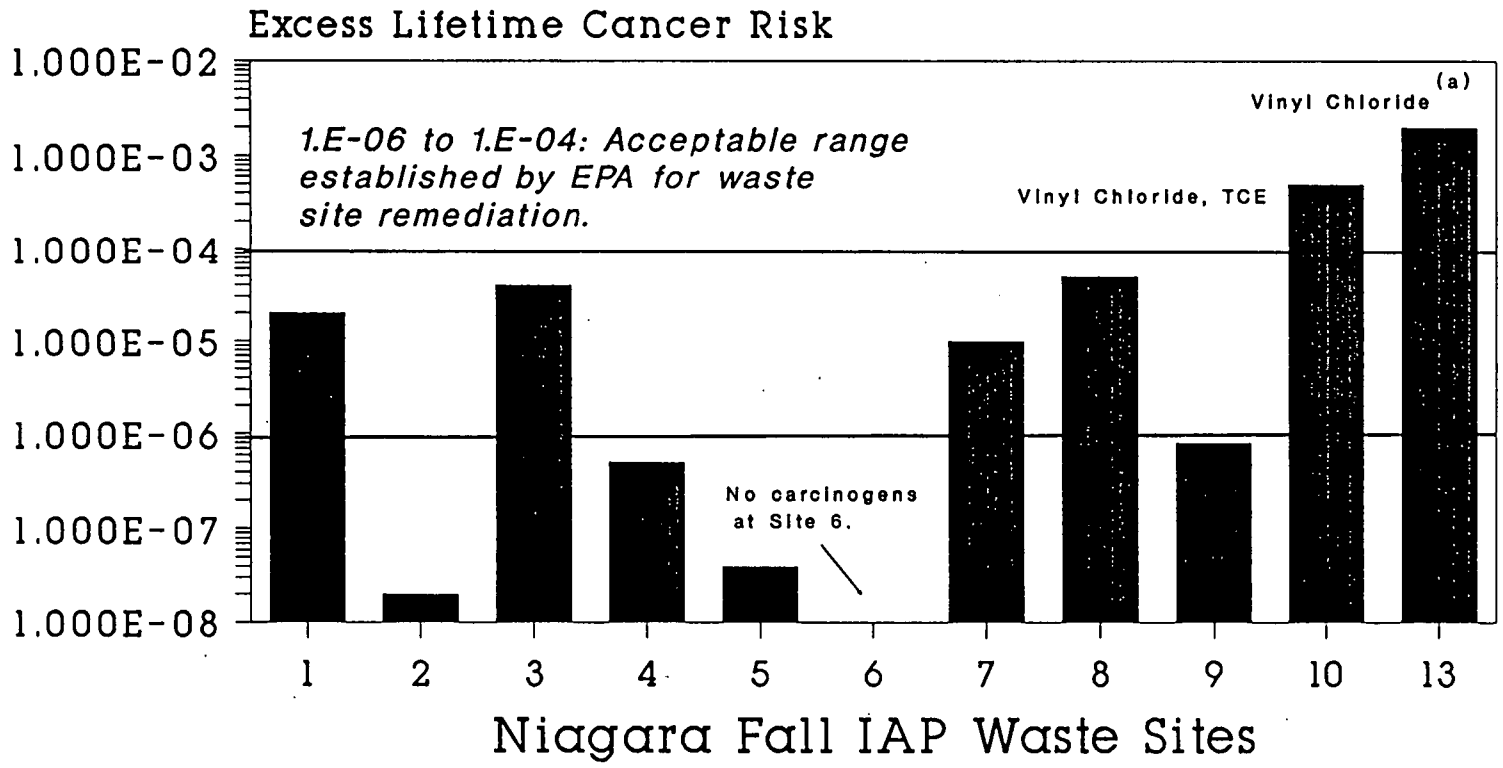
Figures G-1 and G-2 are a summary the excess lifetime cancer risk and the potential for adverse noncarcinogenic effects associated with hypothetical exposure of Niagara Falls IAP personnel to groundwater. In examining these results, it is essential to review all the exposure and toxicity assumptions presented above, and in the site-by-site evaluations. Risk estimates must be interpreted in light of the assumptions adopted as the basis of the analysis.

As shown in Figure G-1, the excess lifetime risk of cancer for hypothetical exposure to groundwater at Sites 10 and 13, exceeded the acceptable range of 10^{-6} to 10^{-4} established by EPA for waste site remediation. Results for all other sites fell within (or below) the acceptable range established by EPA.

Figure G-2 presents the evaluation of the potential for noncarcinogenic effects. The Hazard Index exceeded 1.0 at four sites: Sites 5, 7, 8, 10, and 13. At these sites, the Hazard Index was shown to be greater than 1.0 for a single chemical, or for a group of chemicals with common toxicological effect. As shown in Figure G-2, the magnitude of the hazard indices at sites 7, 10, and 13 are driven by the presence of organic constituents (i.e., benzene, trichloroethylene, and vinyl chloride). At Sites 5 and 7, elevated levels of arsenic and lead resulted in hazard indices exceeding 1.0. From the available information on naturally occurring levels of inorganic chemicals in the Niagara Falls area, arsenic and lead cannot be directly attributed to site-related activities.

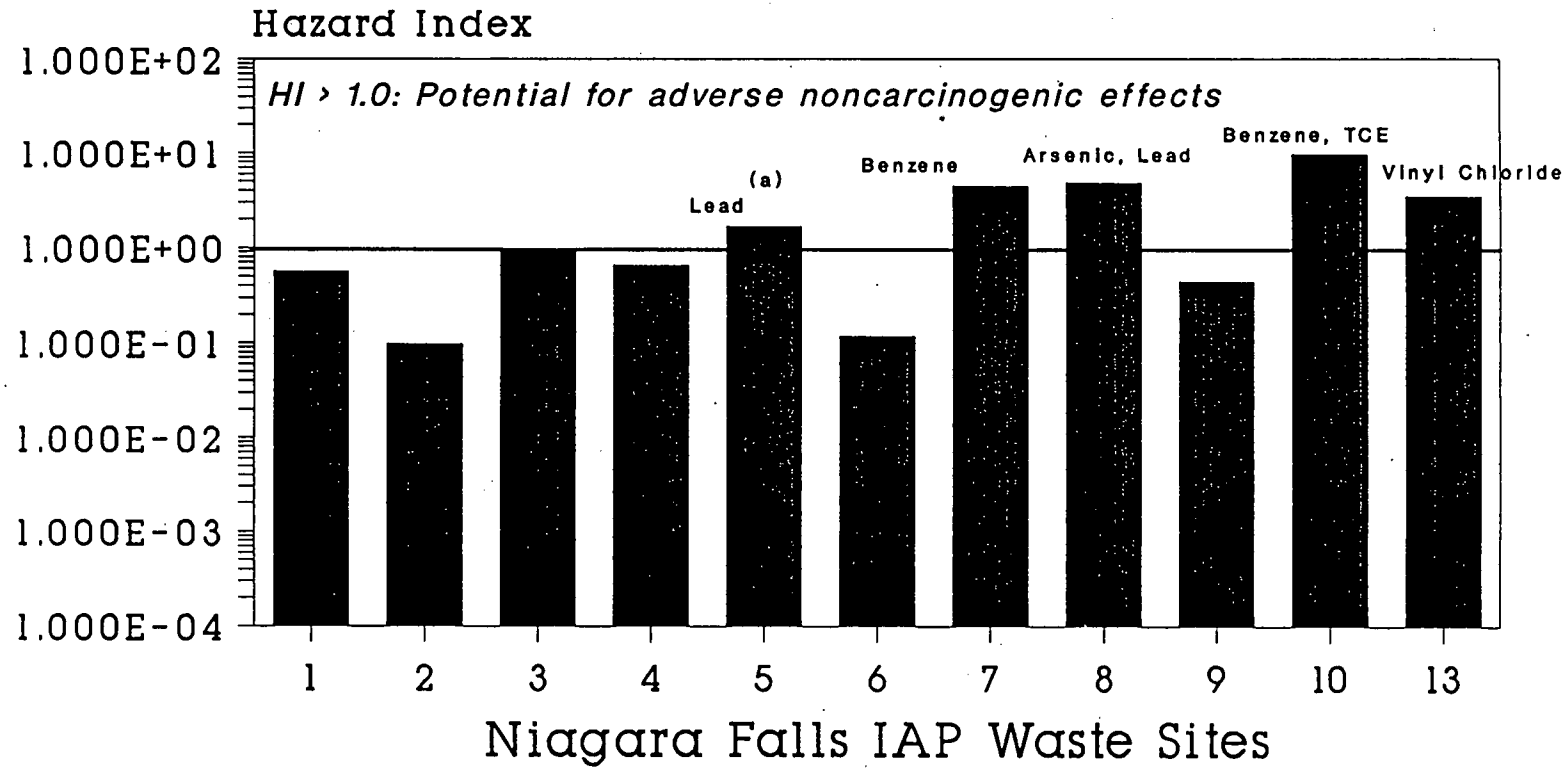
An evaluation was conducted comparing mean levels of chemicals in groundwater with Federal and state ARARs. Mean concentrations of a least one chemical in groundwater at each site exceeded Federal or state ARARs. Note that New York State has established a drinking water standard of "not detectable" for benzene in groundwater. At Sites 2 and 6, although benzene did not exceed the Federal MCL, concentrations in groundwater exceeded the state water quality requirement.

FIGURE G-1. CANCER RISK ASSESSMENT
HYPOTHETICAL EXPOSURE TO GROUNDWATER *



* *Ingestion of 1 L/day, 5 days/week, 50 weeks/years, 20 years.*
(a) Chemicals that drive overall magnitude of risk estimate.

FIGURE G-2. NONCARCINOGENIC EFFECTS HYPOTHETICAL EXPOSURE TO GROUNDWATER *



* Ingestion of 1 L/day, 5 days/week, 52 weeks/years, 20 years.

(a) Chemicals that drive overall magnitude of risk estimate.

G.3.2 Exposure of Base Personnel and Children: Soils and Sediments

Figures G-3 and G-4 are a summary the excess lifetime cancer risk and the potential for adverse noncarcinogenic effects associated with exposure of Niagara Falls IAP personnel to soils. These figures also include a summary of potential risks to children who may visit the Base and use the recreational facilities in the vicinity of Site 8 i.e., playground and ballfields. For Base personnel, the risk assessment examines combined soil exposure via ingestion and inhalation pathways. For children, the risk assessment evaluates combined exposure across several pathways: inadvertent ingestion of soils, inhalation of suspended soil particulates, and inadvertent ingestion of sediments.

Note that monitoring results for the entire soil column were used in calculation of the arithmetic mean soil concentrations. Field screening did not indicate contamination of surface soils. Consequently, an evaluation was conducted of hypothetical chronic exposure to contamination in the soil column.

Again, it is essential to review all the exposure and toxicity assumptions presented above, and in the site-by-site evaluations. Risk estimates must be interpreted in light of the assumptions adopted as the basis of the analysis.

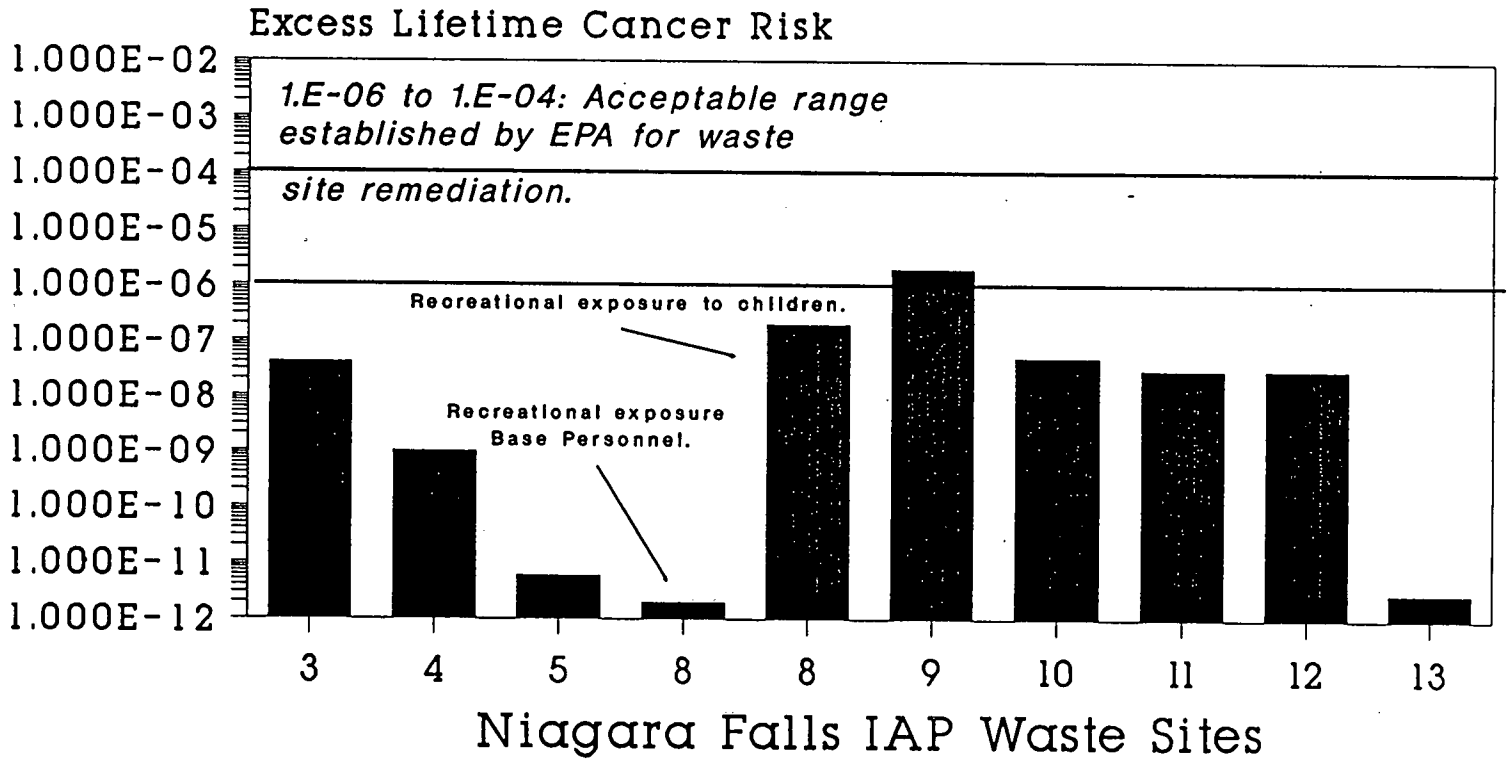
As shown in Figure G-3, the excess lifetime risk of cancer at all sites was within (or below) the acceptable range of 10^{-6} to 10^{-4} established by EPA for waste site remediation. The assessment of risk of adverse noncarcinogenic effects is presented in Figure G-4. The Hazard Index was substantially less than 1.0 at all sites under evaluation. Given the exposure assumptions adopted, no adverse noncarcinogenic effects would be anticipated for chronic exposure of Base personnel to soils at Niagara Falls IAP waste sites, or to visiting children to soils in the vicinity of Site 8.

G.3.3 Evaluation of Surface Water and Sediments: Base Personnel

As noted previously, there is no plausible pathway for exposure (even hypothetical exposure) of Niagara Falls IAP personnel to chemicals in surface water. Therefore, a risk-based evaluation was not conducted. Surface water contamination at the sites under investigation was evaluated by comparison with ARARs. The ARARs of primary importance are the Federal ambient water quality criteria (FWQC) adjusted for drinking water only. Fish consumption from the Cayuga is not a concern at Niagara Falls IAP. FWQC were exceeded at Sites 3 and 8. Chemicals of concern are arsenic and barium.

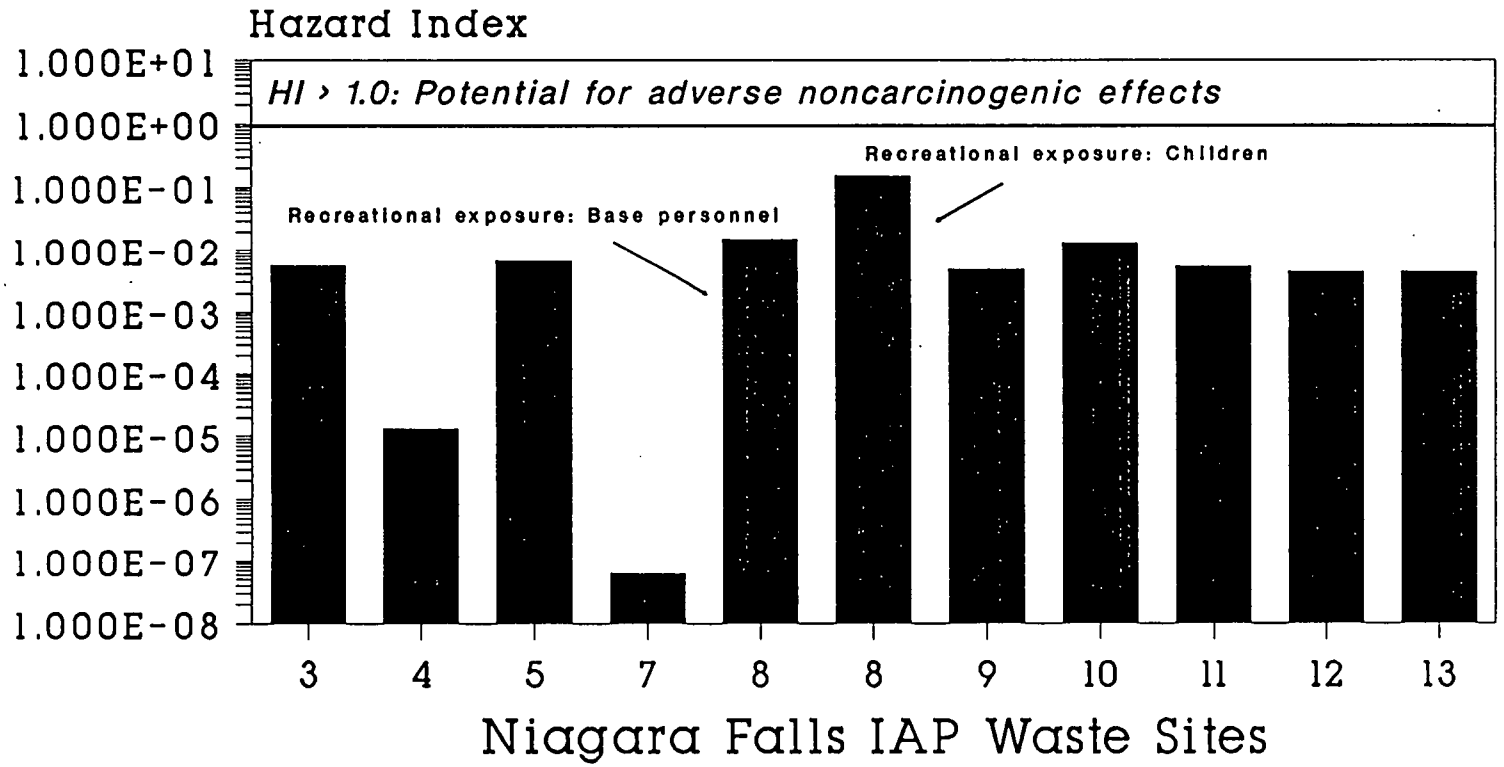
Similar to the situation for surface water, there is no plausible pathway for exposure (even hypothetical exposure) of Niagara Falls IAP personnel to chemicals in sediments. A risk-based evaluation was not conducted for sediments. In addition, Federal and state criteria or standards have not been formally promulgated for chemicals in sediments. Sediment ARARs are therefore not available for use in evaluating the significance of observed levels of contamination.

FIGURE G-3. CANCER RISK ASSESSMENT
EXPOSURE TO SOILS AND SEDIMENTS *



* *Exposure of Base personnel to soils. Exposure of children to soils and sediments at Site 8. Assessment for Site 8 is based on a recreational exposure scenario.*

FIGURE G-4. NONCARCINOGENIC EFFECTS EXPOSURE TO SOILS AND SEDIMENTS *



* *Exposure of Base personnel to soils. Exposure of children to soils and sediments at Site 8. Assessment for Site 8 is based on a recreational exposure scenario.*

In the discussion presented above, it was noted that surface waters from the Base drain to Cayuga Creek and flow off-site. Off-base monitoring of the Cayuga Creek may provide insight into the combined effect of Niagara Falls IAP waste sites on overall surface water and sediment quality. At present, insufficient data are available to evaluate the nature, extent, and significance of site-related surface water and sediment contamination that may occur off-site.

G.4 TOXICITY PROFILES

ACETONE

CAS No: 67-64-1

Chemical Formula: CH_3-CO-CH_3

Synonym: Propanone (IUPAC)

Physico-chemical Characteristics[1]

Acetone is a volatile, highly inflammable liquid with a characteristic pungent odor.

Molecular Weight:	58.08
Flash Point (closed cup):	-18° C
Boiling Point:	56.5° C
Specific Gravity:	0.788 at 20° C
Miscibility in Water:	1.00E+06 mg/L
Log Octanol/Water Partition Coefficient:	-0.24
Solubility in Organics:	Miscible with alcohol, chloroform and ether.

Criteria and Standards[2]

The available toxicity data on acetone is inadequate to establish criteria and standards for acetone.

NIOSH Recommended Standard (air):	250 ppm (593 mg/m^3) TWA
ACGIH (Threshold Limit Value):	750 ppm (1780 mg/m^3) TWA 1000 ppm (2375 mg/m^3) STEL
New York State Water Quality Regulations (Class GA Groundwaters)	none

Environmental Transport and Fate

Environmental persistence of highly volatile and reactive ketones such as acetone is limited. Available information on the environmental transport and fate of acetone is limited. Once in the atmosphere, acetone is oxidized. Acetone has a low octanol/water partition coefficient and therefore is not readily absorbed. Biodegradation is probably important in determining the fate of acetone in the environment because of its aliphatic nature.

General Toxicity and Metabolism

Extensive general toxicity testing has revealed the low toxicity profile for acetone. Prolonged inhalation of high concentrations of acetone may cause irritation, inflammation of the upper respiratory tract followed by coughing, headache, drowsiness and incoordination.

Experimental studies have revealed a reduced food intake among rats consuming acute quantities of acetone. Chronic health effects associated with exposure to acetone are known at this time.

An oral RfD for acetone is estimated to be 1E-1 mg/kg/day (IRIS, 1990; EPA, 1986). In this study albino rats (30/sex/group) were administered acetone by gavage (0 to 2500 mg/kg/day). Body weights, food consumption, clinical chemistry, hematology, and histopathologic parameters, as well as organ weights and organ-to-body weight ratios, were measured and analyzed. No effects were observed at the 100 mg/kg/day dose level throughout the study. RBC parameters were significantly increased in the 2500 mg/kg group at 30 days (males only) and at 90 days in males and females. Statistical analysis of the organ weight and ratio data revealed significantly increased kidney weights for females in 500 and 2500 mg/kg groups and increased organ-to-body weight ratios was increased for kidney, brain, liver in the 2500 mg/kg males and females. Histopathologic studies revealed a marked increase in severity in tubular degeneration of the kidneys and hyaline droplet accumulation with increasing doses. NOEL of 100 mg/kg/day and a LOAEL of 500 mg/kg/day were established basing on the EPA study. Using the animal NOEL of 100 mg/kg/day and applying an uncertainty factor of 1000, an RfD of 0.1 mg/kg/day for human (7.0 mg/day for a 70-kg.bw.wt) for acetone was established.

In the calculation of the oral RfD an uncertainty factor of 1000 was included to count for extrapolation from sub-chronic to chronic exposure and inter-species differences.

Confidence in the principle study is rated medium. This is based on the experimental design such as number of animals, dose, and the experimental end points observed. Confidence in the data base is regarded as low for non availability of reliable supporting studies. Based on these the overall confidence rating for oral RfD is considered low.

Evidence of Carcinogenicity

Experimental studies on the carcinogenicity of acetone tested by various routes of exposures and time periods have generally produced a negative result.
EPA classification of acetone for carcinogenic potentials is under review.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.
[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

Reference

U.S. EPA. 1986. Ninety-day gavage study in albino rats using acetone. Office of Solid Waste, Washington, DC.

ANTIMONY

CAS No:	7440-36-0
Synonyms:	Stibium

Physico-chemical Characteristics[1]

Antimony is silver-white, lustrous, hard, brittle metal; scale-like cryst structure; or dark gray, lustrous powder.

Atomic Weight:	121
Melting Point:	630° C
Boiling Point:	1635° C
Specific Gravity:	6.684 at 25° C
Solubility in Water:	Insoluble (some salts are soluble)
Reactivity with Acid:	Reacts with hot H_2SO_4 or HNO_3 to form antimonous or antimonic oxide
Octanol/Water Partition Coefficient:	N/A

Criteria and Standards[2]

The available data on Antimony are not adequate for establishing criteria. However, EPA has reported the available lowest toxic doses for aquatic organisms.

Clean Water Act

Aquatic Organisms

1. Fresh Water		2. Marine	
a. Acute	9E+3 µg/L	a. Acute	N/A
b. Chronic	1.6E+3 µg/L	b. Chronic	N/A

Ambient Water Quality Criteria	
Water and Fish Consumption	1.46E+2 µg/L
Fish Consumption Only	4.5E+4 µg/L
NIOSH Recommended Standard	0.5 mg/m^3 TWA (antimony and all antimony compounds except stibine)
OSHA Standard	0.5 mg/m^3 TWA
ACGIH (Threshold Limit Value)	0.5 mg/m^3 (antimony and its compounds)
RCRA	Listed
TSCA	Not Available
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Most chemical species of antimony and antimony compounds are quite mobile and are transported in solution. Antimony occurs naturally mostly in the trivalent antimonite (+3) or as soluble oxide. Under reducing conditions and at room temperature, antimony is reduced to Stibine (SbH_3) gas. Biomethylation process resulting in the formation of stibine may also cause some re-mobilization of antimony.

Metabolism

Antimony compounds are slowly absorbed from gastrointestinal tract. Bioavailability of antimony compounds, is somewhat variable and cannot be fully accounted for solely on the basis of valence. The trivalent forms generally concentrate in red blood cells and liver, while the pentavalent compounds are found in the plasma. Antimony and its compounds are slowly excreted from liver and principally in the feces. Following administration, trivalent compounds are found to in high levels in the thyroid of experimental animals. However, pentavalent forms tend to concentrate in the liver and spleen and are excreted in the urine.

General Toxicity

Cardiovascular changes associated with exposure to antimony represent a serious health effect. Antimony compounds (particularly stibine) effects such as the destruction of red blood cells, hemoglobinuria and anuria.

Evidences of cardiac edema, myocardial fibrosis exist among men exposed to antimony.

Antimony miners have developed disabling, but benign forms of silicosis. Some investigators have suggested relationship between antimony and pulmonary carcinogenesis on the basis of possible antimony-containing abnormal enzyme systems. Studies with Salmonella test systems report that various antimony compounds, including antimony trioxide, antimony trichloride, and antimony pentachloride may be mutagenic. Reports on the effects of antimony on the reproductive system are limited. However, increased incidence of gynecological disorders and late spontaneous abortions have been reported among women exposed to metallic antimony dust, antimony trioxide and antimony pentoxide.

The RfD (oral) for antimony and its compounds is 4E-4 mg/kg/day which is developed on the basis of longevity, blood glucose and cholesterol in a rat bioassay (IRIS, 1990; Schroeder et al, 1970). Uncertainty and Modifying Factors for oral RfD are 1000 and 1 respectively. An uncertainty factor of 1000 (10 for inter-species conversion, 10 to protect sensitive individuals, and 10 because the effect level was a LOAEL and no NOEL was established) was applied to the LOAEL of 0.35 mg/kg. Confidence in the oral RfD is considered low because only one species was used, only one dose level was tested, no NOEL was determined, and gross pathology and histopathology were not well described. Confidence in the database is low due to lack of adequate oral exposure investigations. Low confidence in the RfD follows.

Carcinogenicity Assessment for Lifetime Exposure has not been evaluated by the EPA for antimony and its compounds (IRIS, 1990).

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

Reference

Schroeder, H.A., M. Mitchner and A.P. Nasor. 1970. Zirconium, niobium, antimony, vanadium and lead in rats: Life term studies. J. Nutrition. 100:59-66.

ARSENIC

CAS No: 7440-38-2
Synonyms: gray arsenic, metallic arsenic

Physico-chemical Characteristics[1]

Arsenic (As) is a gray, shiny, brittle, rhombohydral metal present ubiquitously in the earth's crust (0.0005%). Other relevant properties include;

Atomic Weight:	74.9216
Sublimation Point:	615° C (without melting)
Melting Point:	818° C
Specific Gravity:	5.727 at 25/4° C
Dielectric Constant:	10.23 at 20 C and 60 Cycles
Solubility in Water:	Insoluble (salts are soluble)
Reactivity with Acid:	Reacts with hot H_2SO_4 or HNO_3 to form Arsenic Acid
Octanol/Water Partition Coefficient:	N/A
Vapor Pressure:	0

Criteria and Standards[2]

Safe Drinking Water Act

Maximum Contaminant Level Goal, MCLG	0.05 mg/L
Maximum Contaminant Level, MCL	0.05 mg/L (interim, 1980)

Clean Water Act

Ambient Water Quality Criteria

Human Health

a. Water and Fish Consumption	2.2E-3 µg/L
b. Fish Consumption Only	1.75E-2 µg/L

Aquatic Organisms

1. Fresh Water		2. Marine	
a. Acute	3.06E+2 µg/L	a. Acute	6.9E+1 µg/L
b. Chronic	1.9E+2 µg/L	b. Chronic	3.6E+1 µg/L

CERC (value, status)	1 lb (Proposed, 1987)
NIOSH Recommended Standard (air)	2 µg/m^3
OSHA Standard (air)	500 µg/m^3
ACGIH (Threshold Limit Value)	200 µg/m^3

New York State Water Quality Regulations (Class GA Groundwaters — 25 µg/l

Environmental Transport and Fate:

Arsenic is generally quite mobile in the environment. Trivalent (+3) and pentavalent (+5) forms of arsenic are inter-convertible. Formation of organic complexes of arsenic results in its high mobility and recycling particularly in the aquatic environment. Volatilization of arsenic and its conversion to highly active arsine or methylarsine forms in the presence of highly reducing conditions is an important fate process in the aquatic environment. Biotransformion of arsenic to organic forms is performed by a number of prokaryotic species present in the environment.

General Toxicity:

Arsenic demonstrates a high acute as well as chronic toxicity. Systemic chronic poisoning is primarily characterized by skin lesions such as dermatoses, which may include eruptions, pigmentations, or hypekeratosis, that may ultimately lead to the development of skin cancer. Reports of abnormal electrocardiograms and peripheral vascular disturbances with gangrene of the extremities (Blackfoot disease) exist following chronic exposure to arsenic. Hematological changes following arsenic exposure are characterized by anemia and leukopenia.

Common acute symptoms include gastritis, fever, insomnia, anorexia, swollen liver, and cardiac dysfunction. Peripheral nervous disturbances primarily are of sensory type and is frequently encountered among individuals surviving arsenic poisoning.

Chronic symptoms of toxicity generally involve the skin, mucous membranes, lungs, gastrointestinal and nervous system. Effects on the circulatory system and liver is sporadic. Several epidemiological studies have indicated a close association of exposure to inorganic arsenicals and various forms of skin diseases. Hyperkeratosis, warts and melanosis of the skin are the most commonly observed lesions following chronic arsenic exposure. Chronic arsenical poisoning is known to cause peripheral neuritis affecting mainly the upper and lower extremities.

Arsenic compounds have been reported to be teratogenic, fetotoxic and embryotoxic in several animal species. An increased incidence of multiple malformations among children born to women occupationally exposed to arsenic has also been reported.

Evidence of Carcinogenicity:

Animal Carcinogenicity data: Experimental data on the effects of arsenic on carcinogenesis are not consistent for various chemical forms of arsenic and routes of administration (IARC 1980). However, there are some data to indicate that arsenic is a carcinogen in experimental animals, if retention time in the lung can be increased. Following an intratracheal

instillation, arsenic trioxide was found to enhance incidence of tumorigenesis of the respiratory tract in hamsters. Similarly a high incidence of lung carcinoma was reported in rats following a single intratracheal instillation of a pesticide mixture containing calcium arsenates (IARC 1987). Arsenic was reported to promote Diethyl nitrosamine-induced renal tumors in rats (Kroes et al., 1974).

Sodium arsenic has been shown to transform Syrian hamster embryo cells (Dipaolo and Casto, 1979) and to produce SCE in DON cells, CHO cells and human peripheral lymphocytes exposed in vitro (Wan et al., 1982; Ohno et al., 1982; Larramendy et al., 1981; Andersen, 1983; Crossen, 1983). While arsenic compounds have not been shown to mutate bacterial strains, it produces preferential killing of repair deficient strains (Rossman, 1981).

Human Carcinogenicity data: Studies of smelter worker populations (Tacoma, WA; Magma, UT; Anaconda, MT; Ronnskar, Sweden; Saganoseki-Machii, Japan) have all found an association between occupational arsenic exposure and lung cancer mortality (Enterline and Marsh, 1982; Lee-Feldstein, 1983; Axelson et al., 1978; Tokudome and Kuratsune, 1976; Rencher et al., 1977). Both proportionate mortality and cohort studies of pesticide manufacturing workers have shown excess of lung cancer deaths among exposed persons (Ott et al., 1974; Mabuchi et al., 1979). One study of a population residing near a pesticide manufacturing plant revealed that these residents were also at an excess risk of lung cancer (Matanoski et al., 1981).

A cross-sectional study of 40,000 Taiwanese exposed to arsenic in drinking water found significant excess skin cancer prevalence by comparison to 7500 residents of Taiwan and Matsu who consumed relatively arsenic-free water (Tseng, 1977). Arsenic-induced skin cancer has also been attributed to water supplies in Chile, Argentina and Mexico (Borgono and Greiber, 1972; Bergoglio, 1964; Cebrian et al., 1983). No excess skin cancer incidence has been observed in U.S. residents consuming relatively high levels of arsenic in drinking water (Morton et al., 1976; Southwick et al., 1981). These U.S. studies, however, are not inconsistent with the existing findings from the foreign populations. The statistical powers of the U.S. studies are considered to be inadequate because of the small sample size.

A study of the population living in the same area of Taiwan studied by Tseng (1977), where arsenic contamination of the water supply was endemic, found significantly elevated standard mortality ratios for cancer of the bladder, lung, liver, kidney, skin and colon. A case control study of bladder, liver and lung cancer cases in the endemic area found a significant association with arsenic exposure that was dose-related. The association of arsenic ingestion and cancer of various internal organs has also been cited in a number of case reports.

Carcinogenic Risk Assessment:

The EPA Risk Assessment Forum has, recently completed a reassessment of the carcinogenicity risk associated with ingestion of inorganic arsenic. The report is based on the linearized multistage model and a maximum likelihood approach was utilized together with the Weibull model. The report concluded, that the most appropriate basis for an oral estimate was the study by Tseng et al. (1977), which reported increased prevalence of skin cancers in humans

as a consequence of arsenic exposure in drinking water. Based on this study a unit risk of 5.0E-05/µg/L was proposed, which is a magnitude lower than the previous estimate (carcinogenic slope factor of 1.75). However, it should be noted, that even when applying this lower estimate, practically no drinking water consumed in the U.S. will fulfill the 1.0E-06 risk goal.

The uncertainties associated with ingested inorganic arsenic are such that estimates could be modified downwards as much as an order of magnitude, relative to risk estimates associated with most other carcinogens (IRIS, 1988).

Although a large study population was observed and included both air and urinary arsenic measurements ASARCO smelter and air measurements for the Anaconda smelter, estimates of carcinogenicity by inhalation does not take into account of differences due to smoking habits and other confounding factors. Therefore validity of EPA estimates of a slope factor of 5.0E+01 $(mg/kg/day)^{-1}$, or unit risk of 4.3E-03/µg/m^3 (calculated assuming a 70 kg human body weight, 20 m^3 air inhaled/day and a 30% absorption of inhaled arsenic) for inhalation exposure are questionable.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Anderson, O. 1983. Effects of coal combustion products and metal compounds on sister chromatid exchange (SCE) in a macrophage cell line. Environ. Health Perspect. 47: 239-253.

Axelson, O., E. Dahlgren, C.D. Jansson and S.O. Rehnlund. 1978. Arsenic exposure and mortality: A case referent study from a Swedish copper smelter. Br. J. Ind. Med. 35: 8-15.

Bergoglio, R.M. 1964. Mortality from cancer in regions of arsenical waters of the province of Cordoba Argentine Republic. Prensa Med. Argent. 51: 994-998.

Borgono, J.M. and R. Greiber. 1972. Epidemiological study of arsenicism in the city of Antofagasta. In: Trace Substances in Environmental Health-V. Proceed. 5th Annual Conference, University of Missouri, Columbia, MO, June 29- July 1, 1971. D.C. Hemphill, Ed., University of Missouri, Columbia, MO. p. 13-24.

Cebrian, M.E., A. Albores, M. Aguilar and E. Blakely. 1983. Chronic arsenic poisoning in the north of Mexico. Human Toxicol. 2: 121-133.

Chen, C.J., Y.C. Chuang, T.M. Lin and H.-Y. Wu. 1985. Malignant neoplasms among residents of a blackfoot disease-endemic area in Taiwan: High arsenic artesian well water and cancers. Cancer Res. 45: 5895-5899.

Chen, C.J., Y.C. Chuang, S.L. You, T.M. Lin and H.Y. Wu. 1986. A retrospective study on malignant neoplasms of bladder, lung and liver in blackfoot disease Endemic area in Taiwan. Br. J. Cancer. 53: 399-405.

Crossen, P.E. 1983. Arsenic and SCE in human lymphocytes. Mutat. Res. 119: 415-419.

DiPaolo, J. and B. Casto. 1979. Quantitative studies of in vitro morphological transformation of Syrian hamster cells by inorganic metal salts. Cancer Res. 39: 1008-1013.

Higgins, I. 1982. Arsenic and respiratory cancer among a sample of Anaconda smelter workers. Report submitted to the Occupational Safety and Health Administration in the comments of the Kennecott Minerals Company on the inorganic arsenic rulemaking. (Exhibit 203-5)

Higgins, I., K. Welch and C. Burchfield. 1982. Mortality of Anaconda smelter workers in relation to arsenic and other exposures. University of Michigan, Dept. Epidemiology, Ann Arbor, MI. IARC (International Agency for Research on Cancer). 1980. IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 23. Some Metals and Metallic Compounds. World Health Organization, Lyon, France.

Larramendy, M.L., N.C. Popescu and J. DiPaolo. 1981. Induction by inorganic metal salts of sister chromatid exchanges and chromosome aberrations in human and Syrian hamster strains. Environ. Mutagen. 3:597-606.

Lee-Feldstein, A. 1983. Arsenic and respiratory cancer in man: Follow-up of an occupational study. In: Arsenic: Industrial, Biomedical, and Environmental Perspectives, W. Lederer and R. Fensterheim, Ed. Van Nostrand Reinhold, New York.

Mabuchi, K., A. Lilienfeld and L. Snell. 1979. Lung cancer among pesticide workers exposed to inorganic arsenicals. Arch. Environ. Health. 34: 312-319.

Matanoski, G., E. Landau, J. Tonascia, C. Lazar, E. Elliot, W. McEnroe and K. King. 1981. Cancer mortality in an industrial area of Baltimore. Environ. Res. 25: 8-28.

Morton, W., G. Starr, D. Pohl, J. Stoner, S. Wagner and P. Weswig. 1976. Skin cancer and water arsenic in Lane County, Oregon. Cancer. 37: 2523-2532.

Ohno, H., F. Hanaoka and M. Yamada. 1982. Inductibility of sister chromatid exchanges by heavy-metal ions. Mutat. Res. 104: 141-145.

Ott, M.G., B.B.Holder and H.I. Gordon. 1974. Respiratory cancer and occupational exposure to arsenicals. Arch. Environ. Health. 29: 250-255.

Pershagen, G., B. Lind and N.E. Bjorkund. 1982. Lung retention and toxicity of some inorganic arsenic compounds. Environ. Res. 29: 425-434.

Pershagen, G., G. Nordberg and N.E. Bjorklund. 1984. Carcinomas of the respiratory tract in hamsters given arsenic trioxide and/or benzo(a)pyrene by the pulmonary route. Environ. Res. 34: 227-241.

Rencher, A.C., M.W. Carter and D.W. McKee. 1978. A retrospective epidemiological study of mortality at a large western copper smelter. J. Occup. Med. 19: 754-758.

Rossman, T.G. 1981. Enhancement of UV-mutagenesis by low concentrations of arsenite in E. Coli. Mutat. Res. 91: 207-211.

Roth, F. 1958. Uber den Bronchialkrebs Arsengeschodigter Winzer. Virchows Arch. 331: 119-137.

Sommers, S.C. and R.G. McManus. 1953. Multiple arsenical cancers of the skin and internal organs. Cancer. 6: 347-359.

Southwick, J., A. Western, M. Beck, T. Whitley, R. Isaacs, J. Petajan and C. Hansen. 1981. Community health associated with arsenic in drinking water in Millard County, Utah. Health Effects Research Laboratory, Cincinnati, OH, EPA-600/1-81-064.

Tokudome, S. and M. Kuratsune. 1976. A cohort study on mortality from cancer and other causes among workers at a metal refinery. Int. J. Cancer. 17: 310-317.

Tseng, W.P., H.M. Chu, S.W. How, J.M. Fong, C.S. Lin and S. Yeh. 1968. Prevalence of skin cancer in an endemic area of chronic arsenicism in Taiwan. J. Natl. Cancer Inst. 40: 453-463.

Tseng, W.P. 1977. Effects and dose response relationships of skin cancer and blackfoot disease with arsenic. Environ. Health Perspect. 19: 109-119.

U.S. EPA. 1984. Health Assessment Document for Inorganic Arsenic. Prepared by Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA/600/8-83/021F.

Wan, B., R.T. Christian and S.W. Sookup. 1982. Studies of cytogenetic effects of sodium arsenicals on mammalian cells in vitro. Environ. Mutag. 4: 493-498.

Welch, K., I. Higgins, M. Oh and C. Burchfield. 1982. Arsenic exposure, smoking, and respiratory cancer in copper smelter workers. Arch. Environ. Health. 37: 325-335.

BARIUM

CAS No: 7440-39-3

Physico-chemical Characteristics[1]

Barium is yellowish-white, slightly lustrous, somewhat malleable, very easily oxidizable alkaline earth metal. Barium has a natural abundance of 0.05% in the earth's crust.

Atomic Weight:	137.33
Melting Point:	710° C
Boiling Point:	1600° C
Specific Gravity:	3.6 at 25° C
Solubility in Water:	Decomposes; combines with sulfates present in natural water form $BaSO_4$.
Reactivity with Acid:	with HNO_3, HCl & H_2SO_4.

Criteria and Standards[2]

Safe Drinking Water Act (USEPA)

Maximum Contaminant Level Goal (MCLG)	1.5 mg/L (proposed, 1985).
Maximum Contaminant Level (MCL)	1.0 mg/L (interim, 1980).
TSCA	Not available
RCRA	listed
OSHA Standard:	0.5 mg/m^3 (soluble compounds, as Ba)
ACGIH (Threshold Limit Value)	0.5 mg/m^3 (soluble compounds, as Ba)
New York State Water Quality Regulations (Class GA Groundwaters)	1000 µg/l

Environmental Transport and Fate

Barium is extremely reactive in the presence of water. It precipitates as carbonates and sulfates in the ground water. Barium sulfate is not highly soluble in water (a few parts per million). However, it increases in the presence of chlorides and other anions. Bio-accumulation is not an environmental fate important process for barium.

Metabolism

Following ingestion, barium bioavailability increases in the lung, kidney, spleen, muscle, heart, brain and liver. The soluble compounds are transported by plasma and usually have a short half-life. Gastrointestinal tract is the major pathway of barium excretion although some renal elimination have been reported in experimental animals.

General Toxicity

The insoluble salts of barium (like barium sulfate) are not toxic when ingested because of minimal absorption. However, soluble barium compounds are reported to be highly toxic.

Acute effects of barium intoxication produce gastroenteritis, muscular paralysis, decreased pulse rate and cardiac condition typical of digitalis intoxication.

Chronic exposure to barium have been reported to produce a reversible clinical condition of benign pneumoconiosis known as Baritosis. Baritosis is an occupational disease due to inhalation of barium sulfate dust and barium carbonate.

It is important to note that when evaluated singly, no single study could be considered adequate to calculate a oral RfD for barium (IRIS, 1990). On the basis of evidence from several studies Perry et al., 1983, Brenniman et al. 1981, Schroeder and Mitchener, 1975,), an oral RfD was estimated at 5E-2 mg/kg/day.

Statistically significant difference were not observed in the blood pressure between humans ingesting drinking water containing barium at 7.3 mg/L compared with 0.1 mg/L (Brenniman et al. 1981). A concentration of 7.3 mg/L corresponds to a dose of 0.20 mg/kg/day (assuming that a 70-kg adult drinks 2 L/day).

Perry et al. (1983) exposed weanling rats to barium at 1, 10, or 100 ppm in drinking water for up to 16 months (average daily barium doses of 0.051, 0.51, and 5.1 mg/kg, respectively). There were no signs of toxicity at any barium dose levels. Systolic blood pressure measurements revealed no increase in pressure in animals exposed to 1 ppm for 16 months, an increase of 4 mm Hg ($p<0.01$) in animals exposed to 10 ppm barium for 16 months, and an increase of 16 mm Hg ($p<0.001$) in animals exposed to 100 ppm barium for 16 months. The animals in this study were maintained in a special contaminant-free environment and fed a diet designed to reduce exposure to trace metals. It is possible that the restricted intake of certain beneficial metals (e.g., calcium and potassium) may have predisposed the test animals to the hypertensive effects of barium (IRIS, U.S. EPA, 1985).

Schroeder and Mitchener (1975a,b) exposed rats and mice to 5 mg/L barium in drinking water for a lifetime (approximately 0.25 mg/kg/day for rats and 0.825 mg/kg/day for mice). No adverse effects were observed.

The uncertainty factor and modifying factor adopted by EPA in the estimation of oral RfD for barium are 100 and 1 respectively. Since exposure to trace metals like calcium is the minimized in these studies an uncertainty factor of 100 appears adequate (competition of barium in calcium-dependent metabolism exist in biological systems). LOAEL identified in the Perry et al. (1983) study (5.1 mg/kg/day) has been used in the derivation of this RfD without an additional 10-fold uncertainty factor (IRIS, 1990).

As mentioned early, any single study considered alone is inadequate in the calculation of RfD. The confidence in the studies and the data base is considered medium. Confidence on RfD (oral) for barium based on the evidences of existing experimental data is considered medium.

Studies on barium carcinogenicity in experimental animals and, human epidemiological data are not available at this time.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Brenniman, G.R., W.H. Kojola, P.S. Levy, B.W. Carnow and T. Namekata. 1981. High barium levels in public drinking water and its association with elevated blood pressure. Arch. Environ. Health. 36(1): 28-32.

Perry, H.M., S.J. Kopp, M.W. Erlanger and E.F. Perry. 1983. Cardiovascular effects of chronic barium ingestion. In: Trace substances in environmental health, XVII, D.D. Hemphill, Ed. Proc. Univ. Missouri's 17th Ann. Conf. on Trace Substances in Environmental Health. University of Missouri Press, Columbia, MO.

Schroeder, H.A. and M. Mitchener. 1975a. Life-term effects of mercury, methyl mercury and nine other trace metals on mice. J. Nutr. 105: 452-458.

Schroeder, H.A. and M. Mitchener. 1975b. Life-term studies in rats: Effects of aluminum, barium, beryllium and tungsten. J. Nutr. 105: 421-427.

Tardiff, R.G., M. Robinson and N.S. Ulmer. 1980. Subchronic oral toxicity of BaCl2 in rats. J. Environ. Pathol. Toxicol. 4: 267-275.

U.S. EPA. 1985. Draft Drinking Water Health Effects Criteria Document on Barium. Office of Drinking Water, Washington, DC. NTIS PB 86-118031/AS.

BENZENE

CAS No: 71-43-2

Chemical Formula: C_6H_6

Synonym: Cyclohexatriene

Physico-chemical Characteristics[1]

Benzene is a clear, colorless, highly inflammable liquid with a characteristic odor.

Molecular Weight:	78.11
Flash Point:	-11.1° C
Boiling Point:	80.1° C
Specific Gravity:	0.8787 at 15° C
Solubility in Water:	1.78 g/L (at 25° C)
Log Octanol/Water Partition Coefficient:	1.95 to 2.13
Solubility in Organics:	Miscible with alcohol, chloroform ether, carbon disulfide
Vapor Pressure:	75 mm Hg at 20° C

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.0 mg/L (Final, 1985).
Maximum Contaminant Level (MCL)	5 µg/L (Final, 1987).

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	6.6E-1 µg/L
Fish Consumption only	4.0E+1 µg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEC:	5.3E+3 µg/L
Chronic Toxicity LEC:	none

Marine Water

Acute Toxicity LEC:	5.1E+3 µg/L
Chronic Toxicity LEC:	7.0E+2 µg/L

FIFRA	Not available
TSCA	Not available
RCRA	listed
CERCLA (Reportable Quantity, RQ)	10 lbs (Proposed, 1987)

OSHA Standard:	30 mg/m^3 TWA 75 mg/m^3 Ceiling Level 150 mg/m^3 10-min Peak Level
ACGIH (Threshold Limit Value) (categorized as a suspect carcinogen)	30 mg/m^3 TWA 75 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	Non-detected

Environmental Transport and Fate

Volatilization of benzene is the most important environment transport process from surface waters to the atmosphere. There are very little evidences of direct oxidation of benzene in the environmental waters. However, benzene is considered to be photo-oxidized in the atmosphere. Based on the octanol/water partition coefficient of benzene, adsorption to organic materials and bio-accumulation are likely under long-term persistence in the environment.

General Toxicity and Metabolism

Acute effects of exposure to high concentrations (20,000 ppm or above) in air can be fatal within minutes (IARC, 1982). The symptoms of acute exposure include, depression of the central nervous system, convulsions, respiratory depression and cardiovascular collapse.

Subchronic and chronic exposures to benzene has been known to produce vertigo, drowsiness, and other symptoms of central nervous system involvement. Cardiac sensitization and arrhythmia have been reported in subchronic exposures to benzene. Locally, exposure to benzene is associated with blistering, erythema and dermatitis.

Chronic health hazard assessment of benzene for noncarcinogenic effects both in oral and inhalation exposures are currently under a review with EPA.

Benzene is classified as a human carcinogen (IARC, 1982). This is based on the existence of sufficient and consistent evidences from epidemiological and experimental studies on the carcinogenicity of benzene.

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Animal data on benzene carcinogenicity is considered sufficient. Several studies in several species have revealed a consistent pattern of carcinogenic potential of benzene (Maltoni and Scarnato 1979, and Maltoni et al.,1983)

In an NTP (1986) study, benzene 0-200 mg/kg) was administered by gavage F344/N rats & B6C3F1 mice/sex, 5 times/week for 103 weeks. Significantlyincreased incidence ($p<0.05$) of various neoplastic growths were seen in bothsexes of both species. Both male and female rats and mice had increasedincidence of carcinomas of the Zymbal gland. Male and female rats had oral cavity tumors, and males showed increased incidence of skin tumors. Mice of both sexes had increased incidence of lymphomas and lung tumors. Males wereobserved to have harderian and preputial gland tumors and females had tumorsof mammary gland and ovary. In general, the increased incidence was dose-related.

In an inhalation study, slightly increased incidence of hematopoietic neoplasms were reported for male C57Bl mice breathing 300 ppm benzene 6 hours/day, 5 days/week for 488 days. There was no increase in tumor incidence in male AKR or CD-1 mice similarly exposed to 100 ppm or 100 or 300 ppm benzene, respectively. Likewise male Sprague-Dawley rats exposed by inhalation to 300 ppm benzene were not observed to have increased incidence of neoplasia (Snyder et al., 1981).

A similar study on Sprague-Dawley rats reported a significant increased in the incidence of hepatomas and carcinomas of the Zymbal gland. The experimental protocol involved exposure to 200 ppm benzene 4 hours/day, 5 days/week for 7 weeks; 200 ppm 7 hours/day, 5 days/week for 12 weeks; 300 ppm 7 hours/day, 5 days/week for 85 weeks. An 8-hour/day TWA for 5 days/week was calculated to be 241 ppm (Maltoni et al.,1983).

Human Carcinogenicity Data: On the bases of the existing evidence, EPA classifies benzene as a human carcinogen (category A). This is based on the adequacy and consistency of human epidemiologic and experimental animal data on benzene carcinogenicity.

Aksoy et al. (1974) reported effects of benzene exposure among 28,500 Turkish workers employed in the shoe industry. Mean duration of employment was 9.7 years (1-15 year range) and mean age was 34.2 years. Peak exposure was reported to be 210-650 ppm. Twenty-six cases of leukemia and a total of34 leukemia or pre-leukemia were observed, corresponding to an incidence of13/100,000 (by comparison to 6/100,000 for the general population). A follow-up paper (Aksoy, 1980) reported eight additional cases of leukemia as well as evidence suggestive of increases in other malignancies.

In a retrospective cohort mortality study Infante et al. (1977a,b)examined leukemogenic effects of benzene exposure in 748 white males exposedwhile employed in the manufacturing of rubber products. Exposure

occurred from 1940-1949, and vital statistics were obtained through 1975. A statistically significant increase (p less than or equal to 0.002) of leukemia was found by comparison to the general U.S. population. There wasno evidence of solvent exposure other than benzene. Air concentrations weregenerally found to be below the recommended limits in effect during the study period.

In a subsequent retrospective cohort mortality study Rinsky et al. (1981) observed seven deaths from leukemia among 748 workers exposed to benzene andfollowed for at least 24 years (17,020 person-years). This increased incidence was statistically significant; standard mortality ratio (SMR) was 560. For the five leukemia deaths that occurred among workers with more than 5 years exposure, the SMR was 2100. Exposures (which ranged from 10-100 ppm8-hour TWA) were described as less than the recommended standards for the timeperiod of 1941-1969.

In an updated version of the Rinsky et al. (1981) study, the authorsfollowed the same cohort to 12/31/81 (Rinsky et al., 1987). An in his earlierstudy, cumulative exposure was derived from historic air-sampling data or interpolated estimates based on existing data. Standardized mortality ratesranged from 109 at cumulative benzene exposures under 40 ppm-years andincreased to 6637 (6 cases) at 400 ppm-years or more. The authors found significantly elevated risks of leukemia at cumulative exposuresless than the equivalent current standard for occupational exposure which is10 ppm over a 40-year working lifetime. Ott et al. (1978) observed three deaths from leukemia among 594 workers followed for at least 23 years in a retrospective cohort mortality study, but the increase was not statistically significant. Exposures ranged from <2 to>25 ppm 8-hour TWA.

Wong et al. (1983) reported on the mortality of male chemical workers whohad been exposed to benzene for at least 6 months during the years 1946-1975.The study population of 4062 persons was drawn from seven chemical plants, andjobs were categorized as to peak exposure. Those with at least 3 days/week exposure (3036 subjects) were further categorized on the basis of an 8-hourTWA. The control subjects held jobs at the same plants for at least 6 months but were never subject to benzene exposure. Dose-dependent increases wereseen in leukemia and lymphatic and hematopoietic cancer. The incidence ofleukemia was responsible for the majority of the increase. It was noted that the significance of the increase is due largely to a less than expected incidence of neoplasia in the unexposed subjects.

Numerous other epidemiologic and case studies have reported an increasedincidence or a causal relationship between leukemia and exposure to benzene (IARC, 1982).

Carcinogenic Risk Estimation

Quantitative estimation of carcinogenic risk from oral exposure to benzene was determined by the EPA based on the pooled data using the One-hit extra-polation method. Risk parameters for oral exposure include a slope factor of 2.9E-2 mg/kg/day and a drinking water unit risk of 8.3-7/µg/L. The water unit risk was calculated on the assumption that an adult human consumes 2 L water/day.

It is relevant to note that the pooled data in the estimation of risk estimates for oral exposure are sufficiently large and were followed for an adequate time periods. Further, the increased incidence of leukemia were statistically significant and dose-response relationships have been demonstrated for this effect (Wong et al., 1983).

In the risk estimation from inhalation exposure, the slope factor was derived from human data for inhalation exposure by a similar methodology as adopted for oral route. The human respiratory rate was assumed to be 20 m^3/day, inhalation absorption was assumed as 100% and an air concentration of benzene of 1 ppm was taken to equal 3.25 mg/m^3. Risk estimate parameters for inhalation exposure are 2.9E-2/mg/kg/day and the Inhalation Unit Risk is 8.3E-6/μg/m^3.

While estimating the confidence of the inhalation study, it is notable that a sufficiently large pool of data was observed for an adequate period of time. On the basis of existing data, a total of 21 unit risk estimates were made using 6 models and various combinations of the epidemiologic data. These range over slightly more than one order of magnitude. A geometric mean of these estimates is 2.7E-2/ppm (mg/kg).

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Aksoy, M., S. Erdem and G. Dincol. 1974. Leukemia in shoe workers exposed chronically to benzene. Blood. 44(6): 837-841.

Aksoy, M. 1980. Different types of malignancies due to occupational exposure to benzene: A review of recent observations in Turkey. Environ. Res. 23:
181.

Anderson, D. and C.R. Richardson. 1979. Chromosome gaps are associated with chemical mutagenesis (abstract No. Ec-9). Environ. Mutat. 1: 179.

IARC (International Agency for Research on Cancer). 1982. Benzene. In: Some industrial chemicals and dyestuffs. IARC Monographs on the evaluation of carcinogenic risk of chemicals to humans. IARC, WHO, Lyon, France. 29: 93-148.

Infante, P.F., R.A. Rinsky, J.K. Wagoner and R.J. Young. 1977a. Benzene and Leukemia. The Lancet. 2(8043): 867-869.

Wagner, W.D., D.H. Groth, J.L. Holtz, G.E. Madden and H.E. Stokinger. 1969. Comparative inhalation toxicity of beryllium ores, bertrandite and beryl, with production of pulmonary tumors by beryl. Toxicol. Appl. Pharmacol. 15: 10-29.

Wagoner, J.K., P.F. Infante and D.L. Bayliss. 1980. Beryllium: An etiologic agent in the induction of lung cancer, nonneoplastic respiratory disease, and heart disease among industrially exposed workers. Environ. Res. 21: 15-34.

BIS(2-ETHYLHEXYL)PHTHALATE

CAS No: 117-81-7

Chemical Formula: $C_6H_4[COOCH_2CH(C_2H_5)C_4H_9]_2$

Synonym: DEHP

Physico-chemical Characteristics

Bis(2-ethylhexyl)phthalate (DEHP) is one of the most extensively studied among the phthalate esters.

Molecular Weight:	390.54
Flash Point:	218.33° C
Boiling Point:	386.5° C at 5 mm Hg
Specific Gravity:	0.985 at 25° C
Solubility in Water:	0.4 mg/L (at 25° C)
Log Octanol/Water Partition Coefficient:	5.3
Solubility in Organics:	Miscible with Mineral oil and Hexane
Vapor Pressure:	2 X 10^{-7} mm Hg at 20° C

Criteria and Standards[2]

Available data at present is inadequate for establishing criteria and standards for DEHP.

ACGIH (Threshold Limit Value)	5 mg/m^3 TWA
	10 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	4200 µg/l

Mancuso, T.F. 1979. Occupational lung cancer among beryllium workers in dusts and disease. In: Proc. Conference on Occupational Exposure to Fibrous and Particulate Dust and Their Extension into the Environment, R. Lemen and J. Dement, Ed. Pathrotox Publishers, Inc.

Mancuso, T.F. 1980. Mortality study of beryllium industry workers' occupational lung cancer. Environ. Res. 21: 48-55.

Miyaki, M., N. Akamatsu, T. Ono, H. Koyama. 1979. Mutagenicity of metal cations in cultured cells from chinese hamster. Mutat. Res. 68: 259-263.

Morgareidge, K., G.E. Cox, D.E. Bailey and M.A. Gallo. 1977. Chronic oral Toxicity of beryllium in the rat. Toxicol. Appl. Pharmocol. 41: 204-205.

Morgareidge, K., G.E. Cox and D.E. Bailey. 1975. Chronic feeding studies with beryllium sulfate in rats. Unpublished report submitted by the Food and Drug Research Laboratories, Inc., to the Aluminum Company of America, Pittsburgh, PA.

Puzanova, L., M. Doskocil and A. Doubkova. 1978. Distribution of the development of chick embryos after the administration of beryllium chloride at early stages of embryogenesis. Folia. Morphologica. 26(3): 228-231.

Reeves, A.L., D. Deith, and A.J. Vorwald. 1967. Beryllium carcinogenesis: I. Inhalation exposure of(rats to beryllium sulfate aerosol. Cancer Res. 27: 439-445.

Schepers, G.W.H. 1961. Neoplasia experimentally induced by beryllium compounds. Prog. Exp. Tumor Res. 2: 203-244.

Schroeder, H.A. and M. Mitchener. 1975a. Life-term studies in rats: Effects of aluminum, barium, beryllium and tungsten. J. Nutr. 105: 421-427.

Schroeder, H.A. and M. Mitchener. 1975b. Life-term effects of mercury, methyl mercury and nine other trace metals on mice. J. Nutr. 105: 452-458.

Simmon, V.F., H.S. Rosenkranz, E. Zeiger and L.A. Poirier. 1979. Mutagenic activity of chemical carcinogens and related compounds in the intraperitoneal host-mediated assay. J. Natl. Cancer Inst. 62: 911-918.

U.S. EPA. 1986. Health Assessment Document for Beryllium. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA 600/8-84-026F.

U.S. EPA. 1987. Drinking Water Criteria Document for Beryllium. Prepared by
the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. (External Review Draft)

Vorwald, A.J. 1968. Biologic manifestation of toxic inhalation in monkeys. In: Use of Nonhuman Primates in Drug Evaluation, H. Vagtborg, Ed. University of Texas Press, Austin, TX. p. 222-228.

The estimates of exposure levels and duration are somewhat uncertain in these studies. While a quantitative assessment based on several animal studies resulted in a similar estimate of risk (which probably increases the confidence), the quality of the available data is considered poor since they lacked multi-dosed studies and adequate controls.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Bayliss, D.L. 1980. U.S. EPA, Washington, DC. Letter to William H. Foege, M.D., Center for Disease Control, Atlanta, GA. November 12.

Bayliss, D.L. and J.K. Wagoner. 1977. Bronchogenic cancer and cardiorespiratory disease mortality among white males employed in a beryllium production facility. OSHA Beryllium Hearing, 1977, Exhibit 13.F.

Cloudman, A.M., D. Vining, S. Barkulis and J.J. Nickson. 1949. Bone changes following intravenous injections of beryllium. Am. J. Pathol. 25: 810-811.

Gardner, L.U. and H.F. Heslington. 1946. Osteosarcoma from intravenous beryllium compounds in rabbits. Fed. Proc. 5: 221. (Cited in U.S. EPA, 1987)

Groth, D.H., C. Kommineni and G.R. Mackay. 1980. Carcinogenicity of beryllium hydroxide and alloys. Environ. Res. 21: 63-84.

Ishinishi, N., M. Mizunoe, T. Inamasu and A. Hisanga. 1980. Experimental study on carcinogenicity of beryllium oxide and arsenic trioxide by intratracheal instillation. Fukuoka Igaku Zasshi. 71(1): 19-26. (Jap. with

Eng. abstract)

Larramendy, M.L., N.C. Popescu and J.A. DiPaola. 1981. Induction by inorganic metal salts of sister chromatid exchanges and chromosome aberrations in human and Syrian hamster cell strains. Environ. Mutagen. 3: 597-606.

MacMahon, B. 1977. Evaluation of epidemiological materials. January 10, 1978. Brush Wellman, Cleveland, OH. OSHA Beryllium Hearings: 5.

MacMahon, B. 1978. OSHA Beryllium Hearings, comment on recent post-hearing submissions. Docket No. H005, February 9, 1979.

Mancuso, T.F. 1970. Relation of duration of employment and prior illness to respiratory cancer among beryllium workers. Environ. Res. 3: 251-275.

Lung tumors, primarily adenomas and adenocarcinomas, have been induced viathe inhalation route in both male and female Sprague-Dawley rats during exposure periods of up to 72 weeks by beryllium sulfate (Reeves et al., 1967),by beryllium phosphate in both male and female Wistar rats by beryllium phosphate and zinc beryllium silicate (Schepers, 1961), and in male Charles River CR-CD rats by beryl ore (Wagner et al., 1969).

Tumors were also induced by intratracheal instillation of metallicberyllium, beryllium-aluminum alloys and beryllium oxide in both Wistar rat(sand rhesus monkeys. Adenomas, adenocarcinomas and malignant lymphomas were seen in the lungs, with lymphosarcomas and fibrosarcomas present at extra pulmonary sites (Groth et al., 1980; Ishinishi et al., 1980). Human Carcinogenicity Data: Human carcinogenicity data on beryllium is considered inadequate. Although several reports exist of increases in the cancer incidence in occupational settings, most of these studies have not taken a variety of possible confounding factors into account. For instance in a study of workers from a beryllium processing plant, and several studies of workers from this plant combined with workers from other beryllium plants, a statistically significant increased incidence of lung cancer (IRIS, 1990, Bayliss and Wagoner, 1977; Mancuso, 1970, 1979, 1980) was reported. However, adjustments were not made for smoking in these studies, and all were limited in their ability to detect a possible increased incidence of lung cancer because of methodological constraints and deficiencies.

Carcinogenicity Risk Assessment

U.S. EPA classifies beryllium as a B2 carcinogen meaning a probable human carcinogen. Weight-of-evidence was based on the observations that beryllium has been shown to induce lung cancer via inhalation in rats and monkeys and to induce osteosarcomas in rabbits via intravenous or intramedullary injection. Human epidemiology studies are considered to be inadequate.

Quantitative estimates of carcinogenic risks from oral exposure (oral slope factor) is 4.3 per(mg/kg)/day. Drinking water Unit risk is estimated at 1.2E-4 per (µg/L). However, it is important to note that the unit risk should not be used if the water concentration exceeds 8.3E+1 µg/L, since above this concentration the slope factor may differ from that stated.

The level of confidence (oral exposure) may be considered limited due to high mortality and unspecified type and site of the tumors and has only one non-zero dose group. Further, the estimate is based on a study which did not show a significant increase in tumorigenic response.

Quantitative estimates of carcinogenic risks from inhalation exposure (inhalation slope factor) is 8.4E+0 per(mg/kg)/day (IRIS, 1990). Inhalation unit risk is estimated at 2.4E-3 per (µg/m^3). Both the risk estimates are based on relative risk extrapolation method. It is relevant to note that despite several limitations, human data were used to quantify inhalation exposure. Humans are most likely to be exposed by inhalation to beryllium oxide, rather than other beryllium salts. Animal studies by inhalation of beryllium oxide have utilized intratracheal instillation, rather than general inhalation exposure.

The oral RfD (NOAEL 0.54 mg/kg bw/day) is based on the studies by Schroeder and Mitchner (1975) (IRIS, 1990). Fifty-two weanling Long-Evans rats of each sex received 0 or 5 ppm beryllium (as $BeSO_4$, beryllium sulfate) in drinking water. Exposure was for the lifetime of the animals. At natural death the rats were dissected and gross and microscopic changes were noted in heart, kidney, liver, and spleen. There were no effects of treatment on these organs or on life span, urinalysis, serum glucose, cholesterol, and uric acid, or on numbers of tumors. Male rats experienced decreased growth rates from 2 to 6 months of age.

Similar studies were carried out on Swiss (CD strain) mice at doses of approximately 0.95 mg/kg/day (Schroeder and Mitchner, 1975). Female animals showed decreased body weight compared with untreated mice at 6 of 8 intervals. Male mice exhibited slight increases in body weight. These effects were not considered adverse, therefore, 0.95 mg/kg/day is considered a NOAEL.

A reference dose for chronic inhalation exposure (RfDi) is not available at present (IRIS, 1990).

Uncertainty and modifying factors for the oral RfD is 100 and 1 respectively. The uncertainty factor of 100 reflects a factor of 10 each for inter species conversion and for the protection of sensitive human sub-populations. It is important to note that this RfD is limited to soluble beryllium salts only.

Confidence in the studies determining the oral RfD is rated as low because only one dose level was administered. Although numerous inhalation investigations and a supporting chronic oral bioassay in mice exist, along with the work by Morgareidge et al. (1975) which indicates that a higher dose level might be a NOEL, these studies are considered as low to medium quality; thus, the data base is given a low confidence rating. The overall confidence in the RfD is low, reflecting the need for more toxicity data by the oral route.

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Evidence of beryllium carcinogenicity from animal studies are considered sufficient. Based on the evidence for induction of tumors by a variety of beryllium compounds in male and female monkeys and in several strains of rats of both sexes, via inhalation and intratracheal instillation, and the induction of osteosarcomas in rabbits by intravenous or intramedullary injection in multiple studies.

Osteogenic sarcomas were induced in rabbits by intravenous injection of beryllium compounds in at least 12 different studies and by intramedullary injection in at least four studies (U.S. EPA, 1987). Bone tumors were induced
by beryllium oxide, zinc beryllium silicate, beryllium phosphate, beryllium silicate and beryllium metal. Positive results, however, were reported in mice injected with zinc beryllium silicate, although the numbers were not listed (Cloudman et al., 1949). The sarcomas were generally reported to be quite malignant and metastasized to other organs.

TSCA	None
CERCLA (Reportable Quantity,RQ)	10 lbs (proposed, 1987)
OSHA Standard (air)	2 $\mu g/m^3$ TWA 5 $\mu g/m^3$ Ceiling Level
ACGIH (Threshold Limit Value)	Suspected human carcinogen 2 $\mu g/m^3$
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Most common beryllium compounds are readily soluble in water. However, in water, soluble beryllium salts are hydrolyzed to form less soluble beryllium hydroxide. Although little information concerning adsorption of beryllium is available, based on its geochemical similarity to aluminum it is expected to be adsorbed or complexed onto clay mineral surfaces. Transport of beryllium via air is generally in the form of particulates.

Metabolism

Beryllium is not well absorbed (1% absorption may be maximum in experimental animals) when administered by any route. Following inhalation exposure, beryllium is mobilized in the blood stream as a colloidal beryllium phosphate and soluble beryllium-citrate complex that is deposited in the bone or excreted in the urine. The colloidal portion is deposited in the liver, spleen or bone marrow.

General Toxicity

There is equivocal evidence linking occupational exposure to beryllium and lung cancer. Experimental animals exposed to beryllium by inhalation have developed carcinoma of the lung and bone marrow. Acute respiratory effects due to beryllium exposure include rhinitis, pharyngitis, tracheobronchitis, and acute pneumonitis.

Chronic skin lesions sometimes appear after a long latent period in conjugation with the chronic pulmonary aspect of the disease. Dermal exposure to soluble beryllium compounds can cause contact dermatitis. Ocular effects include conjunctivitis from splash burns or in association with contact dermatitis.

The most common symptoms of chronic beryllium exposure are granulomatous lung inflammation, with accompanying cough, chest pain, and general weakness. Systemic effects include right heart enlargement with accompanying cardiac failure, liver and spleen enlargement, cyanosis, digital clubbing, and kidney stone development.

Wong, O., R.W. Morgan and M.D. Whorton. 1983. Comments on the NIOSH study of leukemia in benzene workers. Technical report submitted to Gulf Canada, Ltd., by Environmental Health Associates.

BERYLLIUM

CAS No: 7440-47-7

Synonyms: Glucinium

Physico-chemical Characteristics[1]

Beryllium is a gray metal with a natural abundance of 2 to 10 ppm. Chemical properties of beryllium are similar to that of aluminum.

Atomic Weight:	9.012
Melting Point:	1278° C
Boiling Point:	2970° C
Specific Gravity:	1.85 at 25° C
Solubility in Water:	Insoluble (some salts are soluble)
Reactivity with Acid:	Finely divided metal reacts with HCl, dil H_2SO_4 and dil HNO_3.
Octanol/Water Partition Coefficient:	N/A

Criteria and Standards[2]

The available data on Beryllium are not adequate for establishing criteria. However, EPA has reported the available lowest toxic doses for aquatic organisms.

Clean Water Act

Aquatic Organisms

1. Fresh Water		2. Marine	
a. Acute	1.3E+2 µg/L	a. Acute	N/A
b. Chronic	5.3E+0 µg/L	b. Chronic	N/A

Ambient Water Quality Criteria, Human Health

Water & Fish Consumption	6.8E-3 µg/L
Fish Consumption only	1.17E-1 µg/L

FIFRA None

Infante, P.F., R.A. Rinsky, J.K. Wagoner and R.J. Young. 1977b. Leukemia in benzene workers. Lancet. 19: 76-78.

Kissling, M. and B. Speck. 1973. Chromosome aberrations in experimental benzene intoxication. HELV. Med. Acta. 36: 59-66.

Maltoni, C. and C. Scarnato. 1979. First experimental demonstration of the carcinogenic effects of benzene. Long-term bioassays on Sprague-Dawley Rats by oral administration. Med. Lav. 70: 352-357.

Maltoni, C., B. Conti and G. Cotti. 1983. Benzene: A multi potential carcinogen. Results of long-term bioassays performed at the Bologna Institute of Oncology. Am. J. Ind. Med. 4: 589-630.

Meyne, J. and M.S. Legator. 1980. Sex-related differences in cytogenetic effects of benzene in the bone marrow of Swiss mice. Environ. Mutat. 2: 43-50.

NTP (National Toxicology Program). 1986. Toxicology and carcinogenesis studies of benzene (CAS No. 71-43-2) in F344/N rats and B6C3F mice (gavage studies). NTP Technical Report Series No. 289. NIH Publication No. 86-2545.

Ott, M.G., J.C. Townsend, W.A. Fishbeck and R.A. Langner. 1978. Mortality among individuals occupationally exposed to benzene. Arch. Environ. Health. 33: 3-10.

Rinsky. R.A., R.J. Young and A.B. Smith. 1981. Leukemia in benzene workers. Am. J. Ind. Med. 2: 217-245.

Rinsky, R.A., A.B. Smith, R. Hornung, et al. 1987. Benzene and Leukemia. New England J. Med. 316(17): 1044-1050.

Snyder, C.A., M.N. Erlichman, S. Laskin, B.D. Goldstein, and R.E. Albert. 1981. The pharmacokinetics of repetitive benzene exposure at 300 and 100 ppm in AKR mice and Sprague-Dawley rats. Toxicol. Appl. Pharmacol. 57: 164-171.

U.S. EPA. 1980. Ambient Water Quality Criteria Document for Benzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office (Cincinnati, OH) and Carcinogen Assessment Group (Washington, DC), and the Environmental Research Labs (Corvalis, OR; Duluth, MN; Gulf Breeze, FL) for the Office of Water Regulations and Standards, Washington, DC. EPA 440/5-80-018.

U.S. EPA. 1985. Interim Quantitative Cancer Unit Risk Estimates Due to Inhalation of Benzene. Prepared by the Office of Health and Environmental Assessment, Carcinogen Assessment Group, Washington, DC for the Office of Air Quality Planning and Standards, Washington, DC.

U.S. EPA. 1987. Memorandum from J. Orme, HEB, CSD/ODW to C. Vogt, Criteria and Standards Division, ODW, June 1987.

Environmental Transport and Fate

DEHP is probably persistent in the environment. Hydrolysis, photolysis and oxidation are some of the reported environmental fate process for DEHP. Volatilization of DEHP from DEHP-containing materials at relatively high temperatures has also been documented. However, adsorption to solids and particulate matter and complexation with organic materials are probably the most important transport process for DEHP. DEHP readily forms highly soluble complex with fulvic acid present in the humic substances. Bio-accumulation by a variety of microorganisms is a significant environmental fate process of DEHP.

General Toxicity and Metabolism

DEHP has a relatively low LD_{50} values in experimental animals. The Oral, intraperitoneal, and intravenous LD_{50} for DEHP in rat are 31 g/kg, 30.7 g/kg and 0.25 g/kg respectively. Dermal absorption of DEHP is minimal and has no local effects such as irritation, inflammation, and sensitization. Reduced growth has been reported in cases involving chronic exposure to high concentrations of DEHP.

DEHP is one of the most extensively studied phthalate esters for possible mutagenic, carcinogenic and carcinogenesis promoting potentials. Experimental studies have revealed carcinogenic potential of DEHP in rat. However, DEHP has failed to demonstrate a positive result in the short-term mutagenicity testing. Teratogenic and fetotoxic effects of DEHP in experimental animals have been reported.

The principle study in the estimation of an oral RfD 2E-2 mg/kg/day for DEHP was based on relative increase in liver weight in guinea pigs following a subchronic to chronic exposure to DEHP (Carpenter et al., 1953). In this study, guinea pigs were placed on a diets containing DEHP (0.04 to 0.13%) for a period of 1 year. These dietary levels corresponded to 64 or 19 mg/kg bw/day based on measured food consumption. No treatment-related effects were observed on mortality, body weight, kidney weight, or gross pathology and histopathology of kidney, liver, lung, spleen, or testes. Statistically significant increases in relative liver weights were observed in both groups of treated females (64 and 19 mg/kg bw/day).

Groups of 32 male and 32 female Sherman rats were maintained for 2 years on diets containing either 0.04, 0.13 or 0.4% DEHP (equivalent to 20, 60, and about 195 g/kg bw/day based on measured food consumption). An F1 group of 80 were fed the 0.04% diet for 1 year. Mortality in the F1 treated and control groups was high; 46.2 and 42.7%, respectively, survived to 1 year. There was, however, no effect of treatment on either parental or F1 group mortality, life expectancy, hematology, or histopathology of organs. Both parental and F1 rats receiving the 0.4% DEHP diet were retarded in growth and had increased kidney and liver weights. It appears that guinea pigs offer the more sensitive animal model for DEHP toxicity. A LOAEL in this species was determined to be 19 mg/kg/day.

In the estimation of the RfD for DEHP an uncertainty factor of 1000 and a modifying factor of 1 were included. This is to account for inter-species variation (guinea pig appears to be more sensitive to DEHP-induced chronic effects such as growth retardation, and increased liver and kidney weights). An additional factor of 10 was included to account for differences in the exposure pattern.

Confidence in the oral RfD for DEHP is rated medium. This is due to the adequacy of the principle study in terms of the number of animals used, number of experimental endpoints observed and exposure design. Since there are corroborating chronic animal assays, the data base is rated medium. The overall confidence on the oral RfD of DEHP is considered medium.

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Data on the DEHP carcinogenicity from animal studies is considered sufficient. In an NTP (1982) study, 50 male and 50 female F344 rats and B6C3F1 mice per group were fed diets containing DEHP (0 to 12,000 ppm and 0 to 6000 ppm respectively) for 103 weeks. At the end of the experimental period, a statistically significant increase in the incidence of hepatocellular carcinomas and combined incidence of carcinoma and adenoma was observed in female rats and mice (both sex). A positive dose-response effect was also observed. However, it is important to note that an earlier study (Carpenter et al., 1953) did not observe any malignant tumors in rats and guinea pigs treated with DEHP under a similar protocol as described above.

It is relevant to note that DEHP did not demonstrate a positive result in mutagenic assays. DEHP was negative in both forward mutation assay (Salamonella typhimurium, Seed, 1982) and the Rec assay (Bacillus subtilis, Tomita et al., 1982).

Studies in the establishment of DEHP carcinogenicity in experimental animals are considered adequate. In these studies an adequate number of animals was observed and a statistically significant increase in incidence of liver tumors was seen in both sexes and were dose dependent in both sexes of mice and female rats. However, a potential source of variability in the NTP study is the possibility of feed scattering. The above calculations are based on standard food consumption rates for mice (13% of body weight) and rats (5% of body weight).

Human Carcinogenicity Data: DEHP is classified as a B2 (Probable human carcinogen) by the EPA. This is based on the adequacy of data on DEHP carcino-genicity in experimental animals. However, the evidences of DEHP carcinogenicity to humans is inadequate. Thiess et al. (1978) conducted a mortality study of 221 DEHP production workers exposed to unknown concentrations of DEHP for 3 months to 24 years. Workers were followed for a periods from 5 to 10 years (mean follow-up time was 11.5 years). Eight deaths were reported in the exposed population. Deaths attributable to pancreatic carcinoma (1 case) and uremia (1 case in which the workers also had urethral and bladder papillomas) were significantly elevated in workers exposed for

>15 years when compared to the corresponding age groups in the general population. The study is limited by a short follow-up period and unquantified worker exposure. Results are considered inadequate for evidence of a causal association.

Carcinogenicity Risk Assessment

On the basis of the available animal data, DEHP is classified as a probable human carcinogen (category B2). Oral slope factor is 1.4E-2/mg/kg/day for DEHP, calculated on the basis of the linearized multistage model. Drinking water unit risk dose for DEHP is 4.0E-7/µg/L.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Ashby, J., F.J. de Serres, M. Draper, et al. 1985. Evaluation of short-term tests for carcinogens. Report of the International Program on Chemical Safety's Collaborative Study on In Vitro Assays. Elsevier Science Publishers, Amsterdam.

Carpenter, C.P., C.S. Weil and H.F. Smith, Jr. 1953. Chronic oral toxicity of bi-(2-ethylhexyl)phthalate for rats, guinea pigs and dogs. AMA Arch. Ind. Hyg. Occup. Med. 8: 219-226.

Ganning, A.E., V. Brunk and G. Dallner. 1984. Phthalate esters and their effect on the liver. Hepatology. 4(3): 541-547.

Kluwe, W.M. 1982. Overview of phthalate ester pharmacokinetics in mammalian species. Environ. Health Perspect. 45: 3-10.

Kozumbo, W.J., R. Kroll and R.J. Rubin. 1982. Assessment of the mutagenicity of phthalate esters. Environ. Health Perspect. 45: 103-109.

Lhuguenot, J.C., A.M. Mitchell, G. Milner, E.A. Lock and C.R. Elcombe. 1985. The metabolism of bi-(2-ethylhexyl)phthalate (DEHP) and mono-(2-ethylhexyl)phthalate (MEHP) in rats: In vivo and in vitro dose and time dependency of metabolism. Toxicol. Appl. Pharmacol. 80: 11-22.

NTP (National Toxicology Program). 1982. Carcinogenesis bioassay of bi-(2-ethyl-hexyl)phthalate (CAS No. 117-81-7) in F344 rats and B6C3F, mice (feed study). NTP Tech. Rep. Ser. TR No. 217, NTP, Research Triangle Park, NC.

Phillips, B.J., T.E.B. James and S.D. Gangolli. 1982. Genotoxicity studies of bi-(2-ethylhexyl)phthalate and its metabolites in CHO cells. Mutat. Res. 102: 297-304.

Pollack, G.M., R.C. Li, J.C. Ermer and D.D. Shen. 1985. Effects of route of administration and repetitive dosing on the disposition kinetics of bi-(2-ethylhexyl)phthalate and its mono-de-esterified metabolite in rats. Toxicol. Appl. Pharmacol. 79: 246-256.

Seed, J.L. 1982. Mutagenic activity of phthalate esters in bacterial liquid suspension assays. Environ. Health Perspect. 45: 111-114. Tanaka, A., T. Adachi, T. Takahashi and T. Yamaha. 1975. Biochemical studies on phthalic esters. I. Elimination, distribution and metabolism of bi-(2-ethylhexyl)phthalate in rats. Toxicology. 4: 253-264.

Thiess, A.M., R. Frentzel-Beyme and R. Wieland. 1978. Mortality study in workers exposed to bi-(2-ethylhexyl)phthalate (DOP). In: Moglichkerten und Grenzen des Biological Monitoring. Arbeitsmedizinische Probleme des Dienstleistungsqewerbes. Arbeitsmedizinische kolloquium [Possibilities and Limits of Biological Monitoring. Problems of Occupational Medicine in Small Industries. Colloquium in Occupational Medicine], Frankfurt/M., May 1978. Stuttgart, A.W. Gentner, p. 155-164. (Ger.)

Tomita, I., Y. Nakamura, N. Aoki and N. Inui. 1982. Mutagenic/carcinogenic potential of DEHP and MEHP. Environ. Health Perspect. 45: 119-125.

U.S. EPA. 1988. Drinking Water Criteria Document for Phthalic Acid Esters. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. (External Review Draft).

Williams, D.T. and B.J. Blanchfield. 1975. The retention, distribution, excretion and metabolism of dibutylphthalate-7-14C in the rat. J. Agric. Food Chem. 23: 854-857.

2-BUTANONE

CAS No:	78-93-3
Chemical Formula:	C_4H_8O
Synonym:	Methyl Ethyl Ketone

Physico-chemical Characteristics[1]

2-Butanone is a flammable liquid with acetone-like odor.

Molecular Weight:	72.1
Flash Point:	13.2° C
Boiling Point:	79.6° C
Specific Gravity:	0.805 at 20° C

Miscibility in Water:	2.68E+05 mg/L
Log Octanol/Water Partition Coefficient:	0.29
Solubility in Organics:	Miscible with alcohol, benzene and ether.
Vapor Pressure:	71.2 mm Hg at 20° C

Criteria and Standards

The available data on 2-Butanone is insufficient to establish criteria and standards at this time.

OSHA Recommended Standard:	590 mg/m^3 TWA
NIOSH Standard (air):	590 mg/m^3 TWA
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Information on the environmental transport and fate of 2-butanone is limited. Considering the chemical nature of ketones, and the high vapor pressure of 2-butanone, it is not expected to be persistent in the environment for long periods. Since 2-butanone is highly miscible in water, its volatilization should be minimal in aquatic systems or wet soil. Bioaccumulation of 2-butanone is not significant probably due to its low octanol/water coefficient and high reactivity.

General Toxicity and Metabolism

2-Butanone exhibits a relatively low toxicity profile. LD_{50} of 2-butanone in rat (oral) is 2.75 g/kg. Limited data is available on the acute toxicity of 2-butanone. At relatively high concentrations, 2-butanone affects peripheral nervous system and manifestations such as irritation of the eye, nose and skin have been observed. Reports have also been made on teratogenic effects such as retarded fetal development, acaudia, imperforate anus and brachygnathia in experimental animals following exposure to acute levels (3000 ppm) of 2-butanone. There are ambivalent evidences on the mutagenicity of 2-butanone.

RfD of 5E-2 mg/kg/day and NOAEL (235 ppm) for 2-butanone was estimated based on a rat inhalation subchronic bioassay (Schwetz et al., 1974). LOAEL (estimated value of 130.5 mg/kg/day) for 2-butanone is based on the study by LaBelle and Brieger (1955).

Adequate chronic toxicity testing has not been performed with 2-butanone. Although several more recent subchronic studies have been conducted (Freddi

et al., 1982; Cavender et al., 1983; Takeuchi et al., 1983), only the NOAEL of the LaBelle and Brieger (1955) study provides the lowest and most protective dose for deriving an RfD. In this study, 25 rats were exposed to 235 ppm of 2-butanone for 7 hours/day, 5 days/week for 12 weeks. No effects were observed, but only a few parameters were measured. 2-Butanone has also been tested for teratogenic effects (Schwetz et al., 1974; Deacon et al., 1981), and the observed LOAELs for fetotoxicity were higher than the NOAELs of LaBelle and Brieger (1955).

The route extrapolation introduced uncertainty because of differences in pharmacokinetic parameters, notably absorption and elimination.

In the estimation of the RfD for 2-butanone an uncertainty factor of 1000 is included to account for inter-species variability and uncertainty in the extrapolation from a subchronic effect level to chronic effects.

No oral chronic studies are available at this time.

The confidence on the principle study is rated medium due to inadequate number of animals used per group, dose, and unspecified control group size. A consistent NOAEL has been reported from 4 different studies rendering the confidence on the data base as medium. The overall confidence on the RfD is medium.

A risk assessment and estimation of an inhalation RfD for 2-butanone is currently under review.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

References

LaBelle, W. and H. Brieger. 1955. The vapor toxicity of a composite solvent and its principal components. Am. Med. Assoc. Arch. Ind. Health. 12: 623-627.

Schwetz, B.A., B.K.J. Leong and P.J. Gehring. 1974. Embryo- and fetotoxicity of inhaled carbon tetrachloride, 1,1-dichloroethane and methyl ethyl ketone in rats. Toxicol. Appl. Pharmacol. 28(3): 452-464.

CADMIUM

CAS No: 7440-43-9

Physico-chemical Characteristics[1]

Cadmium is a soft, bluish white lustrous metal; with a natural abundance of 0.1 to 0.2 ppm in the earth's crust.

Atomic Weight:	112.41
Melting Point:	321° C
Boiling Point:	765° C
Specific Gravity:	8.642 at 25° C
Solubility in Water:	Insoluble (some salts are soluble)
Vapor Pressure	1 mm Hg at 394° C
Reactivity with Acid:	Reacts readily dil. HNO_3 and slowly with hot HCl
Octanol/Water Partition Coefficient:	N/A

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.005 mg/L (proposed, 1985).
Maximum Contaminant Level (MCL)	0.01 mg/L (interim, 1980).

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	1E+1 µg/L
Fish Consumption only	none

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	3.9E+0 µg/L (1 hr Average)
Chronic Toxicity:	1.1E+0 µg/L (4-day Average)

Marine Water

Acute Toxicity:	4.3E+1 µg/L (1 hr Average)
Chronic Toxicity:	9.3E+0 µg/L (4-day Average)
FIFRA	Not available
TSCA	Not available
RCRA	listed

OSHA Standard (air)	200 µg/m^3 TWA 600 µg/m^3 Ceiling Level
ACGIH (Threshold Limit Value)	50 µg/m^3 TWA

New York State Water Quality Regulations (Class GA Groundwaters)	10 µg/l

Environmental Transport and Fate

Cadmium is relatively mobile in the aquatic environment compared to other heavy metals (EPA 1979). Complexation with organic materials appears to be the mechanism of removal of cadmium from aqueous media. Mobility of cadmium transport in the soil is not clearly known. However, cadmium uptake by the plants is considered significant.

Metabolism

Approximately 6 to 10% of the ingested cadmium is absorbed. Cadmium is transported largely in the red blood cells. Selective accumulation of cadmium in the renal cortex is reported although in cases of excessive exposure the liver may contain more. In inhalation exposure most cadmium salts have short-term retention in the lungs. Under normal conditions inhalation route does not contribute significantly in the overall cadmium intake.

General Toxicity

Acute inhalation exposure to cadmium may result in pulmonary edema and death caused by anoxia. Other acute effects include, cellular proliferation in the alveoli and hyperplasia, occasional intra-alveolar hemorrhage peribronchial fibrosis and emphysema.

Chronic inhalation exposure to cadmium may result in proteinuria and emphysema. Reports of questionable adequacy exist of increased incidence of tumors in animals following a oral exposure to cadmium.

Cadmium is a known animal teratogen and reproductive toxicant. It has been shown to cause renal dysfunction in both humans and animals. Other toxic effects attributed to cadmium include immunosuppression (animal data), anemia (human data), pulmonary disease, bone damage and sensory dysfunction (human data).

The Reference doses for chronic oral exposure (RfDo) for cadmium are 5E-4 mg/kg/day (NOAEL, water) and 1E-3 mg/kg/day (NOAEL, food) (EPA, 1985). These estimates were made on the basis that a concentration of 200 µg cadmium [Cd/gm wet human renal cortex] is the highest renal level not associated with significant proteinuria (IRIS, 1990, U.S. EPA,1985). On the basis of a toxicokinetic model (EPA, 1985) which assumes 0.01% elimination of Cadmium body burden per day, and 2.5% absorption of Cadmium from food or 5% from water, NOAEL for chronic Cadmium exposure is 0.005 and 0.01 mg kg/day from water and food, respectively.

Uncertainty and modifying factors for the oral RfD are estimated at 10 and 1 respectively. These estimation are based on intra human variability

to cadmium toxicity due to non-availability of specific data on sensitive population.

While determining the confidence in the oral RfD, it is important to note that a toxicokinetic model has been used to determine the highest level of exposure associated with the lack of a critical effect. Again, the choice of NOAEL does not reflect the information from any single study but reflects the data obtained from many studies on the toxicity of cadmium in both humans and animals. These data also permit calculation of pharmacokinetic parameters of cadmium absorption, distribution, metabolism and elimination. All of this information considered together gives high confidence in the data base. High confidence in either RfDs follows as well.

Estimation of an RfD for inhalation exposure for cadmium is currently under review.

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Studies with Wistar rats have revealed that exposure via inhalation of cadmium chloride at concentrations of 12.5, 25 and 50 $\mu g/m^3$ for 18 months, with an additional 13-month observation period, resulted in significant increases in lung tumors (Takenaka et al., 1983). Intratracheal instillation of cadmium oxide did not produce lung tumors in Fisher 344 rats but rather mammary tumors in females and tumors at multiple sites in males (Sanders and Mahaffey, 1984). Injection-site tumors and distant site tumors (for example, testicular) have been reported by a number of authors as a consequence of intramuscular or subcutaneous administration of cadmium metal and chloride, sulfate, oxide and sulfide compounds of cadmium to rats and mice (U.S. EPA, 1985). Seven studies in rats and mice where cadmium salts (acetate, sulfate, chloride) were administered orally have shown no evidence of a carcinogenic response. Results of mutagenicity tests in bacteria and yeast are inconclusive. Ambivalent results have been reported on cadmium-induced chromosomal aberration, mutation, and cell transformation tests.

Human Carcinogenicity Data: Data is Limited. A 2-fold excess risk of lung cancer was observed in cadmium smelter workers. The cohort consisted of 602 white males who had been employed in production work a minimum of 6 months during the years 1940-1969. The population was followed to the end of 1978. Urine cadmium data available for 261 workers employed after 1960 suggested a highly exposed population. The authors were able to ascertain that of these possible confounding factors the increased lung cancer risk was probably not due to the presence of arsenic or to smoking (Thun et al., 1985). Due to the involvement of several confounding factors, this study offers limited evidence on human carcinogenicity. Similarly, other studies on excess lung cancer risks have not accounted for the possible exposures to other carcinogens like arsenic, smoking etc., offering considerable limitations on the overall observations (Varner, 1983; Sorahan and Waterhouse, 1983; Armstrong and Kazantzis, 1983).

Cadmium is classified as a B1 carcinogen by the EPA meaning it is a probable human carcinogen (by inhalation route only) (IRIS, 1990). This is

based on limited evidence from epidemiologic studies and sufficient evidence of carcinogenicity in rats and mice by two routes.

At present data is insufficient to classify cadmium as carcinogenic to humans by the oral route. Risk estimates for carcinogenicity by inhalation exposure Inhalation Slope Factor 6.1E+0/mg/kg/day (IRIS, 1990, inhalation Unit Risk 1.8E-3/$\mu g/m^3$) obtained by a two-stage method where only the first stage is affected by exposure.

The confidence in the carcinogenicity data is rated moderate. The data was derived from a relatively large cohort. Effects of arsenic and smoking were accounted for in the quantitative analysis for cadmium effects. A slope factor derived from cadmium chloride inhalation assay data in rats (Takenaka et al., 1983) equals 3.4E-1/µg/kg/day for elemental cadmium or 2.1E-1/µg/kg/day for cadmium chloride (IRIS, 1990). However, it was felt that the use of available human data was more reliable because of species variations in response and the type of exposure (cadmium salt vs.cadmium fume and cadmium oxide).

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Armstrong, B.G. and G. Kazantzis. 1983. The mortality of cadmium workers. Lancet. June 25, 1983: 1425-1427.

Casto, B. 1976. Letter to Richard Troast, U.S. EPA. Enclosing mutagenicity data on cadmium chloride and cadmium acetate.

Foulkes, E.C. 1986. Absorption of cadmium. In: Handbook of Experimental Pharmacology, E.C. Foulkes, Ed. Springer Verlag, Berlin. Vol. 80, p. 75-100.

Friberg, L., M. Piscator, G.F. Nordberg and T. Kjellstrom. 1974. Cadmium in the environment, 2nd ed. CRC Press, Inc., Boca Raton, FL.

Gilliavod, N. and A. Leonard. 1975. Mutagenicity tests with cadmium in the mouse. Toxicology. 5: 43-47.

Holden, H. 1980. Further mortality studies on workers exposed to cadmium fumes. Presented at Seminar on Occupational Exposure to Cadmium, March 20, 1980, London, England.

Kipling, M.D. and J.A.H. Waterhouse. 1967. Cadmium and prostatic carcinoma. Lancet. 1: 730.

Lemen, R.A., J.S. Lee, J.K. Wagoner and H.P. Blejer. 1976. Cancer mortality among cadmium production workers. Ann. N.Y. Acad. Sci. 271: 273.

Oberly, T., C.E. Piper and D.S. McDonald. 1982. Mutagenicity of metal salts in the L5178 Y mouse lymphoma assay. J. Toxicol. Environ. Health. 9: 367-376.

Ochi, T. and M. Ohsawa. 1983. Induction of 6-thioguanine-resistant mutants and single-strand scission DNA by cadmium chloride in cultured Chinese hamster cells. Mutat. Res. 111: 69-78.

Sanders, C.L. and J.A. Mahaffey. 1984. Carcinogenicity of single and multiple intratracheal instillation of cadmium oxide in the rat. Environ. Res. 33: 227-233.

Shaikh, Z.A. and J.C. Smith. 1980. Metabolism of orally ingested cadmium in humans. In: Mechanisms of Toxicity and Hazard Evaluation, B. Holmstedt et al., Ed. Elsevier Publishing Co., Amsterdam. p. 569-574.

Shimada, T., T. Watanabe and A. Endo. 1976. Potential mutagenicity of cadmium in mammalian oocytes. Mutat. Res. 40: 389-396.

Sorahan, T. and J.A.H. Waterhouse. 1983. Mortality study of nickel-cadmium battery workers by the method of regression models in life tables. Br. J. Ind. Med. 40: 293-300.

Takenaka, S., H. Oldiges, H. Konig, D. Hochrainer and G. Oberdoerster. 1983. Carcinogenicity of cadmium aerosols in Wistar rats. J. Natl. Cancer Inst. 70: 367-373.

Thun, M.J., T.M. Schnorr, A.B. Smith and W.E. Halperin. 1985. Mortality among a cohort of U.S. cadmium production workers: An update. J. Natl. Cancer Inst. 74(2): 325-333.

U.S. EPA. 1985. Updated Mutagenicity and Carcinogenicity Assessment of Cadmium. Addendum to the Health Assessment Document for Cadmium (EPA 600/ B-Bl-023). EPA 600/B-83-025F.

U.S. EPA. 1985. Drinking Water Criteria Document on Cadmium. Office of Drinking Water, Washington, DC. (Final draft)

Varner, M.O. 1983. Updated epidemiologic study of cadmium smelter workers. Presented at the Fourth International Cadmium Conference. Unpublished.

Watanabe, T., T. Shimada and A. Endo. 1979. Mutagenic effects of cadmium on mammalian oocyte chromosomes. Mutat. Res. 67: 349-356.

WHO (World Health Organization). 1972. Evaluation of certain food additives and the contaminants mercury, lead, and cadmium. Sixteenth Report of the Joint FAO/WHO Expert Committee on Food Additives. WHO Technical Report Series No. 505, FAO Nutrition Meetings Report Series No. 51. Geneva, Switzerland.

WHO (World Health Organization). 1984. Guidelines for drinking water quality -- recommendations. Vol. 1. Geneva, Switzerland.

CHLOROBENZENE

CAS No: 108-90-7

Chemical Formula: C_6H_5Cl

Synonym: Monochlorobenzene

Physico-chemical Characteristics[1]

Chlorobenzene is a colorless, very refractive liquid with a faint, but not unpleasant odor.

Molecular Weight:	112.56
Flash Point:	28° C
Boiling Point:	131-132° C
Specific Gravity:	1.107 at 20° C
Solubility in Water:	4.66E+02 mg/L
Log Octanol/Water Partition Coefficient:	2.83
Solubility in Organics:	Freely miscible with alcohol, benzene, chloroform and ether.
Vapor Pressure:	8.8 mm Hg at 20° C

Criteria and Standards[2]

The available data on Chlorobenzene at this time is inadequate to establish criteria and standards.

OSHA Standard:	350 mg/m^3 TWA
ACGIH (Threshold Limit Value):	350 mg/m^3 TWA
New York State Water Quality Regulations (Class GA Groundwaters)	100 µg/l

Environmental Transport and Fate

Chlorobenzene is persistent in the environment. Adsorption to organic and inorganic materials and bio-accumulation are important environmental transport and fate process of Chlorobenzene. Considering the high octanol/water partition coefficient, mobility of chlorobenzene in the soil is expected to be low.

General Toxicity and Metabolism

Studies on the occupational exposure to chlorobenzene have revealed that acute exposure to high concentrations of chlorobenzene is associated with blood dyscrasia, hyperlipidemia and cardiac dysfunction. Animals exposed to chlorobenzene have demonstrated liver and kidney damage and atrophy of the seminiferous tubules.

Although, occupational exposures to chronic levels of chlorobenzene cause depression of the central nervous system, no neurotoxic effects have been reported in such exposures.

Based on the 13-week dog studies (Monsanto Co., 1967; Knapp et al., 1971), the oral RfD for chlorobenzene was estimated to be 2E-2 mg/kg/day. In these studies, male and female beagle dogs given chlorobenzene orally by capsule at doses of 27.25, 54.5, or 272.5 mg/kg/day, 5 days/week, for 13 weeks. NOAEL = 27.25 mg/kg/day; LOAEL = 54.5 mg/kg/day (slight bile duct proliferation, cytologic alternations, and leukocytic infiltration of the stroma, all in liver). Death, body weight loss, various changes in hematology, clinical chemistry, and urine analysis, and pathologic changes in liver (bile duct hyperplasia, cytologic changes, leukocytic infiltration, centrolobular degeneration), kidney, gastrointestinal mucosa, and hematopoietic tissue at 272.5 mg/kg/day.

In the estimation of the oral RfD, an uncertainty factor of 1000 is included to account for dose extrapolation, sensitive population, and uncertainty in the effect in extrapolation from subchronic to chronic exposure.

Confidence evaluation of the principles studies in the estimation of the oral RfD are rated medium. This is due to the availability of both NOAEL and LOAEL and inclusion of several biological endpoints in the study. The data base has several toxicity studies including subchronic, chronic, developmental and reproductive toxicity, but does not have a complete assessment of toxicity rendering a medium rating on the data base. The overall confidence on the oral RfD is considered medium.

An inhalation RfD for chlorobenzene is not currently available.

Evidence of Carcinogenicity

A recent study by the NTP has indicated that chlorobenzene increases neoplastic incidence in the liver of male rats. However, the study showed negative results in female rats and mice (both sexes).

Although chlorobenzene is being evaluated for evidences of human carcinogenic potential, a complete carcinogenic risk assessment for chlorobenzene is not currently available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Irish, D.D. 1963. Halogenated hydrocarbons. II. Cyclic. In: Patty's Industrial Hygiene and Toxicology, Vol. II., D.W. Fassett and D.D. Irish, eds. Interscience Publishers, New York, NY. p. 1333-1362.

John, J.A., W.C. Hayes, T.R. Hanley, Jr., K.A. Johnson, T.S. Gushow and K.S. Rao. 1984. Inhalation, teratology study on monochlorobenzene in rats and rabbits. Toxicol. Appl. Pharmacol. 76: 365-373.

Knapp, W.K., W.M. Busey and W. Kundzins. 1971. Subacute oral toxicity of mono-chlorobenzene in dogs and rats. Toxicol. Appl. Pharmacol. 19: 393. (Abstract).

Monsanto Chemical Company. 1967a. 13-week oral administration -- dogs. Monochlorobenzene. Final report. Prepared by Hazelton Laboratories, Project No. 241-105, February 24.

Monsanto Chemical Company. 1967b. Three-month subacute oral study -- rats. Monochlorobenzene. Final report. Prepared by Hazelton Laboratories, Project No. 241-104, March 9.

CHROMIUM

CAS No: 7440-47-3

Physico-chemical Characteristics[1]

Chromium is a steel-gray, lustrous metal with a natural abundance of 100-300 ppm in the earth's crust.

Atomic Weight:	51.996
Melting Point:	1900° C
Boiling Point:	2642° C
Specific Gravity:	7.14 at 25° C
Solubility in Water:	Insoluble (some salts are soluble).
Reactivity with Acid:	Readily with HCl & H_2SO_4 and not with HNO_3.

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.12 mg/L [total chromium] proposed, 1985).
Maximum Contaminant Level (MCL)	0.05 mg/L [total chromium] (interim, 1980).

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	5.0E+1 µg/L
Fish Consumption only	none

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	1.6E+1 µg/L (1 hr Average)
Chronic Toxicity:	1.1E+1 µg/L (4-day Average)

Marine Water

Acute Toxicity:	1.1E+3 µg/L (1 hr Average)
Chronic Toxicity:	5.0E+1 µg/L (4-day Average)

FIFRA	Not available
TSCA	Not available
RCRA	Listed

OSHA Standard: OSHA air standards have been stet for several chromium compounds. Most recognized or suspected carcinogenic chromium compounds have ceiling limit of 100 µg/m^3.

ACGIH (TLV) 0.5 are 0.05 Several chromium compounds have TWAs ranging from 0.05 to mg/m^3. Chromite ore processing (chromate), certain water insoluble Cr VI compounds, and chromates of lead and zinc recognized or suspect human carcinogens and have a TWA of mg/m^3.

NIOSH Recommended Standards (Cr VI): 1 µg/m^3 (carcinogenic effect)

25 µg/m^3 (noncarcinogenic effect)
50 µg/m^3 (noncarcinogenic effect, 15 minute sample)

New York State Water Quality Regulations (Class GA Groundwaters) — 50 µg/l

Environmental Transport and Fate

Chromium exists in 6 valence states. Chromium species including, hexavalent chromium are quite soluble and are not sorbed to the common environmental matrixes such as clays, hydrous metal oxides, and biological substances. However, Cr VI can be effectively removed in the presence of activated carbon. Chromium VI is a moderately strong oxidizing agent and it reacts to form Cr III which get subsequently hydrolyzed to form $Cr(OH)_3$.

In the atmosphere, Chromium is predominantly associated with suspended particulates. Chromium bearing aerosols are transported long distances before settlement. However, the dynamics of transport and distribution of Cr-containing particulates is not clearly understood.

Metabolism

Following intratracheal administration, water soluble chromates disappear from lungs while the trivalent chromic chloride remains largely in the lower respiratory tract. Absorption through the gastrointestinal tract is rapid and depends on the presence of Cr VI, which increases absorption. Chromium normally deposit in the lungs, skin, muscle, and fat. However, chromates are bound predominantly to the red blood cells. Urinary excretion accounts for about 80% of the total chromium recovery. However, elimination through the intestine may also play a role in chromium excretion. Milk is an other route of chromium excretion.

General Toxicity

Occupational exposure to Cr VI causes dermatitis, penetrating ulcers on the hands, forearms, perforation nasal septum, inflammation of the larynx and liver. Although, dermatitis is considered to be an allergic response ulceration is believed to be due to Cr III. Chromic acid and chromates are presumably the causative agents in the perforation of nasal septum. It is relevant to note that skin lesions, as a rule, are not a site of cancer.

Trivalent chromium is an essential element in animals. It is considered to play a role in glucose and lipid metabolism. Chromium deficiency mimics clinical symptoms characteristic of diabetic mellitus.

Determination of the oral RfD for chronic exposure to Cr VI was based on a 1-year study on rat (IRIS, 1990, MacKenzie et al., 1958). The oral RfD for Cr VI is estimated at 5E-3 mg/kg/day. In this study, Sprague-Dawley rats administered 0-11 & 25 ppm (0-11 mg/L & 25 mg/L respectively) hexavalent chromium (in drinking water) for 1 year. No significant adverse effects were seen on appearance, weight gain, or food consumption, and there were no pathologic changes in the blood or other tissues in any treatment group. The rats receiving 25 ppm of chromium (as K_2CrO_4) showed an approximate 20%

reduction in water consumption. This dose corresponds to 2.4 mg Cr VI/kg/day based on actual body eight and water consumption data. In this study, in the 25 ppm treatment groups, tissue concentrations of chromium were approximately 9 times higher for those treated with hexavalent chromium than for the trivalent group.

In the estimation of oral RfD based on this study uncertainty factor of 500 was included to account for expected inter human and inter species variability in response (10), and an additional factor of 5 to account for lack of lifetime exposure data in the principle study.

Confidence in the principle study is low. This is because size of the test groups was small, fewer parameters were measured and the lack data on toxic effect at the highest dose tested. Confidence in the data base is low because
the supporting studies are inadequate, and teratogenic and reproductive end points are not well studied. Low confidence in the RfD follows.

Estimation of a reference dose for chronic inhalation exposure to Cr VI is currently under review at EPA.

The oral Reference dose for Cr III was estimated at 1E+0 mg/kg/day based on a rat chronic feeding study [IRIS, 1990, Ivankovic and Preussmann (1975)]. In this study, rats were fed chromic oxide (Cr_2O_3) 5 days/week for 600 feedings (840 total days). Body weight and food consumption were monitored. The average total amounts of ingested Cr2O3 were given as 360, 720, and 1800 g/kg bw for the 1, 2, and 5% treatment groups, respectively. The animals were maintained on control diets following termination of exposure until they became moribund. No gross histological or pathological effects due to Cr2O3 treatment were observed at any dose level. In a 0-5% Cr_2O_3, 5 days/week, 90 days protocol in rats the only effects observed were reductions (12-37%) in the absolute weights of the livers and spleens of animals in the high-dose group. Organ weights relative to body weight were not reported. The high dose is equivalent to 1400 mg/kg/day (dose converted using reported data). Other subchronic oral studies show no indication of adverse effects

An uncertainty factor of 100 was included in the estimation to represent a two 10-fold decrease in mg/kg bw/day dose that account for both the expected inter human and inter species variability to the toxicity of the chemical in lieu of specific data. A modifying factor of 10 was adopted to reflect uncertainty in NOEL because: 1) the effects observed in the 90-day study were not explicitly addressed in the 2-year study and, thus, the highest NOAEL in the 2-year study may be a LOAEL; 2) the absorption of chromium is low (<1%) and is influenced by a number of factors; thus, a considerable potential variation in absorption exists; and 3) animals were allowed to die naturally after feeding stopped (2 years) and only then was histology performed.

Confidence in the oral RfD for Cr III is considered low because of the lack of explicit detail on study protocol and results. Low confidence in the data base reflects the lack of high-dose supporting data. The low confidence in the RfD reflects the foregoing, but also reflects the lack of an observed effect level. Thus, the RfD, as given, should be considered conservative, since the MF addresses only those factors which might lower the RfD.

Evidence of Carcinogenicity

Chromium (VI) is classified by the EPA under category A, meaning it is a human carcinogen (IRIS, 1990). This is based on sufficient and consistent evidence of Cr VI carcinogenicity from epidemiological studies of chromium-exposed workers (Machle and Gregorius, 1948; Brinton et al., 1952; Mancuso and Hueper, 1951, Mancuso, 1975; Baetjer, 1950a,b; Taylor, 1966; Enterline, 1974; Hayes et al., 1979; Hill and Ferguson, 1979 Bidstrup, 1951; Bidstrup and Case, 1956; Alderson et al., 1981, Watanabe and Fukuchi, 1975; Ohsaki et al., 1978; Sano and Mitohara, 1978; Satoh et al., 1981 Korallus et al., 1982; Bittersohl, 1971). Dose-response relationships have been established for chromium-induced lung cancer. Although epidemiological data is sufficient for Cr III and lung cancer, experimental data on Cr III as a carcinogen are largely negative.

Data from experimental animals on chromium (VI) is considered sufficient and consistent to classify Cr VI as a carcinogen in animal bioassays. Tumors at time injection site in F344 rats and C57BL mice (Furst et al.,1976; Maltoni, 1974, 1976; Payne, 1960a,b; Heuper and Payne, 1959); intra-plural implant site tumors for various chromium VI compounds in SD and Bethesda Black rats (Payne, 1960a,b; Heuper 1961; Heuper and Payne, 1962); intra-bronchial implantation site tumors for various Cr VI compounds in Wistar rats (Levy and Martin, 1983; Laskin et al., 1970; Levy as quoted in NIOSH, 1975); and subcutaneous injection site sarcomas in Sprague-Dawley rats (Maltoni, 1974, 1976).

Carcinogenesis Risk Assessment

On the basis of sufficient and consistent evidence from both epidemiological and experimental studies, Cr VI is classified as a human carcinogen. However, it is relevant to note that Cr III has no supporting experimental data in consistence with adequate epidemiologic data on its carcinogenicity.

An inhalation unit risk dose is estimated at 1.2E-2/$\mu g/m^3$ (IRIS, 1990). Air Concentrations (AC) at Specified Risk Levels (RL) are RL = E-4 (1 in 10,000) for AC of 8E-3 $\mu g/m^3$, RL = E-5 (1 in 100,000) for AC of 8E-4 $\mu g/m^3$, Rl = E-6 (1 in 1,000,000) for AC of 8E-5 $\mu g/m^3$.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Alderson, M.R., N.S. Rattan and L. Bidstrup. 1981. Health of workmen in the chromate-producing industry in Britain. Br. J. Ind. Med. 38:117-124.

Axelsson, G., R. Rylander and A. Schmidt. 1980. Mortality and incidence of tumors among ferro-chromium workers. Br. J. Ind. Med. 37:121-127.

Baetjer, A.M. 1950a. Pulmonary carcinoma in chromate workers. I. A review of the literature and report of cases. Arch. Ind. Hyg. Occup. Med. 2(5): 487-504.

Baetjer, A.M. 1950b. Pulmonary carcinoma in chromate workers. II. Incidence on basis of hospital records. Arch. Ind. Hyg. Occup. Med.): 505-516.

Bidstrup, P.L. 1951. Carcinoma of the lung in chromate workers. Br. J. Med. 8: 302-305.

Bidstrup, P.L. and R.A.M. Case. 1956. Carcinoma of the lung in workmen in the bichromates-producing industry in Great Britain. Br. J. Ind. Med. 13: 260-264.

Bittersohl, G. 1971. Epidemiological research of cancer cases in the chemical industry. Arch. Geschwulstforschl. 38(3-4): 198-209.

Bonatti, S., M. Meini and A. Abbondandolo. 1976. Genetic effects of potassium dichromate in Schizosaccharomyces pombe. Mutat. Res. 38: 147-150.

Brinton, H.P., E.S. Frasier and A.L. Koven. 1952. Morbidity and mortality experience among chromate workers. Public Health Rep. 67(9): 835-847.

Casto, B.C., J. Meyers and J.A. DiPaolo. 1979. Enhancement of viral transformation for evaluation of the carcinogenic or mutagenic potential of inorganic metal salts. Cancer Res. 39: 193-198.

Davies, J.M. 1978. Lung-cancer mortality in workers making chrome pigments. Lancet. 1: 384.

Davies, J.M. 1979. Lung cancer mortality of workers in chromate pigment manufacture: An epidemiological survey. J. Oil Chem. Assoc. 62: 157-163.

Enterline, P.E. 1974. Respiratory cancer among chromate workers. J. Occup. Med. 16: 523-526.

Fradkin, A., A. Janoff, B.P. Lane and M. Kuschner. 1975. In vitro transformation of BHK21 cells grown in the presence of calcium chromate. Cancer Res. 35: 1058-1063.

Frentzel-Beyme, R. 1983. Lung cancer mortality of workers employed in chromate pigment factories. A multicentric European epidemiological study. J. Cancer Res.
Clin. Oncol. 105: 183-188.

Furst, A., M. Schlauder and D.P. Sasmore. 1976. Tumorigenic activity of lead chromate. Cancer Res. 36: 1779-1783.

Hayes, R.B., A.M. Lilienfeld and L.M. Snell. 1979. Mortality in chromium chemical production workers: A prospective study. Int. J. Epidemiol. 8(4): 365-374.

Hueper, W.C. 1961. Environmental carcinogenesis and cancers. Cancer Res. 21: 842-857.

Hueper, W.C. and W.W. Payne. 1959. Experimental cancers in rats produced by chromium compounds and their significance to industry and public health. Ind. Hyg. J. 20: 274-280.

Heuper, W.C. and W.W. Payne. 1962. Experimental studies in metal carcinogenesis: Chromium, nickel, iron, and arsenic. Arch. Environ. Health. 5: 445-462.

Hill, W.J. and W.S. Ferguson. 1979. Statistical analysis of epidemiological data from a chromium chemical manufacturing plant. J. Occup. Med. 21(2): 103-106.

Ivankovic, S. and R. Preussmann. 1975. Absence of toxic and carcinogenic effects after administration of high doses of chromic oxide pigment in subacute and long-term feeding experiments in rats. Food Cosmet. Toxicol. 13: 347-351.

Korallus, U., H. Lange, A. Ness, E. Wustefeld and T. Zwingers. 1982. Relationships between precautionary measures and bronchial carcinoma mortality in the chromate-producing industry. Arbeitsmedizin, Socialmedizin, Preventiv-medizin. 17(7): 159-167. (German - Eng. summary)

Langard, S. and T. Norseth. 1975. A cohort study of bronchial carcinomas in workers producing chromate pigments. Br. J. Ind. Med. 32: 62-65.

Langard, S., A. Anderson and B. Gylseth. 1980. Incidence of cancer among ferrochromium and ferrosilicon workers. Br. J. Ind. Med. 37: 114-120.

Laskin, S., M. Kuschner and R.T. Drew. 1970. Studies in pulmonary carcinogenesis. In: M.G. Hanna, Jr., P. Nettesheim, and J.R. Gilbert, Eds. Inhalation Carcinogenesis, M.G. Hanna, Jr., P. Nettesheim, and J.R. Gilbert, Eds. U.S. Atomic Energy Comm. Symp. Series. Sponsored by the National Cancer Institute and U.S. Atomic Energy Commission. 18: 321-350.

Levis, A.G., M. Buttignol, V. Bianchi and G. Sponza. 1978. Effects of potassium dichromate on nucleic acid and protein syntheses and on precursor uptake in BHK fibroblasts. Cancer Res. 38: 110-116.

Levy, L.S. and P.A. Martin. 1983. The effects of a range of chromium-containing materials on rat lung. Sponsored by Dry Color Manufacturers' Association and others. (Unpublished)

Loeb, L.A., M.A. Sirover and S.S. Agarwal. 1977. Infidelity of DNA synthesis as
related to mutagenesis and carcinogenesis. Adv. Exp. Biol. Med. 91: 103-115.

Lofroth, G. 1978. The mutagenicity of hexavalent chromium is decreased by microsomal metabolism. Naturvissenschaften. 65: 207-208.

Machle, W. and F. Gregorius. 1948. Cancer of the respiratory system in the United States chromate-producing industry. Public Health Rep. 63(35): 1114-1127.

MacKenzie, R.D., R.U. Byerrum, C.F. Decker, C.A. Hoppert and R.F. Langham.

1958. Chronic toxicity studies. II. Hexavalent and trivalent chromium administered in drinking water to rats. Am. Med. Assoc. Arch. Ind. Health.

18: 232-234.

Maltoni, C. 1974. Occupational carcinogenesis. Excerpta Med. Int. Congr. Ser. 322: 19-26.

Maltoni, C. 1976. Predictive value of carcinogenesis bioassays. Ann. NY. Acad. Sci. 271: 431-443.

Mancuso, T.F. 1975. Consideration of Chromium as an Industrial Carcinogen. International Conference on Heavy Metals in the Environment, Toronto, Ontario, Canada, October 27-31. p. 343-356.

Mancuso, T.F. and W.C. Hueper. 1951. Occupational cancer and other health hazards in a chromate plant: A medical appraisal. I. Lung cancers in chromate workers. Ind. Med. Surg. 20(8): 358-363.

Nakamuro, K., K. Yoshikawa, Y. Sayato and H. Kurata. 1978. Comparative studies of chromosomal aberration and mutagenicity of trivalent and hexavalent chromium. Mutat. Res. 58: 175-181.

Newbold, R.F., J. Amos and J.R. Connell. 1979. The cytotoxic, mutagenic and clastrogenic effects of chromium-containing compounds on mammalian cells in culture. Mutat. Res. 67: 55-63.

NIOSH (National Institute for Occupational Safety and Health). 1975. Criteria for a recommended standard occupational exposure to chromium (VI). U.S. Department of Health, Education, and Welfare, Washington, DC.

Ohsaki, Y., S. Abe, K. Kimura, Y. Tsuneta, H. Mikami and M. Murao. 1978. Lung cancer in Japanese chromate workers. Thorax. 33: 372-374.

Okubo, T. and K. Tsuchiya. 1979. Epidemiological study of chromium platers in
Japan. Biologic. Trace Elem. Res. 1: 35-44.

Payne, W.W. 1960a. The role of roasted chromite ore in the production of cancer. Arch. Environ. Health. 1: 20-26.

Petrilli, F.L. and S. DeFlora. 1977. Toxicity and mutagenicity of hexavalent chromium on Salmonella typhimurium. Appl. Environ. Microbiol. 33(4): 805-809.

Petrilli, F.L. and S. DeFlora. 1978. Oxidation of inactive trivalent chromium to the mutagenic hexavalent form. Mutat. Res. 58: 167-178.

Pokrovskaya, L.V. and N.K. Shabynina. 1973. Carcinogenic hazards in the production of chromium ferro-alloys. Gig. Tr. Prof. Zabol. 10: 23-26.

Poaffetto, G., S. Parodi, C. Parodi, M. DeFerrari, R. Troiano and G. Brambilla. 1977. Direct interaction with cellular targets as the mechanism for chromium carcinogenesis. Tumori. 63: 503-512.

Royle, H. 1975. Toxicity of chromic acid in the chromium plating industry. Environ. Res. 10: 141-163.

Sano, T. and I. Mitohara. 1978. Occupational cancer among chromium workers. Japanese J. Chest Disorders. 37(2): 90-101.

Satoh, K., Y. Fukuda, K. Torii and N. Katsuno. 1981. Epidemiologic study of workers engaged in the manufacture of chromium compounds. J. Occup. Med. 23(12): 835-838.

Silverstein, M., F. Mirer, D. Kotelchuck, B. Silverstein and M. Bennett. 1981. Mortality among workers in a die-casting and electroplating plant. Scand. J. Work Environ. Health. 7(Suppl. 4): 156-165.

Taylor, F.H. 1966. The relationship of mortality and duration of employment as reflected by a cohort of chromate workers. Amer. J. Public Health. 56(2): 218-229.

Tsuda, H. and K. Kato. 1977. Chromosomal aberrations and morphological transformation in hamster embryonic cells treated with potassium dichromate in vitro. Mutat. Res. 46: 87-94.

U.S. EPA. 1984. Health Assessment Document for Chromium. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. EPA 600/8-83-014F.

Watanabe, S. and Y. Fukuchi. 1975. An epidemiological survey on lung cancer in workers of a chromate-producing industry in Hokkaido, Japan. Presented at International Congress on Occupational Health.

COBALT

CAS No: 7440-48-4

Physico-chemical Characteristics[1]

Cobalt is a gray, hard, magnetic, ductile, somewhat malleable metal with a natural abundance of 0.001-0.002% in the earth's crust.

Atomic Weight:	58.933
Melting Point:	1495° C
Boiling Point:	2870° C
Specific Gravity:	8.9 at 25° C
Solubility in Water:	Insoluble (some salts are soluble).
Reactivity with Acid:	Readily with dil. HNO_3, and slowly with HCl & H_2SO_4.

Criteria and Standards

The available data on cobalt is insufficient to establish criteria and standards.

OSHA Standard:	0.1 mg/m^3 TWA
ACGIH (Threshold Limit Value)	0.05 mg/m^3 TWA
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Adsorption to hydrous metallic oxides and clay materials appears to be the most important environmental processes limiting the mobility of cobalt. Chelation of cobalt with some organic compounds is also known to occur in aqueous environment. However, relatively insignificant amount of cobalt is present in the soluble form. Adsorption of cobalt is dependent on the pH, presence of organic chemicals and other competing metal ions.

Bio-accumulation of cobalt in plants and animals have been reported, however to an insignificant extent.

Metabolism

Cobalt and cobalt salts are well absorbed after oral ingestion, probably in the jejunum. Although muscle contains the highest total fraction of ingested cobalt, adipose tissue has the highest concentration. Presence of significant amount of ingested cobalt has been detected in the liver, heart, and hair. About 80% of the ingested cobalt is excreted in the urine. Of the

remaining, about 15% is excreted via gastrointestinal pathway. Milk and sweat are the secondary routes of cobalt excretion.

General Toxicity

Ingestion of cobalt produces a characteristic response in experimental animals and humans known as Polycythemia. Excessive cobalt administration in therapeutics has been reported to produce vomiting, diarrhea, and hyperthermia. Intravenous administration leads to flushing of the face, increased blood pressure, slowed respiration, giddiness, tinnitus and deafness (due to nerve damage).

Cardiomyopathy has been reported in excessive intake of cobalt. The signs and symptoms are similar to those of congestive heart failure. Hyperglycemia due to α-cell pancreatic islet damage has been reported in rats following cobalt administration.

High levels of chronic administration of cobalt produces goiter. Epidemiological studies have indicated association of increased cobalt level in water and soil and goiter incidence in the affected population. Ambivalent evidences exist in industrial and occupationally related exposure to cobalt and its compounds and incidence of respiratory diseases. However, presence of sensitization in the affected workers cannot be completely ruled out. Skin, eye lesion and allergic dermatitis have been reported among industrial workers exposed to cobalt and its compounds.

The oral LD_{50} value for cobalt is 1.5 g/kg in the rat. The oral LD_{50} for several inorganic cobalt compounds range from 150 to 530 mg/kg.

An oral reference dose for cobalt and its salts is not presently available.

In the absence of evidence of carcinogenicity of cobalt, carcinogenic risk assessment for life-time exposure to cobalt and its salts is not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

References

National Institute for Occupational Safety and Health. 1984. Registry of Toxic Effects of Chemical Substances. Data Base. Washington, D.C. July 1984.

Speijers, G.J.A., Krajnc, E.I., Berkvens, J.M., and Van Logten, M.J. 1982. Acute Oral toxicity of inorganic cobalt compounds in rats. Food. Chem. Toxicol 20:311-314.

COPPER

CAS No: 7440-50-8

Physico-chemical Characteristics[1]

Copper is a reddish, lustrous, ductile, malleable metal with a natural abundance of up to 70 ppm in the earth's crust.

Atomic Weight:	63.546
Melting Point:	1083° C
Boiling Point:	2595° C
Specific Gravity:	8.92 at 25° C
Solubility in Water:	Copper and most copper salts are insoluble except $CuSO_4$, $Cu(NO)_3$, and $CuCl_2$).
Reactivity with Acid:	Readily with Dil. HNO_3, and hot conc. H_2SO_4 & HBr.
Octanol/Water Partition Coefficient:	N/A

Criteria and Standards[2]

The available data on Copper is inadequate for establishing Criteria and Standards. However, EPA has reported the available lowest toxic doses for aquatic organisms.

Ambient Water Quality Criteria (EPA)

Aquatic Organisms (proposed)

Fresh Water

Acute Toxicity: $e^{(0.905\ [\ln(\text{hardness})]\ -\ 1.413)}$ µg/L
Chronic Toxicity: $e^{(0.905\ [\ln(\text{hardness})]\ -\ 1.785)}$ µg/L

Marine Water

Acute Toxicity: 3.2 µg/L
Chronic Toxicity: 2.0 µg/L

Human Health

National Secondary Drinking Water Standard (EPA): 1 mg/L

OSHA Standards: 1 mg/m^3 TWA (dust & mist)
0.1 mg/m^3 TWA (fume)

ACGIH (Threshold Limit Value) 1 mg/m^3 TWA (dust & mist)

	0.2 mg/m^3 TWA (fume) 2 mg/m^3 STEL (dust & mist)
New York State Water Quality Regulations (Class GA Groundwaters)	1000 µg/l

Environmental Transport and Fate

Copper exists in the less stable cuprous (+1) and cupric (+2) states. Several processes appear to determine the fate of copper in the aquatic environment like complexation with humic substances, sorption to hydrous metal oxides (iron and manganese), clays and organic materials and bio-accumulation. Pattern of bio-accumulation of copper in plants and animals may exhibit seasonal variations related to biological activities.

Metabolism

Copper is an essential element in most organisms. However the range between copper deficiency and toxicity is low in those organisms without effective barriers for controlled absorption. The intestinal mucosa acts to some extent as a barrier to the absorption of ingested copper. Absorbed copper is initially bound to the albumin and later more firmly bound to a copper binding protein, α-ceruloplasmin. Liver plays a primary role in the homeostasis of copper including excretion.

General Toxicity

Acute poisoning from ingestion of excessive amounts of copper salts (notably copper sulfate) is characterized by vomiting, hematemesis, hypotension, melena, coma, jaundice and death. Reports of hemolytic anemia as a consequence of copper exposure exist.

Short-term illness similar to metal fume fever, characterized by chills, fever, aching muscles, dryness of mouth and throat is often reported in cases involving exposure to metallic copper dust. Workers exposed to copper fumes have reported respiratory tract irritation, metal fume fever, and less frequently, skin and hair discoloration.

Copper intake is a tightly controlled homeostatic mechanism. Therefore excessive copper exposure in normal persons does not pose great risks unlike copper deficiency.

At present EPA does not have chronic health hazard assessment of copper for its noncarcinogenic effects.

Evidence of Carcinogenicity

Experimental Animal Data: The existing evidences from experimental studies on copper as a carcinogen is inadequate (IRIS, 1990). In a 78-week study (Bionetics Research Labs) on the carcinogenicity of copper-containing compound, copper hydroxy-quinoline, no statistically significant increase in tumor incidence was observed in mice (B6C3F1 and B6AKF1). Animals were

administered 1000 mg copper hydroxyquinoline/kg bw (180.6 mg Cu/kg) suspended in 0.5% gelatin daily until they were 28 days old, after which they were administered 2800 ppm (505.6 ppm Cu) in the feed for 50 additional weeks.

In the same study, Bionetics Research Labs (1968) administered a single subcutaneous injection of gelatin (control) or 1000 mg of copper hydroxyquinoline/kg bw (180.6 mg Cu/kg) suspended in 0.5% gelatin to groups of
28-day-old mice of both strains. After 50 days of observation, the male B6C3F1 had an increased incidence of reticulum cell sarcomas compared with controls. No tumors were observed in the treated male B6AKF1 mice, and a low

incidence of reticulum cell sarcomas was observed in the treated female mice of both strains.

In a similar study (IRIS, 1990., Gilman, 1962) cupric oxide (16 mg Cu), cupric sulfide (13.3 mg Cu), and cuprous sulfide (16 mg Cu) were administered intra muscularly into the left and right thighs of 2- to 3-month-old Wistar rats. After 20 months of observations, no injection-site tumors were observed in the test group, but other tumor types were observed at very low incidence in the animals receiving cupric sulfide (2/30) and cuprous sulfide (1/30).

There are no reports on copper carcinogenicity in humans.

Carcinogenic Risk Assessment

Quantitative estimates of carcinogenic risk for copper by oral and inhalation exposure are not available. Copper is not classified as a human carcinogen (category D). The basis for such a classification is due to the inadequacy of the animal data, equivocal mutagenicity data and non-availability of human data.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Bionetics Research Labs. 1968. Evaluation of carcinogenic, teratogenic and mutagenic activities of selected pesticides and industrial chemicals. Vol. I. Carcinogenic study prepared for National Cancer Institute. NCI-DCCP-CG-1973-1-1.

Castro, B.C., J. Meyers and J.A. DiPaolo. 1979. Enhancement of viral transformation for evaluation of the carcinogenic or mutagenic potential of inorganic metal salts. Cancer Res. 30: 193.

Demerec, M., G. Bertani and J. Flint. 1951. A survey of chemicals for mutagenic action on E. coli. Am. Natur. 85: 119.

Gilman, J.P.W. 1962. Metal carcinogenesis. II. A study on the carcinogenic activity of cobalt, copper, iron and nickel compounds. Cancer Res. 22: 158-166.

Kanematsu, N., M. Hara and T. Kada. 1980. Rec assay and mutagenicity studies on metal compounds. Mutat. Res. 77: 109-116.

Matsui, S. 1980. Evaluation of a Bacillus subtilis rec-assay for the detection of mutagens which may occur in water environments. Water Res. 14(11): 1613-1619.

Moriya, M., T. Ohta, K. Watanabe, T. Miyazawa, K. Kato and Y. Shirasu. 1983. Further mutagenicity studies on pesticides in bacterial reversion assay systems. Mutat. Res. 116(3-4): 185-216.

Nishioka, H. 1975. Mutagenic activities of metal compounds in bacteria. Mutat. Res. 31: 185-189.

Sina, J.F., C.L. Bean, G.R. Dysart, V.I. Taylor and M.O. Bradley. 1983. Evaluation of the alkaline elution/rat hepatocyte assay as a predictor of carcinogenic/mutagenic potential. Mutat. Res. 113(5): 357-391.

Singh, I. 1983. Induction of reverse mutation and mitotic gene conversion by some metal compounds in Saccharomyces cerevisiae. Mutat. Res. 117(1-2): 149-152.

Sirover, M.A. and L.A. Loeb. 1976. Infidelity of DNA synthesis in vitro: Screening for potential metal mutagens or carcinogens. Science. 194: 1434-1436.

U.S. EPA. 1987. Drinking Water Criteria Document for Copper. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN 417.

DICHLOROBENZENES*

(a) 1,2-Dichlorobenzene

CAS No: 95-50-1

Chemical Formula: $C_6H_4Cl_2$

Synonym: ortho-Dichlorobenzene, DCB

Physico-chemical Characteristics[1]

1,2-Dichlorobenzene (1,2-DCB) is a liquid used as an industrial solvent, as a Degreasing agent, and as an intermediate in the manufacture of dyes.

Molecular Weight:	147.01
Flash Point (closed cup):	66° C
Boiling Point:	180.5° C
Specific Gravity:	1.3059 at 20° C
Solubility in Water:	1.00E+02 mg/L
Log Octanol/Water Partition Coefficient:	3.38
Solubility in Organics:	Freely miscible with alcohol, benzene, and ether.
Vapor Pressure:	1 mm Hg at 20° C

Criteria and Standards[2]

The available data on 1,2-DCB at this time is inadequate to establish criteria and standards.

OSHA Standard:	300 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value):	300 mg/m^3 Ceiling Level

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* General information and physico-chemical characteristics of Dichlorobenzenes will be tabulated separately. However, other information such as environmental transport and fate, general toxicity, evidences of carcinogenicity, and carcinogenicity risk assessments will be addressed commonly as dichlorobenzenes for all the three structural variants of dichlorobenzenes.

(b) 1,3-Dichlorobenzene

CAS No:	541-73-1
Chemical Formula:	$C_6H_4Cl_2$
Synonym:	meta-Dichlorobenzene, DCB

Physico-chemical Characteristics[1]

1,3-Dichlorobenzene (1,3-DCB) is a liquid used as an industrial solvent.

Molecular Weight:	147.01
Boiling Point:	173° C
Specific Gravity:	1.2884 at 20° C
Solubility in Water:	1.23E+02 mg/L
Log Octanol/Water Partition Coefficient:	3.38

Solubility in Organics:	Freely miscible with alcohol, and ether.
Vapor Pressure:	1 mm Hg at 20° C

Criteria and Standards[2]

The available data on 1,3-DCB at this time is inadequate to establish criteria and standards. Separate criteria and standards for 1,3-DCB is not available.

OSHA Standard (as 1,2-DCB):	300 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value): (as 1,2-DCB)	300 mg/m^3 Ceiling Level
New York State Water Quality Regulations (Class GA Groundwaters)	None

(c) 1,4-Dichlorobenzene

CAS No:	106-46-7
Chemical Formula:	$C_6H_4Cl_2$
Synonym:	para-Dichlorobenzene, DCB

Physico-chemical Characteristics[1]

1,4-Dichlorobenzene (1,4-DCB) is a liquid used as an Insecticidal fumigant.

Molecular Weight:	147.01
Flash Point (closed cup):	150° C
Boiling Point:	174.125° C
Specific Gravity:	1.3059 at 20° C
Solubility in Water:	7.90E+01 mg/L
Log Octanol/Water Partition Coefficient:	3.38
Solubility in Organics:	Freely miscible with alcohol, benzene, and ether.
Vapor Pressure:	1 mm Hg at 20° C

Criteria and Standards[2]

The available data on 1,4-DCB at this time is inadequate to establish criteria and standards. Separate criteria and standards for 1,4-DCB are not available.

OSHA Standard:	300 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value):	300 mg/m^3 Ceiling Level
New York State Water Quality Regulations (Class GA Groundwaters)	75 µg/l

Environmental Transport and Fate

Limited information is available on the environmental transport and fate of dichlorobenzenes (DCBs). Under normal conditions, DCBs volatilize at a relative rapid rate and possibly react with the water. However, the extent of atmospheric hydrolysis of DCBs appears to be limited. DCBs are lipophilic and adsorption to organic matter may be an important environmental fate process. Although there are evidences of bio-accumulation of DCBs, its metabolism and metabolic products are not known at present.

General Toxicity

Symptoms of acute intoxication in humans following exposure to DCBs include nausea, headache, eye, skin, and throat irritation. Chronic exposure to DCBs either by inhalation or through dermal contact produces such effects as depression of central nervous system, anemia, irritation of the respiratory tract, and general weakness.

DCBs produce hepatic porphyria in rats following intratracheal intubation of DCB ($455/m^3$) for 15 days. Chronic exposure to DCB has been shown to produce hepatic and renal damage in rats. Other biochemical effects observed following exposure to DCB include, activation of microsomal enzymes, increased prothrombin time, altered conditioned reflexes, and changes in hematopoietic system.

Oral RfD for DCBs is estimated to be 9E-2 mg/kg/day on the basis of an NTP gavage study in rat (NTP, 1985). In this study, 1,2-DCB was administered by gavage (0 to 120 mg/kg/day) to F344/N rats and B6C3F1 mice for 103 weeks (NTP, 1985). Survival of high-dose male rats was decreased compared with controls (19/50 vs. 42/50, P=>0.001), but the difference appears largely because of deaths from gavage error (4 controls vs.20 high-dose). Although an increase (P=>0.05) in renal tubular regeneration in high-dose male mice was observed (17/49 compared with 12/50 in the low-dose group and 8/48 in the control group), there was no other evidence of treatment-related renal lesions in either species. Further, the incidence of this lesion in male control mice was below those of three similar control groups that were

studied during approximately the same period at the testing facility (31/50, 15/50, 24/50). There were no other evidences of treatment-related effects in this study. Because the decrease in survival and the increase in renal tubular regeneration in the high-dose animals were of questionable significance, a NOAEL of 120 mg/kg/day is established.

In a similar protocol, liver necrosis was observed in mice and rats given 250 mg/kg/day. Deaths, degeneration and necrosis in the liver, lymphocyte depletion in the spleen and thymus, renal tubular degeneration (male rats only), and slight decreases in hemoglobin, hematocrit and red blood cell counts (rats only) were induced at 500 mg/kg/day.

In an other study (Hayes, 1985), pregnant F344/N rats and New Zealand rabbits were exposed to 1,2-DCB (0 to 400 ppm) by inhalation 6 hours daily on days 6 through 15 (rats) or 6 through 18 (rabbits) of gestation. Body weight gain was lower (P=>0.05) in rats at all doses and in rabbits at 400 ppm, during the first 3 days of exposure. Liver weights (absolute and relative to body weight) were increased in rats at 400 ppm. No developmental toxicity was evident at any dose. Estimated daily doses at 100 ppm exposure are 40 mg/kg
(rat) and 32 mg/kg (rabbit).

In the estimation of oral RfD for 1,2-DCB, an uncertainty factor of 1000 is included to account for inter-species extrapolation, sensitive population, and lack of adequate chronic toxicity data from other species.

The overall confidence on the RfD for 1,2-DCB is rated low. This is based on the inadequacy of the principle study, and the data base on DCB toxicity. Although the studies provide NOAEL and LOAEL based on several toxicologic end points, data is required from an other comparable experimental animal to strengthen the data base. Further, the data base lacks information on the possible teratologic and reproductive effects of DCBs.

1,2-DCB has been evaluated for its possible carcinogenic effects. However, at this time the available information is inadequate for the carcinogenic risk assessment of 1,2-DCB.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from ACGIH, Documentation on Threshold Limit Values, Ed. 4., Cincinnati, Ohio., and from NIOSH, Registry of Toxic Effects of Chemical Substances. Washington, D.C.

References

Hayes, W.C., T.R. Hanley, Jr., T.S. Gushow, K.A. Johnson, and J.A. John. 1985. Teratogenic potential of inhaled dichlorobenzene in rats and rabbits. Fund. Appl. Toxicol. 5: 190-202.

Hollingsworth, R.L., V.K. Rowe, F. Oyen, T.R. Torkelson, and E.M. Adams. 1958. Toxicity of o-dichlorobenzene. Studies on animals and industrial experience. A.M.A. Arch. Indust. Health 17: 180-187.

NTP (National Toxicology Program). 1985. Toxicology and carcinogenesis studies of 1,2-dichlorobenzene (o-dichlorobenzene) (CAS No. 95-50-1) in F344/N rats and B6C3F1 mice (gavage studies). NTP TR 255. NIH Publ. No. 86-2511.

U.S. EPA. 1987. Drinking Water Criteria Document for ortho-Dichlorobenzene, meta-Dichlorobenzene, para-Dichlorobenzene. Office of Drinking Water, Washington, DC.

1,1-DICHLOROETHANE

CAS No:	75-34-3
Chemical Formula:	CH_3CHCl_2
Synonyms:	Ethylidene chloride

Physico-chemical Characteristics[1]

1,1-dichloroethane is a heavy liquid with a pleasant odor and irritating vapors.

Molecular Weight:	98.96
Boiling Point:	57.3° C
Specific Gravity:	1.1776 at 20° C
Miscibility in Water:	5.5E+03 mg/L
Log Octanol/Water Partition Coefficient:	1.79
Miscibility in Organics:	Miscible with alcohol
Vapor Pressure:	180 mm Hg at 20° C

Criteria and Standards[2]

OSHA Standard (air):	400 mg/m^3 TWA
ACGIH (Threshold Limit Value):	810 mg/m^3 TWA
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

There are very few reports on the environmental transport and fate of 1,1-Dichloroethane. 1,1-Dichloroethane is volatile and disperses from surface waters primarily by volatilization. 1,1-Dichloroethane may be mobile in the soil and ground waters, partly due to its low water solubility and octanol/water partition coefficient.

General Toxicity and Metabolism

There are very few studies on the general toxicity and possible carcinogenic effects of 1,1-dichloroethane in the literature. 1,1-Dichloroethane is one of the least toxic of the chlorinated ethanes. It has an LD_{50} of 725 mg/kg in rat. An NCI (NCI, 1977) study on the possible carcinogenic effects of 1,1-dichloroethane was inconclusive. 1,1-Dichloroethane is not mutagenic as determined in the Ames assay.

Exposure to 1,1-dichloroethane by inhalation has been reported to cause retardation of fetal development (Schwetz et al 1974). There are also evidences of hepatotoxicity and disturbances of central nervous system associated with exposure to 1,1-dichloroethane in humans.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from American Conference of Governmental Industrial Hygienists (ACIGH), 1980. Documentation of the Threshold Limit Values. 4th Edition, Cincinnati, OH.

References

National Cancer Institute (NCI). 1977. Bioassay of 1,1-dichloroethane for possible carcinogenicity. CAS No. 75-34-3. NCI Carcinogenesis Technical Report Series No. 66, Washington, D.C. DHEW Publication No. (NIH) 78-1316.

Schwetz, B.A., Leong, B.K.J., and Gehring, P.J. 1974. Embryo- and Fetotoxicity of inhaled Carbon tetrachloride, 1,1-Dichloroethane and Methyl ethyl ketone in rats. Toxicol. Appl. Pharmacol. 28:452-464.

1,2-DICHLOROETHANE

CAS No: 107-06-2

Chemical Formula: CH_2ClCH_2Cl

Synonyms: Ethylene dichloride

Physico-chemical Characteristics[1]

1,2-dichloroethane is a heavy liquid with a pleasant odor and irritating vapors.

Molecular Weight:	98.96
Flash Point:	13° C
Boiling Point:	83-84° C
Specific Gravity:	1.256 at 20° C
Miscibility in Water:	8 g/L
Log Octanol/Water Partition Coefficient:	1.48
Miscibility in Organics:	Miscible with alcohol, chloroform and ether.
Vapor Pressure:	61 mm Hg at 20° C

Criteria and Standards[2]

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	118 mg/L
Chronic Toxicity:	20 mg/L

Marine Water

Acute Toxicity:	113 mg/L
Chronic Toxicity:	Not Available

OSHA Standard:	200 mg/m^3 TWA 400 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value):	40 mg/m^3 TWA 60 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	5 µg/l

Environmental Transport and Fate

Dispersion of 1,2-dichloroethane in the environment is primarily through volatilization. In the atmosphere, 1,2-dichloroethane is rapidly hydrolyzed and returned to the earth with precipitation. 1,2-dichloroethane has a low octanol-water partition coefficient and may be transported in the soil by leaching.

General Toxicity and Metabolism

When administered by gavage, 1,2-dichloroethane has been shown to produce carcinoma of the forestomach and hemangiosarcoma of the circulatory system in male rats and mammary gland carcinoma in female rats. 1,2-Dichloroethane has a wide spectrum of target organ affinity in experimental animals. In vitro mutagenic assays have revealed that 1,2-dichloroethane is mutagenic in the bacterial test systems.

Exposure to acute doses of 1,2-dichloroethane produces nausea, headache, dizziness, abdominal pain, irritation of the mucous membranes, and liver and kidney dysfunction. Incidence of dermatitis has also been reported in some exposed groups.

Chronic health hazard assessment for 1,2-dichloroethane is not currently available.

Evidence of Carcinogenicity

Evidence of Animal Carcinogenicity: There are sufficient evidence on 1,2-dichloroethane carcinogenicity in experimental animals. An NCI study indicated that 1,2-Dichloroethane administered by gavage (95-299 mg/kg/day) to groups of male and female Osborne-Mendel rats and B6C3F1 mice for 78 weeks indicated a significantly increased incidence of forestomach squamous- cell carcinomas and circulatory system hemangiosarcomas among male rates in the high dose category. Female rats and mice were observed to have significant increases in mammary adenocarcinoma incidence. Mice of both sexes developed alveolar/bronchiolar adenomas, females developed endometrial stromal polyps and sarcomas, and males developed hepatocellular carcinomas (NCI, 1978).

Inhalation exposure of Wistar, Sprague-Dawley rats and Swiss mice did not result in increased respiratory tract tumor incidence (Spencer et al., 1951; Maltoni et al., 1980). An elevation that was not statistically significant in lung adenomas was seen in A/st mice treated i.p. with 1,2-dichloroethane in tricaprylin (Theiss et al., 1977). ICR/Ha Swiss mice treated topically had a significant increase in benign lung papillomas, but not skin carcinomas (van Duuren et al., 1979).

At present human data on 1,2-dichloroethane carcinogenicity is not available.

Commenting on the confidence in the estimation of carcinogenicity of 1,2-dichloroethane by oral route it is relevant to note that the study design and experimental end-points are consistent with risk estimates. Adequate number of animals were treated and observed for most of their expected life

span. The incidence of hemangiosarcoma was significantly elevated in the treated animals and was dose-related. A slope factor of 6.2E-2/mg/kg/day was calculated from the data on hepatocellular carcinoma in male mice (NCI, 1978).

Inhalation risk estimates were derived on the basis of oral data and partly based on the negative inhalation study of Maltoni et al. (1980). A 95% upper bound on risk was inferred to be 1.0E-6/$\mu g/m^3$, which is approximately 26 times smaller than the unit risk calculated from the rat gavage data.

1,2-Dichloroethane is classified as a B2 category (probable human carcinogen) by EPA. This is based on the adequacy of the evidence of 1.2-dichloroethane carcinogenicity in experimental animals.

Carcinogenicity Risk Assessments

Quantitative carcinogenic risk from oral exposure to 1,2-dichloroethane is estimated by EPA by an extrapolation method based on linearized multistage carcinogenesis model. The summary of risk estimates for oral exposure include a oral slope factor of 9.1E-2/mg/kg/day and a drinking water unit risk of 2.6E-6/ $\mu g/L$.

Similarly an inhalation carcinogenic unit risk of 2.6E-5/$\mu g/m^3$ has been estimated for the carcinogenic effects of 1,2-dichloroethane.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Barber, E.D., W.J. Donish and K.R. Mueller. 1981. A Procedure for the quantitative measurement of the mutagenicity of volatile liquids in the Ames Salmonella/microsome assay. Mutat. Res. 90: 31-48.

King, M.T., H. Beikirch, K. Echkhardt, E. Gock and D. Wild. 1979. Mutagenicity studies with X-ray contrast media, analgesics, antipyretics, antirheumatics, and some other pharmaceutical drugs in bacterial, Drosophila and mammalian test systems. Mutat. Res. 66: 33-43.

Maltoni, C., L. Valgimigli and C. Scarnato. 1980. Long-term carcinogenic bioassays on ethylene dichloride administered by inhalation by rats and mice. In: B.N. Ames, P. Infante and R. Ritz, Eds. Ethylene Dichloride: A Potential Health Risk? Cold Spring Harbor Lab, Cold Spring Harbor, NY. p. 3-33. (Banbury Report No. 5).

NCI (National Cancer Institute). 1978. Bioassay of 1,2-Dichloroethane for Possible Carcinogenicity. NCI Carcinogenesis Technical Report Series No. 55. DHEW Publ. No. (NIH) 78-1361, Washington DC.

Nestmann, E.R., E. Lee, T. Matula, G.R. Douglas and J. Mueller. 1980. Mutagenicity of constituents identified in pulp and paper mill effluents using the Salmonella/mammalian-microsome assay. Mutat. Res. 79: 203-212.

Nylander, P.O., H. Olofsson and B. Rasmuson. 1979. The use of Drosophila melanogaster as a test for indirect mutagens. Mutat. Res. 64: 122-123.

Rannug, U., A. Sundvall and C. Ramel. 1978. The mutagenic effect of 1,2-dichloroethane on Salmonella typhimurium. I. Activation through conjugation with glutathione in vitro. Chem. Biol. Interact. 20: 1-16.

Reitz, R.H., T.R. Fox, J.C. Ramsey, J.K. Quast, P.W. Langvardt and P.G. Watanabe. 1982. Pharmacokinetics and macromolecular interactions of ethylene dichloride in rats after inhalation or gavage. Toxicol. Appl. Pharmacol. 62: 190-204.

Shakarnis, V.F. 1969. Induction of x-chromosome nondisjunction and recessive sex-linked recessive lethal mutations in females of Drosophila melanogaster by 1,2-dichloroethane. Sov. Genet. Engl. Transl. 5: 1666-1671.

Shakarnis, V.F. 1970. Effect of 1,2-dichloroethane. Vesnik Leningradskunivsiteta Seviya Biologii. 25: 153-156.

Spencer, H.C., V.K. Adams, E.M. McCollister and D.D. Irish. 1951. Vapor toxicity of ethylene dichloride determined by experiments on laboratory animals. Ind. Hyg. Occup. Med. 4: 482-493.

Theiss, J.C., G.D. Stoner, M.B. Shimkin and E.K. Weisburger. 1977. Test for carcinogenicity of organic contaminants of United States drinking waters by pulmonary tumor response in strain A mice. Cancer Res. 37: 2717.

van Duuren, B., B. Goldschmidt, G. Loewengart, et al. 1979. Carcinogenicity of halogenated olefinic and aliphatic hydrocarbons in mice. J. Natl. Cancer Inst. 63: 1433-1439.

U.S. EPA. 1985. Health Assessment Document for 1,2-Dichloroethane. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA 600/8-84-006F.

1,1-DICHLOROETHYLENE

CAS No: 75-35-4

Chemical Formula: CH_2CCl_2

Synonyms: Vinylidene chloride

Physico-chemical Characteristics[1]

1,1-dichloroethylene is a heavy liquid with a pleasant odor.

Molecular Weight:	96.94
Boiling Point:	37° C
Specific Gravity:	1.218 at 20° C
Miscibility in Water:	400 mg/L (at 20° C)
Log Octanol/Water Partition Coefficient:	1.48
Miscibility in Organics:	Less miscible with alcohol, ether, acetone, benzene
Vapor Pressure:	500 mm Hg at 20° C

Criteria and Standards[2]

The available data on 1,1-dichloroethylene is inadequate for establishing criteria and standards.

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	11,600 µg/L
Chronic Toxicity:	none

Marine Water

Acute Toxicity:	224,000 µg/L
Chronic Toxicity:	none

CAG Unit Risk (EPA):	1.16 $(mg/kg/day)^{-1}$
New York State Water Quality Regulations (Class GA Groundwaters)	100 µg/l

Environmental Transport and Fate

Volatilization and subsequent photo-oxidation in the atmosphere are the primary transport and fate process for 1,1-dichloroethylene. The available information indicate that sorption, bio-accumulation, and degradation of 1,1-dichloroethylene are possible, albeit, at a lower rate and are not of environmental significance.

General Toxicity and Metabolism

Studies on the general toxicity and possible carcinogenicity of 1,1-dichloroethylene are limited. Oral LD_{50} of 1,1-dichloroethylene in rat is 1,500 mg/kg. Exposure to high concentrations is often associated with disturbances of central nervous system. Chronic exposure to low doses of 1,1-dichloroethylene has been shown to produce hepatic and renal toxicity. However, 1,1-dichloro-ethylene does not produce embryo-toxicity and teratogenic effects in experimental animals.

The results of the studies on the carcinogenic effects of 1,1-dichloroethylene are inconclusive. However, 1,1-dichloroethylene has been shown to be mutagenic in several bacterial assays.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from IARC. 1979. Vol.19., WHO. Lyon France.

References

National Toxicology Program. 1982. Carcinogenesis Bioassay of Vinylidene Chloride (CAS No. 75-35-4) in F344 Rats and B6C3F1 mice (Gavage study). NTP Technical Report Series No. 228. Washington, D.C. DHHS Publication No. (NIH) 82-1784.

US Environmental Protection Agency. 1980. Ambient Water Quality Criteria for Dichloroethylenes. Office of Water Regulations and Standards, Criteria and Standards Division, Washington, D.C. October 1980. EPA 440/5-80-041.

US Environmental Protection Agency. 1984. Health Assessment Document for 1,1-Dichloroethylene. Final Draft. Environmental Criteria and Assessment Office, Cincinnati, OH. ECAO-CIN-H051.

DICHLORODIFLUOROMETHANE

CAS No:	75-71-8
Chemical Formula:	CF_2Cl_2
Synonym:	Freon 12, Arcton 9

Physico-chemical Characteristics[1]

Dichlorodifluoromethane (DCFM) is a colorless, practically odorless, noncorrosive, nonirritating, nonflammable gas.

Molecular Weight:	120.92
Boiling Point:	-12.2° C (at 2 Atm)
Specific Gravity (liquid)	1.486 at -29.8° C
Miscibility in Water:	2.8E+02 mg/L
Log Octanol/Water Partition Coefficient:	
Miscibility in Organics:	Freely miscible with alcohol and ether.

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	No data available
Maximum Contaminant Level (MCL)	No data available

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	1.9E-1 µg/L
Fish Consumption only	1.57E+1 µg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEC:	1.1E+4 µg/L
Chronic Toxicity LEC:	none

Marine Water

Acute Toxicity LEC:	1.2E+4 µg/L
Chronic Toxicity LEC:	6.4E+3 µg/L

FIFRA	Not available
TSCA	Not available
RCRA	listed
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

At present, very little information is available on the environmental transport and fate of DCFM. However, it is presumed that as a fluorochlorohydrocarbon, DCFM persists in the environment. DCFM is stable even at 500 °C; under normal temperature DCFM remains in the gaseous phase. DCFM adsorbs less than 0.0025% of water. These physico-chemical properties would contribute to a significant extent the transport and fate processes of DCFM.

General Toxicity and Metabolism

The oral Reference dose (oral RfD) for DCFM was established on the basis of a long-term feeding study by Sherman (1974). The oral RfD for DCFM is determined to be 2E-1 mg/kg/day; NOEL and LOAEL being 300 and 3000 ppm respectively. In this 2-year feeding studies,dogs and rats received 300 ppm or 3000 ppm of DCFM. The study included data on the clinical biochemical, urine analytical, hematological or histopathological evaluations. Additionally, carcinogenic and three-generation reproductive studies were conducted in rats. Except for decreased weight gain in rats (about 20% in females) which received 3000 ppm (150 mg/kg/day) DCFM in the diet, no other adverse effects were attributable to this compound in either rats or dogs.

The principle study reported here (Sherman, 1974) is sufficiently complete to derive an RfD for adequate protection against adverse human health effects. The high dose (3000 ppm or 150 mg/kg/day) caused decreased body weights in rats and is therefore considered a LOAEL, whereas the low dose (300 ppm or 15 mg/kg/day) in rats produced no adverse effects attributable to the oral administration of DCFM.

In the estimation of the RfD for DCFM, an uncertainty factor of 1000 is included to account for inter-species extrapolation and for sensitive population.

Confidence in the RfD based on the adequacy of the study (rated high), data base (rated medium) is considered medium. It is relevant to note that the principle study is a chronic study in two species and involved observation of extensive clinical and toxicological parameters. However, the data base lacks information on the possible teratogenic and reproductive effects of DCFM.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Sherman, H. 1974. Long-term feeding studies in rats and dogs with dichlorodifluoromethane (Freon 12 Food Freezant). Haskell Laboratory for Toxicology and Industrial Medicine Report No. 24-74.

U.S. EPA. 1982. Errata: Halomethanes Ambient Water Quality Criteria Document for the Protection of Human Health. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. ECAO-CIN-D023.

ETHYLBENZENE

CAS No: 100-41-4

Chemical Formula: C_5H_{10}

Synonym: Phenylethane

Physico-chemical Characteristics[1]

Ethylbenzene is a colorless, flammable liquid.

Molecular Weight:	106.16
Flash Point (closed cup):	18° C
Boiling Point:	136.25° C
Specific Gravity:	0.866 at 25° C
Miscibility in Water:	1.52E+02 mg/L
Log Octanol/Water Partition Coefficient:	3.15
Miscibility in Organics:	Miscible with organic solvents.
Vapor Pressure:	7 mm Hg at 20° C

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.68 mg/L
Maximum Contaminant Level (MCL)	Not available

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	1.4 mg/L
Fish Consumption only	3.28 mg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEL:	32000 µg/L
Chronic Toxicity LEL:	none

Marine Water

Acute Toxicity LEL:	430 µg/L
Chronic Toxicity LEC:	none

FIFRA	Not available
TSCA	Not available
RCRA	listed

OSHA Standard (skin):	435 mg/m^3 TWA
ACGIH (Threshold Limit Value)	435 mg/m^3 TWA
	545 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	700 µg/l

Environmental Transport and Fate

The available information on the environmental transport and fate of ethylbenzene is scanty. Volatilization of ethylbenzene is a major environmental transport process from surface waters. In the atmosphere, photodegradation of ethylbenzene has been proposed. Ethylbenzene is lipophilic which would enhance its adsorption to biological materials. There are limited evidences of partial metabolism of ethylbenzene by some microorganisms.

General Toxicity and Metabolism

Exposure of animals to high concentrations of ethylbenzene (400 to 600 ppm for 6 months) has been associated with changes in liver and kidney weights in rats and guinea pigs (600 ppm). Histopathologic changes in the testis and liver of monkeys and rabbits exposed to high concentrations of ethylbenzene has been reported.

The metabolic pathways for humans and rodents are different (Engstrom et al., 1984). Major metabolites in humans, mandelic acid and phenyl glyoxylic acid, are minor metabolites in rats and rabbits (Kiese and Lenk, 1974). The major animal metabolites were not detected in the urine of exposed workers (Engstrom et al., 1984).

The oral RfD for ethylbenzene has been determined to be 1E-1 mg/kg/day on the basis of a chronic oral bioassay in rat (Wolf et al., 1956). NOEL and LOAEL are estimated to be 136 mg/kg/day and 408 mg/kg/day based on the observation of ethylbenzene-induced liver and kidney toxicity (Wolf et al., 1956). In this bioassay, ethylbenzene (13.6 to 680 mg/kg/day) was administered to female albino rats 5 days/week for 182 days.

The criteria considered in judging the toxic effects on the test animals were growth, mortality, appearance and behavior, hematologic findings, terminal concentration of urea nitrogen in the blood, final average organ and body weights, histopathologic findings, and bone marrow counts. The LOAEL of
408 mg/kg/day is associated with histopathologic changes in liver and kidney.

In the estimation of the oral RfD an uncertainty factor of 1000 is included to account for inter-species variation in response and extrapolation of subchronic dose-induced effects to chronic dose effects.

The overall confidence on the RfD is considered low. This is primarily due to the inadequacy of the available information.

Evidence of Carcinogenicity

Ethylbenzene is not classified for human carcinogenicity (category D). This is largely due to non-availability of human and animal carcinogenicity data on this chemical.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Dean, B.J., T.M. Brooks, G. Hodson-Walker and D.H. Hutson. 1985. Genetic toxicology testing of 41 industrial chemicals. Mutat. Res. 153: 57-77.

Engstrom, K., V. Riihimaki and A. Laine. 1984. Urinary disposition of ethyl benzene and m-xylene in man following separate and combined exposure. Int. Arch. Occup. Environ. Health. 54: 355-363.

Kiese, M. and W. Lenk. 1974. Hydroxyacetophenones: Urinary metabolites of ethyl benzene and acetophenone in the rabbit. Xenobiotica. 4(6): 337-343.

Nestmann, E.R., E.G-H. Lee, T.I. Matula, G.R. Douglas and J.C. Mueller. 1980. Mutagenicity of constituents identified in pulp and paper mill effluent using the Salmonella/mammalian-microsome assay. Mutat. Res. 79: 203-212.

Norppa, H. and H. Vainio. 1983. Induction of sister-chromatid exchanges by styrene analogues in cultured human lymphocytes. Mutat. Res. 116: 379-387.

U.S. EPA. 1987. Drinking Water Criteria Document for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. (Final report).

U.S. EPA. 1980. Ambient Water Quality Criteria Document for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, for the Office of Water Regulations and Standards, Washington, DC. EPA 440/5-80-048. NTIS PB 81-117590.

U.S. EPA. 1984. Health Effects Assessment for Ethylbenzene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Emergency and Remedial Response, Washington, DC.

Wolf, M.A., V.K. Rowe, D.D. McCollister, R.L. Hollingsworth and F. Oyen. 1956. Toxicological studies of certain alkylated benzenes and benzene. Arch. Ind. Health. 14: 387-398.

LEAD

CAS No: 7439-92-1

Physico-chemical Characteristics[1]

Lead is a bluish-white, silvery, gray metal with a natural abundance of about 0.002% in the earth's crust.

Atomic Weight:	207.2
Melting Point:	327.4° C
Boiling Point:	1740° C
Specific Gravity:	11.35 at 25° C
Solubility in Water:	Insoluble (some organic lead compounds are soluble).
Reactivity with Acid:	Readily with hot conc. HNO_3, and hot conc. HCl & H_2SO_4.
Vapor Pressure:	1.77 mm Hg (at 1000° C).

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.02 mg/L (proposed, 1985).
Maximum Contaminant Level (MCL)	0.05 mg/L (interim, 1980).

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health	
Water and Fish Consumption	5.0E+1 µg/L
Fish Consumption only	none
Ambient Water Quality Criteria, Aquatic Organisms	
Fresh Water	
Acute Toxicity:	8.2E+1 µg/L (1 hr Average)
Chronic Toxicity:	3.2E+0 µg/L (4-day Average)
Marine Water	
Acute Toxicity:	1.40E+2 µg/L (1 hr Average)
Chronic Toxicity:	5.6E+0 µg/L (4-day Average)
FIFRA	Not available
TSCA	Not available
RCRA	Listed
OSHA Standard:	50 µg/m^3 TWA
ACGIH (Threshold Limit Value)	0.15 mg/m^3 TWA (inorganic dusts and fumes).
	0.45 mg/m^3 STEL (inorganic dusts and fumes).
New York State Water Quality Regulations (Class GA Groundwaters)	25 µg/l

Environmental Transport and Fate

Metallic lead and common lead minerals are insoluble in water. However, several industrially produced lead compounds are readily soluble in water (EPA, 1979). Lead forms insoluble complexes with carbonate or sulfate ions or ferric hydroxide limiting its mobility. However, inorganic and organo-lead compounds are primarily transported as particulates in the atmosphere. Transport of lead in aquatic environment is influenced by the oxidation

states of lead. Lead exists as a divalent cation in unpolluted water. However, organic complexation is critical in polluted waters.

Bioaccumulation of lead is reported in a variety of organisms, and bioaccumulation factors are in a range of 100 to 1000. Biotransformation to a methylated form by microbes can remobilize lead in the environment.

Metabolism

The absorption of lead from the gastro-intestinal tract is regulated to some extent by the mechanism regulating calcium and phosphorus absorption. It is estimated that approximately 37% of the inhaled lead is retained in the lungs. However, this estimation has several variables such as particle size, composition, respiration rate etc.,

Once absorbed, lead selectively accumulates in the bone. It is estimated that 90% of the lead body burden is found in the bone followed by aorta, liver, kidney, and pancreas. Lead remain loosely bound to the red blood cells while in circulation. Biliary pathway is the predominant route of excretion of ingested lead followed by milk, hair, and sweat which are the secondary pathways of lead excretion.

General Toxicity

Literature is replete with studies on the general toxicity of lead. Acute inorganic lead intoxication is rare among adult humans but may occur, especially in children. Manifestations of acute lead poisoning include nausea, vomiting, metallic taste, and circulatory collapse. These are followed by muscular weakness, acute hemolytic anemia and renal damage.

Chronic exposure to inorganic lead has distinct toxicological effects. Acute lead encephalopathy -- a characteristic chronic effect to lead exposure -- is followed by neurological disorders such as tremor, hallucinations, intellectual deterioration, cortical atrophy, and convulsions. Among gastro-intestinal manifestations, colic is particularly characteristic of chronic lead intoxication. Lead-induced decrease in hemoglobin biosynthesis causes marked hematological changes such as anemia, and basophilic stripping erythroblasts. Short-term exposure to lead can cause reversible kidney damage, but prolonged exposure at high concentrations may result in progressive kidney damage and failure.

Symptoms of exposure to organic lead, particularly tetraethyl and tetramethyl lead are somewhat different in that, the effects are largely related to central nervous system. An RfD for both oral and inhalation exposure to inorganic lead is not available (IRIS, 1990). This is because lead-induced effects, particularly changes in the levels of certain blood enzymes and in aspects of children's neuro-behavioral development have no threshold effect.

Evidence of Carcinogenicity

Lead and several lead salts are carcinogenic in experimental animals. Renal tumors in rodents have been reported following parenteral administration of lead. However, the data on the carcinogenicity of lead on humans are inconclusive.

Experimental Animal Data: Evidence of carcinogenicity from experimental studies is considered sufficient. Lead salts, primarily phosphates and acetates when administered by the oral route, diet or by injection has been demonstrated to be carcinogenic in rats and mice by more than 10 investigators. The most characteristic cancer response is bilateral renal carcinoma. Rats given lead acetate or subacetate orally have developed gliomas, and lead subacetate also produced lung adenomas in mice following intra peritoneal administration. Most of these investigations found a carcinogenic response only at the highest dose. The lead compounds tested in animals are almost all soluble salts. Metallic lead, lead oxide and lead tetra alkyls have not been tested adequately. Studies on the inhalation exposure are not available.

Azar et al. (1973) administered 10, 50, 100, and 500 ppm lead as lead acetate in dietary concentrations to fifty rats/sex/treatment group for 2 years. One hundred control rats of each sex received the basal laboratory diet. In a second 2-year feeding study, 20 rats/group were given diets containing 0, 1000, and 2000 ppm lead as lead acetate. No renal tumors were reported in the control groups or in treated animals of either sex receiving 10 to 100 ppm. Male rats fed 500, 1000, and 2000 ppm lead acetate had an increased renal tumor incidence of 5/50, 10/20, and 16/20, while 7/20 females in the 2000 ppm developed renal tumors. This study is limited by the lack of experimental detail. For instance, the possibility of environmental contamina-tion from lead in the air or drinking water was not mentioned.

In an investigation (Kasprzak et al. 1985) on the effects of dietary calcium on lead carcinogenicity, S-D rats were fed a diet with 1% lead subacetate (8500 ppm Pb) for 79 weeks. Of the rats surviving (29/30) in this treatment group beyond 58 weeks, 44.8% had renal tumors . Four rats had adenocarcinomas; the remaining nine had adenomas. Bilateral tumors were noted. No renal tumors were noted among the controls.

Van Esch and Kroes (1969) fed basic lead acetate at 0, 0.1%, and 1.0% inthe diet to 25 Swiss mice/sex/treatment group for 2 years. No renal tumors was observed in the control group, but 6/25 male mice of 0.1% basic lead acetate group had renal tumors (adenomas and carcinomas combined). In the 1.0% group,one female had a renal tumor. It was indicated that the low incidence in the 1.0% group was due to early mortality. Hamsters given lead subacetate at 0.5% and 1% in the diet had no significant renal tumor response (Van Esch and Kroes, 1969).

Human Carcinogenicity Data: Existing epidemiological data associating exposure to lead and carcinogenicity is considered inadequate (IRIS, 1990). Lane (1963), and Nelson et al., (1982) did not find any association between exposure to lead and cancer mortality. Selevan et. al. (1985) in their retrospective cohort mortality study of primary lead smelter workers found a slight decrease in the total cancer mortality (SMR=95). Apparent excesses

were observed for respiratory cancer (SMR=111, obs=41, p>0.05) and kidney cancer (SMR=204,obs=6, p>0.05).

Available studies lack quantitative exposure information, and possible contribution of smoking. Further, adjustments for exposures to other metals such as arsenic, cadmium and zinc was not done. The cancer excesses observed in the lung and stomach were relatively small (<200). There was no consistency of target tissue site among the various studies, and no study showed any dose- response relationship. Thus, the available human evidence is considered to be inadequate to refute or demonstrate potential carcinogenicity for humans from lead exposure.

Carcinogenic Risk Assessment

Lead is classified as a B2 carcinogen by the EPA (IRIS, 1990). Weight-of-evidence for such a classification was based on the availability of sufficient evidence from animal studies, where rat bioassays and one mouse assay have shown statistically significant increases in renal tumors with dietary and subcutaneous exposure to several soluble lead salts. Animal assays have provided reproducible results in several laboratories, in multiple rat strains with some evidence of multiple tumor sites. Short-term studies show that lead affects gene expression. However, human carcinogenicity evidence is inadequate.

Due to the prevalence of several uncertainties, quantitative estimate of carcinogenic risk from oral exposure to lead is not currently available. Likewise, quantitative estimates of carcinogenic risk from inhalation exposure are not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Anderson, E.L., and CAG (Carcinogenic Assessment Group). 1983. Quantitative approaches in use to assess cancer risk. Risk Analysis. 3: 277-295.

Azar, A., H.J. Trochimowicz and M.E. Maxfield. 1973. Review of lead studies in animals carried out at Haskell Laboratory - Two year feeding study and response to hemorrhage study. In: Barth D., A. Berlin, R. Engel, P. Recht and J. Smeets, eds. Environmental health aspects of lead: proceedings international symposium; October 1972; Amsterdam, The Netherlands. Luxemberg: Commission of the European Communities, pp. 199-208.

Casto, B.C., J. Meyers and J.A. DiPaolo. 1979. Enhancement of viral transformation for evaluation of the carcinogenic or mutagenic potential of inorganic metal salts. Cancer Res. 39: 193-198.

Cooper, W.C. 1985. Mortality among employees of lead battery plants and lead producing plants, 1947-1980. Scand. J. Work Environ. Health. 11: 331-345.

Cooper, W.C. and W.R. Gaffey. 1975. Mortality of lead workers. In: Proceedings of the 1974 Conference on Standards of Occupational Lead Exposure, J.F. Cole, Ed., February, 1974. Washington, DC. J. Occup. Med. 17: 100-107.

Dingwall-Fordyce, I. and R.E. Lane. 1963. A follow-up study of lead workers. Br. J. Ind. Med. 20: 313-315.

DiPaolo, J.A., R.L. Nelson and B.C. Casto. 1978. In vitro neoplastic transformation of Syrian hamster cells by lead acetate and its relevance to environmental carcinogenesis. Br. J. Cancer. 38: 452-455.

Grandjean, P., H.C. Wulf and E. Niebuhr. 1983. Sister chromatid exchange in response to variations in occupational lead exposure. Environ. Res. 32: 199-204.

Kasprzak, K.S., K.L. Hoover and L.A. Poirier. 1985. Effects of dietary calcium acetate on lead subacetate carcinogenicity in kidneys of male Sprague- Dawley rats. Carcinogenesis. 6(2): 279-282.

Koller, L.D., N.I. Kerkvliet and J.H. Exon. 1986. Neoplasia induced in male rats fed lead acetate, ethyl urea and sodium nitrate. Toxicol. Pathol. 13: 50-57.

Nelson, D.J., L. Kiremidjian-Schumacher and G. Stotzky. 1982. Effects of cadmium, lead, and zinc on macrophage-mediated cytotoxicity toward tumor cells. Environ. Res. 28: 154-163.

Selevan, S.G., P.J. Landrigan, F.B. Stern and J.H. Jones. 1985. Mortality of lead smelter workers. Am. J. Epidemiol. 122: 673-683.

Van Esch, G.J. and R. Kroes. 1969. The induction of renal tumors by feeding of basic lead acetate to mice and hamsters. Br. J. Cancer. 23: 265-271.

U.S. EPA. 1984. Health Effects Assessment for Lead. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH, for the Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-86/055. NTIS PB85-163996/AS.

U.S. EPA. 1986. Air Quality Criteria Document for Lead. Volumes III, IV. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC, for the Office of Air Quality Planning and Standards. EPA-600/8-83/028dF.

U.S. EPA. 1987. Preliminary review of the carcinogenic potential of lead associated with oral exposure. Prepared by the Office of Health and Environmental Assessment, Carcinogenic Assessment Group, Washington DC, for the Office of Drinking Water, Office of Solid Waste and the Office of

Emergency and Remedial Response (Superfund). OHEA-C-267. Internal Review Draft.

MANGANESE

CAS No: 7439-96-5

Physico-chemical Characteristics[1]

Manganese is a steel-gray, lustrous, hard, brittle metal with a natural abundance of 0.085% in the earth's crust.

Atomic Weight:	54.938
Melting Point:	1244°C
Boiling Point:	2095°C
Specific Gravity:	7.26 at 25°C
Solubility in Water:	Decomposes (some salts are soluble).
Reactivity with Acid:	Reacts with dil. acids and with aqueous soln. $NaHCO_3$ & $KHCO_3$.

Criteria and Standards[2]

The available data at this time is inadequate to establish criteria and standards for manganese.

EPA Regulatory Actions:	Not available
OSHA Standard:	5 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value)	1 mg/m^3 TWA (fume) 3 mg/m^3 STEL (fume) 5 mg/m^3 Ceiling Level (dust and compounds)
New York State Water Quality Regulations (Class GA Groundwaters)	300 µg/l

Environmental Transport and Fate

Manganese occurs most commonly in the divalent(+2) or tetravalent(+4) forms in the aquatic systems. Solubility of manganese depends largely on the pH, dissolved oxygen and the presence of complexing agents in the media. In fresh water, manganese occurs in a soluble form or as a colloid. In the

soil, presence of low pH, chlorides, nitrates or sulfates increases its solubility. Transport of manganese fumes or dust has also been reported.

Metabolism

Manganese is an essential element for human health. Following oral exposure, manganese appears in the liver, kidney, intestine and pancreas in highest concentrations. The lungs do not accumulate manganese with age despite significant concentration in air. The turnover of manganese is rapid. Gastro-intestinal tract is the major route of manganese excretion. Studies have indicated the presence of a homeostatic mechanism regulating the excretion of manganese. This system apparently involves liver, auxiliary gastro-intestinal mechanisms and possibly adrenal cortex.

General Toxicity

In humans, manganese dusts and compounds have relatively low oral and dermal toxicity. However, inhalation exposure to manganese dust cause a variety of toxic effects. Acute exposure to high concentrations of manganese can cause manganese pneumonitis, increased susceptibility to respiratory disease, and pathologic changes including epithelial necrosis and mononuclear proliferation.

Chronic exposure to manganese for over 2 years produce symptoms of central nervous system involvement such as irritability, difficulty in walking, speech disturbances, and compulsive behavior. If condition persists, a Parkinson-like syndrome may develop.

There are no epidemiological studies suggesting that manganese or its compounds are carcinogenic or have teratogenic or reproductive effects in humans.

Presently Reference doses for oral (RfDo) and inhalation (RfDi) routes for manganese are not available.

Evidence of Carcinogenicity

Experimental Animal Data: Existing animal data on manganese carcinogenicity is considered inadequate (IRIS, 1990). A partially published study by DiPaolo (1964) indicated that mice receiving manganese developed lymphosarcomas compared with controls injected with water (16/66; 24%). In addition, tumors appeared earlier in the exposed groups than in the control group. The incidence of tumors other than lymphosarcomas, (i.e., mammary adenocarcinoma, leukemia, injection- site tumors) did not differ significantly between the exposed groups and controls.

Stoner et al. (1976) tested manganous sulfate in a mouse lung adenoma screening bioassay. Groups of strain A/Strong mice were administered manganous sulfate [(i.p.) to 0, 6, 15 or 30 mg/kg] 3 times per week for 7 weeks (a total of 22 injections). The animals were observed for an additional 22 weeks after the dosing period, before sacrifice at 30 weeks. There was an apparent increase in the average number of pulmonary adenomas

per mouse both at the mid and high doses, as compared with the vehicle controls 10 mice/sex, but the increase was
significant only at the high dose (Student's t-test, $p<0.05$). Similarly, lung tumors were observed in 12/20, 7/20 and 7/20 animals in the high, medium and low dosage groups, respectively. While the results of this study are suggestive of carcinogenicity, the data cannot be considered conclusive since the mean number of tumors per mouse was significantly increased at only one dose, and the evidence for a dose-response relationship was marginal.

Human carcinogenicity data on manganese is not available (IRIS, 1990).

Carcinogenic Risk Assessment

Quantitative carcinogenic risk from oral and inhalation exposure to manganese is not available at present (IRIS, 1990). Manganese is not classified as a carcinogen by the EPA as to human carcinogenicity. The is due to the inadequacy in the available data on the carcinogenicity of manganese.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from ACGIH, Documentation on Threshold Limit Values, Ed. 4., Cincinnati, Ohio., and from NIOSH, Registry of Toxic Effects of Chemical Substances. Washington, D.C.

References

DiPaolo, J.A. 1964. The potentiation of lymphosarcomas in mice by manganous chloride. Fed. Proc. 23: 393. (Abstract).

Furst, A. 1978. Tumorigenic effect of an organo-manganese compound on F344 rats and Swiss albino mice: brief communication. J. Natl. Cancer Inst. 60(5): 1171-1173.

Shimkin, M.B. and G.D. Stoner. 1975. Lung tumors in mice: Application to carcinogenesis bioassay. Adv. Cancer Res. 21: 1-58.

Stoner, G.D., M.B. Shimkin, M.C. Troxell, T.L. Thompson and L.S. Terry. 1976. Test for carcinogenicity of metallic compounds by the pulmonary tumor response in strain A mice. Cancer Res. 36: 1744-1747.

Sunderman, F.W., Jr., T.J. Lau and L.J. Cralley. 1974. Inhibitory effect of manganese upon muscle tumorigenesis by nickel subsulfide. Cancer Res. 34: 92-95.

Sunderman, F.W., Jr., K.S. Kasprzak, P.P. Minghetti, R.M. Maenza, N. Becker, C. Onkelinx and P.J. Goldblatt. 1976. Effects of manganese on carcinogenicity and metabolism of nickel subsulfide. Cancer Res. 36: 1790-1800.

Sunderman, F.W., Jr., M.C. Reid, P.R. Allpass and S.B. Taubman. 1980. Manganese inhibition of sarcoma induction by benzo(a)pyrene in Fisher rats. Proc. Am. Assoc. Cancer Res. 21: 72. (Abstract) EPA. 1984. Health Assessment Document for Manganese. Office of Research and Development, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. EPA 600/8-83- 013F.

U.S. EPA. 1984. Health Assessment Document for Manganese. Office of Research and Development, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. EPA 600/8-83-013F.

U.S. EPA. 1988. Drinking Water Criteria Document for Manganese. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-D008. (External Review Draft).

Witschi, H.P., P.J. Hakkinen and J.P. Kehrer. 1981. Modification of lung tumor development in A/J mice. Toxicology. 21: 37-45.

MERCURY

CAS No: 7439-97-6

Synonym: Hydragyrum, Quicksilver

Physico-chemical Characteristics[1]

Mercury is a silver-white, heavy, mobile, liquid metal; slightly volatile at ordinary temperature; solid mercury is a tin-white, ductile, malleable mass. Mercury has a natural abundance of 0.5 ppm in the earth's crust.

Atomic Weight:	200.59
Melting Point:	-38.87° C
Boiling Point:	356.72° C
Specific Gravity:	13.5939 at 25° C
Vapor Pressure:	2 X 10^{-3} mm (at 25° C)
Solubility in Water:	0.28 µmole/L (at 25° C)
Reactivity with Acid:	Readily with HNO_3, and hot conc. H_2SO_4.

Criteria and Standards[2]

Clean Water Act (EPA)

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	1.1E+1 µg/L
Chronic Toxicity:	0.2E+0 µg/L (1 hr Average)

Marine Water

Acute Toxicity:	1.90E+1 µg/L (1 hr Average)
Chronic Toxicity:	0.1E+0 µg/L (1 hr Average)

OSHA Standard:	0.1 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value)	0.01 mg/m^3 TWA (alkyl compd.) 0.03 mg/m^3 STEL (alkyl compd.) 0.05 mg/m^3 TWA (vapor) 0.1 mg/m^3 TWA (aryl and inorganic compd.)
NIOSH Recommended Standard:	0.05 mg/m^3 TWA (inorganic mercury)
New York State Water Quality Regulations (Class GA Groundwaters)	2 µg/l

Environmental Transport and Fate

Two characteristics, volatility and biotransformation, makes mercury somewhat unique as an environmental toxicant. Volatilization is reduced by conversion of metallic mercury to complexed species, particularly biotransformation by bacteria into short-chain alkyl mercury compounds. However, conversion of mercury to methyl and dimethyl forms remobilize mercury in the aquatic systems. Adsorption onto suspended and bed sediments is probably the most important process determining the environmental fate of mercury in the aquatic environment.

Metabolism

Absorption of mercury by inhalation and dermal routes are significant. However, absorption of elemental mercury following ingestion is minimal. Some elemental mercury remain dissolved in blood and in this form it may be transported to the brain. Unlike elemental mercury, mercurial salts seem to selectively accumulate in the brain. Mercury also accumulates in the kidney following an inhalation exposure where it remain bound to the sulfhydryl groups. Renal pathway is the primary route of mercury excretion.

General Toxicity

Acute exposure to elemental mercury is not highly toxic although a massive single dose causes severe hemorrhage of the kidneys, brain, heart, colon and lungs. Inhalation of high concentrations of mercury vapor cause pneumonitis, bronchitis, chest pain, dyspnea, coughing,, stomatitis, gingivitis, salivation and diarrhea.

Chronic exposure to mercury vapor results in the disturbances of central nervous system, kidney, and gastro-intestinal tract. Effects on the central nervous system is characterized by psychic and emotional disturbances. There may be increased irritability, combativeness, defective patterns, ocular disturbances and tremors. Most of the nervous system manifestations are reversible albeit slowly in a few cases.

Embryo toxicity and teratogenic effects of methyl mercury has been reported in various experimental animals. Mercuric chloride is considered to be teratogenic in experimental animals. However, evidences of teratogenic effects of mercury vapor are inconclusive.

Chronic health hazard assessment of mercury (inorganic) for noncarcinogenic effects is presently under review with EPA.

Evidence of Carcinogenicity

Experimental Animal Data: Following an intra peritoneal administration, metallic mercury was found to produce implantation-site sarcoma in rats (IRIS, 1990., Druckery et al., 1957). Several organic mercurial compounds are genotoxic in various test systems. However, it is irrelevant to consider data from studies on organic mercury for the determination of carcinogenicity of inorganic mercury.

Human Carcinogenicity Data: Human data on mercury as a carcinogen is not available. EPA does not classify mercury as a carcinogen as to human carcinogenicity (category D). This is based on the non-availability of human data and inadequacy of experimental data on mercury carcinogenicity.

Carcinogenic Risk Assessment

Quantitative risk estimate for mercury-induced carcinogenicity by oralor inhalation routes of exposure is not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the World Health Organization. 1976. Environmental Health Criteria: 1. Mercury. World Health Organization, Geneva. 131 pages.

References

Druckrey, H., H. Hamperl and D. Schmahl. 1957. Carcinogenic action of metallic mercury after intraperitoneal administration in rats. Z. Krebs-forsch. 61: 511-519.

Mitsumori, K., K. Maita, T. Saito, S. Tsuda and Y. Shikasu. 1981. Carcinogenicity of methylmercury chloride in ICR mice: Preliminary note on renal carcinogens. Cancer Lett. 12: 305-310.

Ramel, C. 1972. Genetic effects. In: Mercury in the Environment -- An Epidemiological and Toxicological Appraisal, L. Friberg and J. Vostal, Ed. CRC Press, Cleveland, OH. p. 169-181.

U.S. EPA. 1987. Drinking Water Criteria Document for Mercury. Prepared for the Office of Drinking Water, Washington, DC. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH. ECAO-CIN-025, February, 1987.

METHYLENE CHLORIDE

CAS No: 75-09-2

Chemical Formula: CH_2Cl_2

Synonym: Methylene dichloride

Physico-chemical Characteristics[1]

Methylene chloride is a colorless, nonflammable, nonexplosive liquid.

Molecular Weight:	84.94
Boiling Point:	39.75° C
Specific Gravity:	1.361 at 15° C
Miscibility in Water:	about 50 parts of water (25° C)
Log Octanol/Water Partition Coefficient:	1.25
Miscibility in Organics:	Miscible with alcohol, ether, DMF
Vapor Pressure:	362.4 mm Hg at 20° C

Criteria and Standards[2]

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	1.9E-1 µg/L
Fish Consumption only	1.57E+1 µg/L

Ambient Water Quality Criteria, Aquatic Organisms	
Fresh Water	
Acute Toxicity LEC:	1.1E+4 µg/L
Chronic Toxicity LEC:	none
Marine Water	
Acute Toxicity LEC:	1.2E+4 µg/L
Chronic Toxicity LEC:	6.4E+3 µg/L
FIFRA	Not available
TSCA	Not available
RCRA	listed
OSHA Standard:	1,737 mg/m^3 TWA 3,474 mg/m^3 Ceiling Level 6,948 mg/m^3 5-min Peak Level
ACGIH (Threshold Limit Value)	350 mg/m^3 TWA 1,750 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Methylene chloride is highly volatile and escapes easily into the atmosphere from aquatic systems. Photo-oxidation of methylene chloride resulting in the formation of carbon dioxide, carbon monoxide and to some extent phosgene appears to be the major environmental fate process in the atmosphere. Due to its volatile and reactive characteristics adsorption and bio-accumulation of methylene chloride by micro organisms is limited.

General Toxicity and Metabolism

Acute exposure to methylene chloride is associated with several peripheral toxic effects such as the irritation of the eye, skin, respiratory tract, and disturbance of peripheral nervous system. Cardiovascular dysfunction such as arrhythmia and cardiac failure has been reported in cases involving acute exposure to methylene chloride. Experimental animals exposed to methylene chloride develop kidney and liver damage, convulsions and distal paresis.

An oral RfD for methylene chloride is estimated to be 6E-2 mg/kg/day based on the induction of liver toxicity in a rat bioassay (IRIS, 1990, National Coffee Association, 1982). In this study rats were administered drinking water containing methylene chloride (5-250 mg/kg/day) for 3 years. Treatment related histological alterations of the liver were evident at

nominal doses of 50 mg/kg/day or higher. The low nominal dose of 5 mg/kg/day was a NOAEL. However, the supporting data on the oral RfD is limited (Haun et al., 1972).

In the estimation of the oral RfD an uncertainty factor of 100 is included to account for intra- and inter-species variability in response. Confidence in the RfD is rated medium. This is due to the adequacy of the principle study on which the estimation of RfD is based. In this study, a large number of controls were included; several endpoints were observed, and a dose-related increase in severity was observed (EPA, 1985a).

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Data on experimental animals indicate that methylene chloride increase the incidence of lung and liver tumors in rats. In a 2-year study (IRIS, 1990, National Coffee Association, 1982, 1983), F344 rats and B6C3F1 mice were administered drinking water containing methylene chloride (0, to 250 mg kg/day) for 2 years. Female rats responded with increased incidence of neoplastic nodules or hepatocellular carcinomas, which was significant by comparison to matched controls. Male rats did not show an increased incidence of liver tumors. Male mice had elevated incidence of combined neoplastic nodules and hepatocellular carcinomas, but female mice did not. This increase was not statistically significant or dose-related.

In an other study, male and female Syrian hamsters exposed to methylene chloride (0 to 3500 ppm) by inhalation for 6 hours/day, 5 days/week for 2 years did not produce neoplasia. However, Increased incidence of mammary tumors were noted in both males and females. Male rats also developed salivary gland sarcomas (EPA, 1985b, Burek et al., 1984). There is a question as to whether these doses were at or near the MTD.

In a NTP study, (NTP, 1986) female F344/N rats and B6C3F1 mice were exposed to dichloromethane 6 hours/day, 5 days/week for 2 years. Exposure concentrations were 0, 1000, 2000, or 4000 ppm for rats and 0, 2000, or 4000 ppm for mice. Survival of male rats was low. Among the treated mice (both sexes), there was an increased incidence of hepatocellular adenomas and carcinomas and highly significant increase in alveolar/bronchiolar adenomas and carcinomas.

Inhalation assays using dogs, rabbits, guinea pigs, and rats were negative, (EPA 1985b Heppel et al., 1944; MacEwen et al., 1972). However, these are short-term studies lending little evidence on long-term effects.

Supporting evidences from short-term in vitro genotoxicity studies on methylene chloride are inconclusive (EPA 1985b, Green, 1983; Callen et al., 1980; Price et al., 1978; Hatch et al., 1983).

Human Carcinogenicity Data: There are inconclusive data on the possible carcinogenicity of methylene chloride among workers exposed to this agent. These studies lack dose-dependent association in the increased incidence of pancreatic tumors (EPA, 1985b, Friedlander et al., 1978, 1985) and the length

of the study to account for latency of site-specific neoplasia (EPA, 1985b, Ott et al., 1983).

Carcinogenic Risk Estimation

Based on the adequate animal carcinogenicity data and inadequate carcinogenicity data, EPA classifies methylene chloride as a probable human carcinogen (B2 carcinogen). Carcinogenic risk potency factor (slope factor) estimated on the linearized multistage procedure is 7.5E-3 mg/kg/day (IRIS, 1990). Drinking water unit risk for methylene chloride is calculated to be 2.1E-7 µg/L.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

National Coffee Association. 1983. Twenty-four month oncogenicity study of methylene chloride in mice. Prepared by Hazleton Laboratories America, Inc., Vienna, VA. (Unpublished)

National Coffee Association. 1982. 24-Month chronic toxicity and oncogenicity study of methylene chloride in rats. Final Report. Prepared by Hazleton Laboratories America, Inc., Vienna, VA. (Unpublished).

NTP (National Toxicology Program). 1986. Toxicology and carcinogenesis studies of dichloromethane (methylene chloride) in F344/N rats and B6C3F1 mice (inhalation studies). NTP-TRS-306.

U.S. EPA. 1985a. Addendum to the Health Assessment Document for Dichloromethane (methylene chloride). Updated carcinogenicity assessment. Prepared by the Carcinogen Assessment Group, OHLA, Washington, DC. EPA 600/8-B2/004FF.

U.S. EPA. 1985b. Drinking Water Criteria Document for Methylene Chloride. Office of Drinking Water, Washington, DC.

NICKEL

CAS No: 7440-02-0

Physico-chemical Characteristics[1]

Nickel is a lustrous white, hard, ferromagnetic metal. Nickel has a natural abundance of 0.018% in the earth's crust.

Atomic Weight:	58.69
Melting Point:	1555° C
Boiling Point (calc):	2837° C
Specific Gravity:	8.902 at 25° C
Solubility in Water:	Insoluble (some salts are soluble).
Reactivity with Acid:	Readily with HNO_3, and slowly with dil. HCl & H_2SO_4.
Vapor Pressure:	1 mm Hg (at 1810° C).

Criteria and Standards[2]

Clean Air Act	Not available
Safe Drinking Water Act	Not available
Clean Water Act	Not available
OSHA Standard:	1 mg/m^3 (metal and soluble compounds, as nickel)
NIOSH Recommended Standard nickel)	15 $\mu g/m^3$ TWA (inorganic
ACGIH (Threshold Limit Value)	0.1 mg/m^3 TWA (soluble compounds as nickel) 0.3 mg/m^3 STEL (soluble compounds as nickel) 0.35 mg/m^3 TWA (nickel carbonyl, as nickel) 1 mg/m^3 TWA (nickel sulfide roasting, fume and dust, as nickel)

New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Nickel is a highly mobile metal in aquatic systems due to a high solubility of nickel compounds in water. However, precipitation of nickel in the presence of sulfide, and high pH (9 and above) the mobility of nickel. Sorption and co-precipitation of nickel in the presence of hydrous iron and manganese oxides are process that could limit nickel mobility in unpolluted water although the effect of such process in polluted water is uncertain.

Nickel does not accumulate in aquatic organisms to a significant degree. The bio-concentration factor is usually on the order of 100 to 1000.

Metabolism

The average body burden of nickel has been estimated at <10 mg. Following ingestion, nickel selectively concentrates in the bones of rat. Nickel levels in the Lung appear to increase with age. Nickel has been found in the bile, and its excretion is largely via feces. Presence of nickel has been detected in the lung, liver, kidney and intestine of most stillborn infants.

General Toxicity

Dermatitis (nickel itch) is the most frequent effect of exposure to nickel. The dermatitis is a sensitization reaction, and contact may, in some cases, produce paroxysmal asthmatic attacks and pulmonary eosinophilia. Most information regarding acute toxicity of nickel involves inhalation exposure to nickel carbonyl [$Ni(CO)_4$] which is the most toxic of nickel compounds. Symptoms of exposure include dyspnea, cyanosis, leukocytosis, central nervous system signs such as delirium, appear. Acute chemical pneumonitis is also reported in some cases.

Chronic exposure to nickel has been implicated epidemiologically in cancer affecting lungs and nasal cavity among workers at nickel refineries and smelters. Ambivalent evidences of increased incidence of respiratory tract cancer has also been reported among workers at nickel electroplating and polishing operations.

In a study on the chronic toxicity of nickel [IRIS, 1990., Ambrose et al. (1976)], rats given nickel sulfate hexahydrate in concentrations of 0, 100, 1000 or 2500 ppm (estimated as 0, 5, 50, and 125 mg Ni/kg bw) in the diet. Body weights in the high-dose male and female rats were significantly decreased compared with controls. Body weight was also reduced at 1000 ppm; this reduction was significant for females at week 6 and from week 26 through 104, whereas males showed body weight reductions only at 52 weeks. Groups of female rats on the 1000 or 2500 ppm nickel diets (50 and 125 mg Ni/kg bw) had significantly higher heart-to-body weight ratios and lower liver-to-body

weight ratios than controls. No significant effects were reported at 100 ppm (5 mg Ni/kg bw). The dose of 1000 ppm (50 mg Ni/kg bw) represents a LOAEL for this study, while the 100 ppm (5 mg Ni/kg bw) dose is a NOAEL.

A related study (EPA, 1986) found 5 mg/kg/day to be a NOAEL for nickel, supporting the results of Ambrose et al. (1976). In a 90-day study with nickel chloride (EPA, 1986), was administered by gavage to both male and female CD rats (30 animals/sex/group). The data generated in this study included clinical pathology, ophthalmologic evaluations, serum biochemistry, body and organ weight changes, and histopathologic evaluations of selected organs (heart, kidney, liver). Based on the results obtained from this extensive study, the NOAEL was estimated as 5 mg/kg/day nickel dose, whereas the LOAEL was 35 mg/kg/day for decreased body and organ weights.

The uncertainty and modifying factors in the estimation of the RfDs are 100 and 3 respectively. The numbers were based on inter-species extrapolation (10) and sensitive population (10). Since two studies support the NOAEL of 5 mg/kg/day an uncertainty factor of 100 is considered appropriate. In order to justify a modifying factor of 3 for these studies, it is important to note the inadequacies in the reproductive studies and lack of information on the postnatal development of F1 generation. Further, studies of Ambrose et al. (1976) has some statistical limitations, such as small sample size, comparison.

Confidence in the determination of the RfD on the basis of the reported studies (Ambrose et al., 1976) is low. This is due to observed high mortality in the control (44/50). Further, a medium confidence in the data base is designated on the availability of adequate data and supporting studies. A medium confidence in the RfD (oral) is acceptable for it is adequately supported by oral sub-chronic and reproductive studies. However, it is necessary to note that additional reproductive studies are required to enhance the confidence in the RfD (oral).

Estimation of a Reference dose for nickel for chronic inhalation exposure (RfDi) is under review at EPA.

Evidence of Carcinogenicity

Nickel and several nickel compounds have been studied for their possible carcinogenic and carcinogenic promoting properties (IRIS, 1990). As mentioned earlier extensive epidemiological evidence indicate excess cancer of the respiratory system among workers in nickel refinery and smelting plants. Nickel has been found to induce malignant tumors in many target organs in experimental animals following exposure by several routes.

Mammalian cell transformation data indicate that several nickel compounds are mutagenic and can cause chromosomal alterations.

The EPA has not evaluated soluble salts of nickel, as a class of compounds, for potential human carcinogenicity. However, nickel refinery dust and specific nickel compounds - nickel carbonyl and nickel subsulfide - have been evaluated. This is largely due to the inconclusive nature or inadequacy of the available experimental and epidemiological data.

Carcinogenic Risk Assessment

Heath hazard assessments on nickel and its compounds for varied exposure duration is not presently available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Ambrose, A.M., D.S. Larson, J.R. Borzelleca and G.R. Hennigar, Jr. 1976. Long-term toxicologic assessment of nickel in rats and dogs. J. Food Sci. Technol. 13: 181-187.

Edwards, M.J. 1986. Hyperthermia as a teratogen: A review of experimental studies and their clinical significance. Teratogen. Carcinogen. Mutagen. 6: 563-582.

RTI (Research Triangle Institute). 1986. Two-generation reproduction and fertility study of nickel chloride administered to CD rats in drinking water. Interim report: Ninety day toxicity study of nickel chloride administered to CD rats in drinking water. Report submitted to Office of Solid Waste, U.S. Environmental Protection Agency, Washington, DC.

RTI (Research Triangle Institute). 1987. Two-generation reproduction and fertility study of nickel chloride administered to CD rats in drinking water. Report submitted to Office of Solid Waste, U.S. Environmental Protection Agency, Washington, DC.

Schroeder, H.A. and M. Mitchener. 1971. Toxic effects of trace elements on the reproduction of mice and rats. Arch. Environ. Health. 23: 102.

U.S. EPA. 1983. Health Assessment Document for Nickel. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. (External Review Draft).

U.S. EPA 1985. Drinking Water Criteria Document for Nickel. Quantification of Toxicological Effects chapter only. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC.

U.S. EPA. 1986. A 90 day gavage study on Albino rats using nickel. Submitted by American Biogenics Corp. Decatur, IL.

SILVER

CAS No: 7440-22-4

Physico-chemical Characteristics[1]

Silver is a white metal with a natural abundance of up to 0.1 ppm in the earth's crust.

Atomic Weight:	107.868
Melting Point:	960.5° C
Boiling Point:	2000° C
Specific Gravity:	10.49 at 15° C
Solubility in Water:	Insoluble (some salts are are soluble).
Reactivity with Acid:	Readily with dil. HNO_3, and hot conc. H_2SO_4.

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	Not available
Maximum Contaminant Level (MCL)	Not available

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	5.0E+1 µg/L
Fish Consumption only	none

Clean Water Act (EPA)

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	Varies with hardness.
Chronic Toxicity (LEC):	1.2E-1 µg/L

Marine Water

Acute Toxicity:	2.3E+0 µg/L
Chronic Toxicity:	Not available

OSHA Standard:	10 $\mu g/m^3$ TWA
ACGIH (Threshold Limit Value)	0.1 mg/m^3 (metal)
	0.01 mg/m^3 (soluble compounds)
New York State Water Quality Regulations (Class GA Groundwaters)	50 µg/l

Environmental Transport and Fate

Silver can exist in several forms in aqueous systems. Presence of hydrated cations is dependent on the levels of halogens in the aqueous environment. Precipitation of silver as highly insoluble silver halides may determine the levels of soluble silver species. Sorption of silver to ferric hydroxide, manganese dioxide and silica is probably the most important reaction leading to the removal of dissolved silver from aqueous systems. Bio-accumulation of silver is not very significant in comparison to its partitioning to the sediments.

Metabolism

Although excessive absorption of silver is of a local type (impregnation), silver can be absorbed from the lungs and gastrointestinal tract. Intravenous administration, results in the accumulation of silver in the spleen, liver, bone marrow, lungs, muscle and skin. Gastro-intestinal tract is the major pathway of silver excretion. Urinary excretion has not been reported to occur even after intravenous administration.

General Toxicity

Localized excessive absorption of silver termed 'argyria' is a chronic occupational disease (industrial argyria). This is characterized by the presence of gray-blue patches on the skin, conjunctiva of the eye and in some severe cases even blackening of the skin with a metallic luster. Respiratory system is severely affected in most of these cases.

Large oral doses of silver nitrate cause severe irritation. Lesions of kidneys, lungs and even arteriosclerosis have been attributed to both industrial and medical exposures. A reference dose for chronic oral dose (RfDo) for silver for oral route of exposure is estimated as 3E-3 mg/kg/day for producing argyria in humans.

Estimation of LOAEL of 1.0 g (IRIS, 1990, Gaul and Staud 1935,), possibly represents the lowest total doses (0.9-1.5 g) of silver associated with argyria in humans. The doses were administered i.v. over a 2- to 3-year period as silver arsphenamine. However, no body weight data were reported in this study.

East et al. (1980) estimated the total body content of silver in oneindividual with argyria to be 6.4 (plus or minus 2) g. The subject ingestedan unknown quantity of silver acetate over a period of 2.5 years. Symptoms of argyria appeared after the first 6 months of exposure. This subject retained 18% of a single dose of orally-administered silver in a separate30-week experiment. Body weight was given as 58.6 kg.

Total dose is the most appropriate parameter because argyria is a cumulative effect of silver. Pharmacokinetic studies in animals suggest that this value (18%) is high and should be considered a conservative estimate. Human body weight defaults to 70 kg in the absence of reported values. The total body burden of silver reported in East et al. (1980) was adjusted for the time of onset of argyria and then converted to an oral dose.

The uncertainty and modifying factors in the estimation of RfD are 2 and 1 respectively (IRIS, 1990). Since the affected individuals are generally of a poor health (argyria is a condition of cumulative accumulation of silver), and the clinical effect considered to be minimally severe, a uncertainty factor of 2 appear reasonable.

Quality of human studies are satisfactory. Therefore the confidence on the studies is considered medium. Further, confidence in the data base is considered medium since the existing experimental data quantitatively support the RfD. Medium confidence in the RfD follows.

A reference dose for chronic inhalation exposure (RfDi) is not available at this time.

Evidence of Carcinogenicity

Experimental Animal Data: Animal data on silver carcinogenicity is considered inadequate (IRIS, 1990). Sarcomas at the site of implantation have been induced with foils and discs of silver and other noble metals. However, later studies (Furst, 1979 & 1981) have indicated a nonspecific nature of such studies as indicators of carcinogenicity. Some studies included here are designed to avoid the complications of solid-state carcinogenesis.

In a study on silver and gold, colloidal silver injected both i.v. and s.c. into rats resulted in tumors in 8 of 26 rats which survived longer than 14 months [Schmahl and Steinhoff (1960)]. However, these studies lacked suitable controls.

In a similar study silver powder was suspended in trioctanoin and injected monthly (i.m.), into 50 male and female Fischer 344 rats (Furst and Schlauder, 1977). The dose was 5 mg each for 5 treatments and 10 mg each for 5 more treatments for a total dose of 75 mg silver. The treatment regimen included a vehicle control (a reportedly inert material), and cadmium as a positive control. Injection site sarcomas were found only in vehicle control (1/50), gold (1/50) and cadmium (30/50); no tumors (0/50) appeared at the site of injection in the silver-treated animals.

Despite frequent medical application, no human cancer data is presently available. EPA has not classified silver as to human carcinogenicity (category D). The basis for this is the ambiguity of data on implantation-induced carcino-genesis and the negative results obtained in studies employing colloidal and powder form of silver.

Carcinogenic Risk Assessment

Presently quantitative estimate of carcinogenic risk for both inhalation and oral exposures for silver is not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Blumberg, H. and T.N. Carey. 1934. Argyremia: Detection of unsuspected and obscure argyria by the spectrographic demonstration of high blood silver. J. Am. Med. Assoc. 103: 1521-1524.

East, B.W., K. Boddy, E.D. Williams, D. MacIntyre and A.L.C. McLay. 1980.Silver retention, total body silver and tissue silver concentrations in argyria associated with exposure to an anti-smoking remedy containing silveracetate. Clin. Exp. Dermatol. 5: 305-311.

Gaul, L.E. and A.N. Staud. 1935. Clinical spectroscopy. Seventy cases of generalized argyria following organic and colloidal silver medication. J.Am. Med. Assoc. 104: 1387-1390.

U.S. EPA. 1985. Drinking Water Criteria Document for Silver. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. (External Review Draft)

U.S. EPA. 1988. Drinking Water Criteria Document for Silver. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-026. Final Draft.

THALLIUM

CAS No: 7440-28-0
Thallium Acetate CAS No: 563-68-8
Chemical Formula: Tl

Physico-chemical Characteristics[1]

Thallium is a bluish-white, very soft, inelastic, easily fusible, heavy metal with a natural abundance of up to 0.7 ppm in the earth's crust.

Atomic Weight:	204.383
Melting Point:	303.5° C
Boiling Point:	1457° C
Specific Gravity:	11.85 at 25° C
Solubility in Water:	Insoluble (some salts are soluble)
Reactivity with Acid:	Reacts with conc. HNO_3, and H_2SO_4 and slowly with HCl.

Criteria and Standards[2]

The available data is inadequate for establishing criteria and standards.

CERCLA (value)	100 lbs (Final, 1986)
RCRA	Listed (total thallium)
OSHA Standard:	100 $\mu g/m^3$ TWA
ACGIH (Threshold Limit Value)	0.1 mg/m^3 TWA (soluble compounds, as Tl).
New York State Water Quality Regulations (Class GA Groundwaters)	None

Environmental Transport and Fate

Formation of thallium sulfide under reducing conditions and sorption of dissolved thallium to clay minerals and hydrous metal oxides are probably the important environmental fate process. Thallium is readily taken up by aquatic organisms and possibility of thallium in food chain magnification

have been reported. Biotransformation does not appear to be an important process although methylation of thallium is possible under aerobic conditions.

Metabolism

Soluble compounds of thallium are readily absorbed through the skin and gastrointestinal tract.

General Toxicity

Symptoms of acute thallium intoxication in humans include gastrointestinal irritation; liver and kidney damage; pulmonary edema; degenerative changes in the adrenals, peripheral nervous system, central nervous system, ocular effects, optic neuritis and in rare cases cataract. The estimated human lethal dose for thallium is 8 to 12 mg/kg. Results of the studies from experimental animals correlate well with human data on thallium toxicity.

Based on the available data and toxicity profiles for thallium an oral RfD of 9E-5 ma/kg/day was determined (IRIS, 1990). In a 90-day subchronic study (EPA, 1986) Sprague-Dawley rats (20/sex/group) were treated by gavage with 0, 0.01, 0.05 or 0.25 mg/kg/day of an aqueous solution of thallium sulfate (approximately 0, 0.008, 0.04 or 0.20 mg Tl/kg/day). Extensive pathologic and histopathological data was collected. However, no differences between the control groups and groups receiving thallium sulfate were observed in body weights, body weight gains, food consumption, or absolute and relative organ weights. Increased SGOT, LDH and sodium levels, and decreased blood sugar levels was observed among the treated groups. The only grossly observed finding at necropsy thought to be treatment-related was alopecia, especially in female rats; however, microscopic evaluations did not reveal any histopathologic alterations. Based on the results of this study the 0.25 mg/kg/day thallium sulfate (0.20 mg/kg/day Tl) is considered a NOAEL. Using the molecular weight ratio of TlC2H302 to Tl (263/204.4) for conversion this NOAEL is converted to 0.26 mg/kg/day thallium acetate; applying a UF of 3000, an RfD of 9E-5 mg/kg/day was derived.

In a related study (Downs et al., 1960) rats (5/sex/dose) were fed diets containing nominal concentrations of thallium acetate of 0, 5, 15 or 50 ppm. The 50 ppm exposure level resulted in 100% mortality by week 5. The 30 ppm level resulted in 100% mortality by week 9. By week 15, 4/10 control animals died (2/sex), making interpretation of survival in remaining dose groups difficult (15 ppm, 3/5 males and 1/5 females died; 5 ppm, 2/6 males and 0/4 females died). At termination, the only gross finding was alopecia in the 15 and 30 ppm groups.

In a study on the possible reproductive effects of thallium and its compounds (Formigli et al., 1986), reduced testicular ß-glucuronidase activities, high concentrations of thallium in the testes and reduced sperm motility was observed.

The uncertainty and modifying factors in the determination of the oral RfD for thallium are estimated to be 3000 and 1 respectively (IRIS, 1990). These are based on the quality of available data, uncertainties in inter-species extra-polation, inter-species variability, and lack of reproductive and chronic toxicity data.

Confidence in the estimated oral RfD is low. This is largely due to uncertainties in the results obtained from the critical study, and lack of chronic data resulting in a low confidence in the data base. In the absence of reproductive and chronic data, confidence in the oral RfD is considered low.

There are no evidence that thallium or its compounds are carcinogenic to humans and experimental animals. Exposure to thallium salts during critical developmental stages is reported to produce achondroplasia in chickens and rats. No other teratogenic effects are reported.

Currently carcinogenic risk assessment for life time exposure to thallium or its compounds is not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

Reference

U.S. EPA. 1986. Subchronic (90-day) toxicity of thallium sulfate in Sprague- Dawley rats. Office of Solid Waste, Washington, DC.

TOLUENE

CAS No: 108-88-3

Chemical Formula: $C_6H_5CH_3$

Synonym: Methylbenzene

Physico-chemical Characteristics[1]

Toluene is a flammable, refractive liquid with a benzene-like odor.

Molecular Weight:	92.13
Flash Point (closed cup):	4.4° C
Boiling Point:	110.6° C
Specific Gravity:	1.4967 at 20° C
Miscibility in Water:	5.35E+02 mg/L
Log Octanol/Water Partition	

Coefficient:	2.69
Miscibility in Organics:	Miscible with several organic solvents.
Vapor Pressure:	28.7 mm Hg at 25° C

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	2 mg/L (Proposed, 1985)
Maximum Contaminant Level (MCL)	Not available

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	14.3 mg/L
Fish Consumption only	424 mg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEL:	17.5 mg/L
Chronic Toxicity LEL:	none

Marine Water

Acute Toxicity LEL:	6.3 mg/L
Chronic Toxicity LEC:	5.0 mg/L

FIFRA	Not available
TSCA	Not available
RCRA	listed
CERCLA (value)	1000 lbs (Final, 1985)

OSHA Standard (skin):	750 mg/m^3 TWA 1,120 mg/m^3 Ceiling Level
NIOSH Recommended Standard:	375 mg/m^3 TWA 560 mg/m^3 STEL
New York State Water Quality Regulations (Class GA Groundwaters)	2000 µg/l

Environmental Transport and Fate

Volatilization appears to be the major environmental transport process of toluene from aquatic environments. Photo-oxidation of toluene in the stratosphere has been proposed to be a major atmospheric process. Subsequently the photo-degraded products and non-reacted toluene could return to the surface water via precipitation. Toluene has a high log octanol/water partition coefficient favoring its adsorption to organic materials. Several microorganisms have been known to metabolize toluene. However, the extent and ease of such microbial transformation of toluene is yet to be determined.

General Toxicity and Metabolism

Oral administration of high levels of toluene (260 mg/kg) has resulted in a significant enhancement in the embryonic death in mice (EPA, 1980). Decreased fetal weight, cleft palate, and other congenital abnormalities have been observed in laboratory animals exposed to high concentrations of toluene.
However, there are no reports of teratogenic and embryotoxic effects of toluene in humans.

Disturbances of the central nervous system, has been reported in humans exposed to an acute level of toluene. However, chronic inhalation exposure to toluene at relatively high concentrations has been shown to produce cerebellar degeneration and irreversible encephalopathy in laboratory animals.

The oral RfD for toluene has been estimated to be 3E-1 mg/kg/day based on the changes in the clinical chemistry and hematological parameters in a rat chronic inhalation bioassay (IRIS, 1990; CIIT, 1980). In this study, toluene was administered by inhalation (30 to 300 ppm) to F344 rats for 6 hours/day, 5 days/week. The same number of animals (120 males and 120 females) was used as a control. All clinical chemistry, hematology and urinalysis testing was conducted at 18 and 24 months. All the groups were normal except for a dose-related reduction in hematocrit values in females exposed to 100 and 300 ppm toluene was observed. Based on these findings, a NOAEL of 300 ppm or 1130 mg/m^3 was derived.

An uncertainty factor of 100 was included in the estimation of the RfD to account for sensitive individuals and intra-species extrapolation.

The overall confidence in the oral RfD is rated medium (IRIS, 1990). This is based on the adequacy of the principle study. Further, several related studies support the estimated effect level enhancing the confidence on data base.

Estimation of an inhalation RfD for toluene is currently under review (IRIS, 1990).

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Animal data on the carcinogenicity of toluene is ambivalent. A study from CIIT did not find any increase in the neoplastic response in rats exposed by inhalation to toluene (0 to 300 ppm) for 103 weeks (CIIT, 1980). However this study is considered inadequate because for two reasons. Firstly the highest dose administered was well below the MTD for toluene and secondly, a high incidence of lesions and pathological changes was observed in the control animals. Several studies have examined the carcinogeni-city in various strains of mice (strains A/He, C3HeB, SWR) exposed to toluene for lifetime (3 times weekly) but with no carcinogenic response (Poel, 1963).

There are no human data linking exposure to toluene and higher neoplastic incidence.

Toluene is not classified as a carcinogen (category D) by the EPA (IRIS, 1990). This is based on inadequate animal data and absence of human data on toluene carcinogenicity.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Bos, R.P., R.M.E. Brouns, R. van Doorn, J.L.G. Theuws and P.Th. Henderson. 1981. Non-mutagenicity of toluene, o-, m- and p-xylene, o-methylbenzylalcohol and o-methylbenzylsulfate in the Ames assay. Mutat. Res. 88(3): 273-279.

CIIT (Chemical Industry Institute of Toxicology). 1980. A twenty-four-month inhalation toxicology study in Fisher-344 rats exposed to atmospheric toluene. Executive Summary and Data Tables, October 15. CIIT, Research Triangle Park, NC.

Coombs, M.M., T.S. Bhatt and C.J. Croft. 1973. Correlation between carcinogeni-city and chemical structure in cyclopenta(a)phenanthrenes. Cancer Res. 33(4): 832-837.

Doak, S.M.A., B.J.E. Simpson, P.F. Hunt and D.E. Stevenson. 1976. The carcinogenic response in mice to the topical application of propane sulfone to the skin. Toxicology. 6: 139-154.

Dobrokhotov, V.B. 1972. The mutagenic influence of benzene and toluene under experimental conditions. Gig. Sanit. 37: 36-39. (Rus.) (Evaluation based on an English translation provided by the U.S. EPA.)

Forni, A., E. Pacifico and A. Limonta. 1971. Chromosome studies in workers exposed to benzene or toluene or both. Arch. Environ. Health. 22(3): 373-378.

Funes-Craviota, F., B. Kolmodin-hedman, J. Lindsten, et al. 1977.Chromosome aberrations and sister-chromatid exchange in workers in chemical laboratories and a rotoprinting factory and in children of women laboratory workers. Lancet. 2: 322-325.

Gerner-Smidt, P. and U. Friedrich. 1978. The mutagenic effect of benzene, toluene and xylene studied by the SCE technique. Mutat. Res. 58(2-3): 313-316.

Lijinsky, W. and H. Garcia. 1972. Skin carcinogenesis tests of hydrogenated derivatives of anthracene and other polynuclear hydrocarbons. Z. Krebsforsch. Klin. Onkol. 77: 226-230.

Litton Bionetics, Inc. 1981. Mutagenicity Evaluation of Toluene. Final Report. Submitted to the American Petroleum Institute, Washington, DC in January, 1981. LBI Project No. 21141-05. Litton Bionetics, Inc., Kansington, MD. p. 58.

Lyapkalo, A.A. 1973. Genetic activity of benzene and toluene. Gig. Tr. Prof. Zabol. 17(3): 24-28. (Rus.) (Evaluation based on an English translation provided by the U.S. EPA.).

Maki-Paakkanen, J., K. Husgafvel-Pursiainen, P.L. Kalliomaki, J. Tuominen and M. Sorsa. 1980. Toluene-exposed workers and chromosome aberrations. J. Toxicol. Environ. Health. 6: 775-781.

Mortelmans, K.E. and E.S. Riccio. 1980. In vitro microbiological genotoxicity assays of toluene. Prepared by SRI International, Menlo Park, CA, under Contract No. 68-02-2947 for the U.S. EPA, Research Triangle Park, NC. p. 25.

Nestmann, E.R., E.G.H. Lee, T.I. Matula, G.R. Douglas and J.C. Mueller. 1980. Mutagenicity of constituents identified in pulp and paper mill effluents using the Salmonella/mammalian-microsome assay. Mutat. Res. 79: 203-212.

NTP (National Toxicology Program). 1982. Subchronic Inhalation Toxicity Test with Toluene in Mice. International Research and Development Corp., Mattawan, MI. Report No. 5701-113A, 5701-113B.

NTP (National Toxicology Program). 1981. Subchronic Oral Toxicity Test with Toluene in Mice. International Research and Development Corp., Mattawan, MI. Report No. 5701-103, Amendment to Final Report No. 5701-107.

Poel, W.E. 1963. Skin as a test site for the bioassay of carcinogens and carcinogen precursors. Natl. Cancer Inst. Monogr. 10: 611-625.

Snow, L., P. MacNair and B.C. Casto. 1981. Mutagenesis testing of toluene in Salmonella strains TA100 and TA98. Report prepared for the U.S. EPA by Northrup Services, Inc., Research Triangle park, NC.

U.S. EPA. 1987. Drinking Water Criteria Document for Toluene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.

U.S. EPA. 1985. Drinking Water Criteria Document for Toluene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC.

Wolf, M.A., V.K. Rowe, D.D. McCollister, R.L. Hollingsworth and F. Oyen. 1956. Toxicological studies of certain alkylated benzenes and benzene. A.M.A. Arch. Ind. Health. 14: 387-398.

1,1,1-TRICHLOROETHANE

CAS No: 71-55-6

Chemical Formula: CH_3CCl_3

Synonym: Methyl chloroform

Physico-chemical Characteristics[1]

1,1,1-Trichloroethane (1,1,1-TCE) is a nonflammable liquid.

Molecular Weight:	133.42
Boiling Point:	74.1° C
Specific Gravity:	1.3376 at 20° C
Miscibility in Water:	1.5E+03 mg/L
Log Octanol/Water Partition Coefficient:	2.17
Miscibility in Organics:	Miscible with acetone, benzene, carbon tetrachloride, methanol, ether
Vapor Pressure:	123 mm Hg at 20° C

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	200 µg/L (Final, 1985).
Maximum Contaminant Level (MCL)	200 µg/L (Final, 1987).

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	1.84E+4 µg/L
Fish Consumption only	1.03E+6 µg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEC:	none
Chronic Toxicity LEC:	none

Marine Water

Acute Toxicity LEC:	3.12E+4 µg/L
Chronic Toxicity LEC:	none

FIFRA	Not available
TSCA	Not available
RCRA	listed
CERCLA (Reportable Quantity, RQ)	1000 lbs (Final, 1985)

OSHA Standard:	1,910 mg/m^3 (350 ppm) TWA
NIOSH Recommended Standard Ceiling Level.	1,910 mg/m^3 (350 ppm) 15 min-
New York State Water Quality Regulations (Class GA Groundwaters)	200 µg/l

Environmental Transport and Fate

Volatilization is the most important environmental transport process for 1,1,1-TCE from aquatic environment. Photo-oxidation in the presence of hydroxyl radicals has been proposed as the primary fate process of 1,1,1-TCE in the atmosphere. Some degree of adsorption of 1,1,1-TCE to organic materials and sediment has been reported. However, the mobility of 1,1,1-TCE in the soil depends on the composition of the soil.

General Toxicity and Metabolism

1,1,1-TCE has a low toxicity profile (oral LD_{50} in rats is 11 g/kg). Both in humans and animals, high concentrations of 1,1,1-TCE causes, disturbances of the central nervous system characterized by such symptoms as depression, imbalance in equilibrium and temporary reversible loss of coordination. Other effects including cardiovascular effects such as hypotension, premature ventricular contractions, and arrhythmia have been

reported. Effects such as irritation of the skin, mucous membranes and eye as a result of exposure to 1,1,1-TCE has been reported.

An oral RfD for 1,1,1-TCE has been estimated at 9E-2 mg/kg/day based on a six-month inhalation study in guinea pigs (IRIS, 1990; Torkelson et al., 1958; Adams et al., 1950). In the principle study (Torkelson et al. 1958) groups of rats, rabbits, guinea pigs and monkeys were exposed to 1,1,1-TCE (500 to 10,000 ppm). From these studies, it was determined that the female guinea pig was the most sensitive species of those tested. At 500 ppm, groups of eight male and eight female guinea pigs showed no evidence of adverse effects compared with unexposed and air-exposed controls after exposure for 7 hours/day, 5 days/week for 6 months. Groups of five female guinea pigs exposed to 1000 ppm 1,1,1-TCE vapor 3 hours/day, 5 days/week for 3 months had fatty changes in the liver and statistically significant increased liver weights. Thus, this study defined a NOAEL of 500 ppm (2730 mg/m^3) in guinea pigs.

In a similar study, (Adams et al. 1950) groups of guinea pigs of 6-10 were exposed to 1,1,1-TCE (650 ppm) vapor 7 hours/day, 5 days week for 2 to 3 months. These animals exhibited a slight depression in weight gain compared with both air-exposed and unexposed controls, thereby establishing a LOAEL of 650 ppm (3550 mg/m^3) in guinea pigs.

In the estimation of the oral RfD an uncertainty factor of 1000 was included to account for dose and inter-species extrapolation, and sensitive population.

The overall confidence in the oral RfD is considered medium IRIS, 1990). This is based on the inadequacy of the principle and supporting studies adopted in the estimation of oral RfD. Although, several animal species were used in these studies, the group size, differences in the length of exposure and the number of experimental endpoints are limited. A general inconsistency in the data base is apparent as a result of limitations in the principle studies.

Estimation of an inhalation RfD for 1,1,1-TCE is under review (IRIS, 1990).

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Existing data on the animal carcinogenicity is considered inadequate. In the NCI study (NCI, 1977) female Osborne-Mendel rats and B6C3F1 hybrid mice were administered 1,1,1-TCE (750 or 1500 mg/kg) by gavage 5 times/week for 78 weeks by gavage. The rats were observed for an additional 32 weeks. Although a variety of neoplasms were observed in both treated and matched control rats, they were common to aged rats and were not significantly related to dosage. In a similar study (Quast et al. 1978) exposed 96 Sprague-Dawley rats to 875 or 1750 ppm 1,1,1-TCE vapor for 6 hours/day, 5 days/week for 12 months, followed by an additional 19-month observation period. Increased incidence of focal hepatocellular alterations in female rats at the highest dose. No significant dose-related neoplasms were reported. However, these dose levels were below those used in the NCI study.

Human Carcinogenicity Data: On the basis of the existing inadequate animal data and absence of human carcinogenicity data, 1,1,1-TCE is not classified as a human carcinogen (IRIS, 1990).

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Adams, E.M., H.C. Spencer, V.K. Rowe and D.D. Irish. 1950. Vapor toxicity of 1,1,1,-trichloroethane (methyl chloroform) determined by experiments on laboratory animals. Arch. Ind. Hyg. Occup. Med. 1: 225-236.

NCI (National Cancer Institute). 1977. Bioassay of 1,1,1-trichloroethane for possible carcinogenicity. Carcino. Tech. Rep. Ser. No. 3, NCI-CG-TR-3. p.70.

NCI (National Cancer Institute). 1977. Bioassay of 1,1,1-trichloroethane for possible carcinogenicity. Carcino. Tech. Rep. Ser. No. 3, NCI-CG-TR-3.

Quast, J.F., B.K.J. Leong, L.W. Rampy and P.J. Gehring. 1978. Toxicologic and carcinogenic evaluation of a methylchloroform 1,1,1-trichloroethane formulation by chronic inhalation in rats-- interim report after 24 months. Dow Chemical Co., Midland, MI. p. 14

Quast, J.F., L.L. Calhoun and M.J. McKenna. 1984. Chlorothene VG: A Chronic Inhalation Toxicity and Oncogenicity Study in Rats and Mice. Part I. Results of Findings in Mice. Toxicology Research Laboratory Health and Environmental Sciences, U.S.A. Dow Chemical U.S.A. Midland, Michigan.

Torkelson, T.R., F. Oyen, D.D. McCollister and V.K. Rowe. 1958. Toxicity of 1,1,1-trichloroethane as determined on laboratory animals and human subjects. Am. Ind. Hyg. Assoc. J. 19: 353-362.

U.S. EPA. 1984a. Health Effects Assessment for 1,1,1-Trichloroethane. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Emergency and Remedial Response, Washington, DC.

U.S. EPA. 1984b. Health Assessment Document for 1,1,1-Trichloroethane. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA-600/8-82-003F.

TRICHLOROETHYLENE

CAS No: 79-01-6

Chemical Formula: C_2HCl_3

Synonym: Trichloroethene

Physico-chemical Characteristics[1]

Trichloroethylene (TCE) is a nonflammable, mobile liquid with a characteristic odor resembling chloroform.

Molecular Weight:	131.4
Boiling Point:	86.7° C
Specific Gravity:	1.469 at 15° C
Miscibility in Water:	1.1E+03 mg/L
Log Octanol/Water Partition Coefficient:	2.29
Miscibility in Organics:	Miscible with ether, alcohol, chloroform.
Vapor Pressure:	60 mm Hg at 20° C
Vapor Density:	4.53

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0 mg/L (Proposed, 1985)
Maximum Contaminant Level (MCL)	5 µg/L (Final, 1987)

Clean Water Act (EPA)

Ambient Water Quality Criteria, Human Health

Water and Fish Consumption	2.7E+0 µg/L
Fish Consumption only	8.07E+1 µg/L

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity LEL:	4.5E+4 µg/L
Chronic Toxicity LEL:	none

Marine Water

Acute Toxicity LEL:	2.0E+3 µg/L
Chronic Toxicity LEC:	none

FIFRA	Not available
TSCA	Not available
RCRA	listed
OSHA Standard (skin):	540 mg/m^3 TWA
NIOSH Recommended Standards (air):	540 mg/m^3 TWA 760 mg/m^3 Ceiling Level
New York State Water Quality Regulations (Class GA Groundwaters)	5 µg/l

Environmental Transport and Fate

Volatilization from surface waters appears to be the most important environmental transport process of TCE. TCE is highly reactive in the atmosphere in the presence of hydroxyl radicals producing carbon dioxide, carbon monoxide. Adsorption and bio-accumulation of TCE is not clearly known. However, there are reports of presence of TCE metabolism in higher organisms.

General Toxicity and Metabolism

The oral acute LD_{50} for TCE ranges from 6,000 to 7,000 mg/kg depending on the type of species studied. Generally, TCE has a low acute toxicity in the experimental animals.

Chronic exposure to high concentrations of TCE is reported to produce toxic symptoms in liver, kidney and nervous system in animals. There are even reports of adverse dermatological reactions following exposure to TCE. However, there are no reports of teratogenic and reproductive toxicity associated with exposure to TCE in experimental animals.

Estimation of an oral and inhalation RfD for TCE is currently under review with EPA (IRIS, 1990).

Evidence of Carcinogenicity

There are limited evidence of carcinogenicity of TCE in experimental animals. Enhanced incidence of hepatocellular carcinoma was observed in mice exposed by oral route to TCE (NCI, 1976; NTP 1982). However, there are few supporting evidences on the carcinogenicity of TCE in experimental animals.

Human carcinogenicity data for TCE is not available.

In the absence of adequate data on the carcinogenicity of TCE, carcinogenic risk assessment for TCE is not available at this time.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

National Cancer Institute (NCI). 1976. Bioassay of Trichloroethylene for Possible Carcinogenicity. CAS No. 79-01-6. NCI Carcinogenesis Technical Report Series No. 2, Washington, D.C. DHEW Publication Number (NIH): 76-802.

National Toxicology Program (NTP). 1982. Carcinogenesis Bioassay of Trichloro-ethylene. CAS No. 79-01-6. NTP 81-84, NIH Publication Number 82-1799.

VANADIUM

	CAS No:	7440-62-2
Vanadium Pentoxide	CAS No:	1314-62-1

Physico-chemical Characteristics[1]

Vanadium is a light gray or white lustrous metal available as a powder. It has a natural abundance of 0.01% by weight in the earth's crust.

Atomic Weight:	50.9415
Melting Point:	1917° C
Boiling Point:	3380° C
Specific Gravity:	6.11 at 18.7° C
Solubility in Water:	Insoluble
Reactivity with Acid:	Reacts with hot conc. HNO_3, H_2SO_4, hydrofluoric acid, aquaregia.

Criteria and Standards[2]

The available data on vanadium is not adequate for establishing criteria and standards.

CERCLA [value (status)]	1000 lbs (Final, 1986)
RCRA	Listed
TSCA	Not available

NIOSH Recommended Standard:	1 mg/m^3 TWA 0.5 mg/m^3 Ceiling Level
ACGIH (Threshold Limit Value)	0.05 mg/m^3 (Vanadium pentoxide respirable dusts and fumes).
New York State Water Quality Regulations (Class GA Groundwaters)	None

Transport and Fate

Vanadium occurs in divalent (+2), trivalent (+3), tetravalent (+4) and pentavalent (+5) forms. The extent of vanadium transport in the environment is determined by the presence of other chemical species, its solubility and other exogenous substances.

Bio-accumulation of vanadium has been reported. However, the ease of renal excretion in mammals reduce considerable body burden of vanadium. In humans, vanadium is excreted as sodium metavanadate or ammonium vanadyl tartrate.

Metabolism

Following ingestion a significant amount of vanadium is excreted by the renal pathway. There are reports suggesting the presence of a homeostatic mechanism for vanadium uptake and elimination in mammals. Following parenteral administration, a transient increase in the levels of vanadium in the liver and kidney is observed. However, teeth and bone are the significant receptors of vanadium accumulation. It is estimated that the body burden of vanadium is at 30 mg.

General Toxicity

The toxic effects of vanadium are largely confined to the respiratory system. Bronchitis and bronchopneumonia are more frequent among workers exposed to vanadium compounds. Greenish-blue discoloration of tongue is characteristic among workers exposed to vanadium dust. Gastro-intestinal distress, cardiac palpitation, tremor, nervous depression and kidney damage have been associated with industrial vanadium exposure.

Pentavalent vanadium forms such as vanadium pentoxide are reported to be the most toxic forms of vanadium compounds in experimental animals. Acute vanadium poisoning is associated with hemorrhage, paralysis, convulsions and respiratory depression. Reports exist of severe damage of the liver, spleen, adrenals and bone marrow in exposure to vanadium pentoxide.

An oral RfD for vanadium pentoxide is estimated as 9E-3 mg/kg/day, and is based on study performed by Stokinger et al., (1981) (IRIS, 1990). In

this chronic study, rats were exposed to dietary levels of 10 or 100 ppm vanadium (about 17.9 or 179 ppm vanadium pentoxide). The criteria used to evaluate vanadium toxicity were growth rate, survival, and hair cystine content. The only significant change reported in this study was a decrease in the amount of cystine in the hair of animals ingesting vanadium.

Of the subchronic and chronic animal studies available, the lower dose level (17.9 ppm vanadium pentoxide) reported in the Stokinger et al. (1953) study is the highest oral NOAEL upon which an RfD can be derived. An oral RfD of 0.009 mg/kg/day (0.62 mg/day for a 70-kg person) can be calculated by assuming that rats feeding is equivalent to 5% of their body weight and by applying an uncertainty factor of 100.

As mentioned above an uncertainty factor of 100, and a modifying factor of 1. are applied to this study for inter species extrapolation (10) and sensitive individuals (10) (IRIS, 1990).

Confidence in the oral RfD for vanadium pentoxide is considered low since the available data on this chemical is inadequate. Further, the reported study on which the estimation of the oral RfD was based lacks detail.

There are no data available to suggest that vanadium has carcinogenic, mutagenic, teratogenic or reproductive effects in humans or experimental animals.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

Reference

Stokinger, H.E., W.D. Wagner, J.T. Mountain, F.R. Stacksill, O.J. Dobrogorski and R.G. Keenan. 1953. Unpublished results. Division of Occupational Health, Cincinnati, OH. (Cited in Patty's Industrial Hygiene and Toxicology, 3rd ed., (1981).

VINYL CHLORIDE

CAS No: 75-01-4

Chemical Formula: CH_2CHCl

Synonyms: Chloroethylene

Physico-chemical Characteristics[1]

Vinyl Chloride is a colorless gas that liquefies in a freezing mixture.

Molecular Weight:	62.5
Boiling Point:	-13.37° C
Specific Gravity:	0.9106 at 20° C
Solubility in Water:	2.67E+03 mg/L
Log Octanol/Water Partition Coefficient:	1.4 (estimated)
Solubility in Organics:	Soluble in alcohol, ether
Vapor Pressure:	2530 mm Hg at 20° C

Criteria and Standards[2]

The available data on vinyl chloride is inadequate for establishing criteria and standards.

CAG Unit Risk (EPA):	1.75×10^{-2} $(mg/kg/day)^{-1}$
OSHA Standard (air):	26 mg/m^3 TWA 13 mg/m^3 (15-min Ceiling Level).
ACGIH (Threshold Limit Value): (human Carcinogen)	10 mg/m^3 TWA
New York State Water Quality Regulations (Class GA Groundwaters)	2 µg/l

Environmental Transport and Fate

Volatilization and subsequent photo-oxidation in the atmosphere are the major environmental transport and fate process of vinyl chloride. Vinyl chloride rapidly reacts with hydroxyl radicals producing hydrogen chloride and formyl chloride, which (formyl chloride) in turn decomposes to form carbon monoxide and hydrogen chloride. Other processes such as sorption,

bio-accumulation and bio-degradation are insignificant in the transport and fate of vinyl chloride.

General Toxicity and Metabolism

Acute occupational exposure to high concentrations of vinyl chloride can produce symptoms of narcosis in humans. Respiratory tract irritation, bronchitis, headache, irritability, memory disturbances have also been reported. Chronic exposure to vinyl chloride is associated with multiple systemic disorders, including a sclerotic syndrome, acro-osteolysis, thrombocytopenia, and liver damage, consisting of damage to parenchymal cells, fibrosis of the liver capsule, periportal fibrosis associated with hepatomegaly and splenomegaly. There are ambivalent reports on the teratogenic and embryo toxic effects of vinyl chloride.

Acute inhalation exposure of experimental animals to high concentrations of vinyl chloride can result in narcosis and death. The 2-hour LC_{50} value for rats is 390 g/m^3. Chronic exposure of experimental animals can result in growth disturbances and histopathological and histochemical lesions in the liver, kidneys, spleen and lungs.

IARC classifies vinyl chloride as a Category I human carcinogen, causing angiosarcomas of the liver and tumors of the brain, lung and hemolymphopoietic system in humans. Vinyl chloride is carcinogenic to experimental animals (mice, rats and hamsters); it produces tumors at several target sites, including angiosarcomas of the liver following oral or inhalation exposure. Vinyl chloride
both as a vapor and in solution, is mutagenic in several biological assay systems. In addition, chromosome aberrations, including fragments, dicentric and ring breaks, and gaps have been found in workers occupationally exposed to vinyl chloride.

It is important to note that the occupationally related evidences of human health effects associated with exposure to vinyl chloride needs further investigations.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from American Conference of Governmental Industrial Hygienists (ACGIH), 1980. Documentation of the Threshold Limit Values. 4th Edition, Cincinnati, OH.

References

International Agency for Research on Cancer (IARC). 1979. IARC Monographs on the Evaluation of Carcinogenic Risks of Chemicals to Humans. Vol. 19: World Health Organization, Lyon, France, pp: 377-438.

U.S. Environmental Protection Agency. 1984. Health Effects Assessment for Vinyl Chloride. Environmental Criteria and Assessment Office, Cincinnati, OH. September 1984. ECAO-CIN-H036 (Final Draft).

XYLENES*

(a) meta-Xylene

CAS No: 108-38-3

Chemical Formula: $C_6H_4(CH_3)_2$

Synonym: Dimethylbenzene

Physico-chemical Characteristics[1]

meta-Xylene is a colorless, mobile and flammable liquid.

Molecular Weight:	106.16
Flash Point (closed cup):	25° C
Boiling Point:	139.3° C
Specific Gravity:	0.868 at 20° C
Miscibility in Water:	1.3E+02 mg/L
Log Octanol/Water Partition Coefficient:	3
Miscibility in Organics:	Miscible with organic solvents.
Vapor Pressure:	10 mm Hg at 20° C

Criteria and Standards[2]

Safe Drinking Water Act (EPA)

Maximum Contaminant Level Goal (MCLG)	0.44 mg/L (Proposed, 1985)
Maximum Contaminant Level (MCL)	Not available
FIFRA	Not available
TSCA	Not available
RCRA	listed
CERCLA (value)	1000 lbs (Final, 1985)
New York State Water Quality Regulations (Class GA Groundwaters)	10,000 µg/l

* General information, and physico-chemical characteristics of ortho-, meta-, and para-Xylenes will be tabulated separately. However, information such as environmental transport and fate, general toxicity, evidences of carcinogenicity, and carcinogenicity risk assessments will be addressed commonly as **Xylenes** for all the three structural variants of xylene.

OSHA Standard (skin): 435 mg/m^3 TWA (as Xylenes)

NIOSH Recommended Standards (air): 435 mg/m^3 TWA
870 mg/m^3 10-minute Ceiling-Level.

(b) ortho-Xylene

CAS No: 95-47-6

Chemical Formula: $C_6H_4(CH_3)_2$

Synonym: Dimethylbenzene

Physico-chemical Characteristics[1]

ortho-Xylene is a colorless, mobile, flammable liquid.

Molecular Weight:	106.16
Flash Point (closed cup):	17° C
Boiling Point:	144° C
Specific Gravity:	0.8801 at 20° C
Miscibility in Water:	1.75E+02 mg/L
Log Octanol/Water Partition Coefficient:	3
Miscibility in Organics:	Miscible with organic solvents.
Vapor Pressure:	10 mm Hg at 20° C

(c) para-Xylene

CAS No: 106-42-3

Chemical Formula: $C_6H_4(CH_3)_2$

Synonym: Dimethylbenzene

Physico-chemical Characteristics[1]

para-Xylene occurs as colorless prisms or plates at low temperature.

Molecular Weight:	106.16
Flash Point (closed cup):	25° C
Melting Point:	13-14° C
Boiling Point:	137-138° C
Specific Gravity:	0.861 at 20° C
Miscibility in Water:	1.98E+02 mg/L
Log Octanol/Water Partition Coefficient:	3
Miscibility in Organics:	Miscible with organic solvents.
Vapor Pressure:	10 mm Hg at 20° C

Environmental Transport and Fate

Xylenes are highly volatile. Volatilization from aqueous environments and subsequent photo-oxidation in the presence of hydroxyl radicals appears to be the most important environmental transport process of xylenes. Xylenes binds to biological substances and biodegradation of bound xylenes by several microbials has been reported. Xylenes are not persistent in the environment because of their low water solubility and ease of biodegradation.

General Toxicity and Metabolism

Information on the general acute and chronic toxic effects associated with exposure to xylenes are limited. Preliminary evidences indicate that acute oral exposure to xylenes in rat cause disturbances of the central nervous system. Further, xylenes have not showed any teratogenic and fetotoxic effects in the limited experimental studies on animals. The oral LD_{50} for xylenes in rat is 5,000 mg/kg.

On the basis of a chronic rat gavage study (NTP, 1986), an oral RfD for xylenes is estimated to be 2E+0 mg/kg/day (IRIS, 1990). The toxicological end- points in this study were decreased body weight, increased mortality and hyperactivity. In this study, F344 rats and B6C3F1 mice of both sexes were administered xylenes by gavage (0 to 1000 mg/kg/day) for 5 days/week for 103 weeks. The animals were observed for clinical signs of toxicity, body weight gain, and mortality. All animals that died or were killed at sacrifice were given gross necropsy and comprehensive histologic examinations. There was a dose-related increase in the mortality in male rats, and the increase was significantly greater in the high-dose group compared with controls. Mice given the high dose exhibited hyperactivity, which is a manifestation of CNS toxicity. There were no compound-related histopathologic lesions in any of the treated rats or mice. Therefore, the high dose is a FEL and the low dose a NOAEL.

An uncertainty factor of 100 was included in the estimation of RfD to account for inter-species extrapolation and sensitive population. Confidence in the estimated RfD for xylenes is rated medium. This is based on the adequacy of the principle study (NTP, 1986). NTP study has a satisfactory test population and includes two species. Observation period is covers a substantial portion of their life-span, comprehensive histology

was performed, and a NOAEL was defined; but clinical chemistries, blood enzymes, and urinalysis were not performed. The data base was given a medium confidence level since, a LOAEL for chronic oral exposure has not been defined.

Evidence of Carcinogenicity

Animal Carcinogenicity Data: Available animal data on the carcinogenicity of xylenes is inadequate. Earlier studies by Berenblum (1941) and Pound (1970) indicated that xylene is a doubtful weak carcinogen in mice (Berenblum, 1941) and is not an initiator in a multiple chemical experiments (Pound 1970). In a similar study, Maltoni et al. (1985), reported higher incidence (compared with controls) of malignant tumors in male and female Sprague-Dawley rats treated by gavage with xylene in olive oil at 500 mg/kg/day, 4 or 5 days/week for 104 weeks. This study did not report survival rates or specific tumor types; therefore, the results cannot be interpreted.

In a recent study, NTP (1986) reported that there were no significant changes in the incidence of neoplastic or non-neoplastic lesions in either the rats or mice that could be considered related to the mixed xylene treatment. In this study F344/N rats were applied a mixture of xylenes in corn oil (60% m-xylene, 14% p-xylene, 9% o-xylene and 17% ethylbenzene) at dosages of 0, 250 or 500 mg/kg/day, 5 days/week for 103 weeks. Similarly, 50 male and 50 female B6C3F1 mice were treated with the same xylene mixture at dosages of 0, 500 or 1000 mg/kg/day. Animals were killed and examined histologically when moribund or after 104-105 weeks. An apparent dose-related increased mortality was observed in male rats, but this difference was statistically significant for the high dose group, only. No other differences in survival between dosage groups of either sex were observed. Interstitial cell tumors of the testes could not be attributed to administration of the test compound observed in male rats (43/50 control, 38/50 low-dose and 41/49 high-dose).

There are no evidences of xylene carcinogenicity in humans.

Based on the existing inadequate animal data and absence of human data on the carcinogenicity, EPA does not classify xylene as a human carcinogen (IRIS, 1990).

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

References

Berenblum, I. 1941. The cocarcinogenic action of croton resin. Cancer Res. 1: 44-48.

Maltoni, C., B. Conti, G. Cotti and F. Belpoggi. 1985. Experimental studies on benzene carcinogenicity at the Bologna Institute of Oncology: Current results and ongoing research. Am. J. Ind. Med. 7: 415-446.

NTP (National Toxicology Program). 1986. NTP Technical Report on the Toxicology and Carcinogenesis of Xylenes (mixed) (60.2% m-xylene, 13.6% p-xylene, 17.0% ethylbenzene and 9.1% o-xylene) in F344/N rats and B6C3F1 mice (gauge studies). U.S. DHHS, PHS, NIH, Research Triangle Park, NC. NTP TR 327, NIH Publ. No. 86-2583.

NTP (National Toxicology Program). 1986. Toxicology and carcinogenesis studies of xylenes (mixed) in F344/N rats and B6C3F1 mice. (Gavage studies). NTP TR 327. NIH PB No. 86-2583.

Pound, A.W. 1970. Induced cell proliferation and the initiation of skin tumor formation in mice by ultraviolet light. Pathology. 2: 269-275.

U.S. EPA. 1987. Drinking Water Criteria Document for Xylene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-416. Final.

ZINC

	CAS No:	7440-66-6
Zinc Phosphide	CAS No:	1314-84-7

Physico-chemical Characteristics[1]

Zinc is a bluish-white, lustrous metal with a natural abundance of 0.02% by weight in the earth's crust.

Atomic Weight:	65.38
Melting Point:	419.5° C
Boiling Point:	908° C
Specific Gravity:	7.14 at 25° C
Solubility in Water:	Insoluble (some salts are soluble).
Reactivity with Acid:	Readily with conc. HNO_3, and slowly with HCl & H_2SO_4.
Vapor Pressure:	1 mm Hg (at 487° C).

Criteria and Standards[2]

The available data on zinc and its compounds is inadequate for establishing criteria and standards. However, EPA has reported some available toxicity information on aquatic organisms.

Ambient Water Quality Criteria, Aquatic Organisms

Fresh Water

Acute Toxicity:	$e^{(0.83[\ln(\text{hardness})] + 1.95)}$ µg/L
Chronic Toxicity:	47 µg/L

Marine Water

Acute Toxicity:	170 µg/L
Chronic Toxicity:	58 µg/L

OSHA Standard: 5 mg/m^3 (zinc oxide)

NIOSH Recommended Standard: 5 mg/m^3 (zinc oxide)

ACGIH (Threshold Limit Value):

Zinc chloride fume	1 mg/m^3 TWA 2 mg/m3 STEL
Zinc oxide fume	5 mg/m^3 TWA 10 mg/m^3 STEL
Zinc sterate	10 mg/m^3 TWA (nuisance particulates) 20 mg/m^3 STEL

New York State Water Quality Regulations (Class GA Groundwaters): 5000 µg/l

Environmental Transport and Fate

The presence of zinc in both suspended and dissolved forms is dependent on changes in the chemical constituents of water. Predominantly zinc remains adsorbed to hydrous metal oxides and clay minerals and organic substances. Under reducing conditions zinc is reduced to zinc sulfide, reducing its mobility in the aqueous environment. Relative mobility of zinc in soil is dependent on the same factors as in aqueous environment.

As an essential element, zinc is bio-accumulated by a variety of organisms. However, its accumulations are not bio-magnified and the major receptor of zinc appears to be the sediments.

Metabolism

Zinc is ubiquitous and is considered an essential trace element. Normally muscle, liver, kidney and pancreas contain large amounts of zinc, although other organs such as testis, eye are reported to have high levels.

Absorbed zinc is predominantly excreted via gastro-intestinal tract. To a lesser extent, zinc is eliminated via renal pathway and lactation. Antagonistic interactions of zinc and cadmium is a well recorded in such effects as growth, dermal lesions, copper metabolism, circulation and body temperature.

General Toxicity

Acute intoxication of zinc and zinc compounds can produce such symptoms as fever, stomach cramps, and diarrhea. It is relevant to note that, some of these symptomatic effects could be attributed to cadmium which is present along with zinc in galvanizing operations. However, metal fume fever resulting from the inhalation of freshly formed fumes of zinc oxide is the most significant of acute zinc intoxication.

Chronic dermal toxicity following exposure to zinc chloride is characteristic. A gray cyanosis, dermatosis and ulceration of the nasal passages have been observed in situations involving chronic inhalation exposure to zinc chloride.

A reference dose of 3E-4 mg/kg/day was estimated for chronic oral exposure to zinc phosphide is based on reduction of food intake and body weight measurements in a rat study (IRIS, 1990, Bai et al. 1980). This is the only available subchronic oral study with zinc phosphide. In this study, groups of female weanling rats were fed diets containing 0, 50, 100, 200 and 500 ppm zinc phosphide. Data from this study include several clinical, biochemical and histopathological parameters. In rats dosed at 200 or 500 ppm, there was approximately 8 and 83% mortality. Food intake and body weight significantly decreased in all exposed rats, indicating a dose--response susceptibility to zinc phosphide toxicity. Histopathological lesions accompanied with increased liver, kidney and brain weights were only observed in rats exposed with 200 or 500 ppm of zinc phosphide. It was concluded that zinc phosphide at the 50 ppm level was less toxic to the albino rats. Because of significant dose-response trends in decreased food intake and body weights, the 50 ppm dose of zinc phosphide or 3.48 mg/kg/day (based on authors' estimated intake of 317 mg/kg bw during 91 days) is considered a LOAEL. By applying an uncertainty factor of 10,000 to this dose, an RfD of 0.0003 mg/kg/day or 24 µg/day for a 70-kg person is derived.

An uncertainty factor of 10,000 and a modifying factor of 1 is included in the determination of RfD (oral) (IRIS, 1990). Uncertainties for inter-species extrapolation (10), sensitive population (10), extrapolation of subchronic to chronic exposures (10) and lack of a NOAEL (10).

Although the principle study is well-designed, only females were tested; thus, the study was given a medium level of confidence. The data base has a low confidence due to lack of information on chronic exposure, and information on females. The RfD was assigned a low confidence due to lack of NOAEL and poor data base.

A reference dose for zinc phosphide for chronic inhalation exposure (RfDi) is not presently available. Likewise, health hazard assessments for zinc phosphide for varied exposure duration is not available.

[1] Physico-chemical data was obtained from The Merck Index (10th Edition), Merck and Co, Rahway. 1983.

[2] Criteria and Standards information was obtained from the Integrated Risk Information System (IRIS), a new on-line file of EPA available with the TOXNET system as of June 1990.

Reference

Bai, K.M., M.K. Krishnakumari, H.P. Ramesh, T. Shivanandappa and S.K. Majunder. 1980. Short-term toxicity study of zinc phosphide in albino rats. Indian J. Exptl. Biol. 18: 854-857.

G.5 REFERENCES

Integrated Risk Information System 1989 US Environmental Protection Agency on-line data base of toxicity measures. Office of Research and Development, Environmental Criteria and Assessment Office, Cincinnati, OH. Electronic Mail Account information via Dialcom, Inc. 600 Maryland Ave, SW, Washington, D.C.

NRC 1983 Risk Assessment in the Federal Government: Managing the Process. National Research Council. National Academy Press, Washington, D.C.

USEPA 1986a Superfund Public Health Evaluation Manual. US Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. EPA 540/1-86/060

USEPA 1986b Guidelines for Carcinogenic Risk Assessment. US Environmental Protection Agency. Federal Register 51(185):33991-34003

USEPA 1986c Guidelines for the Health Risk Assessment of Chemical Mixtures. US Environmental Protection Agency. Federal Register 51(185):34014-34025

USEPA 1987 Superfund Program: Interim Guidance on Compliance with Other Applicable or Relevant and Appropriate Requirements. Federal Register 52(166):32496-32499.

USEPA 1988a CERCLA Compliance with Other Laws Manual. US Environmental Protection Agency, Office of Emergency and Remedial Response. OSWER Directive 9234.1-01

USEPA 1988b Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. US Environmental Protection Agency, Office of Solid Waste and Emergency and Remedial Response. OSWER Directive 9335.3-01

USEPA 1988c National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Federal Register 53(245):51394-51520.

USEPA 1989a Risk Assessment Guidance for Superfund: Human Health Evaluation Manual Part A. US Environmental Protection Agency, Office of Solid Waste and Emergency and Remedial Response. OSWER Directive 9285.701A

USEPA 1989b Risk Assessment Guidance for Superfund: Volume II Environmental Evaluation Manual. US Environmental Protection Agency, Office of Solid Waste and Emergency and Remedial Response. EPA/540/1-89/001

USEPA 1989c Health Effects Assessment Summary Tables Third Quarter FY 1989 US Environmental Protection Agency, Office of Research and Development. OERR 9200.6-303-(89-3)

USEPA 1989d CERCLA Compliance with Other Laws Manual Part II. US Environmental Protection Agency, Office of Emergency and Remedial Response. OSWER Directive 9234.1-01

USEPA 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Federal Register 55(46):8666-8865.