Worldwide Facilities Group
Environmental Services
Remediation Team

James F. Hartnett
Program Manager

March 20, 2001

Ms. Susan Benjamin, P.E.
Bureau of Central Remedial Action
Division of Environmental Remediation
New York State Department of Environmental Conservation
50 Wolf Road, Room 228
Albany, New York 12233-7010

Re: Former IFG Facility/Ley Creek Deferred Media Site
Administrative Order on Consent Index #D-7-001-97-06
Ecological Risk Assessment Problem Formulation Document

Dear Ms. Benjamin:

The purpose of this letter is to present General Motors Corporation's (GM) second round of responses to the Department's comments on the April 2000 Problem Formulation Document (PFD). The Department initially presented comments on the PFD in your September 29, 2000 letter to GM. Initial responses to your September letter were provided by GM in my letter of December 20, 2000. Subsequent to your review of GM's December response letter, a meeting was held at the Department's offices in Albany, New York to openly discuss the remaining issues pertaining to future activities associated with the baseline ecological risk assessment (BERA) for the site. The information contained herein has been prepared based on the discussions held during the January 24, 2001 meeting at your office.

As proposed by you and Mr. Mark Moese of TAMS Consultants, Inc., the Department and the USEPA would approve the PFD after your receipt and review of additional information from GM. It was also agreed that, following your review and concurrence with the additional information, the Department would accept for review a BERA Work Plan (BWP) for the site to include a modeling approach for the evaluation of site-related ecological risk and an evaluation of ecological risk upstream of the site (background analysis).

The additional information requested by the Department and USEPA, and contained as part of this submittal, includes:

1) Revised PFD tables to include new and revised Biota Sediment Accumulation Factors (BSAFs) and toxicity values, as well as Hazard Indices (summation of Hazard Quotients) by chemical class
2) A tabular summary of chemicals used at the site and past known discharges
3) A comparison of groundwater constituents, as detected in wells near Ley Creek, to surface water quality criteria
4) Minor revisions/additions to assessment endpoints

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5) Revised Section 2 of the PFD which includes Principal Component Analysis (PCA) and associated text concerning the dioxin analyses conducted in site soil and sediment.

These items are discussed in greater detail below and within the respective attachments. The attachments are lettered to correspond with our December 20, 2000 submittal. Additional information requested by the Department at the January 24, 2001 meeting that will be incorporated into the BWP includes:

- Revised figures presenting media sample locations with hazard quotients (HQs) greater than 1
- PCB data from downstream location SLC3 to be utilized in the BERA

Presented in the following sections is a description of the information contained herein as requested by the Department in the aforementioned meeting.

Revised PFD tables

Revised tables are included with this letter as Revised Attachment B. Including miscellaneous editing, the following revisions have been made:

- Addition of a BSAF and toxicity value for methylmercury
- Revision of toxicity values for Aroclor 1248 and PAHs
- Addition of Hazard Indices, per chemical class

The specific tables most impacted by these revisions include 3-2a, 3-4a, 3-4b, 3-4c, 3-4d and 3-5a. The revised tables are attached. Additional revisions to associated tables (*e.g.* upstream data tables) will be conducted as part of the BWP, as required.

The BSAF for methyl mercury and selected toxicity values were obtained from USEPA's *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft*, Solid Waste and Emergency Response, EPA A530-D-99-001A, 1999. This document expands on the general guidance available for ecological risk assessment and provides guidance specific to hazardous waste combustion facilities. The Appendices to the document include compilations of species- and chemical-specific toxicity values (Appendix E) and bioconcentration factors (Appendix D). The toxicity and bioconcentration values are drawn from a review of scientific literature, and thus are applicable to a wide range of ecological risk assessments.

It should be noted that the Ley Creek sediment samples were not submitted for analysis of methyl mercury content. Therefore, as a conservative measure, the inorganic mercury results were conservatively assumed to be the methyl mercury content. This assumption is overly conservative due to the relatively slow formation of methyl mercury from inorganic mercury species. Uncertainty associated with this evaluation will be discussed in the BWP and BERA.

Per Mr. Moese's request of February 14, 2001 to Mr. Steve Mooney of O'Brien & Gere, Attachment F of GM's initial PFD comment response has been revised. BSAF values from the Army Corps Database (1999) have been added and/or corrected and are included as Revised Attachment F. As also presented by Mr. Moese, USEPA is in agreement with GM's calculation and use of the 95% Upper Concentration Limits as currently applied in the PFD data tables, where applicable.

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Tabular summary of historic information

Tabular summaries of chemicals used in or resulting from GM processes, major spills, unpermitted releases, and permit violations have been prepared based on available historical data. This information is presented with this letter as Revised Attachment D.

Evaluation of groundwater constituent discharge to Ley Creek

Attachment H presents a comparison of detected concentrations of constituents in groundwater, as sampled and analyzed from monitoring wells near Ley Creek, to surface water criteria and/or screening values. Text and tables are included as part of the attachment.

Minor revisions/additions to assessment endpoints

As presented in the aforementioned meeting, the Department and the USEPA generally agree with the assessment and measurement endpoints as presented in the PFD and GM's subsequent response to the Department's comments (see responses to comments 6.1, 6.2, and 6.3 of GM's 12/20/00 submittal). However, as requested, additional clarification concerning the assessment endpoints is provided with this letter as Attachment I.

PCA evaluation

This information is presented with this letter as Attachment J. To provide continuity with the other elements of the data analysis, the PCA evaluation has been incorporated into Section 2 of the PFD. The revised Section 2, including associated figures and tables, is included as the attachment.

GM would like to proceed with preparation of the BERA Work Plan and, therefore, awaits Department approval of the PFD to include the information presented within and attached to this letter. If you have any questions, please contact Clare Leary at O'Brien & Gere (315) 437-6100, or me at (315) 764-2239.

Sincerely,

James F. Hartnett/CFL

James F. Hartnett
Remedial Program Manager

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Final Comment Responses to the Department's Comments on the Problem Formulation Document:

Revised and New Attachments to GM's Comment Responses of December 20, 2000

Contents:

Revised Attachment B: Revised PFD Tables

Revised Attachment D: Past Chemical Uses and Discharges – Summary Information

Revised Attachment F: Associated Receptor Species Data for BSAF Calculations – Army Corps Database

Attachment H: Ground Water to Surface Water Evaluation

Attachment I: Supplemental Information for Assessment Endpoints

Attachment J: Revised Section 2 of the PFD – PCA Evaluation

3/20/01

Revised Attachment B

Revised PFD Tables

Table 3-2a. Estimation of Constituent Concentrations in Food Chain - Former IFG Facility and Ley Creek Deferred Media

Constituent	CAS-NUM	Surface Soil RME Exposure Point Conc. (mg/kg)	Sediment RME Exposure Point Conc. (mg/kg)	Surface Water RME Exposure Point Conc. (µg/L)	FOC= 0.035 Log Kow	Koc	Kd (Source)	Kd	Benthic Macro Invertebrates BCF (L/kg)	BCF (Source)[2]	BSAF[1]	BSAF (Source)[2]	Fraction Lipid = 0.02 Modeled Conc (BCF*Pore water conc) (mg/kg)	Modeled Conc (BSAF*Sedconc) (mg/kg)	Selected Invert Conc. (mg/kg)
Aluminum	7429905	13,000	7,700	130	NA	NA	Median for Cu, Pb, Cd, Zn, Ni from Hassan et al. 1996	144	231	Sample et al.1996	1.9	Judgement	4,900	6,000	6,000
Antimony	7440360	ND	1.7	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	1	USEPA 1992	1.94	Judgement	0.0047	1.3	1.3
Arsenic	7440382	18	5.8	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	44	USEPA 1992	0.69	ORNL 1998	0.71	1.6	1.6
Barium	7440393	160	ND	66	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	NA	NA	NAP
Beryllium	7440417	ND	0.42	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	19	USEPA 1992	1.9	Judgement	0.022	0.33	0.33
Cadmium	7440439	ND	1.6	ND	NA	NA	Hassan et al. 1996	69	64	USEPA 1992	7.9	ORNL 1998	0.59	5.1	5.1
Calcium	7440702	77,000	64,000	140,000	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	8,400	50,000	50,000
Chromium	7440473	2,000	51	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	16	USEPA 1992	0.47	ORNL 1998	2.3	10	9.6
Copper	7440508	890	61	8.7	NA	NA	Hassan et al. 1996	149	36	USEPA 1992	5.3	ORNL 1998	5.9	130	130
Cyanide	57125	11	1.8	ND	-0.25	0.58	Koc*FOC	0.020	1	USEPA 1992	NA	NA	36	NA	36
Iron	7439896	26,000	ND	430	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	ORNL 1998	NA	NA	NAP
Lead	7439921	65	81	4.0	NA	NA	Hassan et al. 1996	144	49	USEPA 1992	0.070	ORNL 1998	11	2.3	11
Magnesium	7439954	18,000	18,000	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	2,400	14,000	14,000
Manganese	7439965	480	430	ND	NA	NA	Hassan et al 1996)	144	600	USEPA 1992	1.9	Judgement	720	330	720
Mercury	7439976	ND	0.17	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	5500	USEPA 1992	1.1	ORNL 1998	2.6	0.078	2.6
Nickel	7440020	610	23	11	NA	NA	Hassan et al. 1996	45	47	USEPA 1992	2.3	ORNL 1998	10	21	21
Potassium	7440097	2,400	2,200	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	290	1,700	1,700
Selenium	7782492	1.9	0.69	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	6	USEPA 1992	NA	NA	0.012	NA	0.012
Silver	7440224	ND	1.4	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	0.5	USEPA 1992	1.9	Judgement	0.0019	1.1	1.1
Sodium	7440235	410	370	100,000	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	48	290	290
Thallium	7440280	ND	0.60	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	119	USEPA 1992	1.9	Judgement	0.20	0.47	0.47
Vanadium	7440622	28	18	ND	NA	NA	Median for Cu, Pb, Cd, Zn, Ni	144	47	Judgement	1.9	Judgement	2.4	14	14
Zinc	7440666	1,300	200	ND	NA	NA	Hassan et al. 1996	233	47	USEPA 1992	1.9	ORNL 1998	16	160	160
2-Methylnaphthalene	91576	1.7	0.82	ND	4.11	7,940	Koc*FOC	278	30	USEPA 1992	0.50	Judgement	0.035	0.16	0.16
Acenaphthene	83329	40	2.1	ND	3.92	4,600	Koc*FOC	161	242	USEPA 1992	0.02174	ACOE 1999	1.3	0.018	1.3
Acenaphthylene	208968	ND	0.28	ND	3.70	2,500	Koc*FOC	88	30	USEPA 1992	0.020	ACOE 1999	0.038	0.0022	0.038
Anthracene	120127	230	2.7	ND	4.54	14,000	Koc*FOC	490	30	USEPA 1992	1.0	ACOE 1999	0.066	1.1	1.1
Benzo(a)anthracene	56553	24	13	ND	5.61	1,380,000	Koc*FOC	48,300	30	USEPA 1992	0.58	ACOE 1999	0.0032	3.0	3.0
Benzo(b)fluoranthene	205992	24	13	ND	6.06	550,000	Koc*FOC	19,250	NA	NA	0.0708	ACOE 1999	NA	0.37	0.37
Benzo(ghi)perylene	191242	22	8.2	ND	6.51	1,600,000	Koc*FOC	56,000	30	USEPA 1992	0.043	ACOE 1999	0.0018	0.14	0.14
Benzo(k)fluoranthene	207089	8.4	5.1	ND	6.06	550,000	Koc*FOC	19,250	30	USEPA 1992	0.041	ACOE 1999	0.0032	0.084	0.084
Benzo[a]pyrene	50328	21	13	ND	6.25	5,500,000	Koc*FOC	192,500	30	USEPA 1992	0.75	ACOE 1999	0.00081	3.9	3.9
Carbazole	86748	120	2.3	ND	3.30	940	Koc*FOC	33	10.5	USEPA 1992	0.020	Judgement	0.29	0.018	0.29
Chrysene	218019	26	14	ND	5.61	200,000	Koc*FOC	7,000	30	USEPA 1992	0.51	ACOE 1999	0.024	2.9	2.9
Dibenzo(a,h)anthracene	53703	39	3.7	ND	5.61	3,300,000	Koc*FOC	115,500	30	USEPA 1992	0.019	ACOE 1999	0.00038	0.029	0.029
Fluoranthene	206440	75	23	ND	5.20	38,000	Koc*FOC	1,330	1150	USEPA 1992	1.03	ACOE 1999	8.0	9.5	9.5
Fluorene	86737	65	2.0	ND	4.18	7,300	Koc*FOC	256	30	USEPA 1992	0.077	ACOE 1999	0.094	0.061	0.094
Indeno(1,2,3-cd)pyrene	193395	14	7.2	ND	6.50	1,600,000	Koc*FOC	56,000	30	USEPA 1992	0.038	ACOE 1999	0.0015	0.11	0.11
Naphthalene	91203	2.1	2.3	ND	3.36	940	Koc*FOC	33	10.5	USEPA 1992	0.053	ACOE 1999	0.29	0.048	0.29
Phenanthrene	85018	670	69	ND	4.52	14000	Koc*FOC	490	30.00	USEPA 1992	2.14876	ACOE 1999	1.7	59	59
Pyrene	129000	65	38	ND	5.18	38000	Koc*FOC	1,330	30.00	USEPA 1992	1.178	ACOE 1999	0.34	18	18
Aroclor 1016	12674112	ND	5.8	ND	5.88	180000	Koc*FOC	6,300	10616	Sample et al.1996	22	ORNL 1998 (as total PCB)	3.9	51	51
Aroclor 1242	53469219	ND	36	ND	5.90	6300	Koc*FOC	221	10616	Sample et al.1996	22	ORNL 1998	690	320	690
Aroclor 1248	12672296	3,900	25	ND	6.11	277000	Koc*FOC	9,695	30338	Sample et al.1996	22	ORNL 1998 (as total PCB)	31	220	220
Aroclor 1254	11097691	8.0	2.9	ND	6.94	2140000	Koc*FOC	74900	51286.00	Sample et al.1996	21.9	ORNL 1998 (as total PCB)	0.79	25	25
Aroclor 1260	11096825	ND	1.1	ND	6.91	6700000	Koc*FOC	234500	NA	NA	21.9	ORNL 1998 (as total PCB)	NA	10	9.6
Total PCBs	11097691	130	ND	ND	6.94	2140000	Koc*FOC	74900	51286.00	Sample et al.1996	21.9	ORNL 1998 (as total PCB)	NA	NA	NAP
1,2-Dichlorobenzene	95501	0.060	ND	ND	3.38	1,700	Koc*FOC	60	55.6	USEPA 1992	2.2	PCB/10 (based on Kow)	NA	NA	NAP
2,4-Dimethylphenol	105679	ND	0.17	ND	2.42	96	Koc*FOC	3.4	93.8	USEPA 1992	2.2	PCB/10 (based on Kow)	1.9	0.15	1.9
2-Methylphenol	95487	ND	0.073	ND	1.97	15	Koc*FOC	0.53	93.3	=Kow (USEPA 1995)	2.2	PCB/10 (based on Kow)	5.2	0.064	5.2
4-Methylphenol	106445	ND	0.29	ND	1.93	17	Koc*FOC	0.60	85.1	=Kow (USEPA 1995)	2.2	PCB/10 (based on Kow)	17	0.25	17
Bis(2-ethylhexyl)phthalate (BEHP)	117817	2.3	0.83	ND	5.11	87,400	Koc*FOC	3,059	130	USEPA 1992	22	As PCB (based on Kow)	0.014	7.3	7.3
Butyl benzyl phthalate	85687	36	ND	ND	4.47	17,000	Koc*FOC	595	414	USEPA 1992	22	As PCB (based on Kow)	NA	NA	NAP
Dibenzofuran	132649	21	1.7	ND	4.17	9,120	Koc*FOC	319	5000	=TCDD (Log Kow>3)	22	As PCB (based on Kow)	11	15	15
Di-n-octyl phthalate	117840	56	ND	10	5.22	19,000	Koc*FOC	665	5000	=TCDD (Log Kow>3)	22	As PCB (based on Kow)	NA	NA	NAP

Table 3-2a. Estimation of Constituent Concentrations in Food Chain - Former IFG Facility and Ley Creek Deferred Media

Constituent	CAS-NUM	Surface Soil RME Exposure Point Conc. (mg/kg)	Sediment RME Exposure Point Conc. (mg/kg)	Surface Water RME Exposure Point Conc. (µg/L)	FOC= 0.035 Log Kow	Koc	Kd (Source)	Kd	Benthic Macro Invertebrates BCF (L/kg)	BCF (Source)[2]	BSAF[1]	BSAF (Source)[2]	Fraction Lipid = 0.02 Modeled Conc (BCF*Pore water conc) (mg/kg)	Modeled Conc (BSAF*Sedconc) (mg/kg)	Selected Invert Conc. (mg/kg)
Hexachlorobenzene	118741	0.10	ND	ND	5.50	3,900	Koc*FOC	137	5000	=TCDD (Log Kow>3)	22	As PCB (based on Kow)	NA	NA	NAP
Phenol	108952	0.85	0.10	ND	1.48	14	Koc*FOC	0.50	1.4	USEPA 1992	2.2	PCB/10 (based on Kow)	0.11	0.087	0.11
Total TCDD TEQ	1746016	ND	0.000072	ND	6.91	4,570,000	Koc*FOC	159,950	5000	USEPA 1992	22	ORNL 1998 (as total PCB)	0.00000090	0.00063	0.00063
Carbon disulfide	75150	0.038	0.0090	ND	2.00	54	Koc*FOC	1.9	10.6	=TCE (based on Kow)	NA	NA	0.020	NA	0.020
2-Butanone (MEK)	78933	ND	0.00060	ND	0.26	4.5	Koc*FOC	0.16	10.6	=TCE (based on Kow)	NA	NA	0.016	NA	0.016
Acetone	67641	ND	0.0060	ND	-0.24	2.2	Koc*FOC	0.077	1.0	= VC (based on Kow)	NA	NA	0.031	NA	0.031
Trichloroethene	79016	46	0.065	ND	2.42	126	Koc*FOC	4.4	10.6	USEPA 1992	NA	NA	0.062	NA	0.062
Vinyl chloride	75014	ND	ND	ND	1.38	8.2	Koc*FOC	0.29	1.2	USEPA 1992	NA	NA	NA	NA	NAP
Chloromethane	74873	ND	ND	4.2	0.95	5.5	Koc*FOC	0.19	3.75	USEPA 1992	NA	NA	NA	NA	NAP
Methylene chloride	75092	ND	ND	ND	1.51	8.8	Koc*FOC	0.31	0.90	USEPA 1992	NA	NA	NA	NA	NAP
Chloroform	67663	0.020	ND	ND	1.97	44	Koc*FOC	1.5	3.75	USEPA 1992	NA	NA	NA	NA	NAP
cis-1,2-Dichloroethene	156592	0.34	ND	ND	2.09	59	Koc*FOC	2.1	10.60	=TCE (based on Kow)	NA	NA	NA	NA	NAP
Ethylbenzene	100414	0.060	ND	ND	3.15	220	Koc*FOC	7.7	NA	NA	NA	NA	NA	NA	NAP
Tetrachloroethene	127184	0.012	ND	ND	2.53	364	Koc*FOC	13	10.60	=TCE (based on Kow)	NA	NA	NA	NA	NAP
Toluene	108883	0.21	ND	ND	2.69	120	Koc*FOC	4.2	10.70	USEPA 1992	NA	NA	NA	NA	NAP
Xylenes	1330207	0.60	ND	ND	3.20	238	Koc*FOC	8.3	5.20	=Benzene(based on Kow)	NA	NA	NA	NA	NAP
Mercury (as Methyl mercury) 1	22967926	ND	0.17	ND	NA	NA	NA	NA	55000	USEPA 1999	0.48	USEPA 1999	NA	0.033	0.033

See Page 4 for notes.

Table 3-2a. Estimation of Constituent Concentrations in Food Chain - Former IFG Facility and Ley Creek Deferred Media

Constituent	CAS-NUM	Trophic Level 4 Fish				Fraction Lipid = 0.075			Terrestrial Invertebrates			Small Mammals		
		BSAF [1]	BSAF (Source)[2]	BAF (L/kg)	BAF (Source)[2]	Modeled Conc. (BSAF*Sed Conc) (mg/kg)	Modeled Conc (BAF*SW Conc) (mg/kg)	Selected Fish Conc. (mg/kg)	UF	UF Source	Modeled Conc. (mg/kg)	UF	UF Source	Modeled Conc. (mg/kg)
Aluminum	7429905	0.0010	USGS 1999	20	Judgement	7.8	2.6	7.8	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	14,000	0.30	Median of other inorganics	3,900
Antimony	7440360	0.034	USGS 1999	NA	NA	0.058	NA	0.058	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	NAP	0.30	Median of other inorganics	NAP
Arsenic	7440382	0.077	USGS 1999	NA	NA	0.45	NA	0.45	0.5	Sample, et al. 1998a	3.8	0.0154	Sample, et al. 1998b (General)	0.28
Barium	7440393	0.026	USGS 1999	20	Judgement	NA	1.3	1.3	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	170	0.0187	Sample, et al. 1998b (General)	3.0
Beryllium	7440417	0.0010	USGS 1999	NA	NA	0.00042	NA	0.00042	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	NAP	0.30	Median of other inorganics	NAP
Cadmium	7440439	11	As Hg (bioaccumulator)	NA	NA	18	NA	18	66	Sample, et al. 1998a	NAP	6.9	Sample, et al. 1998b (Insectivore)	NAP
Calcium	7440702	0.034	Median of other metals	20	Judgement	2,176	2,800	2,800	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	83,000	0.30	Median of other inorganics	23,000
Chromium	7440473	0.030	USGS 1999	20	Judgement	1.5	NA	1.5	2.7	Sample, et al. 1998a	2,200	0.0927	Sample, et al. 1998b (Insectivore)	190
Copper	7440508	0.12	USGS 1999	290	Sample et al. 1996	7.1	2.5	7.1	2.3	Sample, et al. 1998a	810	1.11	Sample, et al. 1998b (Insectivore)	990
Cyanide	57125	0.034	Judgement	20	Judgement	0.061	NA	0.061	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	12	0.30	Median of other inorganics	3.3
Iron	7439896	0.0026	USGS 1999	20	Judgement	NA	8.6	8.6	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	28,000	0.0278	Sample, et al. 1998b (General)	720
Lead	7439921	0.012	USGS 1999	45	Sample et al. 1996	1.0	0.18	1.0	4.3	Sample, et al. 1998a	110	0.33	Sample, et al. 1998b (Insectivore)	22
Magnesium	7439954	0.034	Median of other metals	NA	NA	612	NA	612	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	19,000	0.30	Median of other inorganics	5,400
Manganese	7439965	0.038	USGS 1999	20	Judgement	16	NA	16	0.16	Sample, et al. 1998a	32	0.30	Median of other inorganics	140
Mercury	7439976	11	USGS 1999	140,000	USEPA 1995	1.9	NA	1.9	30	Sample, et al. 1998a	NAP	0.15	Sample, et al. 1998b (General)	NAP
Nickel	7440020	0.050	USGS 1999	106	Sample et al. 1996	1.2	1.2	1.2	1.9	Sample, et al. 1998a	460	0.47	Sample, et al. 1998b (Insectivore)	290
Potassium	7440097	0.034	Median of other metals	NA	NA	75	NA	75	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	2,600	0.30	Median of other inorganics	720
Selenium	7782492	16	USGS 1999	NA	NA	11	NA	11	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	2.1	0.80	Sample, et al. 1998b (Insectivore)	1.5
Silver	7440224	0.034	Median of other metals	20	Judgement	0.048	NA	0.048	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	NAP	0.30	Median of other inorganics	NAP
Sodium	7440235	0.034	Median of other metals	NA	NA	13	NA	13	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	440	0.30	Median of other inorganics	120
Thallium	7440280	0.034	Median of other metals	NA	NA	0.020	NA	0.020	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	NAP	0.30	Median of other inorganics	NAP
Vanadium	7440622	0.011	USGS 1999	NA	NA	0.19	NA	0.19	2.7	Median (As,Cd,Cr,Cu,Pb,Mn,Zn)	30	0.30	Median of other inorganics	8.4
Zinc	7440666	0.75	USGS 1999	NA	NA	150	NA	150	25	Sample, et al. 1998a	13,000	2.8	Sample, et al. 1998b (Insectivore)	3,600
2-Methylnaphthalene	91576	0.60	Judgement	NA	NA	0.49	NA	0.49	0.18	Ma et al. 1998	0.12	0.18	=UF Worms	0.31
Acenaphthene	83329	0.023	FCM=1	NA	NA	0.048	NA	0.048	0.18	Ma et al. 1998	2.9	0.18	=UF Worms	7.2
Acenaphthylene	208968	0.020	FCM=1	NA	NA	0.0056	NA	0.0056	0.18	Ma et al. 1998	NAP	0.18	=UF Worms	NAP
Anthracene	120127	1.0	FCM=1	NA	NA	2.8	NA	2.8	0.18	Ma et al. 1998	17	0.18	=UF Worms	41
Benzo(a)anthracene	56553	0.58	FCM=1	NA	NA	7.6	NA	8	0.18	Ma et al. 1998	1.7	0.18	=UF Worms	4.3
Benzo(b)fluoranthene	205992	0.078	FCM=1	NA	NA	1.0	NA	1.0	0.18	Ma et al. 1998	1.7	0.18	=UF Worms	4.3
Benzo(ghi)perylene	191242	0.042	FCM=1	NA	NA	0.35	NA	0.35	0.18	Ma et al. 1998	1.6	0.18	=UF Worms	4.0
Benzo(k)fluoranthene	207089	0.041	FCM=1	NA	NA	0.21	NA	0.21	0.18	Ma et al. 1998	0.60	0.18	=UF Worms	1.5
Benzo[a]pyrene	50328	0.75	FCM=1	NA	NA	10	NA	10	0.18	Ma et al. 1998	1.5	0.18	=UF Worms	3.8
Carbazole	86748	0.020	Judgement	NA	NA	0.046	NA	0.046	0.18	Ma et al. 1998	8.6	0.18	=UF Worms	22
Chrysene	218019	0.51	FCM=1	NA	NA	7.2	NA	7	0.18	Ma et al. 1998	1.9	0.18	=UF Worms	4.7
Dibenzo(a,h)anthracene	53703	0.019	FCM=1	NA	NA	0.072	NA	0.072	0.18	Ma et al. 1998	2.8	0.18	=UF Worms	7.0
Fluoranthene	206440	0.79	FCM=1	NA	NA	18	NA	18	0.18	Ma et al. 1998	5.4	0.18	=UF Worms	14
Fluorene	86737	0.077	FCM=1	NA	NA	0.15	NA	0.15	0.18	Ma et al. 1998	4.7	0.18	=UF Worms	12
Indeno(1,2,3-cd)pyrene	193395	0.038	FCM=1	NA	NA	0.27	NA	0.27	0.18	Ma et al. 1998	1.0	0.18	=UF Worms	2.5
Naphthalene	91203	0.029	FCM=1	NA	NA	0.066	NA	0.066	0.18	Ma et al. 1998	0.15	0.18	=UF Worms	0.38
Phenanthrene	85018	2.1	FCM=1	NA	NA	148	NA	148	0.18	Ma et al. 1998	48	0.18	=UF Worms	120
Pyrene	129000	0.088	FCM=1	NA	NA	3.4	NA	3.4	0.18	Ma et al. 1998	4.7	0.18	=UF Worms	12
Aroclor 1016	12674112	15	ACOE 1999	116600000	USEPA 1995	87	NA	87	23	Sample, et al. 1998a	NAP	1.7	=TCDD (based on Kow)	NAP
Aroclor 1242	53469219	15	ACOE 1999	NA	NA	538	NA	538	23	Sample, et al. 1998a	NAP	1.7	=TCDD (based on Kow)	NAP
Aroclor 1248	12672296	15	ACOE 1999	116600000	USEPA 1995	374	NA	374	23	Sample, et al. 1998a	37,000	1.7	=TCDD (based on Kow)	6,600
Aroclor 1254	11097691	15	ACOE 1999	116600000	USEPA 1995	43	NA	43	23	Sample, et al. 1998a	75	1.7	=TCDD (based on Kow)	14
Aroclor 1260	11096825	15	ACOE 1999	116600000	USEPA 1995	16	NA	16	23	Sample, et al. 1998a	NAP	1.7	=TCDD (based on Kow)	NAP
Total PCBs	11097691	15	ACOE 1999	116600000	USEPA 1995	NA	NA	NAP	23	Sample, et al. 1998a	1,200	1.7	=TCDD (based on Kow)	220
1,2-Dichlorobenzene	95501	3.8	ACOE 1999	NA	NA	NA	NA	NAP	22	=TCDD (based on Kow)	0.5	1.7	=TCDD (based on Kow)	0.10
2,4-Dimethylphenol	105679	3.8	=DCB (based o Kow)	NA	NA	0.65	NA	0.65	2.2	=TCDD/10 (based on Kow)	NAP	0.17	=TCDD/10 (based on Kow)	NAP
2-Methylphenol	95487	3.8	=DCB (based o Kow)	NA	NA	0.28	NA	0.28	2.2	=TCDD/10 (based on Kow)	NAP	0.17	=TCDD/10 (based on Kow)	NAP
4-Methylphenol	106445	3.8	=DCB (based o Kow)	NA	NA	1.1	NA	1.1	2.2	=TCDD/10 (based on Kow)	NAP	0.17	=TCDD/10 (based on Kow)	NAP
Bis(2-ethylhexyl)phthalate (BEHP)	117817	15	=PCB (based on Kow)	NA	NA	12	NA	12	22	=TCDD (based on Kow)	20	1.7	=TCDD (based on Kow)	3.9
Butyl benzyl phthalate	85687	15	=PCB (based on Kow)	NA	NA	NA	NA	NAP	22	=TCDD (based on Kow)	320	1.7	=TCDD (based on Kow)	61
Dibenzofuran	132649	15	=PCB (based on Kow)	NA	NA	25	NA	25	22	=TCDD (based on Kow)	190	1.7	=TCDD (based on Kow)	36
Di-n-octyl phthalate	117840	15	=PCB (based on Kow)	NA	NA	NA	NA	NAP	22	=TCDD (based on Kow)	500	1.7	=TCDD (based on Kow)	95

Table 3-2a. Estimation of Constituent Concentrations in Food Chain - Former IFG Facility and Ley Creek Deferred Media

Constituent	CAS-NUM	Trophic Level 4 Fish				Fraction Lipid = 0.075			Terrestrial Invertebrates			Small Mammals		
		BSAF [1]	BSAF (Source)[2]	BAF (L/kg)	BAF (Source)[2]	Modeled Conc. (BSAF*Sed Conc) (mg/kg)	Modeled Conc (BAF*SW Conc) (mg/kg)	Selected Fish Conc. (mg/kg)	UF	UF Source	Modeled Conc. (mg/kg)	UF	UF Source	Modeled Conc. (mg/kg)
Hexachlorobenzene	118741	15	=PCB (based on Kow)	NA	NA	NA	NA	NAP	22	=TCDD (based on Kow)	0.89	1.7	=TCDD (based on Kow)	0.17
Phenol	108952	3.8	=DCB (based on Kow)	NA	NA	0.38	NA	0.38	2.2	=TCDD/10 (based on Kow)	0.75	0.17	=TCDD/10 (based on Kow)	0.14
Total TCDD TEQ	1746016	0.087	ACOE 1999	9.0E+06	USEPA 1995	0.0000063	NA	0.0000063	22	Sample, et al. 1998a	NAP	1.7714	Sample, et al. 1998b (Insectivore)	NAP
Carbon disulfide	75150	2.0	Judgement	339	=TCE (based on Kow)	0.018	NA	0.018	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	78933	0.10	Judgement	18	=methylene chloride (based on Kow)	0.000060	NA	0.000060	NA	NA	NA	NA	NA	NA
Acetone	67641	0.10	Judgement	18	=methylene chloride (based on Kow)	0.00060	NA	0.00060	NA	NA	NA	NA	NA	NA
Trichloroethene	79016	2.0	Judgement	339	USEPA 1995	0.13	NA	0.13	NA	NA	NA	NA	NA	NA
Vinyl chloride	75014	0.10	Judgement	18	=methylene chloride (based on Kow)	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Chloromethane	74873	0.10	Judgement	18	=methylene chloride (based on Kow)	NA	0.076	0.076	NA	NA	NA	NA	NA	NA
Methylene chloride	75092	0.10	Judgement	18	USEPA 1995	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Chloroform	67663	2.0	Judgement	339	=TCE (based on Kow)	NA	NA	NAP	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	156592	2.0	Judgement	339	=TCE (based on Kow)	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Ethylbenzene	100414	NA	NA	NA	NA	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Tetrachloroethene	127184	2.0	Judgement	339	=TCE (based on Kow)	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Toluene	108883	NA	NA	NA	NA	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Xylenes	1330207	NA	NA	NA	NA	NA	NA	NAP	NA	NA	NA	NA	NA	NA
Mercury (as Methyl mercury) 1	22967926	181000	Eisler 1985 - 1995	630,000	Eisler 1985-1995	30,770	NA	30,770	8.5	USEPA, 1999.	NAP	8.5	=UF Worms	NAP

Notes

[1] Reported exposure point concentration in sediment is for elemental mercury. Methyl mercury was not analyzed for.

[2] References:

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BAF	Bioaccumulation factor.
BCF	Bioconcentration factor.
BSAF	Biota-sediment accumulation factor.
foc	Fraction of organic carbon.
Kd	Sediment-water partition coefficient.
Kow	Octanol-water partition coefficient
L/kg	Liters per kilogram.
µg/L	Micrograms per liter.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
ND	Not detected
RME	Reasonable maximum exposure (RME Exposure Point Concentration = the lower between the maximum concentration and the 95% UCL).
UF	Uptake factor.

Table 3-4a. Mink NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Benzo[a]pyrene	50328	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	
Dibenz[a,h]anthracene	53703	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Benzo[a]anthracene	56553	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Cyanide	57125	Rat	68.7	Mink	49.7	1	49.7	1	49.7	Sample et al. 1996	as Potassium cyanide
Acetone	67641	Rat	10	Mink	7.7	1	7.7	1	7.7	Sample et al. 1996	
Chloromethane	74873	Mouse	100	Mouse	100	0.1	10	0.1	10	ATSDR 1997	
Carbon disulfide	75150	Rabbit	11	Rabbit	11	0.1	1.1	0.1	1.1	IRIS 2000	
2-Butanone (MEK)	78933	Rat	1771	Mink	1362	1	1362	1	1362	Sample et al. 1996	
Trichloroethene	79016	Mouse	0.7	Mink	0.291	1	0.291	1	0.291	Sample et al. 1996	
Acenapthene	83329	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Phenanthrene	85018	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Fluorene	86737	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Carbazole	86748										No value
Napthalene	91203	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
2-Methylnapthalene	91576	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
2-Methylphenol	95487	Rat	50	Rat	50	0.1	5	0.1	5	IRIS 2000	
2,4-Dimethylphenol	105679	Mouse	50	Mouse	50	0.1	5	0.1	5	IRIS 2000	
4-Methylphenol	106445	Rat	50	Rat	50	0.1	5	0.1	5	IRIS 2000	as 2-Methylphenol
Phenol	108952	Rat	60	Rat	60	0.1	6	0.1	6	IRIS 2000	
Bis(2-ethylhexyl)phthalate	117817	Mouse	18.3	Mink	7.6	1	7.6	1	7.6	Sample et al. 1996	
Di-n-octyl phthalate	117840	Mouse	550	Mink	229	1	229	1	229	Sample et al. 1996	as Di-N-butylphthalate
Anthracene	120127	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Pyrene	129000	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Dibenzofuran	132649										No value
Benzo[g,h,i]perylene	191242	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Indeno[1,2,3-cd]pyrene	193395	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Benzo[b]fluoranthene	205992	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Fluoranthene	206440	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Benzo[k]fluoranthene	207089	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Acenapthylene	208968	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
Chrysene	218019	Mouse	1	Mink	0.42	1	0.42	1	0.42	Sample et al. 1996	as Benzo(a)pyrene
2,3,7,8-TCDD	1746016	Rat	0.000001	Mink	0.0000008	1	0.0000008	1	8E-07	Sample et al. 1996	
Aluminum	7429905	Mouse	1.93	Mink	0.803	1	0.803	1	0.803	Sample et al. 1996	as AlCl3
Iron	7439896										No value
Lead	7439921	Rat	8	Mink	6.15	1	6.15	1	6.15	Sample et al. 1996	as Lead acetate
Magnesium	7439954						0				No value
Manganese	7439965	Rat	88	Mink	68	1	68	1	68	Sample et al. 1996	as Mn3O4
Mercury	7439976	Mink	1	Mink	1	1	1	1	1	Sample et al. 1996	as Mercuric chloride
Nickel	7440020	Rat	40	Mink	30.77	1	30.77	1	30.77	Sample et al. 1996	as NiSO4 hexahydrate

Table 3-4a. Mink NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Potassium	7440097										No value
Silver	7440224	Rat	181.2		181.2	0.1	18.12	0.1	18.12	ATSDR 1997	
Sodium	7440235										No value
Thallium	7440280	Rat	0.0074	Mink	0.006	1	0.006	1	0.006	Sample et al. 1996	as Thallium sulfate
Antimony	7440360	Mouse	0.125	Mink	0.052	1	0.052	1	0.052	Sample et al. 1996	as Antimony potassium tartrate
Arsenic	7440382	Mouse	0.126	Mink	0.052	1	0.052	1	0.052	Sample et al. 1996	as Arsenite
Barium	7440393	Rat	5.1	Mink	4.1	1	4.1	1	4.1	Sample et al. 1996	as Barium chloride
Beryllium	7440417	Rat	0.66	Mink	0.51	1	0.51	1	0.51	Sample et al. 1996	as Beryllium sulfate
Cadmium	7440439	Rat	1	Mink	0.742	1	0.742	1	0.742	Sample et al. 1996	as Cadmium chloride
Chromium	7440473	Rat	3.28	Mink	2.52	1	2.52	1	2.52	Sample et al. 1996	as Cr+6
Copper	7440508	Mink	11.7	Mink	11.7	1	11.7	1	11.7	Sample et al. 1996	as Copper sulfate
Vanadium	7440622	Rat	0.21	Mink	0.15	1	0.15	1	0.15	Sample et al. 1996	as NaVO3
Zinc	7440666	Rat	160	Mink	123.1	1	123.1	1	123.1	Sample et al. 1996	as Zinc oxide
Calcium	7440702										No value
Selenium	7782492	Rat	0.2	Mink	0.154	1	0.154	1	0.154	Sample et al. 1996	as Selenate (SeO4)
Aroclor 1254	11097691	Mink	0.14	Mink	0.14	1	0.14	1	0.14	Sample et al. 1996	
Aroclor 1260	11096825	Mink	0.14	Mink	0.14	1	0.14	1	0.14	Sample et al. 1996	as Aroclor 1254
Aroclor 1248	12672296	Rhesus monkey	0.01	Mink	0.015	1	0.015	1	0.015	Sample et al. 1996	
Aroclor 1016	12674112	Mink	1.37	Mink	1.37	1	1.37	1	1.37	Sample et al. 1996	
Methyl mercury	22967926	Mink	0.015	Mink	0.015	1	0.015	1	0.015	Sample et al. 1996	as Methylmercury dicyandiamide
Aroclor 1242	53469219	Mink	0.069	Mink	0.069	1	0.069	1	0.069	Sample et al. 1996	

[1] Concentrations are reported in milligrams per kilogram per day (mg/kg/day).

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United States Environmental Protection Agency (USEPA) 1999b. *Volume 2E - Baseline Ecological Risk Assessment: Hudson River Assessment: Hudson River PCBs Reassessment RI/FS.* USEPA Region II, U.S. Army Corps of Engineers, Kansas City District.

ES NOAEL	No observed adverse effect level for the endpoint species.
PFD NOAEL	No observed adverse effect level used in the problem formulation document.
Screening NOAEL	No observed adverse effect level used in the screening level ecological risk assessment.
TS NOAEL	No observed adverse effect level for the test species.
UF	Uncertainty factor.

Table 3-4b. Great Blue Heron NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Benzo[a]pyrene	50328	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute NOAEL
Dibenz[a,h]anthracene	53703	Chicken embryo	39	Chicken embryo	39	0.01	0.39	0.01	0.39	USEPA 1999a	Based on acute LD50
Benzo[a]anthracene	56553	Chicken embryo	79	Chicken embryo	79	0.01	0.79	0.01	0.79	USEPA 1999a	Based on acute LD50
Cyanide	57125	Mallard duck	2	Great Blue Heron	2	1	2	1	2	Cal/Ecotox 1999	as Potassium cyanide
Acetone	67641	Rat	10	Mink	7.7	0.01	0.077	0.1	1	Sample et al. 1996	
Chloromethane	74873	Mouse	100	Mouse	100	0.01	1	0.1	10	ATSDR 1997	
Carbon disulfide	75150	Rabbit	11	Rabbit	11	0.01	0.11	0.1	1.1	IRIS 2000	
2-Butanone (MEK)	78933	Rat	1771	Mink	1362	0.01	13.62	0.1	177.1	Sample et al. 1996	
Trichloroethene	79016	Mouse	0.7	Mink	0.291	0.01	0.00291	0.1	0.07	Sample et al. 1996	
Acenapthene	83329	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Phenanthrene	85018	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Fluorene	86737	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Carbazole	86748										No value
Napthalene	91203	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
2-Methylnapthalene	91576	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
2-Methylphenol	95487	Rat	50	Rat	50	0.01	0.5	0.1	5	IRIS 2000	
2,4-Dimethylphenol	105679	Mouse	50	Mouse	50	0.01	0.5	0.1	5	IRIS 2000	
4-Methylphenol	106445	Rat	50	Mouse	50	0.01	0.5	0.1	5	IRIS 2000	as 2-Methylphenol
Phenol	108952	Rat	60	Rat	60	0.01	0.6	0.1	6	IRIS 2000	
Bis(2-ethylhexyl)phthalate	117817	Ringed dove	1.1	Great Blue Heron	1.1	1	1.1	1	1.1	Sample et al. 1996	
Di-n-octyl phthalate	117840	Ringed dove	0.11	Great Blue Heron	0.11	1	0.11	1	0.11	Sample et al. 1996	as Di-N-butylphthalate
Anthracene	120127	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Pyrene	129000	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Dibenzofuran	132649										No value
Benzo[g,h,i]perylene	191242	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Indeno[1,2,3-cd]pyrene	193395	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute LOAEL
Benzo[b]fluoranthene	205992	Chicken embryo	14	Chicken embryo	14	0.01	0.14	0.01	0.14	USEPA 1999a	as Benzo(k)fluoranthene
Fluoranthene	206440	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Benzo[k]fluoranthene	207089	Chicken embryo	14	Chicken embryo	14	0.01	0.14	0.01	0.14	USEPA 1999a	Based on acute LD50
Acenapthylene	208968	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Chrysene	218019	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute LOAEL
2,3,7,8-TCDD	1746016	Ring necked pheasant	1.4E-05	Great Blue Heron	1.4E-05	1	0.000014	1	1.4E-05	Sample et al. 1996	
Aluminum	7429905	Ringed dove	109.7	Great Blue Heron	109.7	1	109.7	1	109.7	Sample et al. 1996	as Al2(SO4)2
Iron	7439896										No value
Lead	7439921	American kestrel	3.85	Great Blue Heron	3.85	1	3.85	1	3.85	Sample et al. 1996	as Metallic lead
Magnesium	7439954										No value
Manganese	7439965	Japanese quail	997	Great Blue Heron	997	1	997	1	997	Sample et al. 1996	as Mn3O4
Mercury	7439976	Japanese quail	0.45	Great Blue Heron	0.45	1	0.45	1	0.45	Sample et al. 1996	as Mercuric chloride
Nickel	7440020	Mallard duckling	77.4	Great Blue Heron	77.4	1	77.4	1	77.4	Sample et al. 1996	as Nickel sulfate

Table 3-4b. Great Blue Heron NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Potassium	7440097										No value
Silver	7440224	Rat	18.2	Rat	18.2	0.01	0.182	0.1	1.82	ATSDR 1997	
Sodium	7440235										No value
Thallium	7440280	Rat	0.0074	Mink	0.006	0.01	0.00006	0.1	0.00074	Sample et al. 1996	as Thallium sulfate
Antimony	7440360	Mouse	0.125	Mink	0.052	0.01	0.00052	0.1	0.0125	Sample et al. 1996	as Antimony potassium tartrate
Arsenic	7440382	Mallard duck	5.14	Great Blue Heron	5.1	1	5.1	1	5.14	Sample et al. 1996	as Sodium arsenite
Barium	7440393	1-day old chicks	20.8	Great Blue Heron	20.8	1	20.8	1	20.8	Sample et al. 1996	as Barium hydroxide
Beryllium	7440417	Rat	0.66	Mink	0.51	0.01	0.0051	0.1	0.066	Sample et al. 1996	as Beryllium sulfate
Cadmium	7440439	Mallard duck	1.45	Great Blue Heron	1.45	1	1.45	1	1.45	Sample et al. 1996	as Cadmium chloride
Chromium	7440473	Black duck	1	Great Blue Heron	1	1	1	1	1	Sample et al. 1996	as Cr+3
Copper	7440508	1 day old chicks	47	Great Blue Heron	47	1	47	1	47	Sample et al. 1996	as Copper oxide
Vanadium	7440622	Mallard duck	11.4	Great Blue Heron	11.4	1	11.4	1	11.4	Sample et al. 1996	as Vanadyl sulfate
Zinc	7440666	White leghorn hen	14.5	Great Blue Heron	14.5	1	14.5	1	14.5	Sample et al. 1996	as Zinc sulfate
Calcium	7440702										No value
Selenium	7782492	Mallard duck	0.5	Great Blue Heron	0.5	1	0.5	1	0.5	Sample et al. 1996	as Sodium selenite
Aroclor 1254	11097691	Ring necked pheasant	0.18	Great Blue Heron	0.18	1	0.18	1	0.18	Sample et al. 1996	
Aroclor 1260	11096825	Ring necked pheasant	0.18	Great Blue Heron	0.18	1	0.18	1	0.18	Sample et al. 1996	as Aroclor 1254
Aroclor 1248	12672296	Screech owl	0.4	Screech owl	0.4	1	0.4	1	0.4	USEPA 1999b	
Aroclor 1016	12674112	Domestic Chicken	1.4	Domestic Chicken	1.4	1	1.4	1	1.4	USEPA 1999b	
Methyl mercury	22967926	Mallard duck	0.0064	Great Blue Heron	0.006	1	0.006	1	0.006	Sample et al. 1996	as Methylmercury dicyandiamide
Aroclor 1242	53469219	Screech owl	0.41	Great Blue Heron	0.41	1	0.41	1	0.41	Sample et al. 1996	

[1] Concentrations are reported in milligrams per kilogram per day (mg/kg/day).

[2] References:

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ES NOAEL	No observed adverse effect level for the endpoint species.
PFD NOAEL	No observed adverse effect level used in the problem formulation document.
Screening NOAEL	No observed adverse effect level used in the screening level ecological risk assessment.
TS NOAEL	No observed adverse effect level for the test species.
UF	Uncertainty factor.

Table 3-4c. Short Tailed Shrew NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Benzo[a]pyrene	50328	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	
Dibenz[a,h]anthracene	53703	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Benzo[a]anthracene	56553	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Cyanide	57125	Rat	68.7	Short-tailed Shrew	141.9	1	141.9	1	141.9	Sample et al. 1996	as Potassium cyanide
Chloroform	67663	Rat	15	Short-tailed Shrew	33	1	33	1	33	Sample et al. 1996	
Carbon disulfide	75150	Rabbit	11	Short-tailed Shrew	11	1	11	0.1	1.1	IRIS 2000	
Trichloroethene	79016	Mouse	0.7	Short-tailed Shrew	0.832	1	0.832	1	0.832	Sample et al. 1996	
Acenapthene	83329	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Phenanthrene	85018	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Butyl benzyl phthalate	85687	Rat	159	Short-tailed Shrew	159	1	159	0.1	15.9	IRIS 2000	
Fluorene	86737	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Carbazole	86748										No value
Napthalene	91203	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
2-Methylnapthalene	91576	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
1,2-Dichlorobenzene	95501	Rat	85.7	Short-tailed Shrew	85.7	1	85.7	0.1	8.57	IRIS 2000	
Ethylbenzene	100414										No value
Toluene	108883	Mouse	26	Short-tailed Shrew	30.9	1	30.9	1	30.9	Sample et al. 1996	
Phenol	108952	Rat	60	Short-tailed Shrew	60	1	60	0.1	6	IRIS 2000	
Bis(2-ethylhexyl)phthalate	117817	Mouse	18.3	Short-tailed Shrew	21.8	1	21.8	1	21.8	Sample et al. 1996	
Di-n-octyl phthalate	117840	Mouse	550	Short-tailed Shrew	654	1	654	1	654	Sample et al. 1996	as Di-N-butylphthalate
Hexachlorobenzene	118741										No value
Anthracene	120127	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Tetrachloroethylene	127184										No value
Pyrene	129000	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Dibenzofuran	132649										No value
cis-1,2-Dichloroethene	156592	Mouse	45.2	Short-tailed Shrew	53.8	1	53.8	1	53.8	Sample et al. 1996	
Benzo[g,h,i]perylene	191242	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Indeno[1,2,3-cd]pyrene	193395	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Benzo[b]fluoranthene	205992	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Fluoranthene	206440	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Benzo[k]fluoranthene	207089	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Chrysene	218019	Mouse	1	Short-tailed Shrew	1.19	1	1.19	1	1.19	Sample et al. 1996	as Benzo(a)pyrene
Xylene (total)	1330207	Mouse	2.1	Short-tailed Shrew	2.497	1	2.497	1	2.497	Sample et al. 1996	mixed isomers
2,3,7,8-TCDD	1746016	Rat	0.000001	Short-tailed Shrew	2.2E-06	1	0.0000022	1	2.2E-06	Sample et al. 1996	No value
Aluminum	7429905	Mouse	1.93	Short-tailed Shrew	2.295	1	2.295	1	2.295	Sample et al. 1996	as AlCl3
Iron	7439896										No value
Lead	7439921	Rat	8	Short-tailed Shrew	17.58	1	17.58	1	17.58	Sample et al. 1996	as Lead acetate

Table 3-4c. Short Tailed Shrew NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Magnesium	7439954										No value
Manganese	7439965	Rat	88	Short-tailed Shrew	193	1	193	1	193	Sample et al. 1996	as Mn3O4
Nickel	7440020	Rat	40	Short-tailed Shrew	87.91	1	87.91	1	87.91	Sample et al. 1996	as NiSO4 hexahydrate
Potassium	7440097										No value
Sodium	7440235										No value
Arsenic	7440382	Mouse	0.126	Short-tailed Shrew	0.15	1	0.15	1	0.15	Sample et al. 1996	as Arsenite
Barium	7440393	Rat	5.1	Short-tailed Shrew	11.8	1	11.8	1	11.8	Sample et al. 1996	as Barium chloride
Chromium	7440473	Rat	3.28	Short-tailed Shrew	7.21	1	7.21	1	7.21	Sample et al. 1996	as Cr+6
Copper	7440508	Mink	11.7	Short-tailed Shrew	33.4	1	33.4	1	33.4	Sample et al. 1996	as Copper sulfate
Vanadium	7440622	Rat	0.21	Short-tailed Shrew	0.428	1	0.428	1	0.428	Sample et al. 1996	as NaVO3
Zinc	7440666	Rat	160	Short-tailed Shrew	351.7	1	351.7	1	351.7	Sample et al. 1996	as Zinc oxide
Calcium	7440702										No value
Selenium	7782492	Rat	0.2	Short-tailed Shrew	0.44	1	0.44	1	0.44	Sample et al. 1996	as Selenate (SeO4)
Aroclor 1254	11097691	Old field Mouse	0.068	Short-tailed Shrew	0.067	1	0.067	1	0.067	Sample et al. 1996	
Aroclor 1248	12672296	Rhesus monkey	0.01	Short-tailed Shrew	0.043	1	0.043	1	0.043	Sample et al. 1996	

[1] Concentrations are reported in milligrams per kilogram per day (mg/kg/day).

[2] References:

Integrated Risk Information System (IRIS) 2000. Online database access site: www.epa.gov/iris

Sample, B.E., D.M. Opreski, and G.W. Suter. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision Report.* Report No. ES/ER/TM-86R1. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

ES NOAEL	No observed adverse effect level for the endpoint species.
PFD NOAEL	No observed adverse effect level used in the problem formulation document.
Screening NOAEL	No observed adverse effect level used in the screening level ecological risk assessment.
TS NOAEL	No observed adverse effect level for the test species.
UF	Uncertainty factor.

Table 3-4d. Red Tailed Hawk NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Benzo[a]pyrene	50328	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute NOAEL
Dibenz[a,h]anthracene	53703	Chicken embryo	39	Chicken embryo	39	0.01	0.39	0.01	0.39	USEPA 1999a	Based on acute LD50
Benzo[a]anthracene	56553	Chicken embryo	79	Chicken embryo	79	0.01	0.79	0.01	0.79	USEPA 1999a	Based on acute LD50
Cyanide	57125	Mallard duck	2	Red-tailed hawk	2	0.1	0.2	1	2	Cal/Ecotox 1999	as Potassium cyanide
Chloroform	67663	Rat	15	Mink	11.5	0.01	0.115	0.1	1.5	Sample et al. 1996	
Carbon disulfide	75150	Rabbit	11	Red-tailed hawk	11	0.01	0.11	0.1	1.1	IRIS 2000	
Trichloroethene	79016	Mouse	0.7	Mink	0.291	0.01	0.00291	0.1	0.07	Sample et al. 1996	
Acenapthene	83329	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Phenanthrene	85018	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Butyl benzyl phthalate	85687	Rat	159	Red-tailed hawk	159	0.01	1.59	0.1	15.9	IRIS 2000	
Fluorene	86737	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Carbazole	86748										No value
Napthalene	91203	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
2-Methylnapthalene	91576	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
1,2-Dichlorobenzene	95501	Rat	85.7	Red-tailed hawk	85.7	0.01	0.857	0.1	8.57	IRIS 2000	
Ethylbenzene	100414										No value
Toluene	108883	Mouse	26	Mink	10.8	0.01	0.108	0.1	2.6	Sample et al. 1996	
Phenol	108952	Rat	60	Red-tailed hawk	60	0.01	0.6	0.1	6	IRIS 2000	
Bis(2-ethylhexyl)phthalate	117817	Ringed dove	1.1	Red-tailed hawk	1.1	0.1	0.11	1	1.1	Sample et al. 1996	
Di-n-octyl phthalate	117840	Ringed dove	0.11	Red-tailed hawk	0.11	0.1	0.011	1	0.11	Sample et al. 1996	as Di-N-butylphthalate
Hexachlorobenzene	118741										No value
Anthracene	120127	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Tetrachloroethylene (PCE	127184										No value
Pyrene	129000	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Dibenzofuran	132649										No value
cis-1,2-Dichloroethene	156592	Mouse	45.2	Mink	18.8	0.01	0.188	0.1	4.52	Sample et al. 1996	
Benzo[g,h,i]perylene	191242	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Indeno[1,2,3-cd]pyrene	193395	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute LOAEL
Benzo[b]fluoranthene	205992	Chicken embryo	14	Chicken embryo	14	0.01	0.14	0.01	0.14	USEPA 1999a	as Benzo(k)fluoranthene
Fluoranthene	206440	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	as Benzo(a)pyrene
Benzo[k]fluoranthene	207089	Chicken embryo	14	Chicken embryo	14	0.01	0.14	0.01	0.14	USEPA 1999a	Based on acute LD50
Chrysene	218019	Chicken embryo	100	Chicken embryo	100	0.01	1	0.01	1	USEPA 1999a	Based on acute LOAEL
Xylene (total)	1330207	Mouse	2.1	Mink	0.874	0.01	0.00874	0.1	0.21	Sample et al. 1996	mixed isomers
2,3,7,8-TCDD	1746016	Ring necked pheasant	0.000014	Red-tailed hawk	0.000014	0.1	0.0000014	1	0.000014	Sample et al. 1996	
Aluminum	7429905	Ringed dove	109.7	Red-tailed hawk	109.7	0.1	10.97	1	109.7	Sample et al. 1996	as Al2(SO4)2
Iron	7439896										No value
Lead	7439921	American kestrel	3.85	Red-tailed hawk	3.85	0.1	0.385	1	3.85	Sample et al. 1996	as Metallic lead

Table 3-4d. Red Tailed Hawk NOAEL Values

Constituent	CAS #	Test Species	TS NOAEL[1]	Endpoint Species	ES NOAEL[1]	UF	Screening NOAEL[1]	UF	PFD NOAEL[1]	Source[2]	Notes
Magnesium	7439954										No value
Manganese	7439965	Japanese quail	997	Red-tailed hawk	997	0.1	99.7	1	997	Sample et al. 1996	as Mn3O4
Nickel	7440020	Mallard duckling	77.4	Red-tailed hawk	77.4	0.1	7.74	1	77.4	Sample et al. 1996	as Nickel sulfate
Potassium	7440097										No value
Sodium	7440235										No value
Arsenic	7440382	Mallard duck	5.14	Red-tailed hawk	5.1	0.1	0.51	1	5.14	Sample et al. 1996	as Sodium arsenite
Barium	7440393	1-day old chicks	20.8	Red-tailed hawk	20.8	0.1	2.08	1	20.8	Sample et al. 1996	as Barium hydroxide
Chromium	7440473	Black duck	1	Red-tailed hawk	1	0.1	0.1	1	1	Sample et al. 1996	as Cr+3
Copper	7440508	1 day old chicks	47	Red-tailed hawk	47	0.1	4.7	1	47	Sample et al. 1996	as Copper oxide
Vanadium	7440622	Mallard duck	11.4	Red-tailed hawk	11.4	0.1	1.14	1	11.4	Sample et al. 1996	as Vanadyl sulfate
Zinc	7440666	White leghorn hen	14.5	Red-tailed hawk	14.5	0.1	1.45	1	14.5	Sample et al. 1996	as Zinc sulfate
Calcium	7440702										No value
Selenium	7782492	Mallard duck	0.5	Red-tailed hawk	0.5	0.1	0.05	1	0.5	Sample et al. 1996	as Sodium selenite
Aroclor 1254	11097691	Ring necked pheasant	0.18	Red-tailed hawk	0.18	1	0.18	1	0.18	Sample et al. 1996	
Aroclor 1248	12672296	Screech owl	0.4	Screech owl	0.4	1	0.4	1	0.4	USEPA 1999b	

[1] Concentrations are reported in milligrams per kilogram per day (mg/kg/day).

[2] References:

Agency for Toxic Substances and Disease Registry (ATSDR) 1997. *ATSDR's Toxicological Profiles on CD-ROM.* CRC Press, Inc. Boca Raton, Florida.

Integrated Risk Information System (IRIS) 2000. Online database access site: www.epa.gov/iris

Sample, B.E., D.M. Opreski, and G.W. Suter. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision Report.* Report No. ES/ER/TM-86R1. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

United States Environmental Protection Agency (USEPA) 1999a. *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft.* Solid Waste and Emergency Response. EPA A530-D-99-001A. August.

United States Environmental Protection Agency (USEPA) 1999b. *Volume 2E - Baseline Ecological Risk Assessment: Hudson River Assessment: Hudson River PCBs Reassessment RI/FS.* USEPA Region II, U.S. Army Corps of Engineers, Kansas City District.

ES NOAEL	No observed adverse effect level for the endpoint species.
PFD NOAEL	No observed adverse effect level used in the problem formulation document.
Screening NOAEL	No observed adverse effect level used in the screening level ecological risk assessment.
TS NOAEL	No observed adverse effect level for the test species.
UF	Uncertainty factor.

Table 3-5a. Ley Creek Deferred Media and IFG Facility Hazard Quotients and Hazard Indices

Constituent	CAS-NUM	Surface Soil RME Exposure Point Conc. (mg/kg)	Sediment RME Exposure Point Conc. (mg/kg)	Surface Water RME Exposure Point Conc. (µg/L)	Biota Concentration			Mink			Great Blue Heron			Shrew			Red Tailed Hawk		
					Trophic Level 4 Fish (mg/kg)	Worms (mg/kg)	Small Mammals (mg/kg)	TDI (mg/kg/day)	NOAEL (mg/kg/day)	HQ (unitless)	TDI (mg/kg/day)	NOAEL (mg/kg/day)	HQ (unitless)	TDI (mg/kg/day)	NOAEL (mg/kg/day)	HQ (unitless)	TDI (mg/kg/day)	NOAEL (mg/kg/day)	HQ (unitless)
Aluminum	7429905	13,000	7,700	130	7.8	14,000	3,900	12	0.80	**15**	26	110	**0.24**	7,943	2.3	**3,500**	382	11	**35**
Antimony	7440360	ND	2	ND	0.058	NAP	NAP	0.011	0.052	0.21	0.015	0.00052	**29**	NAP	0.15	NAP	NAP	0.00052	NAP
Arsenic	7440382	18	5.8	ND	0.45	3.8	0.28	0.073	0.052	**1.4**	0.091	5.1	0.018	2.3	0.15	**16**	0.027	0.51	0.054
Barium	7440393	160	ND	66	1.3	170	3.0	0.20	4.1	0.049	0.22	21	0.010	96	12	**8.2**	0.30	2.1	0.14
Beryllium	7440417	ND	0.42	ND	0.00042	NAP	NAP	0.00067	0.51	0.0013	0.0014	0.0051	0.28	NAP	1.5	NAP	NAP	0.0051	NAP
Cadmium	7440439	ND	1.6	ND	18	NAP	NAP	2.6	0.74	**3.5**	2.9	1.5	**2.0**	NAP	2.1	NAP	NAP	0.15	NAP
Calcium	7440702	77,000	64,000	140,000	2,800	83,000	23,000	516	NA	NA	667	NA	NA	47,122	NA	NA	2,262	NA	NA
Chromium	7440473	2,000	51	ND	1.5	2,200	190	0.29	2.5	0.120	0.41	1.0	0.41	1,248	7.2	**170**	19	0.10	**190**
Copper	7440508	890	61	8.7	7.1	810	990	1.1	12	0.096	1.3	47	0.029	461	33	**14**	97	4.7	**21**
Cyanide	57125	11	1.8	ND	0.061	12	3.3	0.012	50	0.00023	0.016	2.0	0.008	6.8	142	0.048	0.32	0.20	**1.6**
Iron	7439896	26,000	ND	430	8.6	28,000	720	1.3	NA	NA	1.4	NA	NA	15,886	NA	NA	71	NA	NA
Lead	7439921	65	81	4.0	1.0	110	22	0.26	6.2	0.043	0.42	3.9	0.11	62	18	**3.5**	2.2	0.39	**5.6**
Magnesium	7439954	18,000	18,000	ND	612	19,000	5,400	115	NA	NA	157	NA	NA	10,785	NA	NA	529	NA	NA
Manganese	7439965	480	430	ND	16	32	140	2.99	68	0.04	4.03	997	0.00	24	193	0.13	14	100	0.14
Mercury	7439976	ND	0.17	ND	1.9	NAP	NAP	0.28	1.0	0.28	0.31	0.45	0.69	NAP	2.9	NAP	NAP	0.045	NAP
Nickel	7440020	610	23	11	1.2	460	290	0.20	31	0.0067	0.26	77	0.0034	263	88	**3.0**	28	7.7	**3.7**
Potassium	7440097	2,400	2,200	ND	75	2,600	720	14	NA	NA	19	NA	NA	1,475	NA	NA	71	NA	NA
Selenium	7782492	1.9	0.69	ND	11	2.1	1.5	1.6	0.15	**10**	1.8	0.50	**3.6**	1.2	0.44	**2.7**	0.15	0.050	**2.9**
Silver	7440224	ND	1.4	ND	0.048	NAP	NAP	0.0090	18	0.00049	0.012	0.18	0.067	NAP	18	NAP	NAP	0.18	NAP
Sodium	7440235	410	370	100,000	13	440	120	13	NA	NA	7.8	NA	NA	272	NA	NA	18	NA	NA
Thallium	7440280	ND	0.60	ND	0.020	NAP	NAP	0.0038	0.0060	0.64	0.0052	0.000060	**87**	NAP	0.016	NAP	NAP	0.000060	NAP
Vanadium	7440622	28	18	ND	0.19	30	8.4	0.054	0.15	0.36	0.089	11	0.0078	17	0.43	**40**	0.82	1.1	0.72
Zinc	7440666	1,300	200	ND	150	13,000	3,600	22	123	0.18	25	15	**1.7**	7,232	352	**21**	353	1.5	**240**
Hazard Index - Total Metals									**Mink HI:**	**32**		**Great Blue Heron HI:**	**125**		**Shrew HI:**	**3,779**		**Red Tailed Hawk HI:**	**501**
2-Methylnaphthalene	91576	1.7	0.82	ND	0.49	0.12	0.31	0.073	0.42	0.17	0.082	1.0	0.082	0.089	1.2	0.075	0.030	1.0	0.030
Acenaphthene	83329	40	2.1	ND	0.048	2.9	7.2	0.010	0.42	0.024	0.015	1.0	0.015	2.1	1.2	**1.8**	0.71	1.0	0.71
Acenaphthylene	208968	ND	0.28	ND	0.0056	NAP	NAP	0.0012	0.42	0.0029	0.0018	1.0	0.0018	NAP	1.2	NAP	NAP	1.0	NAP
Anthracene	120127	230	2.7	ND	2.8	17	41	0.41	0.42	1.0	0.46	1.0	0.46	12	1.2	**11**	4.0	1.0	**4.0**
Benzo(a)anthracene	56553	24	13	ND	7.6	1.7	4.3	1.1	0.42	**2.7**	1.3	0.79	**1.6**	1.3	1.2	**1.1**	0.42	0.79	0.53
Benzo(b)fluoranthene	205992	24	13	ND	1.0	1.7	4.3	0.17	0.42	0.40	0.21	0.14	**1.5**	1.3	1.2	**1.1**	0.42	0.14	**3.0**
Benzo(ghi)perylene	191242	22	8.2	ND	0.35	1.6	4.0	0.063	0.42	0.15	0.08	1.0	0.08	1.2	1.2	1.0	0.39	1.0	0.39
Benzo(k)fluoranthene	207089	8.4	5.1	ND	0.21	0.60	1.5	0.038	0.42	0.090	0.051	0.14	0.36	0.44	1.2	0.37	0.15	0.14	**1.1**
Benzo[a]pyrene	50328	21	13	ND	10	1.5	3.8	1.4	0.42	**3.4**	1.6	1.0	**1.6**	1.1	1.2	0.93	0.37	1.0	0.37
Carbazole	86748	120	2.3	ND	0.046	8.6	22	0.010	NA	NA	0.015	NA	NA	6	NA	NA	2.2	NA	NA
Chrysene	218019	26	14	ND	7.2	1.9	4.7	1.1	0.42	**2.5**	1.2	1.0	**1.2**	1.4	1.2	**1.2**	0.46	1.0	0.46
Dibenzo(a,h)anthracene	53703	39	3.7	ND	0.072	2.8	7.0	0.016	0.42	0.038	0.024	0.39	0.061	2.1	1.2	**1.7**	0.69	0.39	**1.8**
Fluoranthene	206440	75	23	ND	18	5.4	14	2.7	0.42	**6.4**	3.0	1.0	**3.0**	4.0	1.2	**3.4**	1.4	1.0	**1.4**
Fluorene	86737	65	2.0	ND	0.15	4.7	12	0.025	0.42	0.060	0.031	1.0	0.031	3.5	1.2	**2.9**	1.2	1.0	**1.2**
Indeno(1,2,3-cd)pyrene	193395	14	7.2	ND	0.27	1.0	2.5	0.050	0.42	0.12	0.067	1.0	0.07	0.74	1.2	0.6	0.25	1.0	0.25
Naphthalene	91203	2.1	2.3	ND	0.066	0.15	0.38	0.013	0.42	0.031	0.018	1.0	0.018	0.11	1.2	0.09	0.037	1.0	0.037
Phenanthrene	85018	670	69	ND	148	48	120	22	0.42	**51**	24	1.0	**24**	36	1.2	**30**	12	1.0	**12**
Pyrene	129000	65	38	ND	3.4	4.7	12	0.54	0.42	**1.3**	0.67	1.0	0.67	3.5	1.2	**2.9**	1.2	1.0	**1.2**
Hazard Index - Total PAHs									**Mink HI:**	**69**		**Great Blue Heron HI:**	**35**		**Shrew HI:**	**60**		**Red Tailed Hawk HI:**	**28**
Aroclor 1016	12674112	ND	5.8	ND	87	NAP	NAP	13	1.4	**9.2**	14	1.4	**10**	NAP	3.9	NAP	NAP	1.4	NAP
Aroclor 1242	53469219	ND	36	ND	540	NAP	NAP	0.052	0.069	0.76	0.12	0.41	0.28	NAP	0.20	NAP	NAP	0.41	NAP
Aroclor 1248	12672296	3900	25	ND	374	37,000	6,600	54	0.015	**3,600**	61	0.40	**150**	20,587	0.043	480,000	647	0.40	**1,600**
Aroclor 1254	11097691	8.0	2.9	ND	43	75	14	6.3	0.14	**45**	7.0	0.18	**39**	42	0.067	**620**	1.4	0.18	**7.6**
Aroclor 1260	11096825	ND	1.1	ND	16	NAP	NAP	2.4	0.14	**17**	2.7	0.18	**15**	NAP	0.067	NAP	NAP	0.18	NAP
Total PCBs	11097691	130	NA	ND	NAP	1,200	220	NAP	0.14	NAP	NAP	0.18	NAP	668	0.067	**10,000**	22	0.18	**120**
Hazard Index - Total PCBs									**Mink HI:**	**3,672**		**Great Blue Heron HI:**	**214**		**Shrew HI:**	**490,620**		**Red Tailed Hawk HI:**	**1,728**

Table 3-5a. Ley Creek Deferred Media and IFG Facility Hazard Quotients and Hazard Indices

Constituent	CAS-NUM	Surface Soil RME Exposure Point Conc. (mg/kg)	Sediment RME Exposure Point Conc. (mg/kg)	Surface Water RME Exposure Point Conc. (µg/L)	Biota Concentration Trophic Level 4 Fish (mg/kg)	Biota Concentration Worms (mg/kg)	Biota Concentration Small Mammals (mg/kg)	Mink TDI (mg/kg/day)	Mink NOAEL (mg/kg/day)	Mink HQ (unitless)	Great Blue Heron TDI (mg/kg/day)	Great Blue Heron NOAEL (mg/kg/day)	Great Blue Heron HQ (unitless)	Shrew TDI (mg/kg/day)	Shrew NOAEL (mg/kg/day)	Shrew HQ (unitless)	Red Tailed Hawk TDI (mg/kg/day)	Red Tailed Hawk NOAEL (mg/kg/day)	Red Tailed Hawk HQ (unitless)
1,2-Dichlorobenzene	95501	0.060	ND	ND	NAP	0.53	0.10	NAP	8.6	NAP	NAP	0.86	NAP	0.29	86	0.0034	0.010	0.86	0.011
2,4-Dimethylphenol	105679	ND	0.17	ND	0.65	NAP	NAP	0.095	5.0	0.019	0.11	0.50	0.21	NAP	50	NAP	NAP	0.50	NAP
2-Methylphenol	95487	ND	0.073	ND	0.28	NAP	NAP	0.041	5.0	0.008	0.045	0.50	0.091	NAP	50	NAP	NAP	0.50	NAP
4-Methylphenol	106445	ND	0.29	ND	1.1	NAP	NAP	0.16	5.0	0.032	0.18	0.50	0.36	NAP	50	NAP	NAP	0.50	NAP
Bis(2-ethylhexyl)phthalate	117817	2.3	0.83	ND	12	20	3.9	1.8	7.6	0.24	2.0	1.1	1.8	11	22	0.51	0.38	0.11	3.5
Butyl benzyl phthalate	85687	36	ND	ND	NAP	320	61	NAP	16	NAP	NAP	1.6	NAP	178	159	1.1	6.0	1.6	3.8
Dibenzofuran	132649	21	1.7	ND	25	190	36	3.7	NA	NA	4.1	NA	NA	106	NA	NA	3.5	NA	NA
Di-n-octyl phthalate	117840	56	ND	10.00	NAP	500	95	0.0011	229	0.0000047	0.00045	0.11	0.0041	278	654	0.43	9.3	0.011	850
Hexachlorobenzene	118741	0.10	ND	ND	NAP	0.9	0.17	NAP	NA	NAP	NAP	NA	NAP	0.50	NA	NA	0.017	NA	NA
Phenol	108952	0.85	0.099	ND	0.38	0.8	0.14	0.055	6.0	0.0092	0.062	0.60	0.10	0.43	60	0.0071	0.014	0.60	0.023
Hazard Index - Total SVOCs									**Mink HI:**	**0.31**		**Great Blue Heron HI:**	**2.6**		**Shrew HI:**	**2.1**		**Red Tailed Hawk HI:**	**857**
Total TCDD TEQ	1746016	ND	0.000072	ND	0.0000063	NAP	NAP	0.0000010	0.00000080	1.3	0.0000012	0.000014	0.089	NAP	0.0000022	NAP	NAP	0.0000014	NAP
Hazard Index - Total TCDD									**Mink HI:**	**1.3**		**Great Blue Heron HI:**	**0.089**		**Shrew HI:**	**0.0**		**Red Tailed Hawk HI:**	**0.0**
Carbon disulfide	75150	0.038	0.0090	ND	0.018	NA	NA	0.0026	1.1	0.0024	0.0029	0.11	0.027	0.00051	11	0.000046	NAP	0.11	NAP
2-Butanone (MEK)	78933	ND	0.00060	ND	0.000060	NA	NA	0.000010	1,362	0.000000007	0.000012	14	0.00000086	NAP	3,892	NAP	NAP	14	NAP
Acetone	67641	ND	0.0060	ND	0.00060	NA	NA	0.000096	7.7	0.000012	0.0001	0.077	0.0015	NAP	22	NAP	NAP	0.077	NAP
Trichloroethene	79016	46	0.065	ND	0.13	NA	NA	0.019	0.29	0.065	0.021	0.0029	7.3	0.61	0.83	0.74	NAP	0.0029	NAP
Vinyl chloride	75014	ND	ND	ND	NAP	NA	NA	NAP	0.13	NAP	NAP	0.0013	NAP	NAP	0.37	NAP	NAP	0.0013	NAP
Chloromethane	74873	ND	ND	4.2	0.076	NA	NA	0.011	10	0.0011	0.012	1.0	0.012	0.00094	100	0.0000094	0.00025	1.0	0.00025
Methylene chloride	75092	ND	ND	ND	NAP	NA	NA	NAP	4.5	NAP	NAP	0.045	NAP	NAP	13	NAP	NAP	0.045	NAP
Chloroform	67663	0.020	ND	ND	NAP	NA	NA	NAP	12	NAP	NAP	0.12	NAP	0.00027	33	0.0000081	NAP	0.12	NAP
cis-1,2-Dichloroethene	156592	0.34	ND	ND	NAP	NA	NA	NAP	19	NAP	NAP	0.19	NAP	0.0045	54	0.000084	NAP	0.19	NAP
Ethylbenzene	100414	0.060	ND	ND	NAP	NA	NA	NAP	NA	NAP	NAP	NA	NAP	0.00080	NA	NA	NAP	NA	NAP
Tetrachloroethene	127184	0.012	ND	ND	NAP	NA	NA	NAP	NA	NAP	NAP	NA	NAP	0.00016	NA	NA	NAP	NA	NAP
Toluene	108883	0.21	ND	ND	NAP	NA	NA	NAP	11	NAP	NAP	0.11	NAP	0.0028	31	0.000091	NAP	0.11	NAP
Xylenes	1330207	0.60	ND	ND	NAP	NA	NA	NAP	0.87	NAP	NAP	0.0087	NAP	0.0080	2.5	0.0032	NAP	0.0087	NAP
Hazard Index - Total VOCs									**Mink HI:**	**0.069**		**Great Blue Heron HI:**	**7.3**		**Shrew HI:**	**0.74**		**Red Tailed Hawk HI:**	**0.00025**
Methyl mercury[1]	22967926	ND	0.17	ND	30770	NAP	NAP	4,477	0.015	300,000	4,985	0.0060	830,000	NAP	0.070	NAP	NAP	0.0060	NAP
Hazard Index - Total MeHg									**Mink HI:**	**300,000**		**Great Blue Heron HI:**	**830,000**		**Shrew HI:**	**NA**		**Red Tailed Hawk HI:**	**NA**

Notes:

[1] Reported exposure point concentration in sediment is for elemental mercury. Methyl mercury was not analyzed for.

COPC	Constituent of potential concern.
HI	Hazard index (Sum of HQs for all constituents in the same chemical class).
HQ	Hazard quotient (Calculated per constituent as TDI divided by NOAEL).
µg/L	Micrograms per liter.
mg/kg	Milligrams per kilogram.
mg/kg/day	Milligrams per kilogram per day.
NA	Not available.
NAP	Not applicable (constituent was not detected in this media).
ND	Not detected.
NOAEL	No observed adverse effect level.
PAHs	Polycyclic aromatic hydrocarbons.
PCBs	Polychlorinated biphenyls.
RME	Reasonable maximum exposure.
SVOCs	Semi-volatile organic compounds.
TDI	Total dietary intake.
VOCs	Volatile organic compounds.

Revised Attachment D

Past Chemical Uses and Discharges – Summary Information

List of chemicals generated by GM processes	
Chemical	**Source of information**
PCB Aroclor 1242	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
PCB Aroclor 1248	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
1,1,1-Trichloroethane	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Xylene	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Freon	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Methylene chloride	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Trichloroethene	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Cyanide	1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
Chromium (hexavalent, and trivalent)	1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
Heavy metals	1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
acids and alkalies	1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2

Known discharges/spills/unpermitted releases from Former IFG Facility				
Waste	**Receiving media**	**Permitted discharge**	**Date**	**Source of information**
PCBs	Holding pond # 1 that discharged to Ley Creek	Yes	Early 1980's	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Process wastewater discharges	Ley Creek	No	1954 – 1972	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Process wastewater discharges	Treated at IWTP then discharged to Ley Creek	Yes – starting in 1972	1964 to 1986	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9 and # 10
Process wastewater discharges	Treated at IWTP then discharged to Onondaga County Metropolitan Treatment Plant	Yes	1986 to 1997	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
1,1,1-TCA, xylene, freon, methylene chloride, TCE, PCB Aroclor 1242, and PCB Aroclor 1248	Impoundment # 1 that discharged to Ley Creek	Yes	1963 to1986	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
Paint thinner solvent spill (ethylbenzene, xylene, and toluene)	Reported spill to subsurface on northwestern edge of manufacturing building	No	12/11/1984	10/29/1994 Response by General Motors to EPA/DEC Request for Information under CERCLA 104(e) Comment # 9
IWTP Conditioning Tank Overflow (80 – 90 ppm of PCBs)	Reported spill to ground surface on south side of tank.	No	9/20/1983	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-13
Unleaded gas tank leak detected	Reported release to subsurface	No	5/9/1985	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-16
Paint thinner solvent spill	Reported release to subsurface while testing thinner lines 1, 2 and 3 for leaks.	No	3/29/1985	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-17

Known discharges/spills/unpermitted releases from Former IFG Facility				
Waste	**Receiving media**	**Permitted discharge**	**Date**	**Source of information**
Oil spill	Reported release of hydraulic oil to a storm grate which led to the large pond	No	7/25/1985	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-18
Process water spill	Primary holding tank overflowed into the storm sewer leading to the "small water retention pond"	No	3/6/1986	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-23
Hydraulic oil release	Information not documented	No	4/17/1986	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-24
Hydraulic oil release	Reported release from piping between clean oil reclamation tank and the oil transfer pump in the IWTP basement.	No	5/16/1986	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-25
Hydrualic oil release	Reported release from outfall 003, which led to Ley Creek.	No	4/9/1987	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-26
Groundwater and xylene mixture release	Information not documented	No	4/14/1987	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-27
Treated process water spill	Reported release to storm sewer.	No	6/11/1987	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-28
NALCO 1WP019 Spray Booth spill	Reported release to paved surface. No release to storm sewer.	No	8/18/1988	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-29
Oil spill	Reported spill from a Conrail engine on railroad tracks. No release to storm sewer.	No	11/3/1988	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-30
Process water spill	Reported spill from the sump between the clarifiers at the IWTP. Process water was spilled on paved surface.	No	10/18/1989	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-31
Hydraulic oil spill	Reported spill to paved surface on the south roadway.	No	5/20/1992	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-32

List of materials used in GM processes		
Operation/material	**Date**	**Source of information**
Plating operations/ copper, nickel, chromium	1952 to 1973	4/20/00 Supplemental RI report, 1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
Die casting operations/ aluminum, zinc, Pydraul PCB - containing hydraulic oil	1952 to 1973	4/20/00 Supplemental RI report, 1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
Injection molding operations/ polypropylene pellets, Pydraul PCB - containing hydraulic oil	1963 to 1993	4/20/00 Supplemental RI report, 1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2
Paint operations/ paint, paint thinner (ethylbenzene, xylene, toluene)	1963 to 1993	4/20/00 Supplemental RI report, 1/8/95 Supplemental Response to Information Demand under CERCLA 104(e) Comment #2

List of Permit Violations			
Constituent	**Receiving Media**	**Date**	**Source of Information**
Oil and grease	Former Outfall 001 which discharged to Ley Creek	10/22/1981	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-12
Oil and grease	Information not documented	1/6/1983	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-14
Oil and grease	Former Outfall 001 which discharged to Ley Creek	8/1983	General Motors Former IFG Facility files. August 1983 DMR.
Permit violation of facility effluent	Information not documented	2/21/1984	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-15
Total Suspended Solids	Former Outfall 001 which discharged to Ley Creek	3/1984	General Motors Former IFG Facility files. March 1984 DMR
Oil and grease	Former Outfalls 001 and 002 which discharged to Ley Creek	4/1984	General Motors Former IFG Facility files. April 1984 DMR
Oil and grease	Former Outfall 002 which discharged to Ley Creek	5/1984	General Motors Former IFG Facility files. May 1984 DMR
Oil and grease	Former Outfall 002 which discharged to Ley Creek	6/1984	General Motors Former IFG Facility files. June 1984 DMR
Oil and grease	Former Outfall 002 which discharged to Ley Creek	10/1984	General Motors Former IFG Facility files. October 1984 DMR
Oil and grease	Former Outfall 002 which discharged to Ley Creek	11/1984	General Motors Former IFG Facility files. November 1984 DMR
Oil and grease	Former Outfall 001 which discharged to Ley Creek	12/1984	General Motors Former IFG Facility files. December 1984 DMR
Oil and grease	Former Outfall 002 which discharged to Ley Creek	2/1985	General Motors Former IFG Facility files. February 1985 DMR
PCB and toluene	Outfall 003 which discharged to Ley Creek	10/1985	General Motors Former IFG Facility files. October 1985 DMR
Toluene	Outfall 003 which discharged to Ley Creek	11/1985	General Motors Former IFG Facility files. November 1985 DMR
Toluene	Outfall 003 which discharged to Ley Creek	12/1985	General Motors Former IFG Facility files. December 1985 DMR

List of Permit Violations			
Constituent	**Receiving Media**	**Date**	**Source of Information**
Toluene	Ley Creek	1/30/1986	CERCLA 104(e) Document Submission 9/29/94 Binder #3 Exhibit 3-22
Total Suspended solids	Outfall 003 which discharged to Ley Creek	12/18/97	General Motors Former IFG Facility files. December 1997 DMR
PCB, oil and grease, and BOD5	Outfall 003 which discharged to Ley Creek	9/9/1999	General Motors Former IFG Facility files. September 1999 DMR
PCB	Outfall 003 which discharged to Ley Creek	10/26/1999	General Motors Former IFG Facility files. October 1999 DMR
Iron	Outfall 003 which discharged to Ley Creek	2/9/2000	General Motors Former IFG Facility files. February 2000 DMR
cis-1,2-Dichloroethene	Outfall 03B which discharged to Outfall 003 and then Ley Creek	2/28/2000	General Motors Former IFG Facility files. February 2000 DMR
Zinc	Outfall 003 which discharged to Ley Creek	3/8/2000	General Motors Former IFG Facility files. March 2000 DMR
cis-1,2-Dichloroethene	Outfall 03B which discharged to Outfall 003 and then Ley Creek	3/2000	General Motors Former IFG Facility files. March 2000 DMR
cis-1,2-Dichloroethene and trichloroethene	Outfall 03B which discharged to Outfall 003 and then Ley Creek	4/2000	General Motors Former IFG Facility files. April 2000 DMR
Oil and grease	Outfall 003 which discharged to Ley Creek	9/29/2000	General Motors Former IFG Facility files. September 2000 DMR
Xylene and cis-1,2-dichloroethene	Outfall 003 which discharged to Ley Creek	12/2000	General Motors Former IFG Facility files. December 2000 DMR
cis-1,2-Dichloroethene	Outfall 003 which discharged to Ley Creek	1/2001	O'Brien & Gere Engineers, Inc. files January 2001 DMR

Revised Attachment F

Associated Receptor Species Data for BSAF Calculations
Army Corps Database

Biota Sediment Acumulation Factors (BSAF) from Army Corps Data Base

TCDD (Trophic Level 4)		TCDD (Trophic Level 3)		TCDD (Benth Inv.)		TCDD (bi-valves)		Total PCB (Trophic Level 3)		Total PCB (Trophic Level 4)		Total PCB (Benth Inv.)		Total PCB (bi-valves)	
BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species
0.03	Lake Trout	0.27	Carp	0.5	Nereis virens	0.9	Bent nosed clam	1.09	Alewife	0.62	Rainbow Trout	0.88	Oligochaete		
0.038	Large Mouth Bass	0.155	Guppy	1.212	Worms	0.3	Mollusca misc.	1.23	Yellow Perch	48.63	Brown Trout	0.72	Oligochaete		
0.1	Large Mouth Bass			0.349	Nephtys sp.			1.27	Yellow Perch	0.050	Rainbow Trout	2.37	Oligochaete		
0.096	Large Mouth Bass			0.514	Cerebratulus lacteus			2.24	Yellow Perch	0.28	Brown Trout	0.50	Oligochaete		
0.18	Bowfin			0.344	Polychaete misc.			1.05	Blunt nose minnow	5.3	Small Mouth Bass	1.93	Oligochaete		
0.255	Bowfin			0.2706	Polychaete worms			0.83	Blunt nose minnow	10.7	Lake Trout	0.25	Oligochaete		
0.281	Bowfin			1.6582	Polychaete worms			1.84	Black Bullhead	15.5	Small Mouth Bass	0.28	Oligochaete		
				3.1342	Polychaete worms			0.79	Channel Catfish	7.3	Small Mouth Bass	0.18	Oligochaete		
								2.39	Green sunfish	12.7	Small Mouth Bass	1.57	Oligochaete		
0.100	Median	0.2125	Median	0.507	Median			1.99	Green sunfish	3.8	Small Mouth Bass	1.3	Crayfish		
0.2654	90th percentile	0.2585	90th percentile	2.101	90th percentile			2.06	Pumpkin seed	8.8	Lake Trout	2.28	Crayfish		
								2.78	Alewife	4.0	Small Mouth Bass	4.38	Crayfish		
								20.76	Alewife	3.8	Lake Trout	6.72	Crayfish		
								3.83	Yellow Perch	6.7	Small Mouth Bass	0.36	Crayfish		
								2.28	Yellow Perch	4.3	Lake Trout	0.90	Crayfish		
								7.72	Yellow Perch			2.38	Worms/Leeches		
								6.4	Yellow Perch	5.3	median	0.84	Oligochaete		
								9.7	Yellow Perch	14.38	90th percentile	0.87	Oligochaete		
								4.66	Black Bullhead	15	Count	0.27	Mercenaria sp.		
								5.69	Channel Catfish			0.884	Nucula sp.		
								4.62	Gizzard Shad			0.546	Lumbrineridae misc.		
								4.66	Carp			0.217	Nephtys sp.		
								0.41	Alewife			0.316	Cerebratulus lacteus		
								1.14	Alewife			0.329	Polychaete misc.		
								0.72	Alewife			0.266	Oligochaete		
								0.21	Yellow Perch			0.82	Oligochaete		
								0.25	Yellow Perch			0.34	Oligochaete		
								0.33	Yellow Perch			0.744	Oligochaete		
								0.49	Yellow Perch			0.527	Oligochaete		
								0.63	Yellow Perch			0.685	Oligochaete		
								0.42	Gizzard Shad			1.065	Oligochaete		
								1.07	Black Bullhead			1.42	Oligochaete		
								0.66	Green sunfish			1.69	Oligochaete		
								0.26	Carp			0.462	Oligochaete		
								0.29	Goldfish			0.907	Oligochaete		
								1.91	Black Bullhead			0.346	Oligochaete		
								0.31	Fathead minnow			0.267	Oligochaete		
								1.48	Black Bullhead			0.313	Oligochaete		
								2.22	Channel Catfish			0.344	Oligochaete		
								2.0	Fathead minnow			3.26	Glycera sp.		
								13.2	Blunt nose minnow			3.71	Nephtys incisa		
								13.8	Blunt nose minnow			1.37	Nereis virens		
								2.9	Golden Shiner			5.11	Yoldia limatula		
								2.8	Blunt nose minnow			1.0	Chironimid sp.		
								7.3	Golden Shiner			0.80	Mayfly		
								4.3	Blunt nose minnow			0.2224	Nereis virens		
								3.0	Golden Shiner			11	Chironimidae		
								0.13	Golden Shiner			2.36	Hyalella azteca		
								1.6	Blunt nose minnow						
								0.90	Golden Shiner			0.83	Median		
								3.1	Blunt nose minnow			3.395	90th percentile		
								1.8	Golden Shiner			48	Count		
								1.875	Median						
								7.21	90th percentile						
								52	Count						

Biota Sediment Acumulation Factors (BSAF) from Army Corps Data Base

Acenaphthene		Acenaphthelyne		Anthracene		Benzo-a-pyrene		Benz(bk)fluoranthene		Benzo(b)fluoranthene		Benzo(ghi)perylene	
BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species
0.0104	Pooled Organisms	0.0233	Pooled Organisms	0.0085	Pooled Organisms	0.85	Bent nosed clam	1.02	Bent nosed clam	0.0060	Mercenaria sp.	0.0324	Pooled organisms
0.023	Nucula sp.	0.0090	Nucula sp.	0.029	Nucula sp.	0.050	Bent nosed clam	0.22	Bent nosed clam	0.147	Nucula sp.	0.058	Nucula sp.
		0.0010	Mollusca misc.	0.0010	Polychaete misc.	0.21	Bent nosed clam	0.33	Bent nosed clam	0.020	Lumbrineridae misc.	0.0080	Lumbrineridae misc.
				0.0010	Mollusca misc.	0.33	Bent nosed clam	0.41	Bent nosed clam	0.0030	Nephtys sp.	0.0010	Nephtys sp.
				1.726	Lugworm	0.20	Bent nosed clam	0.31	Bent nosed clam	0.0040	Cerebratulus lacteus	0.0010	Cerebratulus lacteus
0.0167	median	0.009	median			0.20	Bent nosed clam	0.21	Bent nosed clam	0.0050	Polychaete misc.	0.0030	Polychaete misc.
0.02174	90th percentile	0.02044	90th percentile	0.0085	median	0.0343	Pooled organisms	0.0731	Pooled organisms	0.0060	Mollusca misc.	0.0030	Mollusca misc.
2	count	3	count	1.0472	90th percentile	0.062	Nucula sp.						
				5	count	0.011	Lumbrineridae misc.	0.31	median	0.0060	median	0.003	median
						0.0010	Nephtys sp.	0.654	90th percentile	0.0708	90th percentile	0.04264	90th percentile
						0.0030	Polychaete misc.	7	count	7	count	7	count
						0.0040	Mollusca misc.						
						1.12	Lugworm						
						0.062	median						
						0.746	90th percentile						
						13	count						

Biota Sediment Acumulation Factors (BSAF) from Army Corps Data Base

Benzo(k)fluoranthene		Benz(a)anthracene		Chrysene		Dibenzo(ah)anthracene		Fluoranthene		Fluorene	
BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species
0.0030	Mercenaria sp.	0.62	Bent nosed clam	0.61	Bent nosed clam	0.011	Pooled organisms	0.0415	Pooled organisms	0.0027	Pooled organisms
0.085	Nucula sp.	0.15	Bent nosed clam	0.21	Bent nosed clam	0.025	Nucula sp.	0.039	Mercenaria sp.	0.085	Nucula sp.
0.012	Lumbrineridae misc.	0.24	Bent nosed clam	0.40	Bent nosed clam	0.0030	Lumbrineridae misc.	0.531	Nucula sp.		
0.0010	Nephtys sp.	0.21	Bent nosed clam	0.53	Bent nosed clam	0.0010	Polychaete misc.	0.028	Lumbrineridae misc.		
0.0010	Cerebratulus lacteus	0.44	Bent nosed clam	0.47	Bent nosed clam	0.0010	Mollusca misc.	0.007	Nephtys sp.		
0.0030	Polychaete misc.	0.48	Bent nosed clam	0.39	Bent nosed clam			0.007	Polychaete misc.	0.04385	median
0.0040	Mollusca misc.	0.0425	Pooled organisms	0.0614	Pooled organisms	0.003	median	0.019	Mollusca misc.	0.07677	90th percentile
		0.023	Mercenaria sp.	0.029	Mercenaria sp.	0.0194	90th percentile	1.8662	Lugworm	2	count
0.003	median	0.262	Nucula sp.	0.299	Nucula sp.	5	count	0.417	Diporeia sp.		
0.0412	90th percentile	0.03	Lumbrineridae misc.	0.038	Lumbrineridae misc.			0.236	Diporeia sp.		
7	count	0.0090	Polychaete misc.	0.0070	Nephtys sp.			1.33	Diporeia sp.		
		0.015	Mollusca misc.	0.0040	Cerebratulus lacteus			1.28	Diporeia sp.		
		0.61	Lugworm	0.011	Polychaete misc.			0.492	Diporeia sp.		
				0.020	Mollusca misc.			0.654	Diporeia sp.		
		0.21	median					0.346	Diporeia sp.		
		0.584	90th percentile	0.1357	median			0.424	Diporeia sp.		
		13	count	0.512	90th percentile			0.17	Diporeia sp.		
				14	count			0.219	Diporeia sp.		
								0.18	Hyalella azteca		
								0.219	Hyalella azteca		
								0.474	Hyalella azteca		
								0.564	Hyalella azteca		
								0.407	Hyalella azteca		
								0.667	Hyalella azteca		
								0.216	Hyalella azteca		
								0.36	Hyalella azteca		
								0.353	median		
								0.9735	90th percentile		
								26	count		

Biota Sediment Acumulation Factors (BSAF) from Army Corps Data Base

Indeno(123-cd)pyrene		Naphthalene		Phenanthrene		Pyrene	
BSAF	Species	BSAF	Species	BSAF	Species	BSAF	Species
0.0225	Pooled organisms	0.1031	Pooled organisms	0.0435	Pooled organisms	0.53	Bent nosed clam
0.053	Nucula sp.	0.028	Mercenaria sp.	0.30	Mercenaria sp.	0.44	Bent nosed clam
0.0070	Lumbrineridae misc.	0.031	Nucula sp.	2.919	Nucula sp.	0.37	Bent nosed clam
0.0010	Nephtys sp.	0.025	Lumbrineridae misc.	0.257	Lumbrineridae misc.	0.50	Bent nosed clam
0.0020	Polychaete misc.	0.01	Nephtys sp.	0.093	Nephtys sp.	0.47	Bent nosed clam
0.0020	Mollusca misc.	0.009	Cerebratulus lacteus	0.092	Cerebratulus lacteus	0.43	Bent nosed clam
		0.008	Polychaete misc.	0.077	Polychaete misc.	0.1477	Pooled organisms
0.0045	median	0.008	Mollusca misc.	0.106	Mollusca misc.	0.36	Mercenaria sp.
0.03775	90th percentile			1.9562	Lugworm	3.731	Nucula sp.
6	count	0.0175	median			0.388	Lumbrineridae misc.
		0.05263	90th percentile	0.106	median	0.003	Nephtys sp.
		8	count	2.14876	90th percentile	0.047	Cerebratulus lacteus
				9	count	0.131	Polychaete misc
						0.242	Mollusca misc
						1.61	Lugworm
						0.388	median
						1.178	90th percentile
						15	count

Attachment H

Ground Water to Surface Water Evaluation

Groundwater Constituent Comparison to Surface Water Screening Values

A conservative evaluation of the potential impacts of constituents detected in shallow ground water to ecological receptors of Ley Creek was conducted via a comparison of the data from monitoring wells adjacent to Ley Creek to applicable surface water criteria and/or screening values. Ground water at the site generally flows north towards Ley Creek (see Figure 3-3 of the Supplemental Remedial Investigation (SRI) Report; O'Brien & Gere 2000). Therefore, seven wells located between Factory Avenue and the southern bank of Ley Creek (OBG-1, OBG-2, OBG-3, OBG-5, OBG-7A, OBG-7B, and OBG-7C) were considered in this assessment. The locations of these wells are depicted on Figure 2-2 of the SRI Report, attached. Data from the most recent (November 1999) sampling event, as provided in Tables 3-12, 3-13, 3-14, and 3-15 of the SRI Report, were used for this comparison.

The attached Table H-1 shows the detected concentrations of constituents in the shallow groundwater monitoring wells located nearest to Ley Creek. Only three of the eight wells (OBG-3, OBG-5, and OBG-7A) reported measured constituents at concentrations above the method detection limit. Therefore, these are the only results used for this comparison. The detected concentrations of constituents in ground water were directly compared to surface water screening values. This is a conservative measure since ground water flow towards Ley Creek would be diluted by attenuation and by water from the creek once discharged.

As presented in the PFD, the surface water criteria/screening values used for this comparison were obtained from the following sources:

- New York Department of Environmental Conservation (NYSDEC). 1998. *New York State Ambient Water Quality Standards and Guidance Values.* TOGS 1.1.1. Division of Fish, Wildlife, and Marine Resources.
- United States Environmental Protection Agency (USEPA). 1999. *National Recommended Water Quality Criteria - Correction.* Office of Water. EPA 822-Z-99-001.
- Suter, G.W. II and C.L. Tsao. 1996. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision.* Risk Assessment Program. Health Sciences Research Division. Oak Ridge Tennessee.
- United States Department of Defense (USDOD) 1997. *DoD Relative Risk Site Evaluation Primer.* Appendix B-2. Ambient Water Quality Criteria for Ecological Endpoint Evaluations.
- USEPA. 1996. *ECO Update: Ecotox Thresholds.* Solid Waste and Emergency Response, Washington, D.C.

There were two volatile organic compounds (VOCs), two polychlorinated biphenyl (PCB) Aroclors, and six inorganics (metals) detected in the target monitoring wells during the November 1999 sampling event. Methylene chloride and toluene were the only VOCs detected in the ground water monitoring wells adjacent to Ley Creek. Both of these detections were in well OBG-5. Toluene was detected at a concentration several orders of magnitude below the surface water screening values. Therefore, potential ground water contributions of toluene to Ley Creek would not be expected to pose unacceptable risks to ecological receptors in the creek.

Methylene chloride was detected in ground water at a concentration below the National Recommended Water Quality Criteria (USEPA 1999), the Freshwater LEL (USDOD 1997) and the New York State (NYS) criterion for human consumption of fish. A NYS criterion for chronic ecological effects was not available. The concentration of methylene chloride detected in well OBG-5 exceeded the most conservative NYS criterion, which is based on human ingestion of water. Methylene chloride, a common laboratory contaminant, was detected in one of the three site surface water samples collected from Ley

Creek as part of the November 1999 sampling event. Since the single surface water screening value that was exceeded is based on human health effects, it is not anticipated that discharge of methylene chloride from ground water into Ley Creek would pose unacceptable risks to ecological receptors.

Aroclors 1242 and 1248 were each detected in monitoring wells OBG-7A and OBG-3, respectively. Each detection exceeded the selected surface water screening values. These constituents were not detected in surface water samples collected at Ley Creek (see Table 2-4a of the PFD), but are present in sediment samples (see Table 2-3a of the PFD). Since both of these compounds are considered COPCs in Ley Creek sediment, the potential effects of exposure to ecological receptors are currently being evaluated as part of the ERA.

Six metals were detected in the ground water monitoring wells along Ley Creek (arsenic, chromium, copper, lead, nickel, and zinc). Arsenic, chromium, copper, and nickel were detected at concentrations less than their respective surface water screening value. Therefore, potential ground water contributions of these metals to Ley Creek surface water and sediment are not expected to pose unacceptable risks to ecological receptors.

Lead was detected in well OBG-7A at a concentration greater than surface water screening values. Lead was also detected in Ley Creek surface water, but at concentrations below the surface water screening values (see Table 2-4a of the PFD). Since lead has been retained as a COPC in Ley Creek sediment (see Table 2-3a of the PFD) the potential effects to ecological receptors exposed to lead in sediments are currently being evaluated as part of the ERA.

Zinc was detected in three of the ground water monitoring wells along the creek. Two of these three detections (at wells OBG-5 and OBG-7A) were at concentrations greater than the surface water screening value for zinc. As shown in Table 2-4a of the PFD, zinc was detected in surface water at concentrations below the surface water screening levels. However, zinc has been retained as a COPC in Ley Creek sediment and, therefore, potential impacts to ecological receptors are currently being evaluated as part of the ERA.

Table H-1. Detected Constituents in Monitoring Wells Located Along Ley Creek[1]

	Groundwater Monitoring Wells[2]			Surface Water Criteria/Screening Value[7]				
	OBG-3	OBG-5	OBG-7A	National Recommended Water Quality Criteria (USEPA 1999)	TOGS 1.1.1. (NYSDEC 1998)	Freshwater LEL (USDOD 1997)	Suter and Tsao (1996)	USEPA Ecotox . (1996)
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Inorganics								
Arsenic[3]	5.4	3.5	ND	150	150	190	NA	190
Chromium[4]	ND	ND	7.2	11	11	11	NA	10
Copper	ND	1.5	1.7	19	19	12	NA	11
Lead	ND	ND	19.8	5.1	10	3.2	NA	2.5
Nickel	1.2	16.2	47.8	108	108	160	NA	160
Zinc	20.1	532	2,280	246	173	110	NA	100
Volatile Organic Compounds								
Methylene chloride	ND	8	ND	11,000	5	NA	NA	NA
Toluene	ND	2	ND	17,500	NA	17,500	NA	130[6]
PCBs								
Aroclor 1248	0.07	ND	ND	0.014[5]	NA	0.014[5]	0.081	0.19[6]
Aroclor 1242	ND	ND	0.5	0.014[5]	NA	0.014[5]	0.053	0.19[6]

[1] Monitoring wells are located between Factory Boulevard and Ley Creek, as shown on Figure 2-2 of the Supplemental Remedial Investigation (SRI) (O'Brien & Gere 2000).

[2] Results for groundwater monitoring wells report only detected constituents from the most recent (November 1999) sampling event as presented in the SRI report (O'Brien & Gere 2000).

[3] Screening values for Arsenic III, dissolved, are reported.

[4] Screening values for Chromium VI, dissolved, are reported.

[5] Screening values are for total PCBs.

[6] Screening values were calculated using Great Lakes Water Quality Initiative Tier II methodology (40 CFR 9).

[7] References:

New York Department of Environmental Conservation (NYSDEC). 1998. *New York State Ambient Water Quality Standards and Guidance Values. TOGS 1.1.1*. Division of Fish, Wildlife, and Marine Resources. The most conservatve value for all freshwater classes was selected for the protection of fish, when available.

United States Environmental Protection Agency (USEPA). 1999. *National Recommended Water Quality Criteria - Correction*. Office of Water. EPA 822-Z-99-001. April. (NOTE: Values reported are for chronic toxicity in freshwater systems).

Suter, G.W. II and C.L. Tsao. 1996. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision*. Risk Assessment Program. Health Sciences Research Division. Oak Ridge Tennessee.

United States Department of Defense (USDOD) 1997. *DoD Relative Risk Site Evaluation Primer*. Appendix B-2. Ambient Water Quality Criteria for Ecological Endpoint Evaluations.

USEPA. 1996. *ECO Update: Ecotox Thresholds*. Solid Waste and Emergency Response. Washington, D.C. (NOTE: ambient water quality criteria or EPA-derived final chronic values reported unless otherwise noted.)

NA No screening value available.

ND Constituent was not detected.

µg/L Micrograms per liter.

PCBs Polychlorinated biphenyls.

Indicates reported concentration exceeds a surface water criteria/screening value.

Attachment I

Supplemental Information for Assessment Endpoints

Supplemental Information Concerning Assessment Endpoints

The information presented in this attachment is provided as a supplement to GM's response to the Department's comments on the PFD. Presented herein are the proposed assessment endpoints for the terrestrial and aquatic ecological pathways at the site. As agreed upon during the January 24, 2000 meeting, a modeling approach will be utilized to assess potential risk to ecological receptors at the site. Therefore, the assessment endpoints are presented with the knowledge that potential impacts to these endpoints will be measured via media COPC concentration comparisons to appropriate ecological screening values and incorporation of media COPC concentrations into food chain models prepared for receptors representing multiple trophic levels existing at the site.

Following the assessment endpoints identified below, a discussion is presented concerning the likely mechanism to be employed to measure the potential effects to that endpoint. Risk questions associated with the assessment endpoints are presented in GM's aforementioned comment response. Specific details concerning the proposed measurement endpoints including, but not limited to, constituent interactions between media and potential synergistic effects of constituents on ecological receptors, will be presented in the BERA Work Plan.

Terrestrial (Former IFG Facility) pathway assessment endpoints

1. Growth or yield of the site's plant community.
   - comparison of site surface soil COPC concentrations to the phytotoxicity benchmark values presented in Efroymson, *et. al* (1997a) provides a means to evaluate these effects to site flora.

2. Growth, survival and/or reproduction of the soil invertebrate community of the site.
   - comparison of site surface soil COPC concentrations to applicable criteria and the benchmark values presented in Efroymson, et.al (1997b) provides a means to evaluate these effects to the site's soil invertebrate community.

3. Growth, survival, and/or reproduction of small mammal (*e.g.* white-footed mouse, raccoon) individuals and populations inhabiting the site.
   - a food chain model will be utilized to calculate the selected receptor's total daily intake (TDI) of site COPCs via intake from site media. The TDI will be compared to a literature-derived toxicity value (TV) for an evaluation of impact. TVs will be selected first on availability, then based on the effect studied (*i.e.* growth, survival, and/or reproduction).
   - modeled body burden data will be compared to applicable toxicological criteria

4. Survival, and/or reproduction of insectivorous bird (*e.g.* robin) individuals frequenting the site.
   - a food chain model will be utilized to calculate the selected receptor's TDI of site COPCs via intake from site media. The TDI will be compared to a literature-derived TV for an evaluation of impact. TVs will be selected first on availability, then based on the effect studied (*i.e.* survival, and/or reproduction).

5. Survival, and/or reproduction of predatory birds (*e.g.* red-tailed hawk) individuals foraging from the site.
   - a food chain model will be utilized to calculate the selected receptor's TDI of site COPCs via intake from site media. The TDI will be compared to a literature-derived TV for an evaluation of impact. TVs will be selected first on availability, then based on the effect studied (*i.e.* survival, and/or reproduction).

Aquatic (Ley Creek) pathway assessment endpoints

1. Growth or yield of the site's plant community.
   - comparison of site sediment COPC concentrations to the phytotoxicity benchmark values presented in Efroymson, *et. al* (1997a) provides a means to evaluate these effects to aquatic flora.

2. Benthic invertebrate community of Ley Creek as a food source to local wildlife,
   - comparison of site sediment COPC concentrations to applicable criteria and screening benchmarks provides a means to evaluate potential impact to the site's benthic community.

3. Protection and maintenance (growth, survival, and/or reproduction) of local wildlife (including amphibians, reptiles, mammals and birds).
   - comparison of site surface water COPC concentrations to applicable criteria and screening benchmarks for the protection of wildlife
   - potential synergistic impacts of COPCs detected in multiple media will be evaluated

4. Growth, survival, and/or reproduction of piscivorous mammals foraging from Ley Creek,
   - a food chain model will be utilized to calculate the selected receptor's TDI of site COPCs via intake from site media. The TDI will be compared to a literature-derived TV for an evaluation of impact. TVs will be selected based first on availability, then on the effect studied (*i.e.* growth, survival, and/or reproduction).
   - modeled body burden data will be compared to applicable toxicological criteria

5. Growth, survival, and/or reproduction of omnivorous (e.g. pumpkinseed) and/or piscivorous (e.g. largemouth bass) fish inhabiting Ley Creek.
   - a food chain model will be utilized to calculate the selected receptor's TDI of site COPCs via intake from site media. The TDI will be compared to a literature-derived TV for an evaluation of impact. TVs will be selected first on availability, then based on the effect studied (*i.e.* growth, survival, and/or reproduction).
   - modeled body burden data will be compared to applicable toxicological criteria

6. Survival, and/or reproduction of piscivorous bird (*e.g.* great blue heron) individuals frequenting the site.
   - a food chain model will be utilized to calculate the selected receptor's total daily intake (TDI) of site COPCs via intake from site media. The TDI will be compared to a literature-derived TV for an evaluation of impact. TVs will be selected first on availability, then based on the effect studied (*i.e.* growth, survival, and/or reproduction).
   - modeled body burden data will be compared to applicable toxicological criteria

Attachment J

PCA Evaluation – Revised Section 2 of PFD

2. Data evaluation

Metals, polycyclic aromatic hydrocarbons (PAHs), PCBs, polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs) were detected in surface soils, sediments and surface water at the Former IFG facility site, Ley Creek study area (between Town Line Road and Route 11), and upstream reaches of Ley Creek. Many of these constituents, such as metals, are naturally occurring in soils and sediments, whereas others, such as PAHs, PCBs, SVOCs, VOCs, PCDDs/PCDFs, and certain metals are products of common societal sources, such as combustion processes, automotive emissions, asphalt and paving, and other sources. As such, many of these constituents occur at elevated "anthropogenic background" levels in urban and industrial soils or sediments receiving urban run-off or combined sewer overflow (CSO) discharges. As stated in the ERAGS guidance, refinement of the preliminary COPCs involves a re-evaluation of the SLEA Hazard Quotients (HQs) based on more realistic exposure assumptions and inputs. *"For those constituents for which the HQs drop to near or below unity, the risk assessor and risk manager should discuss and agree on which can be eliminated from further consideration at this time"*. Information on local or regional pristine or urban background levels may be relevant in assessing if naturally occurring or anthropogenic constituents with derived HQs near unity are included as COPCs in the BERA. Based on these considerations, this section has the following objectives:

- Describe the sources of data applied in the analysis, and present statistical summaries of constituents detected in sediment, surface soil, and surface water
- Assess the extent to which site related or other sources may be contributing to constituents detected in Ley Creek sediments and site soils using statistical and graphical pattern recognition techniques. Based on the analysis, constituents detected at elevated levels relative to local and regional pristine or urban background levels are identified.

2.1. Data summary

The purpose of this section is to describe the sources of data applied in the analysis, and present statistical summaries of constituents detected in sediment, surface soil, and surface water.

2.1.1. Sediment

Analytical data from Ley Creek between Town Line Road and Route 11, as well as data from the South Branch, Sanders Creek, and North Branch, collected by O'Brien & Gere in 1990 and NYSDEC in 1996 was utilized in the analysis. The segment of Ley Creek between the Town Line Road Bridge (TLRB) and the Route 11 bridge was defined as the "study area" portion of Ley Creek, whereas the South Branch, Sanders Creek, North Branch, and segment of Ley Creek upstream of TLRB are identified as "upstream" of the Site (Figure 2-2). The samples were analyzed for VOCs, SVOCs, metals, PCBs, and PCDDs/PCDFs.

The first step of the analysis was to compare the concentrations of detected constituents in the O'Brien & Gere data set with detected constituents in the NYSDEC data set. A summary of the O'Brien & Gere data and NYSDEC data, respectively, is presented in Appendix 2 . The O'Brien & Gere and NYSDEC data for each constituent in each reach were compared using the Kruskal-Wallis non-parametric multiple comparison test. Within each reach, no statistically significant differences were observed between the O'Brien & Gere data and the NYSDEC data at the 95% confidence level. Therefore, the O'Brien & Gere and NYSDEC data were combined for subsequent analyses.

The next step was to compare the constituents in the four upstream reaches (confluence, North Branch, South Branch, Sanders Creek) in order to identify a representative upstream data set. A summary of PAHs and metals detected in the four reaches is presented on Figure 2-4 and 2-5 respectively. As shown on Figure 2-4, the PAH levels in the North Branch are consistently lower than the PAH levels in the South Branch, Sanders Creek and confluence reaches, whereas the levels in the South Branch, Sanders Creek, and confluence are statistically equivalent at the 95% confidence level (Appendix 2). For most of the metals, the concentrations in the North Branch are also lower than the levels observed in the other reaches, though the concentration differences are less pronounced as compared with the PAH data. The metal concentrations in the South Branch, Sanders Creek, and confluence are statistically equivalent at the 95% confidence level (Appendix 2). As shown on Figure 2-2, the confluence reach is immediately downstream of Sanders Creek and the South Branch. Therefore, to improve the statistical power of the analysis, the data from these three reaches was combined as the "upstream" data for the analysis.

Summary tables showing the minimum, maximum, arithmetic mean (using one-half detection limit for non-detects) and the frequency of detections are presented on Tables 2-3a for the study area, and 2-3b for the sampled upstream sediments. As shown on Tables 2-3a and 2-3b, metals, PAHs, PCBs, SVOCs, and VOCs and PCDDs/PCDFs were detected in study area sediments and in upstream sediments.

2.1.2. Surface soils

Soil samples were collected from the IFG Facility by O'Brien & Gere in July and October 1999 (Figure 2-1). In addition, historical data collected by O'Brien & Gere between 1988 and 1996 were used (OBG 1997). Most of the samples were analyzed for VOCs, SVOCs, and metals. In addition, six samples were collected from the vicinity of the former liquid waste incinerator and analyzed for PCDDs/PCDFs. Summary tables showing the minimum, maximum, arithmetic mean (using one-half detection limit for non-detects) and the frequency of detections are presented on Table 2-2. As shown on Table 2-2, metals, PAHs, PCBs, SVOCs, VOCs, and PCDDs/PCDFs [1] were detected in surface soils at the site. Appendix A1-3 presents the laboratory analytical data utilized for the PFD.

2.1.3. Surface water

Surface water samples were collected by O'Brien & Gere from the study area and upstream during two sampling events between 1998 and 1999 (Figure 2-2). A low flow sampling event was conducted in November 1998 and a high flow event was conducted in September 1999. The samples were analyzed for PCBs, VOCs, SVOCs, and metals. Appendix A4 and A5 present the surface water data utilized in this PFD.

As previously discussed, surface water data were collected during two events, a high flow event and a low flow event. The small number of samples and low frequency of detections during the two rounds precluded statistical analysis of the data. However, qualitative review of the data suggests that the data from the two rounds are equivalent. Therefore, the data from the high flow and low flow data were combined for the evaluation. Summary tables showing the minimum, maximum, arithmetic mean (using one-half detection limit for non-detects) and the frequency of detections are presented on Table 2-4a for the study area surface water samples, and Table 2-4b for the upstream surface water samples.

2.2. Source assessment

The objective of the source assessment was to evaluate the detected constituent levels and patterns in soils and sediments of the Former IFG Facility site with detected levels and patterns in upstream samples and data published in the literature. As discussed in this section, metals, PAHs, PCBs, PCDDs/PCDFs, SVOCs, and VOCs were detected in surface soils, sediments and surface water at the site, and upstream

[1] Sample specific PCDD/PCDF levels were expressed as 2,3,7,8-TCDD equivalents (TEQs) based on the mammalian congener specific Toxicity Equivalence Factors (TEFs) presented in Van den Berg *et al.* , 1998, Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife, Env. Health Perspectives, 106, 12, 775-792.

reaches of Ley Creek. Many of these constituents, such as metals, are naturally occurring in soils and sediments, whereas others, such as PAHs, PCBs, PCDDs/PCDFs, and certain metals are products of common societal sources, such as combustion processes, automotive emissions, asphalt and paving, and other sources. As such, many of these constituents occur at elevated "anthropogenic background" levels in urban and industrial soils or sediments receiving urban run-off or combined sewer overflow (CSO) discharges. The purpose of this section is to evaluate the constituent concentrations detected in site surface soils and study area sediments in the context of naturally occurring and anthropogenic background concentrations, since this information may assist in refining the list of COPCs and assessing the strategy for the BERA. However, it is important to stress that, consistent with ERAGS guidance, the analytical data set, media concentration screening and PFD HQ calculations have not been modified or adjusted as a result of the background assessment.

2.2.1. Comparison of Ley Creek study area data with upstream

As part of the data analysis, the constituent concentrations detected in study area sediments were compared with upstream levels. Statistical analysis was performed using Analysis of Variance (ANOVA) (a parametric multiple comparison procedure) on the log transformed data[2]. A summary of the study area data and the upstream data is presented on Table 2-1. As shown on Table 2-1, the sediment concentrations of Aroclor 1016, Aroclor 1242, and Aroclor 1248 in study area samples are statistically greater than upstream levels. However, the concentrations of metals, PAHs[3], SVOCs, and VOCs, in study area sediments are statistically equivalent with the upstream sediments. This observation is consistent with the fact that Ley Creek drains an urban / industrial area, and as such would be expected to have elevated concentrations of metals, PAHs, and PCDD/PCDFs as compared with sediments from a pristine water body. Furthermore, as previously discussed, the metals and PAHs were detected at lower concentrations and frequency in the North Branch as compared with the South Branch, Sanders Creek and confluence. Therefore, the North Branch sediment was considered to be representative of local background levels.

2.2.2. Evaluation of metals, PCDDs/PCDFs, and PAHs

The levels of metals, PAHs, and PCDDs/PCDFs were further assessed relative to naturally occurring or anthropogenic background levels based on one or more of the following tasks:

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[2] The data distributions for the study area and upstream data were examined using histograms, normal probability plots, skewness and kurtosis, and the Shapiro-Wilke test of normality. Based on this analysis, most of the constituents were described by log-normal distributions. Therefore, the analysis was performed on the log-transformed data.

[3] With the exception of benzo(g,h,i)perylene

- Comparison of detected concentrations of metals in soils and sediments with published ranges for naturally occurring levels in New York State.

- Comparison of PAHs and PCDDs/PCDFs concentrations in site soils and study area sediments with "anthropogenic background" levels reviewed in the literature.

- Comparison of PAH and PCDDs/PCDFs congener profiles (pattern assessment) in site soils and study area sediments with upstream sediment samples and literature data on characteristic congener profiles of possible site related or local off-site sources. The pattern assessment techniques applied included Principal Components Analysis (PCA), histograms, boxplots, and qualitative review.

Metals

Metals are naturally occurring in soils and sediments and may occur at elevated concentrations in the vicinity of anthropogenic sources and urban areas. For example, lead and aluminum may be elevated alongside roads, and arsenic and lead may occur at elevated levels in agricultural settings where arsenical pesticides were used. No information was identified relating to urban background metal concentrations in cities in New York State. NYSDEC has reviewed the ranges for naturally occurring background levels of metals in soils in New York State (McGovern 1993). Therefore, in order to assess background, the concentrations of metals in surface soils were compared with the range of naturally occurring soil background levels in New York State. In addition, detected metals concentrations in the study area sediments were compared with detected levels in upstream sediments and the North Branch[4].

A summary of the site soil, background soil, and sediment metal concentrations is presented on Table 2-5. As shown on Table 2-5, the study area sediment concentrations are equivalent to the range detected in upstream sediments. The maximum detected levels of arsenic, chromium, copper, magnesium, nickel, selenium, and zinc in surface soil exceed naturally occurring background. The levels of aluminum, chromium, cobalt, lead, selenium, silver, sodium, vanadium, and zinc in the study area and upstream reaches exceed the range detected in the North Branch. Overall, these observations suggest that there are elevated soil metal concentrations in certain areas of the site. The metal levels in the Ley Creek study area and upstream locations exceed naturally occurring background, but are likely representative of anthropogenic background from urban point or non-point sources.

[4] The North Branch sediment data are assumed to be representative of naturally occurring background levels, whereas the upstream data (South Branch, Sanders Creek, and the confluence) are considered as anthropogenic background.

PCDDs/PCDFs

At the request of NYSDEC, six surface soil samples in the vicinity of the former liquid waste incinerator, six Ley Creek study area sediment samples, and six upstream sediment samples were collected an analyzed for PCDDs/PCDFs. According to NYSDEC sampling and analysis for PCDDs/PCDFs was warranted based on their possible formation during combustion of potential PCB containing materials in a former liquid waste incinerator. PCDD/PCDFs may be formed during the combustion of solid waste, industrial waste, and PCB containing materials. However, numerous other anthropogenic sources such as household and industrial furnaces and burners, municipal solid waste incinerators, combined sewer overflows, urban run-off, and other sources also result in the formation and release of PCDDs/PCDFs to the environment (Rappe 1993, Hutzinger and Fiedler, 1989, Cavallaro *et al.* 1980). As a result, PCDDs/PCDFs have been widely detected in background urban / industrial soils and sediments, urban storm-water runoff, sewage, and combined sewer overflows (Rappe *et al.* 1991, Rappe 1993, Huntley *et al.* 1997). It is useful, therefore, to evaluate the likely sources for the PCDD/PCDFs detected in site soils and Ley Creek sediments, and assess the extent to which site related or other sources may be contributing to these levels.

In general, source/anthropogenic background assessment for PCDD/PCDFs may be performed by comparing the detected concentrations with literature-reported concentrations or site specific background concentrations. In addition, examination of "congener profiles" may also provide insight regarding possible or likely anthropogenic sources. Due to thermodynamic factors, different source processes may result in characteristic ratios of the PCDD/PCDF congeners (congener profile). Since PCDD/PCDFs are relatively resistant to environmental degradation, comparison of the detected congener profiles in soil or sediment samples with reported profiles in background samples or emission sources may provide information regarding the potential sources of the detected PCDD/PCDFs residues. Statistical and graphical pattern recognition techniques have been widely applied to evaluate similarities and differences in PCDD/PCDF congener ratios, and infer likely sources for PCDD/PCDFs detected in environmental media (Townsend, 1986, Huntley *et al.* 1997, Norwood *et al.* 1989, Hansson *et al.* 1996). In this assessment, graphical pattern recognition techniques were applied to compare the congener profiles in site samples with upstream samples and other potential sources as reported in the literature. Based on the results of the analysis the potential sources of the detected PCDD/PCDF levels in site soils and Ley Creek sediments are assessed.

The source/background evaluation for PCDD/PCDFs was performed based on the following comparisons:

- Comparison of detected surface soil levels with published ranges for urban and industrial soils

- Comparison of detected Ley Creek sediment levels with detected upstream levels as well as published ranges for urban and industrial sediments

- Pattern Assessment of the PCDD/PCDF congener profiles from the study area compared with upstream data and reported congener profiles[5] for source processes that may be contributing to PCDD/PCDF levels in site soils and Ley Creek sediments.

A brief review of concentrations and congener profiles in urban media and relevant anthropogenic sources is presented below. Following that, the concentrations and pattern assessment of PCDD/PCDFs detected in Ley Creek sediments and Site surface soils are described and interpreted with respect to potential sources.

Literature Review:
Based on a review of site conditions and history, the following anthropogenic sources were considered to be potential contributors to detected PCDD/PCDFs in site soils and Ley Creek sediments and were the subject of the literature review:

- Fossil fuel fired boilers
- Trace residues in Aroclor mixtures
- Combustion of PCB containing materials
- General urban background from atmospheric deposition
- Urban run-off, stormwater, and combined sewer overflows

Fossil Fuel Boilers: PCDDs/PCDFs are formed during the combustion of wood (Bacher et al. 1992) and fossil fuels, such as coal and oil (Thoma, 1988) in boilers, furnaces, and heating systems. Thoma analyzed 50 soot samples from oil, coal, or wood ovens, and oil or wood central heating systems in Germany. He reported generally 5 to10 times higher levels of PCDFs in the samples as compared with PCDDs. Of the PCDDs detected, the heptachlorinated and octachlorinated dioxins were the dominant congeners. Based on the data of Thoma, TCDD TEQ levels were calculated for ash from coal, wood or oil furnaces (see Appendix B). The TCDD TEQ in coal ash ranged from approximately 1,000 to 15,000 ng/kg with a median of approximately 5,000 ng/kg, wood ranged from 230 to 43,000 ng/kg with a median of 5,500 ng/kg, and oil ranged from 9 to 1,400 ng/kg with a median of 89 ng/kg.

Aroclor Mixtures: Many commercial Aroclor mixtures contain trace levels of PCDF due to their inadvertent production during manufacture (Brown *et al.*, 1988; ATSDR, 1993). Bowes *et al.* (1975a) reported that samples of unused Aroclors manufactured in 1969 and 1970 contained PCDFs (primarily TCDF through HxCDF) concentrations ranging from 0.8 to 2.0 mg/kg. In a follow up paper, Bowes *et al.* (1975b) reported 2,3,7,8-TCDF and 2,3,4,7,8-PeCDF concentrations ranging from 0.11 to

[5] Since the intent of the analysis was to examine differences in the relative distributions of the congeners rather than the absolute concentrations, each congener was normalized to the sum of all congeners detected in that sample (as described by Norwood *et al.* 1989 and Huntley et al. 1997).

0.33 mg/kg and 0.12 to 0.83 mg/kg, respectively, in unused samples of Aroclor 1254 and Aroclor 1260. Other studies have also observed that the levels of PCDDs in commercial PCB mixtures are much lower than those of the PCDFs (Malisch 1994).

Combustion of PCB containing material The accidental combustion of PCB containing electrical equipment or intentional combustion of PCBs in incinerators and boilers not approved for PCB burning may produce PCDFs and lower levels of PCDDs. At elevated temperatures, such as in transformer fires, PCBs can undergo reactions to form PCDFs and other by-products. Numerous accidental fires and explosions involving PCB transformers and capacitors in the United States and Scandinavia, which involved the combustion of PCBs and the generation of PCDDs and PCDFs, have been documented (Hutzinger and Fiedler, 1991b; O'Keefe and Smith, 1989; Williams et al., 1985). For example, analyses of soot samples from a Binghamton, New York, office building fire detected 20 pg/kg of total PCDDs (0.6 to 2.8 pg/kg of 2,3,7,8-TCDD) and 765 to 2,160 pg/kg of total PCDFs with 12 to 270 pg/kg of 2,3,7,8-TCDF. At that site, the fire involved the combustion of a mixture containing PCBs (65 percent) and chlorobenzene (35 percent).

Urban run-off stormwater, and combined sewer overflows: Due to their widespread urban distribution, PCDD/PCDFs are commonly detected in sediments receiving urban runoff (Fisher et al. 1999), CSO and sewage discharge (Rappe 1993, Mclachlan et al. 1996, Rappe 1989, Huntley et al., 1997), and industrial discharges (Norwood et al., 1989, Huntley et al., 1997). Huntley et al analyzed 40 sediment samples for PCDD/PCDF levels adjacent to four CSO outfalls in the Lower Passaic River in New Jersey. They reported PCDD/PCDF levels ranging from approximately 30 ng/kg TEQ to greater than 500 ng/kg TEQ. In their data, the congener profile was dominated by OCDD (65 to 75 %) with significantly lower levels of lesser PCDDs/PCDFs.

Surface sediment samples were collected from several estuaries in the United States (Norwood *et al.*, 1989). The sampling sites included Black Rock Harbor (BRH) in Bridgeport, Connecticut, (described as an industrialized urban estuary); central Long Island Sound (LIS) (described as a relatively clean reference site) New Bedford Harbor (NBH), Massachusetts, (described to be sediments adjacent to a PCB Superfund site). The sample from Black Rock Harbor contained a TEQ level of approximately 250 ng/kg TEQ (comparable to the data of Huntley *et al.*), whereas the sample from Long Island Sound contained lower levels of PCDDs/PCDFs (approx. 18 ng/kg TEQ). The congener profile for both the Black Rock Harbor and the Long Island Sound sample was dominated by OCDD (66 to 76 %). The PCDD/PCDF levels in sediments in New Bedford Harbor, ranged from 150 to 500 ng/kg TEQ. The congener profiles for this sample shows lower OCDD ratios (32 % to 66%) as compared with the Black Rock Harbor and Long Island Sound, and substantially higher ratios of 2,3,7,8 TCDF, PCDFs, and HxCDFs as compared with the BRH and LIS samples. This observation

is consistent with the fact that PCDFs (2,3,7,8-TCDF in particular) are the dominant congeners in PCBs and their combustion products.

General urban background from atmospheric deposition: Due to widespread urban/industrial sources, PCDDs/PCDFs may be widely distributed in urban air and surficial urban soils (Bumb et al. 1980, Bingham et al. 1989, McLachlan et al. 1996, Bacher et al. 1992). Soil sampled in 1987 from the vicinity of a sewage sludge incinerator was compared with soil from rural and urban sites in Ontario, Canada, by Pearson et al. (1990). Soil in the vicinity of the incinerator showed a general increase in CDD concentration with increasing degree of chlorination. Of the PCDFs, only OCDF was detected (mean concentration 43 ppt). Rural woodlot soil samples contained only OCDD (mean concentration of 30 ppt). Soil samples from undisturbed urban parkland settings revealed only HpCDDs and OCDD, but all PCDF congener groups (Cl_4 to Cl_8) were present. Those samples showed an increase in concentration from the HpCDDs to OCDD and PeCDFs to OCDD. The TCDFs had the highest mean value (29 ppt) of all the PCDF congener groups.

Birmingham (1990) analyzed PCDD and PCDF levels in soil samples from industrial, urban, and rural sites in Ontario and some U.S. Midwestern States The levels of PCDD/PCDF in rural soils were primarily nondetected (ND), although the HpCDDs and OCDD were found in a few samples. In urban soils, the tetra- through octa-congener groups were measured for both PCDDs and PCDFs. The HpCDDs and OCDD dominated the homologue profile and were two orders of magnitude greater than in the rural soils. These soils also contained measurable quantities of the TCDDs and PeCDDs. Industrial soils did not contain any TCDDs or PeCDDs, but they contained the highest levels of the TCDFs, HpCDFs, and OCDF. In another study, soils from industrialized areas of a group of cities from Midwestern and Mid-Atlantic States (Michigan, Illinois, Ohio, Tennessee, Pennsylvania, New York, West Virginia, Virginia) were analyzed for levels of 2,3,7,8-TCDD (Nestrick *et al.*, 1986). Many of the samples were taken within 1 mile of major steel, automotive or chemical manufacturing facilities, or municipal solid waste incinerators. Concentrations of 2,3,7,8-TCDD measured in this study ranged from ND to 9.4 ppt.

Evaluation of site PCDD/PCDF data, a summary of the analytical data, and congener profiles for the data collected from the site and the reference data from the literature are presented on Table 2-6.

In this assessment, we applied four different approaches to assess similarities and differences within soil and sediment samples collected at the site, and compare the congener patterns in site samples with characteristic congener patterns from different source materials as reported in the literature. :

1) Comparison of TEQ Concentrations: As shown on Table 2-6, the range of detected PCDDs/PCDFs in the Ley Creek study area sediment

samples (20 ng/kg to- 55 ng/kg TEQ, median 35 ng/kg) is comparable to the range of PCDD/PCDFs detected in upstream sediments (10 ng/kg to 56 ng/kg TEQ, median 25 ng/kg TEQ). Furthermore, the detected PCDD/PCDFs in Ley Creek study area or upstream sediments slightly exceed the reported PCDD/PCDF from Long Island Sound sample (reference sediment) (19 ng/kg TEQ) but are less than or comparable to the levels reported for non-point source urban/industrial sediments from Black Rock Harbor or the Passaic River.

2) Principal Components Analysis (PCA) - PCA has been widely applied as a basis to assess similarities and differences in chlorinated dioxin and furan patterns in sediments (Huntely et al. 1997, Norwood et al. 1989) and other media (Hansson et al. 1996). PCA was used as an initial examination of potential pattern similarities in PCDD/F profiles in site and reference source samples[6]. The patterns observed in the PCA plot were then examined and further assessed using other graphical, statistical, and qualitative approaches. PCA is a technique in which multiple variables which describe a given pattern are combined into a few underlying descriptive dimensions, which facilitates an examination of the potential systematic variations which may occur in data matrices. PCA provides an overview of the dominating patterns and major trends in the data, if they exist. The PCA output generates a score for each principal component associated with each sample. A plot of the major PCA scores against each other provides a graphical basis to assess similarities and differences in the underlying pattern in each sample - samples which are spatially proximate on the PC score plots have similar underlying patterns, whereas samples which are spatially distant are less similar.

The PCA score plot for the data analyzed is presented as Figure 2-8. The correlation matrices, eigenvalues, and eigenvector loadings from the PCA are presented in Appendix 1 . As the eigenvalues in Appendix 1show, the first three principal components account for approximately 79 % of the total variability in the data structure. This indicates that PCA is a useful tool for simplifying the total variability and examining underlying correlations in the data structure. The sample specific scores for the principal components is also presented in Appendix 1 .

As previously discussed, a scatter plot of the sample specific scores for the main principal components is very useful to assess similarities and differences in data structure between samples. A plot of Prin 1 vs Prin2, therefore provides a graphical basis to assess similarities and differences in the underlying pattern in each sample - samples which

[6] Since the intent of the analysis was to examine differences in the relative distributions of the congeners rather than the absolute concentrations, each congener was normalized to the sum of all congeners detected in that sample (as described by Norwood et al. 1989 and Huntley et al. 1997). In addition, as discussed by Norwood et al., the normalized data were log-transformed so that the influence of components occurring at low concentrations would not be minimized. Non detects were assigned the value of the Method Detection Limit (MDL).

are spatially proximate on the PC score plots have similar underlying patterns, whereas samples which are spatially distant are less similar.

The scatter plot of Prin1 vs Prin2 for the study area sediments, upstream sediments, site soils, and reference sources is presented as Figure 2-6a. To aid in the graphical interpretation, the site and references samples are grouped into the classifications presented in Section 5, and plotted as color coded symbols. As shown on Figure 2-6a, the samples from the Site Sediment (orange triangles) and Upstream Sediment (blue squares) cluster in the same region, suggesting a similar pattern for study area sediments as compared with upstream sediments. These samples are also closely clustered with the CSO (pink squares) and general harbor sediment samples (black circles), which suggests that the chlorinated dioxin and furan congener patterns in Site Sediment and Upstream Sediment samples are similar to the pattern commonly observed in CSO/sewage sludge materials and common harbor sediments. In contrast, the data from PCB impacted sediment (brown circles) cluster in the bottom right quadrant, suggesting that the congener profile reported in "PCB impacted" sediments is different that that observed in study area sediments. Most of the samples from Plant Area soils (blue circles) are in the right side of the plot. This suggests that the patterns observed in the Ley Creek sediments is different than the Plant Area soil data.

3)Histogram Plots – Histogram plots are commonly used for comparison for a wide variety of data. Histograms were used to compare site sediment data to upstream sediment data (Figure 2-6) and site sediment data to reference data (Figure 2-7). Examination of the histograms on Figure 2-6 shows that the sample specific congener profiles in Ley Creek study area are very consistent between samples and highly similar to the congener profiles from upstream samples. Furthermore, the congener profile in Ley Creek study area samples are very similar to the congener profiles reported in the literature for local or regional urban sediments (Figs. 2-6, 2-7, 2-8).

The dominant congeners are OCDD (65 - 80%), with relatively high levels of 1,2,3,4,6,7,8 HpCDD (8 % to 13%), OCDF (3 % to 7 %), and 1,2,3,4,6,7,8-HpCDF (2 % to 3.5 %) and low levels of 2,3,7,8-TCDF (0.04 - 0.8%). The study area and upstream congener profiles are very similar to the congener profiles from reference and urban sediments reported in the literature (Fig. 2-8), which are also dominated by OCDD (66 % to 75%), 1,2,3,4,6,7,8 HpCDD (5% to 11%), OCDF (7% to 14%), and 1,2,3,4,6,7,8-HpCDF (3% to 8%) and low levels of 2,3,7,8-TCDF (0.09 - 0.6%). The study area and upstream sample profiles are different from the New Bedford Harbor samples (reported in the literature as PCB sediments), which show markedly higher levels of 2,3,7,8 TCDF (6% to 13%) and lower ratios of OCDD (32% to 64 %).

4)Box and Whisker Plots - Box and whisker plots have also been used to graphically examine similarities and differences in chlorinated dioxin and furan congener patterns (Townsend et al. 1986). Box and whisker plots were used to graphically compare the relative congener pattern in different areas and reference sources. For each set of site data or reference data, the median, 75th, 25th, 5th and 95th percentile across all the samples in that group was derived for each normalized congener value. This data was plotted as a box and whisker plot on a logarithmic scale side by side for the groups being compared. A log scale was used to allow graphical comparison of the isomer profiles over a wide range of normalized congener values. The box-plot comparisons are presented as Figure 2-8.

5)Qualitative Evaluation - In addition to the quantitative techniques discussed above, the detected congener patterns in site soils were qualitatively compared with the patterns which may occur from different reference sources. The qualitative assessment was particularly useful as a basis to compare site samples with potential sources for which 2,3,7,8-substituted congener data was not available. In these cases, data on total congener levels was applied.

The detected PCDD/PCDF levels and congener ratios in site surface soils are presented on Table 2-6. Histogram graphs of the congener profiles are presented on Figure 2-9. Overall, the detected PCDD/PCDF levels in certain surface soil samples (maximum detected TEQ of 900 ng/kg) appear to be higher than the levels reported in the literature for typical non-point source urban background, but are comparable to the levels reported in ash from oil fired boilers (9 to 1400 ng/kg TEQ). Analysis of the congener profile shows significant variability across samples. Generally, however, the soil samples show relatively high ratios for 2,3,7,8-TCDF (8% to 40 %) and 2,3,4,7,8-PeCDF. The relatively high PCDF levels are consistent with the patterns expected from fossil fuel boilers or combustion products of PCBs. The OCDD ratios (15 % to 56 %) are generally lower than the OCDD ratio expected for typical urban background, but higher than the ratio in boiler ash or PCB related sources. This suggests that deposition of airborne urban particulates is also contributing to the detected PCDD/PCDFs.

PCDD/PCDF Conclusions: Overall, the data assessment for sediments samples suggests that the detected levels and congener profiles of PCDD/PCDFs in the Ley Creek study area and upstream sediments are very similar and highly consistent with the reported levels and congener profiles in sediments receiving non-point source urban run-off and CSO discharges. Furthermore, the congener profiles in Ley Creek study area samples are different than the congener profiles reported in Aroclor products, PCB combustion products, and PCB impacted sediments.

Overall, the detected PCDD/PCDF levels in certain surface soil samples appear to be higher than the levels reported in the literature for typical non-point source urban background, but are comparable to the levels reported in ash from oil fired boilers. The relatively high PCDF levels

observed in site soils are consistent with the patterns expected from fossil fuel boilers or combustion products of PCBs. The OCDD ratios (15 % to 56 %) are generally lower than the OCDD ratio expected for typical urban background, but higher than the ratio in boiler ash or PCB related sources. This suggests that deposition of airborne urban particulates is also contributing to the detected PCDD/PCDFs.

PAHs

Literature Review

PAHs are formed in the incomplete combustion of coal, oil and gas, garbage, and other organic substances. They may also be found in substances such as coal tar, creosote, crude oil, road and roofing tar, used motor oils, and in refined petroleum products including gasoline, kerosene, diesel fuel, and some home heating oils. Due to their formation in combustion processes, PAH's are ubiquitous in soils. Background PAH levels in a specific urban environment would depend on various factors such as proximity to roadways, combustion sources, and combustion related fill materials.

Three studies addressing PAHs in New York State or the Northeast United States urban soils were identified. Bradley *et al.* (1994) conducted a survey of PAHs in twenty surficial soils from each of three New England cities (Boston, MA, Providence, RI, and Springfield, MA). They reported total PAH levels ranging from approximately 2,000 to 166,000 ug/kg with an arithmetic mean of 18,000 ug/kg. Detected carcinogenic PAH levels ranged from approximately 300 to 21,000 ug/kg benzo-a-pyrene equivalents (B(a)P TE) with an arithmetic mean of 2,000 ug/kg. Furthermore, the authors observed that PAH levels adjacent to pavements were approximately three times greater than the levels reported in samples remote from paved areas. Based on a statistical analysis of their data, the authors derived a 95 % upper confidence limit of 3,300 ug/kg on the arithmetic mean for Ba(P) TE, which they proposed as a "background" urban soil level.

Stern *et al.* (1989) (for the New York State Department of Health) conducted PAH analyses on twelve surface soil samples from a New York city neighborhood in the vicinity of a municipal incinerator. In general, they reported lower average concentrations and less frequent detections of PAHs in soils as compared with the data of Bradley *et al.* (1994). The differences in reported concentrations may be attributed to different local conditions, such as the proximity of roads or paved surfaces, and the presence of combustion related fill materials.

Recently, the New York State Department of Health conducted surface soil sampling in two residential neighborhoods in Buffalo, New York, with the objective of "*evaluating PAHs in urban soils*" (Miles *et al.*, 1998). They collected 24 soil samples in the Seneca-Babcock neighborhood of Buffalo, and nine samples in a nearby neighborhood for comparison. According to the authors, the samples were collected

without bias using a 160-meter grid superimposed over a map of each neighborhood. The results of their study are summarized on Table 2-7. The concentrations of total PAHs averaged 30,000 ug/kg and carcinogenic PAHs averaged 15,000 ug/kg. According to the authors, "*these concentrations are higher than the data reported in the literature for other residential neighborhoods and are attributed to a long history of commercial and industrial uses, including energy production, vehicular traffic and industrial emissions.*" However, it is important to note that the levels reported by Miles *et al.* (1989) are generally consistent with the data of Bradley *et al.* (1994) from Massachusetts cities, which indicates that urban PAH background levels in historically commercial/industrial areas, or near roads or pavement may be higher than the PAH levels in areas with other historic land uses.

Evaluation of Site PAH Data

Sediments: A summary of the detected PAH concentrations in the Ley Creek study area, upstream, and North Branch are presented on Table 2-7. As shown on Table 2-7, and discussed in Section 2.2.1, the PAH levels detected in the study area do not exceed the PAH levels detected in upstream sediments. However, PAH levels detected in the North Branch are lower than the levels monitored in the study area or upstream locations, which suggests that the study area sediments and upstream sediments are anthropogenically impacted.

Histogram graphs of the congener profiles for the study area and upstream sediment samples are presented of Figures 2-10 and 2-11 respectively. There is high variability in the sample specific congener profile for PAHs. As such, no clear or consistent patterns are evident in the histogram charts. The boxplot congener profiles comparison (Figure 2-12) show that the relative proportions of individual PAH compounds in the study area sediments are similar to those observed in the upstream sediments.

Surface Soils: A summary of the detected PAH concentrations in surface soil at the site, and the anthropogenic background levels discussed above are presented on Table 2-7. As shown on Table 2-7, the maximum detected PAH levels in site soils exceed the range for the anthropogenic background levels reviewed. However, it is important to recognize that there is substantial variability in the PAH levels detected across the site. The highest concentrations were associated with one sample (OBG-TB-46) collected from the vicinity of the former transformer/switch house, located in the former thinner tanks area (up to 1200 mg/kg), and to a lesser extent in surface soil samples located in the IWT plant area (up to 18 mg/kg). The detected PAH levels in most of the site are within the reported range for urban background.

2.3. Data evaluation summary and conclusions

The following conclusions are drawn based on the data evaluation:

- The detected levels of metals, PAHs, PCBs, and PCDDs/PCDFs in surface soil in certain areas of the site exceed naturally occurring or typical local or regional urban background levels.

- The concentrations of Aroclor 1016, Aroclor 1242, and Aroclor 1248 in Ley Creek study area sediment samples are statistically greater than upstream levels. However, the concentrations of metals, PAHs, SVOCs, and VOCs, in study area sediments are statistically equivalent with the upstream sediments.

- The detected levels and congener profiles of PCDD/PCDFs in the Ley Creek study area sediments are very similar and highly consistent with the congener profiles observed in upstream samples and regional urban/industrial sediments. The congener profiles in Ley Creek study area sediment samples are different than the dominant congeners reported in Aroclor products, PCB combustion products, and PCB impacted sediments.

  Collectively, these observations suggest that, with the exception of Aroclor 1016, Aroclor 1242, and Aroclor 1248, the constituents detected in the Ley Creek study area sediments are largely attributable to general urban and industrial point and non-point sources rather than site related releases.

Table 2-1. *Summary of detected constituents in sediments*

Units = mg/kg	Site (1)				Combined Upstream (2)			
Chemical	Freq	Min	Max	Mean	Freq	Min	Max	Mean
Aluminum	11/11	4,390	10,300	6,500	27/27	521	25,900	9,000
Antimony	26/28	0.17	1.7	0.6	32/37	0.18	18.7	1.3
Arsenic	28/28	2.2	14.1	5.1	36/37	1.1	19.1	6.2
Barium	11/11	38.2	86.7	55	27/27	7.2	316	99
Beryllium	11/11	0.26	0.53	0.37	27/27	0.05	1.2	0.5
Cadmium	11/11	0.25	2.5	0.84	23/27	0.07	10	1.6
Calcium	11/11	11,200	105,000	44,000	27/27	6,030	274,000	82,000
Chromium	28/28	10.9	164	39	37/37	1.3	98.2	27
Cobalt	11/11	3.9	8.2	5.8	27/27	0.59	15.8	7.8
Copper	28/28	14.6	128	48	37/37	2.5	423	73
Cyanide	1/25	1.8	1.8	0.44	1/20	1.2	1.2	0.44
Iron	11/11	11,300	18,700	14,000	27/27	1,870	36,100	19,000
Lead	28/28	6.9	172	54	38/38	2.5	1,170	100
Magnesium	11/11	5,100	23,600	12,000	27/27	3,490	29,900	14,000
Manganese	11/11	167	433	270	22/22	134	547	320
Mercury	9/28	0.05	0.17	0.081	20/37	0.06	1.1	0.15
Nickel	28/28	6.5	57.9	19	37/37	1.8	56	20
Potassium	11/11	423	2,810	1,500	27/27	139	8,430	2,000
Selenium	17/28	0.45	1.2	0.51	19/37	0.39	43	1.8
Silver	9/11	0.12	1.4	0.6	19/26	0.13	47.9	3.1
Sodium	11/11	171	540	290	27/27	68.9	1,420	370
Thallium	1/11	0.6	0.6	0.33	4/26	0.73	0.98	0.44
Vanadium	11/11	11	24.5	16	27/27	1.6	50.3	22
Zinc	19/19	59.6	390	160	35/35	24	811	200
2-Methylnaphthalene	20/24	0.061	3.5	0.48	23/37	0.05	5.5	0.49
Acenaphthene	21/24	0.081	9.9	1.2	27/37	0.054	21	1.4
Acenaphthylene	19/24	0.054	0.28	0.32	25/37	0.058	1.7	0.46
Anthracene	23/24	0.14	12	1.6	30/37	0.049	25	2.3
Benzo(a)anthracene	24/24	0.059	30	5.3	32/37	0.061	60	5.9
Benzo(b)fluoranthene	23/24	0.52	27	6.1	32/37	0.089	66	6.3
Benzo(ghi)perylene	23/24	0.42	20	4.2	31/37	0.092	36	2.7
Benzo(k)fluoranthene	24/24	0.055	13	2.5	29/37	0.08	23	3.2
Benzo[a]pyrene	24/24	0.045	27	5	32/37	0.054	50	5.4
Carbazole	22/24	0.058	10	1.2	27/37	0.078	20	1.6
Chrysene	24/24	0.062	29	5.5	33/37	0.083	59	6.6
Dibenzo(a,h)anthracene	14/24	0.093	5.9	1.7	13/37	0.13	11	0.88
Fluoranthene	24/24	0.14	57	9.7	33/37	0.041	130	13
Fluorene	22/24	0.067	9.4	1.1	27/37	0.071	18	1.4
Indeno(1,2,3-cd)pyrene	23/24	0.4	17	3.8	31/37	0.074	34	2.5
Naphthalene	19/24	0.057	9.3	1	23/37	0.054	10	0.77
Phenanthrene	24/24	0.13	69	9.5	32/37	0.066	130	11
Pyrene	24/24	0.13	68	13	34/37	0.045	130	12
Aroclor 1016	6/30	0.038	5.81	0.52	8/30	0.034	0.068	0.038
Aroclor 1242	6/30	0.019	36.3	1.6	8/30	0.04	1.9	0.1
Aroclor 1248	24/30	0.15	25	3.3	11/28	0.043	1.1	0.09
Aroclor 1254	5/30	0.019	2.9	0.47	20/38	0.013	2.133	0.23
Aroclor 1260	18/30	0.035	1.13	0.46	29/38	0.012	7.9	0.54

Table 2-1. *Summary of detected constituents in sediments*

Units = mg/kg Chemical	Site (1)				Combined Upstream (2)			
	Freq	Min	Max	Mean	Freq	Min	Max	Mean
1,2-Dichlorobenzene	ND	ND	ND	ND	3/22	0.058	0.16	0.4
1,4-Dichlorobenzene	1/41	0.067	0.067	0.29	ND	ND	ND	ND
2,4-Dimethylphenol	2/24	0.076	0.17	0.76	2/30	0.048	0.072	0.39
2-Methylphenol	1/24	0.073	0.073	0.78	ND	ND	ND	ND
4-Methylphenol	7/24	0.054	0.29	0.36	13/37	0.048	0.62	0.34
Butyl benzyl phthalate	2/24	0.35	0.61	1.9	6/30	0.15	34	1.6
Di-n-octyl phthalate	ND	ND	ND	ND	7/30	0.063	0.75	0.46
Dibenzofuran	20/24	0.078	8.8	0.95	22/37	0.078	14	1.1
Dimethyl phthalate	ND	ND	ND	ND	1/20	0.2	0.2	0.46
Isophorone	ND	ND	ND	ND	1/20	0.066	0.066	0.48
Phenol	3/24	0.079	0.099	0.47	1/20	0.071	0.071	0.48
bis(2-Ethylhexyl)phthalate (BEHP)	3/24	0.045	0.83	1	21/37	0.051	12	1.6
n-Nitrosodiphenylamine	ND	ND	ND	ND	1/10	0.47	0.47	0.25
1,1-Dichloroethane		ND	ND	ND	2/30	0.001	0.003	0.0075
1,1-Dichloroethene	ND	ND	ND	ND	1/20	0.01	0.01	0.0091
1,2-Dichloroethene	ND	ND	ND	ND	7/26	0.002	0.013	0.0084
2-Butanone (MEK)	2/8	0.005	0.006	0.011	10/26	0.006	0.1	0.016
Acetone	5/8	0.015	0.065	0.02	19/26	0.007	0.18	0.048
Benzene	ND	ND	ND	ND	1/7	0.002	0.002	0.002
Carbon disulfide	3/8	0.003	0.009	0.012	14/27	0.002	0.015	0.0064
Chlorobenzene	ND	ND	ND	ND	3/30	0.002	0.012	0.0076
Chloroform	ND	ND	ND	ND	1/20	0.002	0.002	0.0091
Chloromethane	ND	ND	ND	ND	1/20	0.009	0.009	0.0098
Ethylbenzene	2/25	0.002	0.002	0.0045	3/30	0.002	0.003	0.0076
Methylene chloride	ND	ND	ND	ND	2/7	0.065	0.36	0.063
Tetrachloroethene	1/25	0.002	0.002	0.0044	1/20	0.002	0.002	0.0088
Toluene	ND	ND	ND	ND	6/37	0.002	0.027	0.0077
Trichloroethene	2/25	0.002	0.003	0.0045	8/37	0.002	0.038	0.008
Vinyl chloride	ND	ND	ND	ND	2/20	0.002	0.006	0.0086
Xylene (total)	2/25	0.004	0.006	0.006	6/37	0.003	0.013	0.0076
cis-1,2-Dichloroethene	ND	ND	ND	ND	1/5	0.002	0.002	0.0014
TOC	20/20	6,720	67,200	39,000	27/27	13,700	116,000	42,000

Notes
1 - Data from NYSDEC (1996 and 1997) and OBG (1998)
2 - Combined upstream reflects data from South Branch, Sanders Creek, and confluence.
ND = Not Detected

Table 2-2. Site Surface Soil (0-2') Detections - Media Screening Comparison

Chemical	Minimum Detected Concentration(1)	Maximum Detected Concentration	Maximum Qualifier	Arithmetic Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Minimum Screening Value	Screening Value WSRC (1998)	Max Conc Exceeds Screening Value?
Aluminum	8,360	14,600		11,000	mg/Kg	SS-99-17	7/7	50	50	Y
Antimony	0.38	1.4	J	0.36	mg/Kg	SS-99-21	2/7	3.5	3.5	
Arsenic	2.2	162		11	mg/Kg	SS-99-21	47/47	10	10	Y
Barium	48.4	228		95	mg/Kg	SS-99-10	7/7	165	165	Y
Beryllium	0.44	0.94	J	0.61	mg/Kg	SS-99-10	7/7	1.1	1.1	
Cadmium	0.2	1	J	0.35	mg/Kg	SS-99-21	7/12	1.6	1.6	
Calcium	8,090	76,600		33,000	mg/Kg	SS-99-13	7/7	NA	NA	Y
Chromium	8.5	32,000		790	mg/Kg	SS-99-26	45/45	0.4	0.4	Y
Cobalt	5.4	10.8		7.4	mg/Kg	SS-99-17	7/7	20	20	
Copper	8	4,790		130	mg/Kg	SS-99-26	52/52	40	40	Y
Cyanide	0.98	11		0.62	mg/Kg	BH-7 COMP	30/147	0.9	0.9	Y
Iron	14,300	31,200		20,000	mg/Kg	SS-99-10	7/7	200	200	Y
Lead	4.3	717		43	mg/Kg	SS-99-26	42/42	50	50	Y
Magnesium	5,780	19,200		11,000	mg/Kg	SS-99-13	7/7	NA	NA	Y
Manganese	228	524		400	mg/Kg	SS-99-05	7/7	100	100	Y
Mercury	0.025	0.095		0.033	mg/Kg	SS-99-06	8/13	0.1	0.1	
Nickel	6.9	6,630		260	mg/Kg	SS-99-26	50/50	30	30	Y
Potassium	1,460	2,530		2,100	mg/Kg	SS-99-17	7/7	NA	NA	Y
Selenium	0.54	2.4		1.1	mg/Kg	SS-99-10	7/7	1	0.81	Y
Sodium	97.5	568		220	mg/Kg	SS-99-10	7/7	NA	NA	Y
Thallium	0.4	0.4	J	0.12	mg/Kg	SS-99-10	1/7	1	1	
Vanadium	19.1	28.1		24	mg/Kg	SS-99-10	7/7	2	2	Y
Zinc	17.8	5,880		330	mg/Kg	SS-99-26	43/43	50	50	Y

Table 2-2. Site Surface Soil (0-2') Detections - Media Screening Comparison

Chemical	Minimum Detected Concentration(1)	Maximum Detected Concentration	Maximum Qualifier	Arithmetic Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Minimum Screening Value	Screening Value WSRC (1998)	Max Conc Exceeds Screening Value?
2-Methylnaphthalene	0.047	2.8	J	0.72	mg/Kg	SS-99-26	15/39	0.1	0.1	Y
Acenaphthene	0.046	40		1.5	mg/Kg	OBG-TB-46	8/40	20	20	Y
Acenaphthylene	0.073	0.073	J	0.73	mg/Kg	SS-99-16	1/40	0.1	0.1	
Anthracene	0.052	230		6.2	mg/Kg	OBG-TB-46	12/41	0.1	0.1	Y
Benzo(a)anthracene	0.043	350	J	11	mg/Kg	OBG-TB-46	27/37	0.1	0.1	Y
Benzo(b)fluoranthene	0.039	360	J	11	mg/Kg	OBG-TB-46	29/39	0.1	0.1	Y
Benzo(ghi)perylene	0.05	310	J	9.1	mg/Kg	OBG-TB-46	16/37	0.1	0.1	Y
Benzo(k)fluoranthene	0.041	120	J	3.6	mg/Kg	OBG-TB-46	22/41	0.1	0.1	Y
Benzo[a]pyrene	0.037	300	J	9.2	mg/Kg	OBG-TB-46	23/37	0.1	0.1	Y
Carbazole	0.05	120		3.3	mg/Kg	OBG-TB-46	10/42	0.1	0.1	Y
Chrysene	0.042	380		10	mg/Kg	OBG-TB-46	32/42	0.1	0.1	Y
Dibenzo(a,h)anthracene	0.14	39	J	1.8	mg/Kg	OBG-TB-46	5/35	0.1	0.1	Y
Fluoranthene	0.04	1,200		32	mg/Kg	OBG-TB-46	33/40	0.1	0.1	Y
Fluorene	0.051	65		2.2	mg/Kg	OBG-TB-46	9/38	30	30	Y
Indeno(1,2,3-cd)pyrene	0.067	190	J	6.0	mg/Kg	OBG-TB-46	17/37	0.1	0.1	Y
Naphthalene	0.04	2.1	J	0.49	mg/Kg	OBG-TB-46	10/41	0.1	0.1	Y
Phenanthrene	0.04	670		18	mg/Kg	OBG-TB-46	28/41	0.1	0.1	Y
Pyrene	0.041	1,000		27	mg/Kg	OBG-TB-46	34/40	0.1	0.1	Y
Aroclor 1248	0.005	3,900		95	mg/Kg	SS-99-26	49/73	0.02	0.02	Y
Aroclor 1254	0.027	8	J	7.2	mg/Kg	SS-99-18	12/73	0.02	0.02	Y
Total PCBs	0.027	130		8.2	mg/Kg	23+25-124+3	35/50	0.02	0.02	Y

Table 2-2. Site Surface Soil (0-2') Detections - Media Screening Comparison

Chemical	Minimum Detected Concentration(1)	Maximum Detected Concentration	Maximum Qualifier	Arithmetic Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Minimum Screening Value	Screening Value WSRC (1998)	Max Conc Exceeds Screening Value?
1,2-Dichlorobenzene	0.059	0.059	J	0.39	mg/Kg	SS-99-06	1/77	NA	NA	Y
Bis(2-ethylhexyl)phthalate (BEHP)	0.042	6.1		1.0	mg/Kg	OBG-TB-40	33/40	0.1	0.1	Y
Butyl benzyl phthalate	0.048	36		2.6	mg/Kg	SS-99-30	9/39	0.1	0.1	Y
Dibenzofuran	0.039	21		1.0	mg/Kg	OBG-TB-46	11/40	NA	NA	Y
Dimethyl phthalate	0.051	0.84		0.69	mg/Kg	SS-99-04	4/44	200	200	
Di-n-butyl phthalate	0.055	0.35	J	0.72	mg/Kg	SS-99-03	5/41	200	200	
Di-n-octyl phthalate	56	56		2.3	mg/Kg	SS-99-09	1/37	0.10	0.10	Y
Hexachlorobenzene	0.1	0.1	J	0.69	mg/Kg	SS-99-01	1/43	0.0025	0.0025	Y
Phenol	0.041	0.85	J	0.67	mg/Kg	SS-99-26	3/41	0.05	0.05	Y
1,2-Dichloroethene	0.039	0.054		0.047	mg/Kg	BH-6 COMP	2/2	0.1	0.1	
Benzene	0.005	0.005	J	0.0076	mg/Kg	SS-99-10	1/52	0.05	0.05	
Carbon disulfide	0.038	0.038	J	0.011	mg/Kg	SS-99-10	1/9	NA	NA	Y
Chloroform	0.019	0.019	N	0.0025	mg/Kg	SS-99-08	1/43	0.001	0.001	Y
cis-1,2-Dichloroethene	0.005	0.34		0.012	mg/Kg	SS-99-10	2/45	0.1000	0.1000	Y
Ethylbenzene	0.01	0.06		0.0045	mg/Kg	T-13	3/51	0.05	0.05	Y
Methylene chloride	0.001	0.05	N	0.012	mg/Kg	SS-99-26	29/46	2	2.0	
Tetrachloroethene	0.002	0.012	J	0.011	mg/Kg	SS-99-10	2/46	0.01	0.01	Y
Toluene	0.001	0.21		0.012	mg/Kg	BH-7 COMP	7/52	0.05	0.05	Y
Trichloroethene	0.004	46	J	1.1	mg/Kg	SS-99-10	9/43	0.001	0.001	Y
Xylene (total)	0.01	0.6		0.016	mg/Kg	T-13	3/53	0.05	0.05	Y

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

J = Estimated Value

N = tentatively identified

Y = Exceeds Criteria

Westinghouse Savannah River Company (WSRC) 1998. *Ecological Screening Values for Surface Water, Sediment and Soil*. WSRC-TR-98-00110. Aiken, South Carolina.

Table 2-3a. *Site Sediment Detections - Media Screening Comparison*

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Minimum Screening Value	Max Conc Exceeds Screening Value?	Marine ERL (Long&Morgan 1990)	Freshwater LEL (Persaud et al. 1993)	Severe Effects Level (SEL) (Persaud et al. 1993)	ER-L (mg/kg) Long et al. 1995	ER-M (mg/kg) Long et al. 1995	LEL and Chronic Sediment Criteria (NYS 1999)(1)	SEL (NYS 1998) Value	USEPA Ecotox (1996)	SQV-TEL '(Smith 1996)	SQV - PEL (Smith 1996)	SQV-TEL (Ingersoll 1996)	SQV - PEL (Ingersoll 1996)	WA State AETs (1997)	WSRC (1998)
Aluminum	4,390	10,300	*	6,500	mg/Kg	L11B	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	0.17	1.7	BNJ	0.60	mg/Kg	L7	26/28	0.09-3.6	0.06	Y	2	NA	NA	NA	NA	2	25	NA	NA	NA	NA	NA	0.06	12
Arsenic	2.2	14.1		5.1	mg/Kg	L10A	28/28	-.-	0.15	Y	33	6	33	8.2	70	6	33	8.2	5.9	17	NA	NA	0.15	7.24
Barium	38.2	86.7		55	mg/Kg	L7	11/11	-.-	200		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200
Beryllium	0.26	0.53	B	0.37	mg/Kg	L11B	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.25	2.5		0.84	mg/Kg	L7	11/11	-.-	0.012	Y	5	0.6	10	1.2	9.6	0.6	9	1.2	0.6	3.53	NA	NA	0.01	1.00
Calcium	11,200	105,000		44,000	mg/Kg	L12C	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	10.9	164		39	mg/Kg	L7	28/28	-.-	0.28	Y	80	26	110	81	370	26	110	NA	37.3	90	NA	NA	0.28	52.3
Cobalt	3.9	8.2	B	5.8	mg/Kg	L11B	11/11	-.-	20		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20
Copper	14.6	128		48	mg/Kg	GM98-SED01B-C	28/28	-.-	1	Y	70	16	110	34	270	16	110	34	35.7	197	NA	NA	0.84	18.7
Cyanide	1.8	1.8		0.44	mg/Kg	GM98-SED06-C	1/25	0.29-0.5	1.00	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.0
Iron	11,300	18,700	*	14,000	mg/Kg	L8	11/11	-.-	20000		NA	20000	NA	NA	NA	20000	40000	NA	NA	NA	NA	NA	NA	NA
Lead	6.9	172		54	mg/Kg	GM98-SED08-C	28/28	-.-	0.7	Y	35.00	31	250	47	218	31	110	47	35	91.3	NA	NA	0.72	30.2
Magnesium	5,100	23,600		12,000	mg/Kg	L12C	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	167	433		270	mg/Kg	L9B	11/11	-.-	2	Y	NA	460	NA	NA	NA	460	1100	NA	NA	NA	NA	NA	1.80	NA
Mercury	0.05	0.17	NJ	0.081	mg/Kg	L7	9/28	0.06-0.105	0.0027	Y	0.15	0.2	2.0	0.15	0.71	0.15	1.3	0.15	0.17	0.49	NA	NA	0.00	0.13
Nickel	6.5	57.9		19	mg/Kg	GM98-SED01B-C	28/28	-.-	16	Y	30	16	75	21	52	16	50	21	18	36	NA	NA	NA	15.9
Potassium	423	2,810		1,500	mg/Kg	L11B	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	0.45	1.2		0.51	mg/Kg	GM98-SED08-C	17/28	0.145-0.325	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	0.12	1.4	B	0.60	mg/Kg	L7	9/11	0.045-0.05	0.0045	Y	1.00	NA	NA	1.00	3.7	1.0	2.2	NA	NA	NA	NA	NA	0.0045	2
Sodium	171	540	B	290	mg/Kg	L9C	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	0.6	0.6	B	0.33	mg/Kg	L8	1/11	0.22-0.42	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	11	24.5		16	mg/Kg	L11B	11/11	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	59.6	390		160	mg/Kg	GM98-SED10-C	19/19	-.-	3.2	Y	120	120	820	150	410	120	270	150	NA	NA	NA	NA	3.2	124
2-Methylnaphthalene	0.061	3.5	J	0.48	mg/Kg	GM98-SED04-C	20/24	0.21-0.95	0.065	Y	0.07	NA	NA	0.07	0.67	0.34	NA	NA	NA	NA	NA	NA	NA	0.33
Acenaphthene	0.081	9.9		1.2	mg/Kg	GM98-SED04-C	21/24	0.21-0.95	0.003	Y	NA	NA	NA	0.02	0.50	1.40	1.40	0.02	NA	NA	NA	NA	34	0.0033
Acenaphthylene	0.054	0.28	J	0.32	mg/Kg	L7	19/24	0.21-2.1	0.044	Y	NA	NA	NA	0.04	0.64	NA	NA	0.43 (6)	NA	NA	NA	NA	0.83	0.33
Anthracene	0.14	12		1.6	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	0.085	Y	0.09	0.22	370	0.09	1.1	1.07	NA	0.43 (6)	NA	NA	NA	NA	17	0.33
Benzo(a)anthracene	0.059	30		5.3	mg/Kg	GM98-SED04-C	24/24	-.-	0.032	Y	0.23	0.32	1480	0.26	1.6	0.12	NA	0.43 (6)	NA	NA	NA	NA	0.03	0.39	9.2	0.33
Benzo(b)fluoranthene	0.52	27		6.1	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	15	Y	NA	NA	NA	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	15	NA
Benzo(ghi)perylene	0.42	20		4.2	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	0.170	Y	NA	0.17	320	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	9.1	NA
Benzo(k)fluoranthene	0.055	13		2.5	mg/Kg	GM98-SED04-C	24/24	-.-	0.240	Y	NA	0.24	1340	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	15	NA
Benzo[a]pyrene	0.045	27	J	5.0	mg/Kg	GM98-SED04-C	24/24	-.-	0.032	Y	0.40	0.37	1440	0.43	1.60	NA	NA	0.43	NA	NA	0.03	0.78	9.1	0.33
Carbazole	0.058	10		1.2	mg/Kg	GM98-SED04-C	22/24	0.21-0.28	0.340	Y	0.40	0.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.062	29		5.5	mg/Kg	GM98-SED04-C	24/24	-.-	0.057	Y	0.06	0.06	460	0.38	2.8	NA	NA	0.43 (6)	NA	NA	0.06	0.86	17	0.33
Fluoranthene	0.14	57		9.7	mg/Kg	GM98-SED04-C	24/24	-.-	0.111	Y	0.60	0.75	1020	0.6	5.1	10.2	10.2	2.90	NA	NA	0.11	2.36	48	0.33
Fluorene	0.067	9.4		1.1	mg/Kg	GM98-SED04-C	22/24	0.21-0.95	0.019	Y	0.04	0.19	160	0.02	0.54	0.08	NA	0.54	NA	NA	NA	NA	42	0.33
Indeno(1,2,3-cd)pyrene	0.4	17		3.8	mg/Kg	GM98-SED04-C	23/24	0.21-0.21	0.2	Y	NA	0.20	320	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	3.8	NA
Naphthalene	0.057	9.3		1.0	mg/Kg	GM98-SED04-C	19/24	0.21-1.3	0.160	Y	0.34	NA	--	0.16	2.1	0.30	NA	0.48	NA	NA	NA	NA	23	0.33
Phenanthrene	0.13	69		9.5	mg/Kg	GM98-SED04-C	24/24	-.-	0.042	Y	0.23	0.56	950	0.24	1.5	1.2	1.2	0.85	NA	NA	0.04	0.52	91	0.33
Pyrene	0.13	68		13	mg/Kg	GM98-SED04-C	24/24	-.-	0.053	Y	0.35	0.49	850	0.67	2.6	9.61	NA	0.66	NA	NA	0.05	0.88	31	0.33

Table 2-3a. *Site Sediment Detections - Media Screening Comparison*

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Minimum Screening Value	Max Conc Exceeds Screening Value?	Marine ERL (Long&Morgan 1990)	Freshwater LEL (Persaud et al. 1993)	Severe Effects Level (SEL) (Persaud et al. 1993)	ER-L (mg/kg) Long et al. 1995	ER-M (mg/kg) Long et al. 1995	LEL and Chronic Sediment Criteria (NYS 1999)(1)	SEL (NYS 1998) Value	USEPA Ecotox (1996)	SQV-TEL '(Smith 1996)	SQV - PEL (Smith 1996)	SQV-TEL (Ingersoll 1996)	SQV - PEL (Ingersoll 1996)	WA State AETs (1997)	WSRC (1998)
Aroclor 1016	0.038	5.81	X	0.52	mg/Kg	L7	6/30	0.0115-2.95	0.007	Y	NA	0.01	53	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	0.019	36.3	D	1.6	mg/Kg	L7	6/30	0.0115-2.95	0.193	Y	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	0.15	25		3.3	mg/Kg	GM98-SED08-C	24/30	0.019-2.905	0.03	Y	NA	0.03	150	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	0.019	2.9	JD	0.47	mg/Kg	L7	5/30	0.0115-2.95	0.06	Y	NA	0.06	34	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	0.035	1.13	JD	0.46	mg/Kg	L7	18/30	0.0205-2.95	0.005	Y	NA	0.01	24	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.06
1,4-Dichlorobenzene	0.067	0.067	J	0.29	mg/Kg	L7	1/41	0.003-2.6	0.12		NA	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	0.076	0.17	J	0.76	mg/Kg	GM98-SED07A-C	2/24	0.21-7	0.005	Y	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA	NA	0.35
2-Methylphenol	0.073	0.073	J	0.78	mg/Kg	GM98-SED07A-C	1/24	0.21-7	0.005	Y	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	0.054	0.29	J	0.36	mg/Kg	GM98-SED06-C	7/24	0.21-2.1	0.005	Y	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate (BEHP)	0.045	0.83		1.0	mg/Kg	L7	3/24	0.22-4.65	0.182	Y	NA	NA	NA	NA	NA	2	2	NA	NA	NA	NA	NA	NA	0.18
Butyl benzyl phthalate	0.35	0.61	J	1.9	mg/Kg	GM98-SED15-C	2/24	0.21-7	11		NA	NA	NA	NA	NA	NA	NA	11	NA	NA	NA	NA	NA	11
Dibenzo(a,h)anthracene	0.093	5.9		1.7	mg/Kg	GM98-SED04-C	14/24	0.21-7	0.06	Y	NA	0.06	130	0.06	0.26	NA	NA	NA	NA	NA	NA	NA	NA	1.6	0.33
Dibenzofuran	0.078	8.8		0.95	mg/Kg	GM98-SED04-C	20/24	0.21-0.95	2	Y	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	5.1	2.0
Phenol	0.079	0.099	J	0.47	mg/Kg	GM98-SED07A-C	3/24	0.21-2.6	0.05	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05
Total TCDD TEQ	2.58E-06	6.17E-05		0.0000057	mg/Kg	GM98-SED07A	6/6	-.-	2.0E-06	Y	NA	NA	NA	NA	NA	2.00E-06 ~	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	0.005	0.006	J	0.011	mg/Kg	GM98-SED01B-G	2/8	0.006-0.0435	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	0.015	0.065	J	0.020	mg/Kg	L7	5/8	0.006-0.008	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	0.0030	0.0090	J	0.012	mg/Kg	L8	3/8	0.006-0.0435	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	0.0020	0.0020	J	0.0045	mg/Kg	L12C	2/25	0.0005-0.0435	0.0500		NA	NA	NA	NA	NA	0.24	NA	NA	NA	NA	NA	NA	NA	0.05
Tetrachloroethene	0.0020	0.0020	J	0.0044	mg/Kg	L12C	1/25	0.0005-0.0435	0.0100		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
Trichloroethene	0.0020	0.0030		0.0045	mg/Kg	GM98-SED09-G	2/25	0.0005-0.0435	0.0010	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.001
Xylene (total)	0.0040	0.0060	J	0.0060	mg/Kg	L12C	2/25	0.002-0.0435	0.025		NA	NA	NA	NA	NA	0.92	NA	0.03	NA	NA	NA	NA	NA	0.05
Mercury (as Methyl mercury)	0.050	0.17	NJ	0.08	mg/Kg	L7	9/28	0.06-0.105	0.000010	Y	NA	NA	0.000010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes: _. = 100% detection Frequency - detection limits not reported

(1) - from "Technical Guidance for Screening Contaminated Sediments." Value for organic constituents is Benthic Aquatic Life Sediment Criteria assuming 1% organic carbon.

(6) - Values given as Benzo(a)pyrene

Total unchlorinated phenols NYSDEC guidance value used for 2,4-Dimethylphenol, 2-methylphenol, and 4-methylphenol

2,3,7,8-TCDD NYSDEC (1999) Wildlife Bioaccumulation Criteria used as screening value.

Dichlorobenzenes NYSDEC guidance value used for 1,2-Dichlorobenzenes and 1,4-Dichlorobenzenes.

Value for metals is Lowest Effect Level.

LEL - Lowest effect level

ER-L - Effects range low

SQV - Sediment Quality Assessment Value

TEL - Threshold effects level

AETs - Apparent effects threshold

N/A = Not Applicable

SQL = Sample Quantitation Limit

J = Estimated Value

N = tentatively identified

* - If the qualifier is not defined, the qualifier definition was not provided in the NYSDEC data package.

Y = Exceeds criteria

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Table 2-3b. *Upstream Sediment Detections - Media Screening Comparison*

Chemical (mg/kg)	Minimum Detected Concentration(1)	Maximum Detected Concentration	Maximum Qualifier	Detection Frequency	Range of Detection Limits	Minimum Screening Value	Max Conc Exceeds Screening Value?	Marine ERL (Long&Morgan 1990)	Freshwater LEL (Persaud et al. 1993)	(SEL) (Persaud et al. 1993)	ER-L (mg/kg) Long et al. 1995	ER-M (mg/kg) Long et al. 1995	LEL and Chronic Sediment Criteria (NYS 1999)(1)	SEL (NYS 1998)	USEPA Ecotox	SQV-TEL (Smith 1996)	SQV - PEL (Smith 1996)	SQV-TEL (Ingersoll 1996)	SQV - PEL (Ingersoll 1996)	WA State AETs(5)(8)	WSRC (1998)
Aluminum	521	25,900		27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	0.18	18.7	N*J	32/37	0.08-0.1	0.1	Y	2	NA	NA	NA	NA	2	25	NA	NA	NA	NA	NA	0.06	12
Arsenic	1.1	19.1	*J	36/37	0.295-0.295	0.15	Y	33	6	33	8.2	70	6	33	8.2	5.9	17	NA	NA	0.15	7.24
Barium	7.2	316		27/27	-.-	200	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200.0
Beryllium	0.05	1.2	B	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	0.07	10		23/27	0.025-0.045	0.0120	Y	5	0.6	10	1.2	9.6	0.6	9	1.2	0.6	3.53	NA	NA	0.01	1.0
Calcium	6,030	274,000	J	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	1.3	98.2	*	37/37	-.-	0.28	Y	80	26	110	81	370	26	110	NA	37.3	90	NA	NA	0.28	52.3
Cobalt	0.59	15.8	J	27/27	-.-	20		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20
Copper	2.5	423	N*J	37/37	-.-	0.84	Y	70	16	110	34	270	16	110	34.00	35.7	197	NA	NA	0.84	18.7
Cyanide	1.2	1.2		1/37	0.3-0.55	1	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.00
Iron	1,870	36,100	*	27/27	-.-	20,000	Y	NA	20,000	NA	NA	NA	20,000	40,000	NA	NA	NA	NA	NA	NA	NA
Lead	2.5	1170	*J	38/38	-.-	0.72	Y	35	31	250	47	218	31	110	47	35	91.3	NA	NA	0.72	30.2
Magnesium	3,490	29,900	J	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	134	547		22/22	-.-	1.8	Y	NA	460	NA	NA	NA	460	1100	NA	NA	NA	NA	NA	1.80	NA
Mercury	0.06	1.1		20/37	0.03-0.08	0.0027	Y	0.15	0.2	2	0.15	0.71	0.15	1.3	0.15	0.17	0.49	NA	NA	0.00	0.13
Methylene chloride	0.065	0.36	J	2/37	0.0005-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	1.8	56		37/37	-.-	15.9	Y	30	16	75	21	52	16	50	21	18	36	NA	NA	NA	15.9
Potassium	139	8,430	EJ	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	0.39	43	J	19/37	0.17-0.65	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	0.13	47.9		19/27	0.05-0.175	0.0045	Y	1.00	NA	NA	1.0	3.7	1.0	2.2	NA	NA	NA	NA	NA	0.00	2.0
Sodium	68.9	1,420	B	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	0.73	0.98	B	4/27	0.235-0.6	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	1.6	50.3	*	27/27	-.-	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	24	811	E*J	35/35	-.-	3.2	Y	120	120	820	150	410	120	270	150	NA	NA	NA	NA	3.20	124
2-Methylnaphthalene	0.05	5.5		23/37	0.205-0.65	0.065	Y	0.07	NA	NA	0.07	0.67	0.34	NA	NA	NA	NA	NA	NA	NA	0.33
Acenaphthene	0.054	21		27/37	0.205-0.275	0.0033	Y	NA	NA	NA	0.02	0.5	1.4	1.40	0.02	NA	NA	NA	NA	34.00	0.0033
Acenaphthylene	0.058	1.7	JD	25/37	0.205-2.2	0.044	Y	NA	NA	NA	0.04	0.64	NA	NA	0.43 (6)	NA	NA	NA	NA	0.83	0.33
Anthracene	0.049	25		30/37	0.205-0.275	0.085	Y	0.09	0.22	370	0.09	1.10	1.07	NA	0.43 (6)	NA	NA	NA	NA	17.00	0.33
Benzo(a)anthracene	0.061	60	J	32/37	0.205-0.275	0.0317	Y	0.23	0.32	1480	0.26	1.60	0.12	NA	0.43 (6)	NA	NA	0.03	0.39	9.20	0.33
Benzo(b)fluoranthene	0.089	66	J	32/37	0.205-0.275	15	Y	NA	NA	NA	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	15.00	NA
Benzo(ghi)perylene	0.092	36	J	31/37	0.205-0.275	0.17	Y	NA	0.17	320	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	9,10	NA
Benzo(k)fluoranthene	0.08	23	JD	29/37	0.205-0.275	0.24	Y	NA	0.24	1,340	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	15.00	NA
Benzo[a]pyrene	0.054	50	J	32/37	0.205-0.275	0.0319	Y	0.40	0.37	1,440	0.43	1.60	NA	NA	0.43	NA	NA	0.03	0.78	9.10	0.33
Carbazole	0.078	20	J	27/37	0.205-0.275	0.34	Y	0.40	0.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.083	59	J	33/37	0.205-0.245	0.0571	Y	0.06	0.06	460	0.38	2.8	NA	NA	0.43 (6)	NA	NA	0.06	0.86	17.00	0.33
Dibenzo(a,h)anthracene	0.13	11	J	13/37	0.205-3.3	0.06	Y	NA	0.06	130	0.06	0.26	NA	NA	NA	NA	NA	NA	NA	1.60	0.33
Fluoranthene	0.041	130		33/37	0.215-0.255	0.111	Y	0.60	0.75	1,020	0.60	5.1	10.2	10.2	2.9	NA	NA	0.11	2.36	48.00	0.33
Fluorene	0.071	18		27/37	0.205-0.275	0.019	Y	0.04	0.19	160	0.02	0.54	0.08	NA	0.54	NA	NA	NA	NA	42.00	0.33
Indeno(1,2,3-cd)pyrene	0.074	34	J	31/37	0.205-0.275	0.2	Y	NA	0.20	320	NA	NA	NA	NA	0.43 (6)	NA	NA	NA	NA	3.80	NA
Naphthalene	0.054	10		23/37	0.205-0.65	0.16	Y	0.34	NA	--	0.16	2.1	0.30	NA	0.48	NA	NA	NA	NA	23.00	0.33
Phenanthrene	0.066	130		32/37	0.205-0.275	0.0419	Y	0.23	0.56	950	0.24	1.5	1.2	1.2	0.85	NA	NA	0.04	0.52	91.00	0.33
Pyrene	0.045	130	J	34/37	0.205-0.245	0.053	Y	0.35	0.49	850	0.67	2.6	9.61	NA	0.66	NA	NA	0.05	0.88	31.00	0.33

Table 2-3b. *Upstream Sediment Detections - Media Screening Comparison*

Chemical (mg/kg)	Minimum Detected Concentration(1)	Maximum Detected Concentration	Maximum Qualifier	Detection Frequency	Range of Detection Limits	Minimum Screening Value	Max Conc Exceeds Screening Value?	Marine ERL (Long&Morgan 1990)	Freshwater LEL (Persaud et al. 1993)	(SEL) (Persaud et al. 1993)	ER-L (mg/kg) Long et al. 1995	ER-M (mg/kg) Long et al. 1995	LEL and Chronic Sediment Criteria (NYS 1999)(1)	SEL (NYS 1998)	USEPA Ecotox	SQV-TEL (Smith 1996)	SQV - PEL (Smith 1996)	SQV-TEL (Ingersoll 1996)	SQV - PEL (Ingersoll 1996)	WA State AETs(5)(8)	WSRC (1998)
Aroclor 1016	0.034	0.068	PJN	8/38	0.01-0.13	0.007	Y	NA	0.01	53	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	0.04	1.9	D	8/38	0.01-0.13	0.193	Y	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	0.043	1.1	D	11/38	0.0125-0.13	0.03	Y	NA	0.03	150	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	0.013	2.133	D	20/38	0.01-0.13	0.06	Y	NA	0.06	34	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	0.012	7.9	D	29/38	0.0125-0.0275	0.005	Y	NA	0.01	24	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.060
1,2-Dichlorobenzene	0.058	0.16	JD	3/46	0.003-11	0.12	Y	NA	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	0.048	0.072	J	2/37	0.2-3.3	0.005	Y	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	0.048	0.62	JD	13/37	0.205-3.3	0.005	Y	NA	NA	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate (BEHP)	0.051	12	D	21/37	0.205-11	0.182	Y	NA	NA	NA	NA	NA	2	2	NA	NA	NA	NA	NA	NA	0.182
Butyl benzyl phthalate	0.15	34	D	6/37	0.205-4.05	11	Y	NA	NA	NA	NA	NA	NA	NA	11	NA	NA	NA	NA	NA	11
Chlorobenzene	0.002	0.012	J	3/36	0.0005-0.041	0.0350		NA	NA	NA	NA	NA	0.04	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	0.078	14		22/37	0.205-3.3	2	Y	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	5.10	2.0
Dimethyl phthalate	0.2	0.2	JD	1/37	0.2-3.3	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl phthalate	0.063	0.75	JD	7/37	0.205-11	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	0.066	0.066	J	1/37	0.205-4.05	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	0.47	0.47	UJD	1/37	0.2-3.3	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	0.071	0.071	J	1/37	0.2-11	0.05	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.050
Total TCDD TEQ	0.000001	0.0000573		6/6	-	2.00E-06	Y	NA	NA	NA	NA	NA	2.00E-06	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	0.001	0.003	J	2/36	0.0005-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	0.01	0.01	J	1/36	0.0005-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethene	0.002	0.013		7/27	0.006-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone (MEK)	0.006	0.1	J	10/27	0.006-0.0115	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	0.007	0.18	J	19/27	0.006-0.0075	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	0.002	0.002	J	1/37	0.0005-0.041	0.28		NA	NA	NA	NA	NA	0.28	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	0.002	0.015	J	14/27	0.006-0.01	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	0.002	0.002	J	1/36	0.0005-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	0.009	0.009	J	1/36	0.006-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.002	0.002	J	1/9	0.0005-0.0035	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	0.002	0.003	NJ	3/36	0.0005-0.041	0.05		NA	NA	NA	NA	NA	0.24	NA	NA	NA	NA	NA	NA	NA	0.050
Tetrachloroethene	0.002	0.002	J	1/36	0.0005-0.041	0.01		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.010
Toluene	0.002	0.027		6/37	0.0005-0.041	0.49		NA	NA	NA	NA	NA	0.49	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	0.002	0.038	J	8/37	0.0005-0.041	0.001	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0010
Vinyl chloride	0.002	0.006	J	2/36	0.0005-0.041	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene (total)	0.003	0.05		9/45	0.002-0.041	0.025	Y	NA	NA	NA	NA	NA	0.92	NA	0.025	NA	NA	NA	NA	NA	0.050

Notes: _ = 100% detection Frequency - detection limits not reported

(1) - from "Technical Guidance for Screening Contaminated Sediments." Value for organic constituents is Benthic Aquatic Life Sediment Criteria assuming 1% organic carbon.

(6) - Values given as Benzo(a)pyrene

Total unchlorinated phenols NYSDEC guidance value used for 2,4-Dimethylphenol, 2-methylphenol, and 4-methylphenol

2,3,7,8-TCDD NYSDEC (1999) Wildlife Bioaccumulation Criteria used as screening value.

Dichlorobenzenes NYSDEC guidance value used for 1,2-Dichlorobenzenes and 1,4-Dichlorobenzenes.

Value for metals is Lowest Effect Level.

LEL - Lowest effect level

ER-L - Effects range low

SQV - Sediment Quality Assessment Value

TEL - Threshold effects level

AETs - Apparent effects threshold

N/A = Not Applicable

SQL = Sample Quantitation Limit

J = Estimated Value

N = tentatively identified

* - If the qualifier is not defined, the qualifier definition was not provided in the NYSDEC data package.

Y = Exceeds criteria

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Table 2-4a. Site Surface Water Detections - Media Screening Comparison

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Minimum Screening Value	Max Conc Exceeds Screening Value?	USEPA (1999) Value	USEPA (1999) Note	Marine LEL (FAWC) Value	Marine LEL (FAWC) Note	NYCRR TOGS 1.1.1 (1998) Value	NYCRR TOGS 1.1.1 (1998) Note	Suter & Tsao (1996)	USEPA Ecotox (1996)
Aluminum	129	129		130	ug/l	GM98-SW1	1/1	87	Y	87	f	NA	NA	100	j	NA	NA
Antimony	1.5	1.8	J	7.2	ug/l	GM98-SW2	2/5	3		30	i	500	d	3	k	30	NA
Barium	66.1	66.1	J	66	ug/l	GM98-SW1	1/1	3.9	Y	NA	NA	NA	NA	1000	k	NA	3.9
Beryllium	0.41	0.41	J	0.41	ug/l	GM98-SW1	1/1	5.3		5.3	i	NA	NA	1100	m	NA	NA
Calcium	139,000	139,000		140,000	ug/l	GM98-SW1	1/1	116000	Y	NA	NA	NA	NA	NA	NA	116000	NA
Chromium	5	7.4	J	6.3	ug/l	GM98-SW2	5/5	11		11	g	NA	NA	151	c,j	NA	NA
Copper	2.9	8.7	J	5.1	ug/l	GM99-SW2	5/5	2.9	Y	19	c	2.9	b	19	c,j	NA	NA
Iron	430	430		430	ug/l	GM98-SW1	1/1	158	Y	1000	NA	NA	NA	300	k	158	NA
Lead	2.3	4	J	2.9	ug/l	GM99-SW2	3/5	5		5.1	c, e	8.5	NA	10	k	NA	NA
Nickel	1	10.7	J	4.8	ug/l	GM99-SW2	5/5	8	Y	108	c, e	8.3	NA	108	c,j	NA	NA
Potassium	2,650	2,650	J	2,700	ug/l	GM98-SW1	1/1	53000		NA	NA	NA	NA	NA	NA	53000	NA
Sodium	102,000	102,000		100,000	ug/l	GM98-SW1	1/1	20000	Y	NA	NA	NA	NA	20000	k	680000	NA
Zinc	11.2	33.1		20	ug/l	GM99-SW2	5/5	86		246	c, e	86	NA	173	c,j	NA	NA
Di-n-octyl phthalate	10	10	J	8.0	ug/l	GM98-SW3	3/5	3	Y	3	a, i	3.4	a, i	50	n	708	NA
Magnesium	24,900	24,900		25,000	ug/l	GM98-SW1	1/1	35000		NA	NA	NA	NA	35000	k	82000	NA
Manganese	71.1	71.1		71	ug/l	GM98-SW1	1/1	80		NA	NA	NA	NA	300	l	NA	80
Methylene chloride	0.2	0.2	J	3.8	ug/l	GM99-SW1RE	1/4	5		11000	a, h, i	NA	NA	5	k	NA	NA
Acetone	2	2	J	4.3	ug/l	GM99-SW1RE	1/4	50		NA	NA	NA	NA	50	m	NA	NA
Chloromethane	0.2	0.2	J	4.2	ug/l	GM99-SW1RE	1/6	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.7	2	J	1.4	ug/l	GM98-SW2	4/4	5		11600	a, b, i	224000	a,b	5	k	590	NA
Trichloroethene	0.9	1	J	2.0	ug/l	GM98-SW2	3/4	5		21900	a, i	2000	a, b, i	5	k	47	NA
Vinyl chloride	0.1	0.1	J	3.8	ug/l	GM99-SW1RE	1/4	0.3		NA	NA	NA	NA	0.3	m	NA	NA

Notes:

(1) - If AWQC were not available, then the LEL from DOD (1999) was inserted here.

(2) - New York State Ambient Water Quality Standards and Guidance Values - June 1998

Y = Exceeds criteria

J = Estimated Value

* - If the qualifier is not defined, the qualifier definition was not provided in the NYSDEC data package.

NA - not available

LEL - Lowest effect level

ER-L - Effects range low

a - Insufficient data to develop criteria. Value presented is the Lowest Obs (LOEL)

b - No chronic exposure values available; value presented based on available levels

c - Hardness dependent criteria

d - Value presented is a proposed criterion.

e - reported as dissolved metal in the water column

f - reported as recoverable metal in the water column

g - Value for hexavalent chromium

h - Acute value used because no chronic value was available

i - Value from Buckman 1999

j - Value is Aquatic(chronic) Standard

k - Value is Health(water source) Standard

Table 2-4a. Site Surface Water Detections - Media Screening Comparison

Notes (continued):

l - Value is Aesthetic Standard

m - Value is Health(water source) Guidance

n - Value for Di-n-butyl phthalate

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Table 2-4b. Upstream Surface Water Detections - Media Screening Comparison

Chemical	Minimum Concentration	Maximum Concentration	Maximum Qualifier	Mean Concentration	Units	Location of Maximum Concentration	Detection Frequency	Minimum Screening Value	Max Conc Exceeds Screening Value?	USEPA (1999) Value	USEPA (1999) Note	Marine LEL (FAWC) Value	Marine LEL (FAWC) Note	NYS TOGS 1.1.1 (1998) Value	NYS TOGS 1.1.1 (1998) Note	Suter & Tsao (1996)	USEPA Ecotox (1996)
Aluminum	166	264		220	ug/l	L21	2/2	87	Y	87	f	NA	NA	100	j	NA	NA
Antimony	1.7	2.4	J	1.5	ug/l	GM98-SW6	3/8	3		30	i	500	d	3	k	30	NA
Barium	81.9	88.7	B	85	ug/l	L23	2/2	3.9	Y	NA	NA	NA	NA	1000	k	NA	3.9
Cadmium	0.2	0.2	B	0.15	ug/l	L23	1/2	4.1		4.24	c, e	9.3	NA	4.1	c,j	NA	NA
Calcium	166,000	196,000		180,000	ug/l	L23	2/2	116000	Y	NA	NA	NA	NA	NA	NA	116000	NA
Chromium	1.6	8	J	4.8	ug/l	GM98-SW7	8/8	11		11	g	NA	NA	151	c,j	NA	NA
Copper	3.8	9.8	B	6.0	ug/l	L21	8/8	2.9	Y	18.8	c	2.9	b	19	c,j	NA	NA
Iron	582	595		590	ug/l	L23	2/2	158	Y	1000	NA	NA	NA	300	k	158	NA
Lead	1.4	4.5	J	2.3	ug/l	GM98-SW7	5/8	5		5.1	c, e	8.5	NA	10	k	NA	NA
Magnesium	25,700	29,200		27,000	ug/l	L23	2/2	35000		NA	NA	NA	NA	35000	k	82000	NA
Manganese	129	139		130	ug/l	L23	2/2	80	Y	NA	NA	NA	NA	300	l	NA	80
Nickel	1.6	13	J	4.9	ug/l	GM99-SW7	8/8	8.3	Y	108	c, e	8.3	NA	108	c,j	NA	NA
Potassium	9,380	9,760	EJ	9,600	ug/l	L23	2/2	53000		NA	NA	NA	NA	NA	NA	53000	NA
Silver	1.2	1.2	B	0.70	ug/l	L23	1/2	0.10	Y	0.12	a, i	0.92	d	0.1	j	NA	NA
Sodium	263,000	271,000		270,000	ug/l	L23	2/2	20000	Y	NA	NA	NA	NA	20000	k	680000	NA
Thallium	2.5	2.5	B	1.7	ug/l	L21	1/2	8		40	i	2130	a,b	8	j	NA	NA
Total cyanide-CLP-B	11	11		7.0	ug/l	GM99-SW6	1/3	1	Y	5.2	NA	1.0	b	5.2	j	NA	NA
Zinc	20.3	42.1		30	ug/l	GM98-SW7	6/6	86		246	c, e	86	NA	173	c,j	NA	NA
bis(2-Ethylhexyl)phthalate (BEHP)	1	1	J	4.2	ug/l	L23	1/5	1	Y	360	d, i	360	d, i	0.6	j	NA	NA
Di-n-octyl phthalate	10	10	J	6.7	ug/l	GM98-SW7	3/9	3	Y	3.0	a, i	3.4	a, i	50	n	708	NA
1,2-Dichloroethene	1	2	J	1.5	ug/l	L23	2/2	5		11600	a, b, i	224000	a,b	5	k	590	NA
Acetone	1	3	J	3.3	ug/l	GM98-SW7	4/7	50		NA	NA	NA	NA	50	m	NA	NA
Chloromethane	0.20	0.20	J	4.2	ug/l	GM99-FD1RE	1/11	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.7	5	J	2.7	ug/l	GM98-SW6	5/5	5		11600	a, b, i	224000	a,b	5	k	590	NA
cis-1,2-Dichloroethylene	4	4		1.4	ug/l	GM99-SW6	1/4	5		11600	a, b, i	224000	a,b	5	k	590	NA
Methylene chloride	0.3	2	J	3.2	ug/l	GM98-SW7	3/7	5		11000	a, h, i	NA	NA	5	k	NA	NA
Trichloroethene	0.9	12		4.6	ug/l	GM98-SW6	5/7	5	Y	21900	a, i	2000	a, b, i	5	k	47	NA
Trichloroethylene	5	5		1.6	ug/l	GM99-SW6	1/4	5		21900	a, i	2000	a, b, i	5	k	47	NA
Vinyl chloride	0.2	0.2	J	3.7	ug/l	GM99-SW6	1/7	0.3		NA	NA	NA	NA	0.3	m	NA	NA

Notes:

(1) - If AWQC were not available, then the LEL from DOD (1999) was inserted here.

(2) - New York State Ambient Water Quality Standards and Guidance Values - June 1998

Y = Exceeds criteria

J = Estimated Value

* - If the qualifier is not defined, the qualifier definition was not provided in the NYSDEC data package.

NA - not available

LEL - Lowest effect level

ER-L - Effects range low

a - Insufficient data to develop criteria. Value presented is the Lowest Obs (LOEL)

b - No chronic exposure values available; value presented based on available levels

c - Hardness dependent criteria

d - Value presented is a proposed criterion.

e - reported as dissolved metal in the water column

Table 2-4b. Upstream Surface Water Detections - Media Screening Comparison

Notes (continued):

f - reported as recoverable metal in the water column

g - Value for hexavalent chromium

h - Acute value used because no chronic value was available

i - Value from Buckman 1999

j - Value is Aquatic(chronic) Standard

k - Value is Health(water source) Standard

l - Value is Aesthetic Standard

m - Value is Health(water source) Guidance

n - Value for Di-n-butyl phthalate

New York Department of Environmental Conservation (NYSDEC). 1998. *TOGS 1.1.1*. Division of Fish, Wildlife, and Marine Resources

Suter, G.W. II and C.L. Tsao. 1996. T*oxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Division*. Risk Assessment Program. Health Sciences Research Division. Oak Ridge Tennessee.

United States Department of Defense (USDoD). 1999. *Appendix B-2: Ambient Water Quality Criteria for Ecological Endpoint Evaluations*.

United States Environmental Protection Agency (USEPA). 1996. *ECO Update: Ecotox Thresholds*. Solid Waste and Emergency Response, Washington, D.C.

United States Environmental Protection Agency (USEPA). 1999. National Ambient Water Quality Criteria Correction.

Table 2-5. *Comparison of Metals in soil and sediment to background*

Metal	Surface Soil	Study Area Sediment	Upstream sediment	North Branch	Naturally Occuring Background In Soils (1)	Basis
Aluminum	8360 - 14600	4390 - 10300	521 25900	3070 - 3700	1000 - 25,000	Albany, Area
Antimony	0.38 - 1.4	0.17 - 1.7	0.18 18.7	0.23 - 0.77	NA	
Arsenic	2.2 - 162	2.2 - 14.1	7.2 316	2.9 - 13.7	<0.1 - 6.5	Albany Area
Barium	48.4 - 228	38.2 - 86.7		18.2 - 36.7	250 - 350	Albany Area
Beryllium	0.44 - 0.94	0.26 - 0.53	0.05 1.2	0.16 - 0.3	ND - 0.9	Albany Area
Cadmium	0.2 - 1	0.25 - 2.5	0.07 10	0.15 - 0.26	0.0001 - 1	Northeastern US
Calcium	8090 - 76600	11200 - 105000	6030 274000	17500 - 50100	778 - 3532	New York State
Chromium	9.2 - 32000	10.9 - 164	1.3 98.2	6.5 - 20	1 - 1000	Eastern US
Cobalt	5.4 - 10.8	3.9 - 8.2	0.59 15.8	4.2 - 4.7	<0.3 - 70	Eastern US
Copper	6.9 - 5410	14.6 - 128	2.5 423	9.7 - 26.1	<1 - 700	Eastern US
Cyanide	0.98 - 102	1.8 - 1.8	1.2 1.2	-		NA
Iron	14300 - 31200	11300 - 18700	1870 36100	11900 - 16400	17,500 - 25,000	Albany Area
Lead	3.7 - 717	6.9 - 172	2.5 1170	6.5 - 57.7	1 - 12.5	Albany Area
Magnesium	5780 - 19200	5100 - 23600	3490 29900	4700 - 16900	2,500 - 6,000	Albany Area
Manganese	228 - 524	167 - 433	134 547	-	400 - 600	Albany Area
Mercury	0.025 - 0.14	0.05 - 0.17	0.06 1.1	0.06 - 0.07	0.042 - 0.066	Albany Area
Nickel	8.3 - 6630	6.5 - 57.9	1.8 56	6.2 - 15.6	6 - 12.5	Albany Area
Potassium	1460 - 2530	423 - 2810	139 8430	693 - 1130	12,500 - 17,500	Albany Area
Selenium	0.54 - 2.4	0.45 - 1.2	0.39 43	0.34 - 0.34	<0.1 - 0.125	Albany Area
Silver	ND	0.12 - 1.4	0.13 47.9	0.19 - 0.31		
Sodium	97.5 - 568	171 - 540	68.9 1420	128 - 322	6,000 - 8,000	Albany Area
Thallium	0.4 - 0.4	0.6 - 0.6	0.73 0.98	0.57 - 0.57	NA	
Vanadium	19.1 - 28.1	11 - 24.5	1.6 50.3	8.2 - 11.4	25 - 60	Albany Area
Zinc	25 - 8470	59.6 - 390	24 811	40.4 60.6	37 - 60	Albany Area

Notes:
units: mg/kg

McGovern, E.C. 1993. Background concentrations of 20 elements in soils with special regard for New York State. Wildlife pathology unit, Wildlife Resources Center, New York State Department of Environmental Conservation. Delmar, New York.

Table 2-6 Summary of PCDD/PCDFs in site surface soils, study area sediments, upstream sediments, and urban reference sediments

Site Sediment	Bird	GM98-SED01			GM98-SED01B			GM98-SED07A			GM98-SED11A			GM98-SED11B			GM98-SED16		
LAB_CHEM	TEF	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ
1,2,3,4,6,7,8-HpCDD	0.001	212	8.76	0.21	216	8.55	0.22	381	9.71	0.38	444	10.96	0.44	676	9.29	0.68	167	7.22	0.17
1,2,3,4,7,8-HxCDD	0.050	5	0.21	0.25	5	0.20	0.25	6.37	0.16	0.32	6.92	0.17	0.35	10.1	0.14	0.51	< 5	0.22	0.25
1,2,3,6,7,8-HxCDD	0.010	16.1	0.67	0.16	16.7	0.66	0.17	33.7	0.86	0.34	29.8	0.74	0.30	40.1	0.55	0.40	10.5	0.45	0.11
1,2,3,7,8,9-HxCDD	0.100	15.8	0.65	1.58	16	0.63	1.60	48	1.22	4.80	28.9	0.71	2.89	35.9	0.49	3.59	12	0.52	1.20
1,2,3,7,8-PeCDD	1.000	6.96	0.29	6.96	6.03	0.24	6.03	23.8	0.61	23.80	11.8	0.29	11.80	13.8	0.19	13.80	5.6	0.24	5.60
2,3,7,8-TCDD	1.000	3.93	0.16	3.93	3.83	0.15	3.83	13.3	0.34	13.30	6.04	0.15	6.04	4.68	0.06	4.68	2.58	0.11	2.58
OCDD	0.0001	1870	77.30	0.19	1900	75.21	0.19	3050	77.77	0.31	2950	72.84	0.30	5680	78.07	0.57	1860	80.43	0.19
1,2,3,4,6,7,8-HpCDF	0.010	54	2.23	0.54	67.9	2.69	0.68	80.2	2.04	0.80	131	3.23	1.31	193	2.65	1.93	49.5	2.14	0.50
1,2,3,4,7,8,9-HpCDF	0.010	9.53	0.39	0.10	12.2	0.48	0.12	12.4	0.32	0.12	18.8	0.46	0.19	34.8	0.48	0.35	7.64	0.33	0.08
1,2,3,4,7,8-HxCDF	0.100	16.9	0.70	1.69	24.1	0.95	2.41	14.3	0.36	1.43	22.7	0.56	2.27	33.6	0.46	3.36	10.6	0.46	1.06
1,2,3,6,7,8-HxCDF	0.100	7.43	0.31	0.74	10.1	0.40	1.01	8.09	0.21	0.81	14.6	0.36	1.46	20.2	0.28	2.02	< 5	0.22	0.50
1,2,3,7,8,9-HxCDF	0.100	< 5	0.21	0.50	< 5	0.20	0.50	< 5	0.13	0.50	< 5	0.12	0.50	< 5	0.07	0.50	< 5	0.22	0.50
1,2,3,7,8-PeCDF	0.100	6.1	0.25	0.61	6.46	0.26	0.65	8.06	0.21	0.81	13.4	0.33	1.34	19.9	0.27	1.99	5.42	0.23	0.54
2,3,4,6,7,8-HxCDF	0.100	5.12	0.21	0.51	6.63	0.26	0.66	7.37	0.19	0.74	10.6	0.26	1.06	15.6	0.21	1.56	< 5	0.22	0.50
2,3,4,7,8-PeCDF	1.000	19.9	0.82	19.90	27.1	1.07	27.10	10.9	0.28	10.90	14	0.35	14.00	22.2	0.31	22.20	8.54	0.37	8.54
2,3,7,8-TCDF	1.000	16.5	0.68	16.50	20.3	0.80	20.30	13.5	0.34	13.50	18.2	0.45	18.20	2.8	0.04	2.80	12.2	0.53	12.20
OCDF	0.0001	149	6.16	0.01	183	7.24	0.02	206	5.25	0.02	324	8.00	0.03	468	6.43	0.05	141	6.10	0.01
Total TEQ (ppt)				54.4			65.73			72.87			62.47			60.97			34.52

Upstream Sediment		GM98-SED18B			GM98-SED17			GM98-SED18A			GM98-SED19			GM98-SED20A			GM98-SED20B		
		Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ
1,2,3,4,6,7,8-HpCDD	0.001	< 5	5.81	0.01	575	10.18	0.58	9.73	5.60	0.01	73.5	7.83	0.07	317	13.49	0.32	36.9	7.20	0.04
1,2,3,4,7,8-HxCDD	0.050	< 5	5.81	0.25	6.64	0.12	0.33	< 5	2.88	0.25	< 5	0.53	0.25	< 5	0.21	0.25	< 5	0.98	0.25
1,2,3,6,7,8-HxCDD	0.010	< 5	5.81	0.05	29.5	0.52	0.30	< 5	2.88	0.05	< 5	0.53	0.05	21.3	0.91	0.21	< 5	0.98	0.05
1,2,3,7,8,9-HxCDD	0.100	< 5	5.81	0.50	24.5	0.43	2.45	< 5	2.88	0.50	< 5	0.53	0.50	24.3	1.03	2.43	< 5	0.98	0.50
1,2,3,7,8-PeCDD	1.000	< 5	5.81	5.00	11.2	0.20	11.20	< 5	2.88	5.00	5	0.53	5.00	11	0.47	11.00	< 5	0.98	5.00
2,3,7,8-TCDD	1.000	< 1	1.16	1.00	6.07	0.11	6.07	< 1	0.58	1.00	1.02	0.11	1.02	4.96	0.21	4.96	< 1	0.20	1.00
OCDD	0.0001	< 10	11.61	0.00	4220	74.68	0.42	97.5	56.10	0.01	749	79.78	0.07	1770	75.34	0.18	385	75.09	0.04
1,2,3,4,6,7,8-HpCDF	0.010	< 5	5.81	0.05	162	2.87	1.62	< 5	2.88	0.05	16.1	1.71	0.16	44.5	1.89	0.45	8.92	1.74	0.09
1,2,3,4,7,8,9-HpCDF	0.010	< 5	5.81	0.05	31.9	0.56	0.32	< 5	2.88	0.05	< 5	0.53	0.05	7.24	0.31	0.07	< 5	0.98	0.05
1,2,3,4,7,8-HxCDF	0.100	< 5	5.81	0.50	40.2	0.71	4.02	< 5	2.88	0.50	< 5	0.53	0.50	10.6	0.45	1.06	< 5	0.98	0.50
1,2,3,6,7,8-HxCDF	0.100	< 5	5.81	0.50	22.4	0.40	2.24	< 5	2.88	0.50	< 5	0.53	0.50	5.62	0.24	0.56	< 5	0.98	0.50
1,2,3,7,8,9-HxCDF	0.100	< 5	5.81	0.50	< 5	0.09	0.50	< 5	2.88	0.50	< 5	0.53	0.50	< 5	0.21	0.50	< 5	0.98	0.50
1,2,3,7,8-PeCDF	0.100	< 5	5.81	0.50	25.7	0.45	2.57	< 5	2.88	0.50	< 5	0.53	0.50	5.76	0.25	0.58	< 5	0.98	0.50
2,3,4,6,7,8-HxCDF	0.100	< 5	5.81	0.50	17.8	0.32	1.78	< 5	2.88	0.50	< 5	0.53	0.50	< 5	0.21	0.50	< 5	0.98	0.50
2,3,4,7,8-PeCDF	1.000	< 5	5.81	5.00	25.9	0.46	25.90	< 5	2.88	5.00	< 5	0.53	5.00	6.47	0.28	6.47	< 5	0.98	5.00
2,3,7,8-TCDF	1.000	< 0.12	0.14	0.12	33.7	0.60	33.70	0.58	0.33	0.58	3.66	0.39	3.66	10.1	0.43	10.10	2.78	0.54	2.78
OCDF	0.0001	10	11.61	0.00	413	7.31	0.04	< 5	2.88	0.00	40.6	4.32	0.00	95.5	4.06	0.01	23.1	4.51	0.00
Total TEQ (ppt)				14.53			94.03			15.00			18.34			39.64			17.30

CSO/Runoff		Long Island Sound (Ref. Sed.(1))			Black Rock Harbor (Urban/Ind. Sed. (1))			Passaic River CSO1 (Urban/Ind. Sed (2))			Passaic River CSO2 (Urban/Ind. Sed (2))			Passaic River CSO3 (Urban/Ind. Sed (2))			Passaic River CSO4 (Urban/Ind. Sed (2))			New Bedford Harbor (PCB Sediment)(1)			New Bedford Harbor2 (PCB Sediment)(1)			New Bedford Harbor3 (PCB Sediment)(1)		
Literature Ref.			%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ		%Total	TEQ
1,2,3,4,6,7,8 HPCDD	0.001	300	11.18	0.30	2000	8.40	2.00	495	7.28	0.50	780	5.92	0.78	720	5.49	0.72	200	7.79	0.2	1000	5.86	1	960	8.03	0.96	300	4.85	0.3
1,2,3,4,7,8 HXCDD	0.050	6.5	0.24	0.33	60	0.25	3.00	7.6	0.11	0.38	12	0.09	0.6	11	0.08	0.55	3.4	0.13	0.17	65	0.38	3.25	25	0.21	1.25	25	0.40	1.25
1,2,3,6,7,8 HXCDD	0.010	13.5	0.50	0.14	150	0.63	1.50	27	0.40	0.27	42	0.32	0.42	38	0.29	0.38	8.7	0.34	0.087	90	0.53	0.9	25	0.21	0.25	30	0.49	0.3
1,2,3,7,8,9 HXCDD	0.100	12	0.45	1.20	100	0.42	10.00	16	0.24	1.60	22	0.17	2.2	19	0.14	1.9	200	7.79	20	80	0.47	8	20	0.17	2	20	0.32	2
1,2,3,7,8 PCDD	1.000	1	0.04	1.00	95	0.40	95.00	6.4	0.09	6.40	13	0.10	13	9	0.07	9	2.5	0.10	2.5	29	0.17	29	22	0.18	22	11	0.18	11
2,3,7,8 TCDD	1.000	0.93	0.03	0.93	57	0.24	57.00	190	2.80	190.00	590	4.48	590	490	3.74	490	1.8	0.07	1.8	4.2	0.02	4.2	2.8	0.02	2.8	0.74	0.01	0.74
OCDD	0.0001	2000	74.53	0.20	16000	67.22	1.60	4500	66.22	0.45	8800	66.75	0.88	8700	66.33	0.87	1700	66.18	0.17	5500	32.23	0.55	6500	54.35	0.65	4000	64.70	0.4
1,2,3,4,6,7,8 HPCDF	0.010	95	3.54	0.95	1050	4.41	10.50	530	7.80	5.30	1000	7.58	10	1100	8.39	11	160	6.23	1.6	3000	17.58	30	800	6.69	8	105	1.70	1.05
1,2,3,4,7,8,9 HPCDF	0.010	2	0.07	0.02	220	0.92	2.20	16	0.24	0.16	30	0.23	0.3	28	0.21	0.28	5.1	0.20	0.051	300	1.76	3	155	1.30	1.55	110	1.78	1.1
1,2,3,4,7,8 HXCDF	0.100	10	0.37	1.00	180	0.76	18.00	97	1.43	9.70	200	1.52	20	220	1.68	22	24	0.93	2.4	2200	12.89	220	320	2.68	32	33	0.53	3.3
1,2,3,6,7,8 HXCDF	0.100	5	0.19	0.50	100	0.42	10.00	30	0.44	3.00	52	0.39	5.2	49	0.37	4.9	8.2	0.32	0.82	700	4.10	70	170	1.42	17	30	0.49	3
1,2,3,7,8,9 HXCDF	0.100	4.5	0.17	0.45	14	0.06	1.40	5.5	0.08	0.55	8	0.06	0.8	7.9	0.06	0.79	1.5	0.06	0.15	8	0.05	0.8	30	0.25	3	8	0.13	0.8
1,2,3,7,8 PCDF	0.100	6.6	0.25	0.66	91	0.38	9.10	12	0.18	1.20	17	0.13	1.7	15	0.11	1.5	2.7	0.11	0.27	490	2.87	49	390	3.26	39	360	5.82	36
2,3,4,6,7,8 HXCDF	0.100	4	0.15	0.40	58	0.24	5.80	24	0.35	2.40	34	0.26	3.4	31	0.24	3.1	8.7	0.34	0.87	140	0.82	14	60	0.50	6	9.5	0.15	0.95
2,3,4,7,8 PCDF	1.000	7.6	0.28	7.60	73	0.31	73.00	41	0.60	41.00	53	0.40	53	51	0.39	51	10	0.39	10	560	3.28	560	280	2.34	280	70	1.13	70
2,3,7,8 TCDF	1.000	15	0.56	15.00	56	0.24	56.00	18	0.26	18.00	31	0.24	31	27	0.21	27	2.3	0.09	2.3	1100	6.45	1100	1400	11.71	1400	790	12.78	790
OCDF	0.0001	200	7.45	0.02	3500	14.70	0.35	780	11.48	0.08	1500	11.38	0.15	1600	12.20	0.16	230	8.95	0.023	1800	10.55	0.18	800	6.69	0.08	280	4.53	0.028
Total TEQ (ppt)				30.69			356.45			280.98			733.43			625.15			43.411			2093.88			1816.54			922.218

Table 2-6 (cont.) *Summary of PCDD/PCDFs in site surface soils, study area sediments, upstream sediments, and urban reference sediments*

Site Soils	Bird	SS-99-24			SS-99-25			SS-99-26			SS-99-27			SS-99-27 DUP			SS-99-31		
LAB_CHEM	TEF	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ	Conc (ppt)	%Total	TEQ
1,2,3,4,6,7,8-HpCDD	0.001	6.45	4.86	0.01	14.4	6.25	0.01	571	7.10	0.57	21.2	7.19	0.02	42.8	7.40	0.04	32.9	1.01	0.03
1,2,3,4,7,8-HxCDD	0.050	< 5	3.77	0.25	< 4.2	1.82	0.21	4.98	0.06	0.25	< 5	1.70	0.25	< 5	0.86	0.25	< 5	0.15	0.25
1,2,3,6,7,8-HxCDD	0.010	< 5	3.77	0.05	< 4.2	1.82	0.04	102	1.27	1.02	< 5	1.70	0.05	< 5	0.86	0.05	< 5	0.15	0.05
1,2,3,7,8,9-HxCDD	0.100	< 5	3.77	0.50	< 4.2	1.82	0.42	38	0.47	3.80	< 5	1.70	0.50	< 5	0.86	0.50	< 5	0.15	0.50
1,2,3,7,8-PeCDD	1.000	< 5	3.77	5.00	< 4.2	1.82	4.20	7.44	0.09	7.44	< 5	1.70	5.00	< 5	0.86	5.00	< 5	0.15	5.00
2,3,7,8-TCDD	1.000	< 1	0.75	1.00	< 0.83	0.36	0.83	2.49	0.03	2.49	< 1	0.34	1.00	< 1	0.17	1.00	< 1	0.03	1.00
OCDD	0.0001	50.4	37.97	0.01	120	52.06	0.01	1880	23.37	0.19	185	62.72	0.02	216	37.34	0.02	238	7.33	0.02
1,2,3,4,6,7,8-HpCDF	0.010	< 5	3.77	0.05	8.17	3.54	0.08	663	8.24	6.63	7.21	2.44	0.07	107	18.50	1.07	17.9	0.55	0.18
1,2,3,4,7,8,9-HpCDF	0.010	< 5	3.77	0.05	< 4.2	1.82	0.04	150	1.86	1.50	< 5	1.70	0.05	8.74	1.51	0.09	< 5	0.15	0.05
1,2,3,4,7,8-HxCDF	0.100	< 5	3.77	0.50	6.14	2.66	0.61	700	8.70	70.00	< 5	1.70	0.50	34.1	5.90	3.41	10.2	0.31	1.02
1,2,3,6,7,8-HxCDF	0.100	< 5	3.77	0.50	< 4.2	1.82	0.42	221	2.75	22.10	< 5	1.70	0.50	25.7	4.44	2.57	< 5	0.15	0.50
1,2,3,7,8,9-HxCDF	0.100	< 5	3.77	0.50	< 4.2	1.82	0.42	16.4	0.20	1.64	< 5	1.70	0.50	< 5	0.86	0.50	< 5	0.15	0.50
1,2,3,7,8-PeCDF	0.100	< 5	3.77	0.50	< 4.2	1.82	0.42	335	4.16	33.50	< 5	1.70	0.50	12.6	2.18	1.26	6.05	0.19	0.61
2,3,4,6,7,8-HxCDF	0.100	< 5	3.77	0.50	4.2	1.82	0.42	113	1.40	11.30	< 5	1.70	0.50	18	3.11	1.80	< 5	0.15	0.50
2,3,4,7,8-PeCDF	1.000	< 5	3.77	5.00	14.8	6.42	14.80	1380	17.15	1380.00	< 5	1.70	5.00	14.3	2.47	14.30	20.4	0.63	20.40
2,3,7,8-TCDF	1.000	4.89	3.68	4.89	8.38	3.64	8.38	670	8.33	670.00	8.66	2.94	8.66	28.1	4.86	28.10	43.5	1.34	43.50
OCDF	0.0001	< 10	7.53	0.00	20	8.68	0.00	1190	14.79	0.12	16.9	5.73	0.00	45.1	7.80	0.00	2838	87.38	0.28
Total TEQ (ppt)				19.30			31.33			2212.55			23.12			59.97			74.39

Notes:

(1) Norwood, C.B., M. Hackett, R.J., Pruell, B.C. Butterworth, K.J. Williamson and S.M. Naumann. 1989. Polychlorinated dibenzo-p-dioxins and dibenzofurans in selected estuarine sediments. *Chemosphere*. 18. 553-560.

(2) Huntley, S.L., T.J. Iannuzi, J.D. Avantaggio, H. Carlson-Lynch, C.W. Schmidt, and B.L. Finley. 1997. Combined sewer overflows (CSOs) as sources of sediment contamination in the Lower Passaic River, New Jersey. II. Polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and polychlorinated biphenyls. Chemosphere. 34(2). 233-250.

Table 2-7. *Comparison of PAHs in site surface soil, study area sediment, and upstream sediment with urban background*

PAH	Surface Soil	Study Area Sediment	Upstream sediment	North Branch	Urban Background in Soils (1)
2-Methylnaphthalene	0.047 - 11	0.061 - 3.5	0.05 - 5.5	-	0.039 - 5.7
Acenaphthene	0.046 - 40	0.081 - 9.9	0.054 - 21	0.055 - 0.061	0.021 - 0.51
Acenaphthylene	0.073 - 0.073	0.054 - 0.28	0.058 - 1.7	-	0.019 - 0.61
Anthracene	0.052 - 230	0.14 - 12	0.049 - 25	0.05 - 0.11	0.012 - 1.6
Benzo(a)anthracene	0.045 - 350	0.059 - 30	0.061 - 60	0.15 - 0.57	0.09 - 7.7
Benzo(b)fluoranthene	0.039 - 360	0.52 - 27	0.089 - 66	0.069 - 1.1	0.33 - 7
Benzo(ghi)perylene	0.05 - 310	0.42 - 20	0.092 - 36	0.056 - 0.57	0.25 - 6
Benzo(k)fluoranthene	0.041 - 120	0.055 - 13	0.08 - 23	0.052 - 0.37	0.097 - 6.3
Benzo[a]pyrene	0.077 - 300	0.045 - 27	0.054 - 50	0.046 - 0.67	0.092 - 6.9
Chrysene	0.042 - 380	0.062 - 29	0.083 - 59	0.058 - 0.8	0.15 - 8.2
Dibenzo(a,h)anthracene	0.14 - 39		0.13 - 11	0.16 - 0.16	0.038 - 0.78
Fluoranthene	0.04 - 1200	0.14 - 57	0.041 - 130	0.079 - 1.2	0.71 - 18
Fluorene	0.051 - 65	0.067 - 9.4	0.071 - 18	0.051 - 0.07	0.054 - 1.4
Indeno(1,2,3-cd)pyrene	0.067 - 190	0.4 - 17	0.074 - 34	0.049 - 0.51	0.25 - 6.3
Naphthalene	0.04 - 8	0.057 - 9.3	0.054 - 10	-	0.43 - 4.2
Phenanthrene	0.04 - 670	0.13 - 69	0.066 - 130	0.22 - 0.76	0.09 - 12
Pyrene	0.041 - 1000	0.13 - 68	0.045 - 130	0.077 - 1.6	0.18 - 14

Notes:
units: mg/kg
(1) Data from NYSDOH 1998, Polycyclic Aromatic Hydrocarbons Concentrations in Surface Soils of the Seneca Bacock Neighborhood, Buffalo, New York

Table 2-8a. *1985 EDI Fish Analytical Data*

Species	Aroclor 1248 (µg/g)	Aroclor 1254 (µg/g)	Total PCB (µg/g)	Dry Weight (%)	Lipid Weight (%)	Total Weight (g)	Non-carcinogenic Final Fish Flesh Criteria (Newell et al. 1987) (µg/g)
Bluegill	≤0.2	---	≤0.2	25.0	0.25	60	**0.11**
Bluegill	≤0.3	---	≤0.3	27.4	0.26	62	
Bluegill	≤0.2	---	≤0.2	26.0	0.85	64	
Bluegill	≤0.4	---	≤0.4	26.5	1.1	86	
Bluegill	≤0.2	---	≤0.2	25.1	0.40	59	
Pumkinseed	≤0.3	---	≤0.3	26.0	0.10	65	
Shiners	<3	---	<3	25.6	1.6	11	
Brown Bullhead	≤0.2	---	≤0.2	19.4	0.07	134	
Carp	4.1	2.7	6.8	31.2	7.3	2680	
Carp	≤0.3	---	<0.3	20.9	0.17	2885	
Carp	2.2	1.2	3.4	30.9	4.8	1884	
Carp	0.55	0.53	1.1	21.7	0.24	3481	

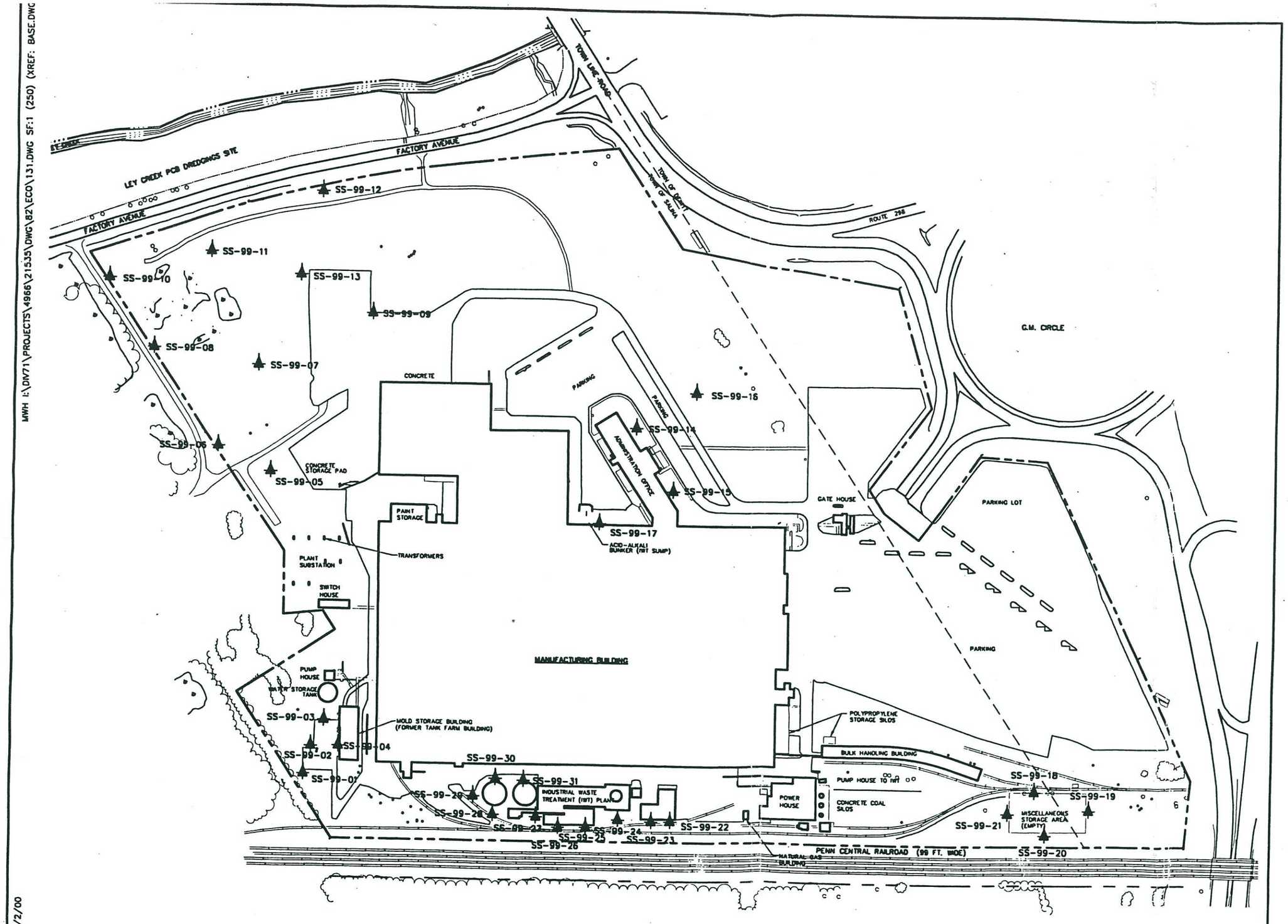
Notes:

EDI Engineering & Science. 1985(b). *Oil and PCB Sampling and Analyses of Portions of Ley Creek, Onondaga County, New York.*

Newell, A.J., D.W. Johnson, L.K. Allen. 1987. *Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife*. New York State Department of Environmental Conservation. Division of Fish and Wildlife.

FIGURES

FIGURE 2-1



LEGEND

- SURFACE SOIL SAMPLE
- PROPERTY BOUNDARY
- TREE LINE

GENERAL MOTORS CORP.
SYRACUSE, NEW YORK

SURFACE SOIL SAMPLE LOCATIONS

0 250 500
SCALE IN FEET

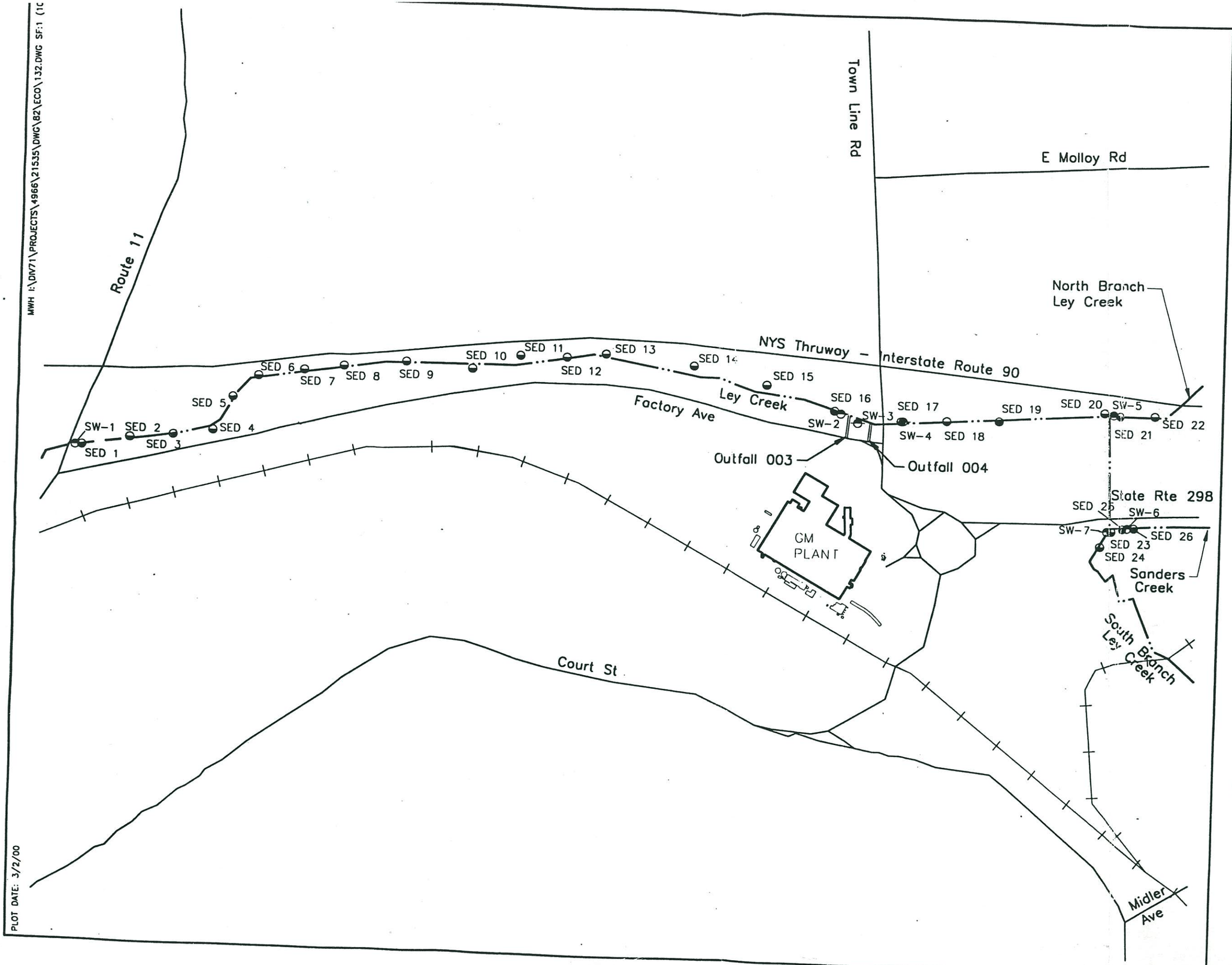
FILE NO. 4966.21535.131
DATE: MARCH 2000

O'BRIEN & GERE ENGINEERS, INC.

MWH I:\DIV71\PROJECTS\4966\21535\DWG\82\ECO\131.DWG SF:1 (250) (XREF: BASE.DWG

PLOT DATE: 3/2/00

FIGURE 2-2



LEGEND

- SEDIMENT CORE SAMPLE LOCATION
- SURFACE WATER SAMPLE LOCATION

GENERAL MOTORS CORP.
SYRACUSE, NEW YORK

1998/1999 LEY CREEK SURFACE WATER AND SEDIMENT / SAMPLING LOCATION PLAN

0 1000 2000

SCALE IN FEET

FILE NO. 4966.21535.132

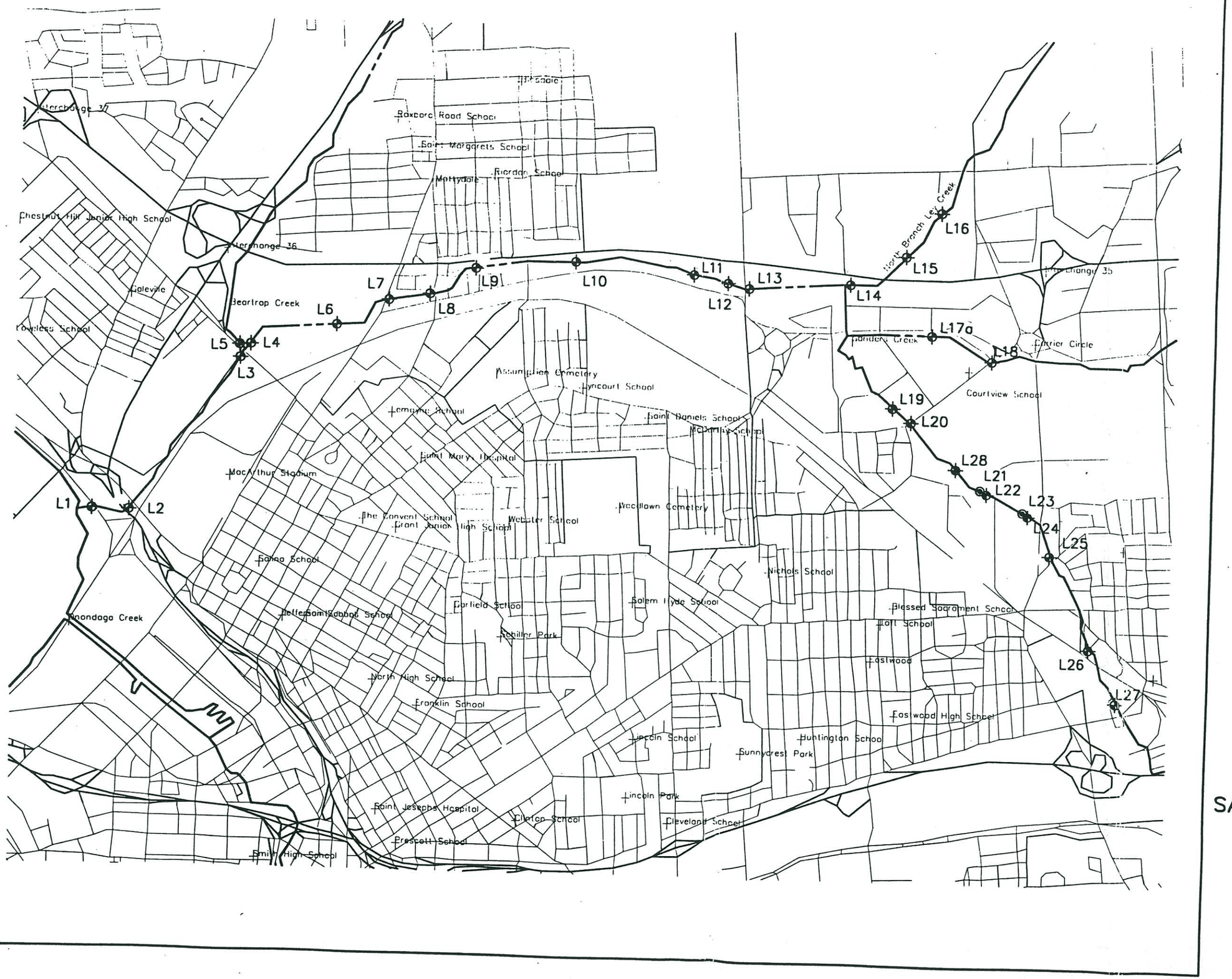
DATE: MARCH 2000

O'BRIEN & GERE

MWH I:\DIV71\PROJECTS\4966\21535\DWG\82\ECO\132.DWG SF:1 (10

PLOT DATE: 3/2/00

FIGURE 2-3



LEGEND

27 ⊕ SEDIMENT SAMPLE LOCATION

21 ◉ SURFACE WATER SAMPLE LOCATION

GENERAL MOTORS CORP.
SYRACUSE, NEW YORK

1996 NYSDEC LEY CREEK SURFACE WATER AND SEDIMENT SAMPLING LOCATION PLAN

0 2000 4000
SCALE IN FEET

FILE NO. 4966.21535.133
DATE: MARCH 2000

O'BRIEN & GERE ENGINEERS INC.

MWH I:\DM71\PROJECTS\4966\21535\DWG\B2\ECO\133.DWG SF:1 (

PLOT DATE: 3/2/00

Figure 2-4

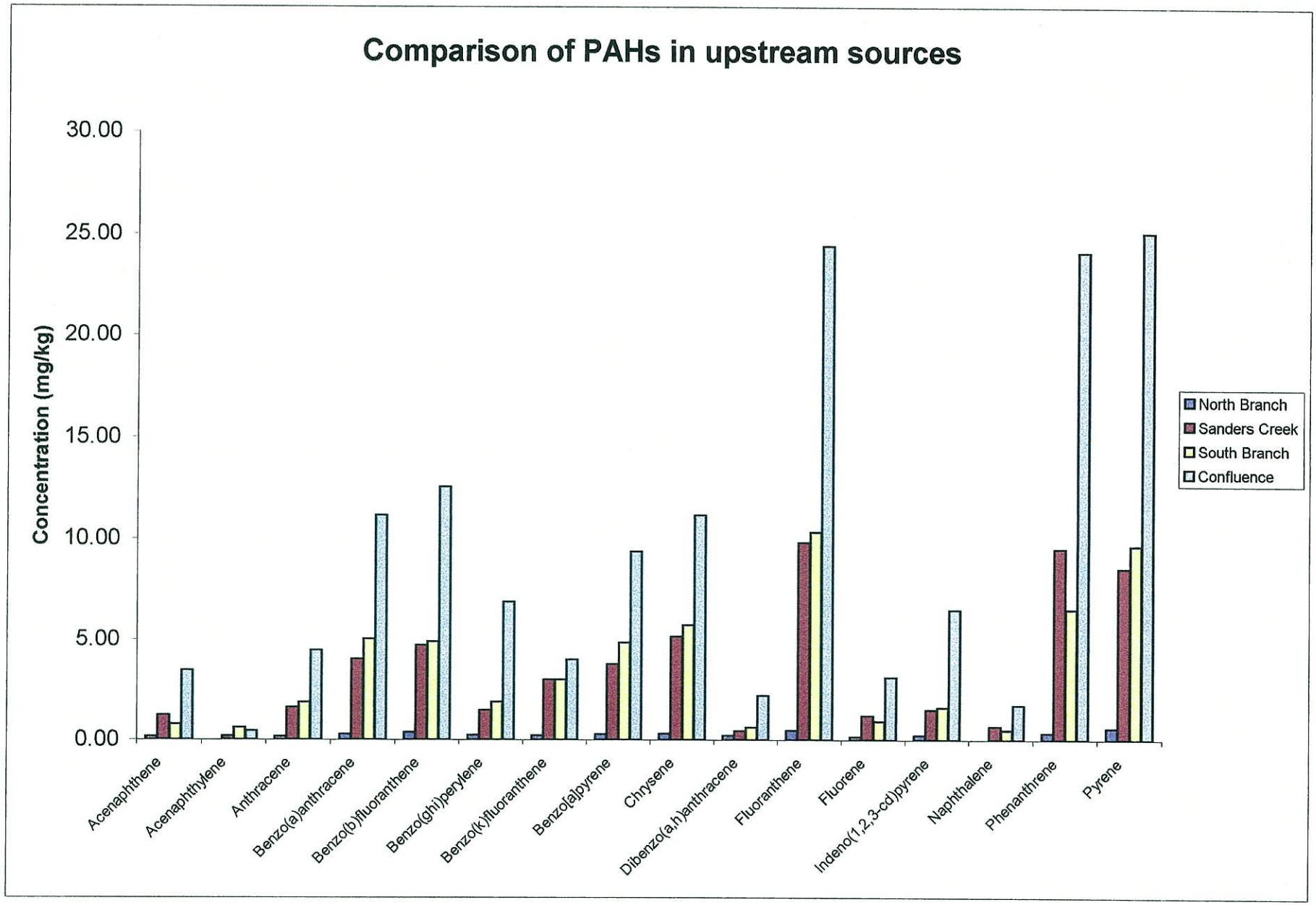

Comparison of PAHs in upstream sources
Concentration (mg/kg)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
North Branch
Sanders Creek
South Branch
Confluence
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Benzo[a]pyrene
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

Figure 2-5

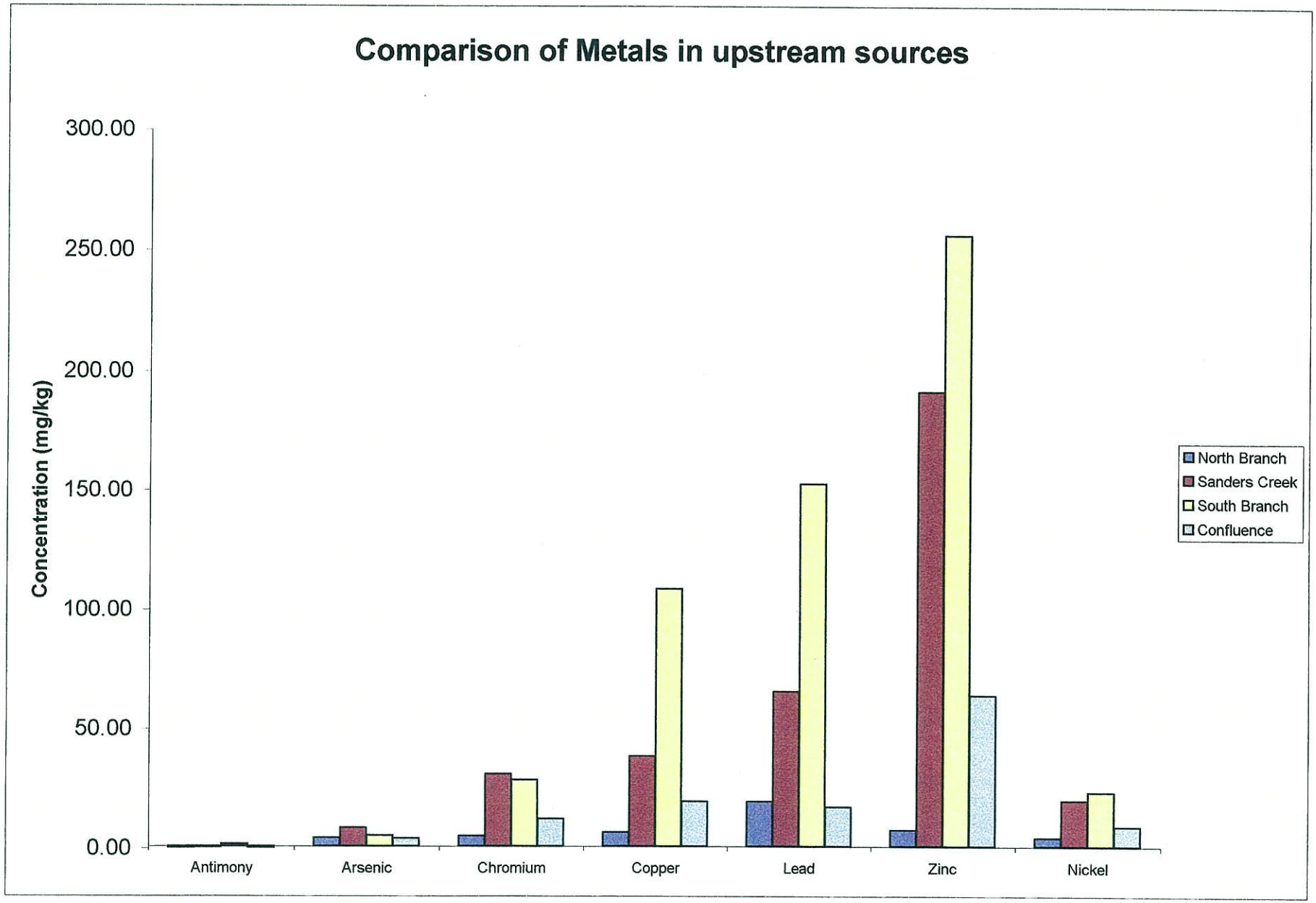

Comparison of Metals in upstream sources
Concentration (mg/kg)
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Antimony
Arsenic
Chromium
Copper
Lead
Zinc
Nickel
North Branch
Sanders Creek
South Branch
Confluence

Figure 2-6

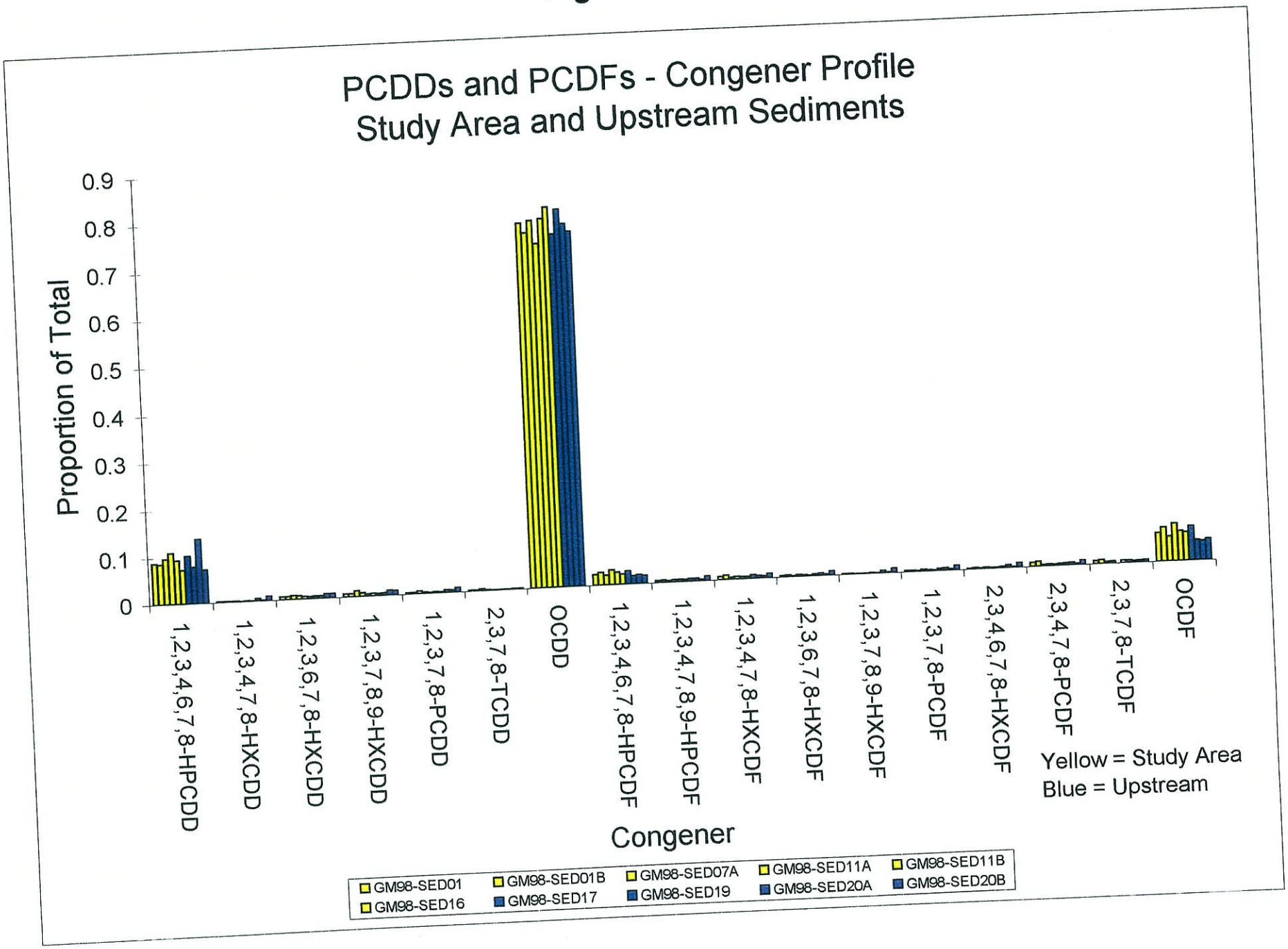

PCDDs and PCDFs - Congener Profile
Study Area and Upstream Sediments
Proportion of Total
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1,2,3,4,6,7,8-HPCDD
1,2,3,4,7,8-HXCDD
1,2,3,6,7,8-HXCDD
1,2,3,7,8,9-HXCDD
1,2,3,7,8-PCDD
2,3,7,8-TCDD
OCDD
1,2,3,4,6,7,8-HPCDF
1,2,3,4,7,8,9-HPCDF
1,2,3,4,7,8-HXCDF
1,2,3,6,7,8-HXCDF
1,2,3,7,8,9-HXCDF
1,2,3,7,8-PCDF
2,3,4,6,7,8-HXCDF
2,3,4,7,8-PCDF
2,3,7,8-TCDF
OCDF
Yellow = Study Area
Blue = Upstream
Congener
GM98-SED01
GM98-SED01B
GM98-SED07A
GM98-SED11A
GM98-SED11B
GM98-SED16
GM98-SED17
GM98-SED19
GM98-SED20A
GM98-SED20B

Figure 2-6a
PCA Analysis Plot

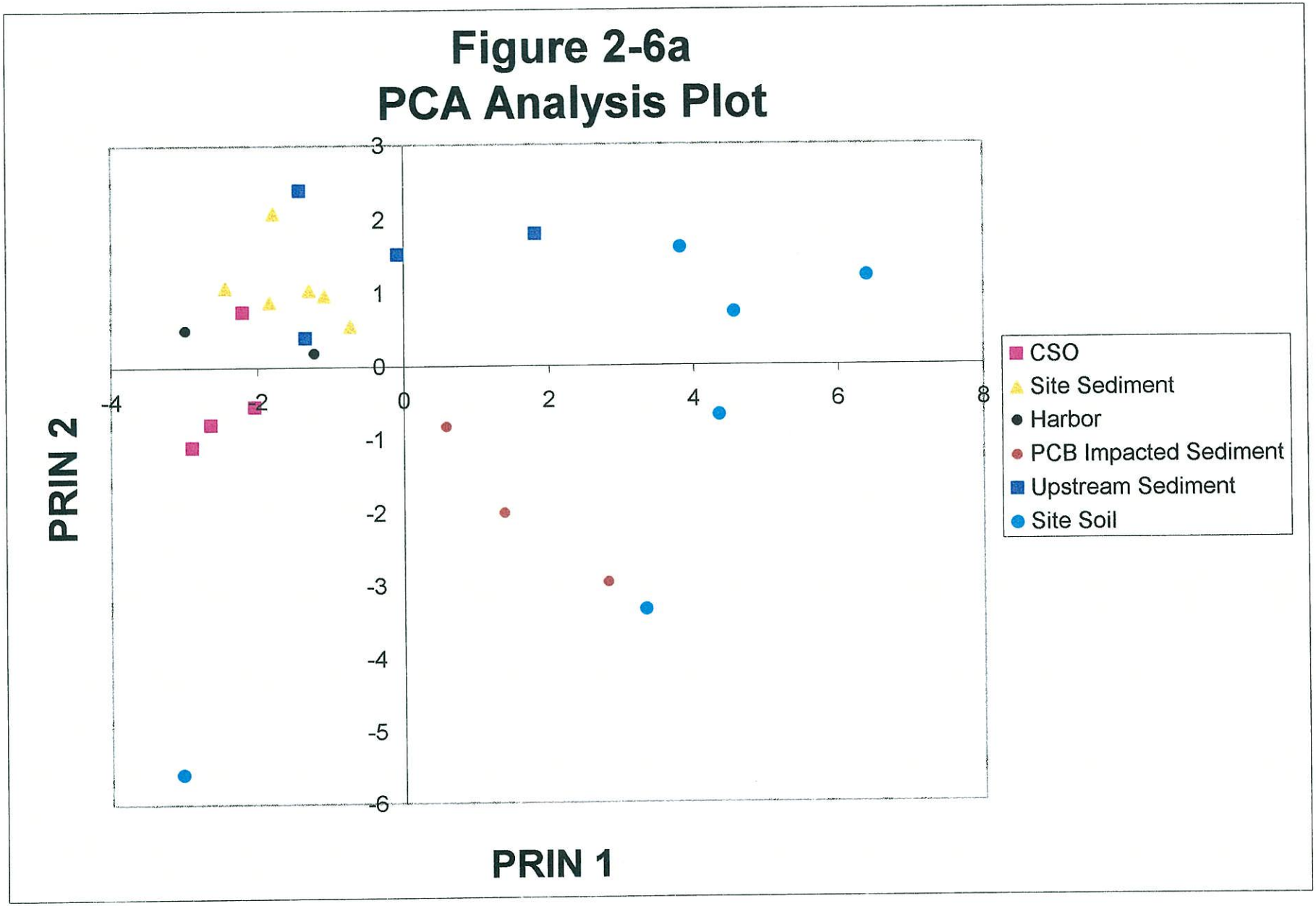


Figure 2-7

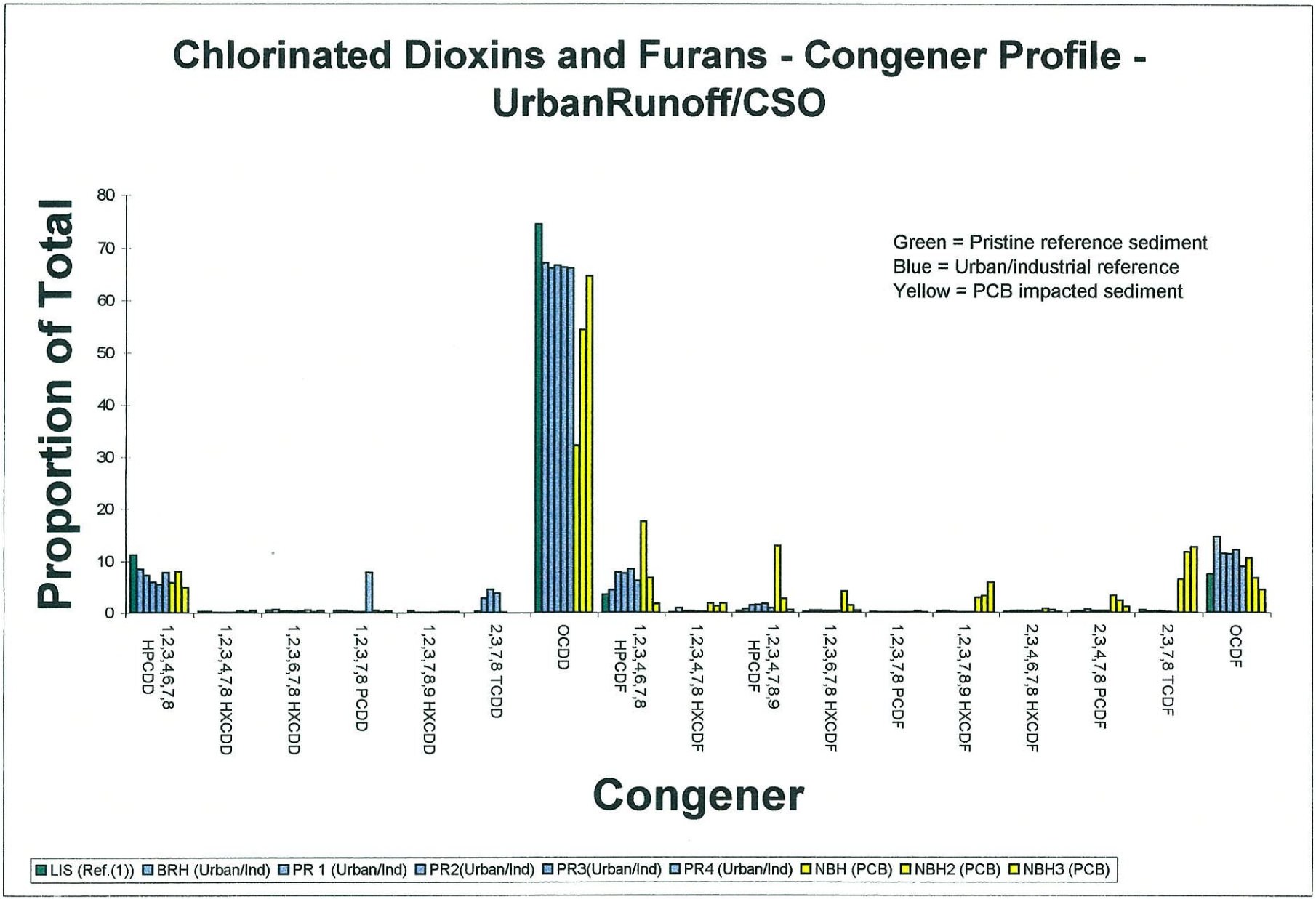

Chlorinated Dioxins and Furans - Congener Profile - UrbanRunoff/CSO
Proportion of Total
80
70
60
50
40
30
20
10
0
Green = Pristine reference sediment
Blue = Urban/industrial reference
Yellow = PCB impacted sediment
1,2,3,4,6,7,8 HPCDD
1,2,3,4,7,8 HXCDD
1,2,3,6,7,8 HXCDD
1,2,3,7,8 PCDD
1,2,3,7,8,9 HXCDD
2,3,7,8 TCDD
OCDD
1,2,3,4,6,7,8 HPCDF
1,2,3,4,7,8 HXCDF
1,2,3,4,7,8,9 HPCDF
1,2,3,6,7,8 HXCDF
1,2,3,7,8 PCDF
1,2,3,7,8,9 HXCDF
2,3,4,6,7,8 HXCDF
2,3,4,7,8 PCDF
2,3,7,8 TCDF
OCDF
Congener
LIS (Ref.(1))
BRH (Urban/Ind)
PR 1 (Urban/Ind)
PR2(Urban/Ind)
PR3(Urban/Ind)
PR4 (Urban/Ind)
NBH (PCB)
NBH2 (PCB)
NBH3 (PCB)

Figure 2-8

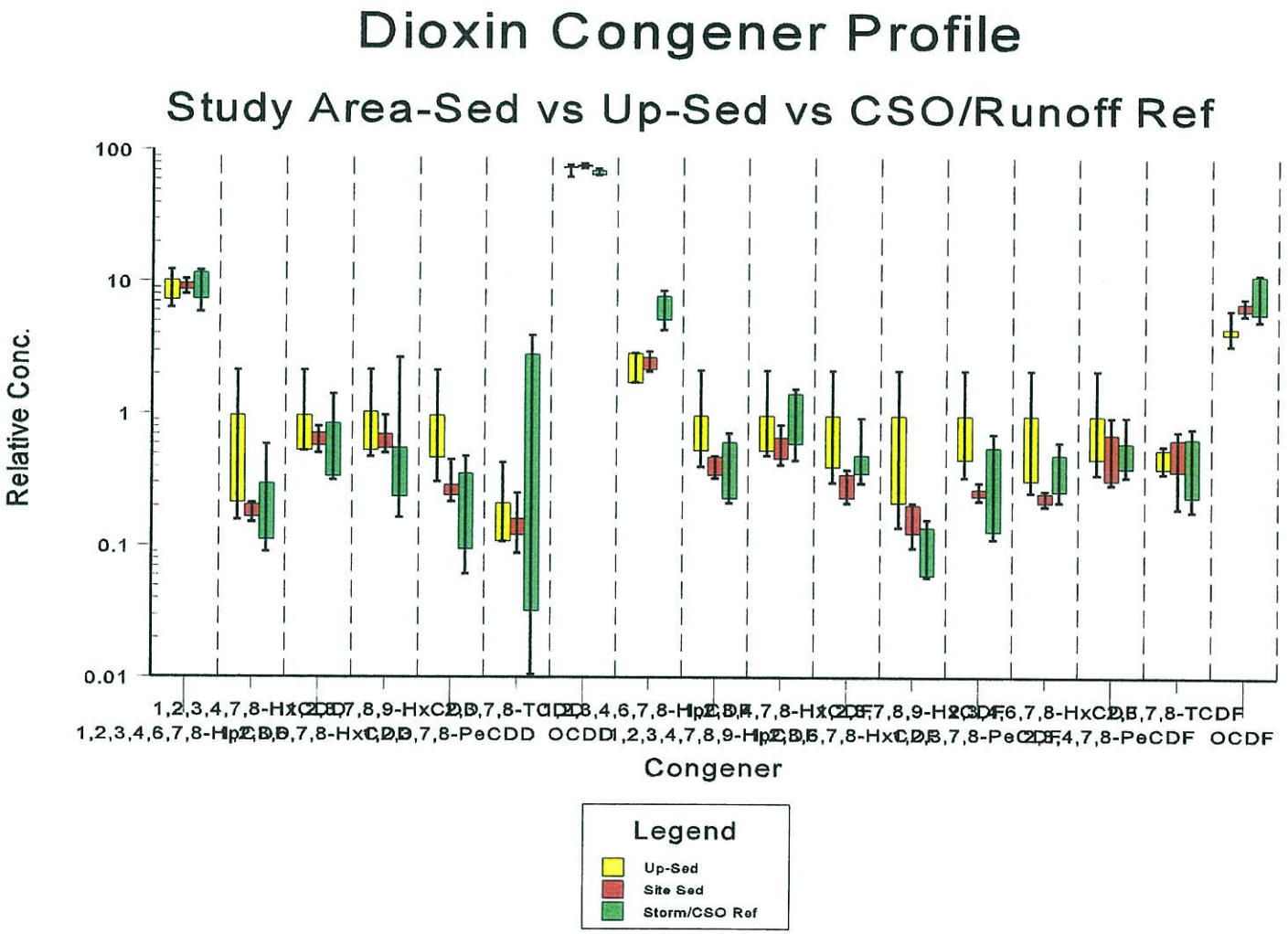

Dioxin Congener Profile
Study Area-Sed vs Up-Sed vs CSO/Runoff Ref
Relative Conc.
100
10
1
0.1
0.01
1,2,3,4,7,8-HxCDD
1,2,3,4,6,7,8-HpCDD
1,2,3,7,8,9-HxCDD
1,2,3,6,7,8-HxCDD
2,3,7,8-TCDD
1,2,3,7,8-PeCDD
OCDD
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8-HxCDF
1,2,3,7,8,9-HxCDF
1,2,3,6,7,8-HxCDF
2,3,4,7,8-PeCDF
1,2,3,7,8-PeCDF
2,3,7,8-TCDF
OCDF
Congener
Legend
Up-Sed
Site Sed
Storm/CSO Ref

Figure 2-9

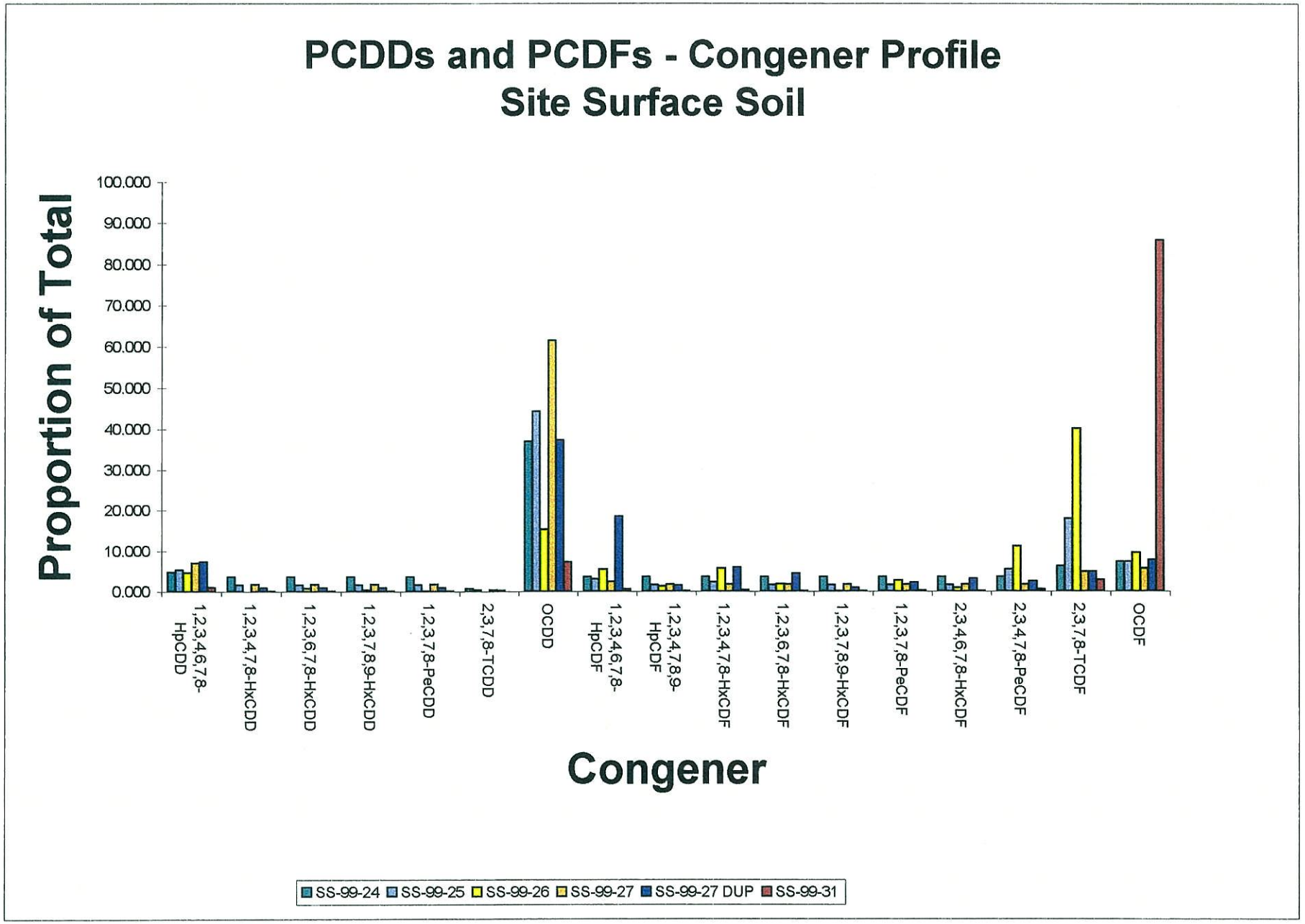

PCDDs and PCDFs - Congener Profile
Site Surface Soil
Proportion of Total
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
1,2,3,4,6,7,8-HpCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
1,2,3,7,8-PeCDD
2,3,7,8-TCDD
OCDD
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
1,2,3,7,8-PeCDF
2,3,4,6,7,8-HxCDF
2,3,4,7,8-PeCDF
2,3,7,8-TCDF
OCDF
Congener
SS-99-24
SS-99-25
SS-99-26
SS-99-27
SS-99-27 DUP
SS-99-31

Figure 2-10

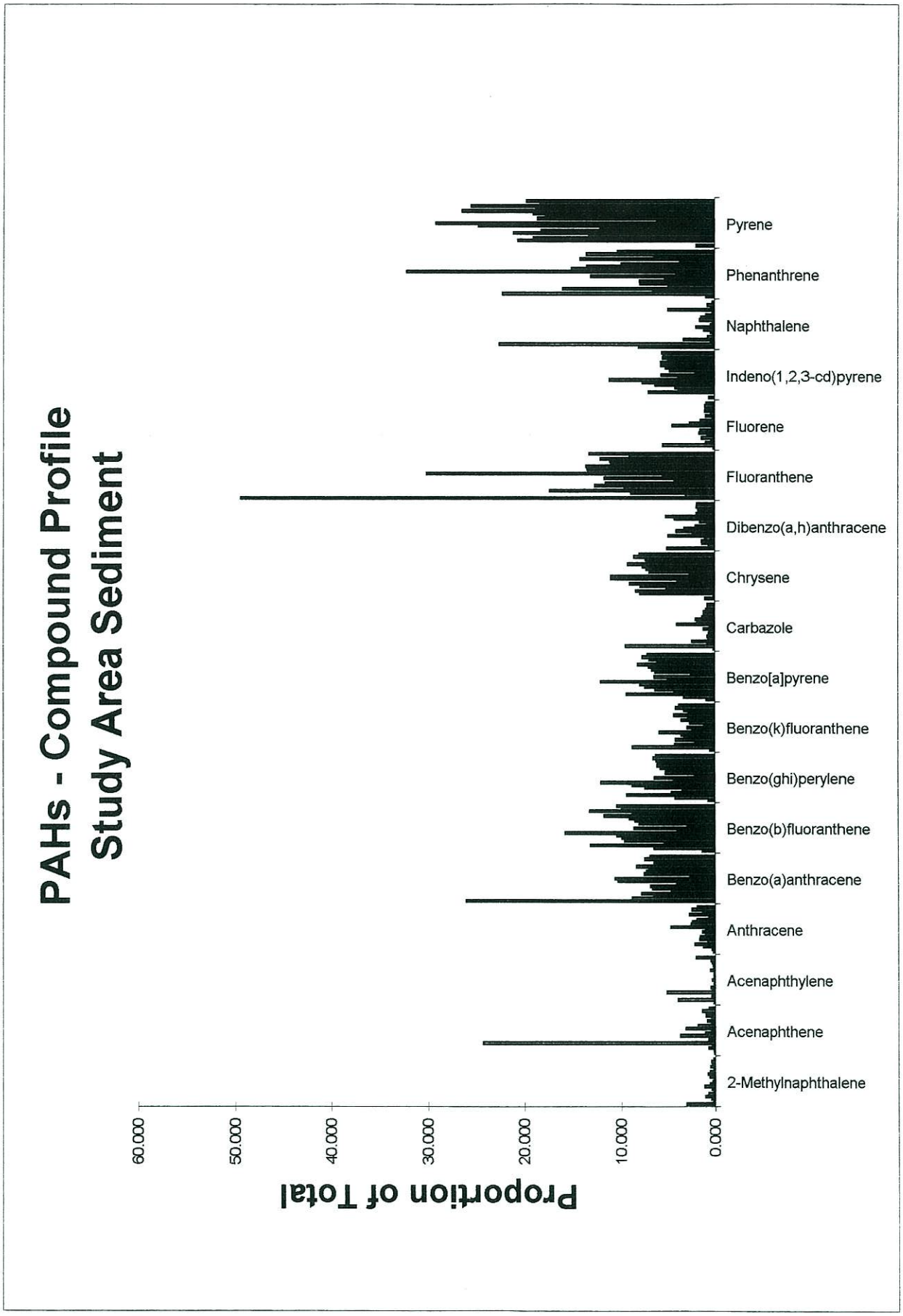

PAHs - Compound Profile
Study Area Sediment
Proportion of Total
60.000
50.000
40.000
30.000
20.000
10.000
0.000
Pyrene
Phenanthrene
Naphthalene
Indeno(1,2,3-cd)pyrene
Fluorene
Fluoranthene
Dibenzo(a,h)anthracene
Chrysene
Carbazole
Benzo[a]pyrene
Benzo(k)fluoranthene
Benzo(ghi)perylene
Benzo(b)fluoranthene
Benzo(a)anthracene
Anthracene
Acenaphthylene
Acenaphthene
2-Methylnaphthalene

Figure 2-11

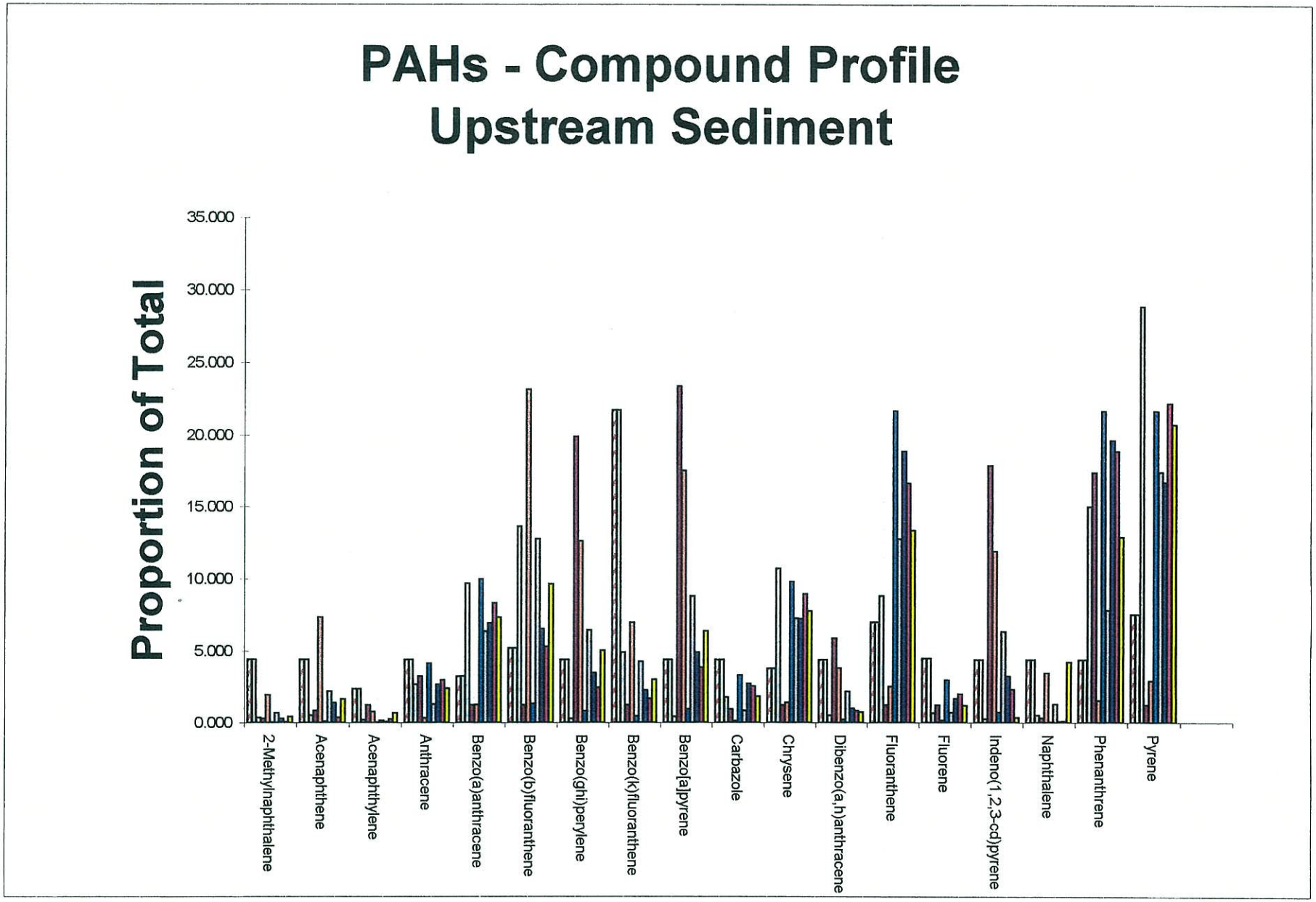

PAHs - Compound Profile
Upstream Sediment
Proportion of Total
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.000
2-Methylnaphthalene
Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Benzo[a]pyrene
Carbazole
Chrysene
Dibenzo(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

Figure 2-12

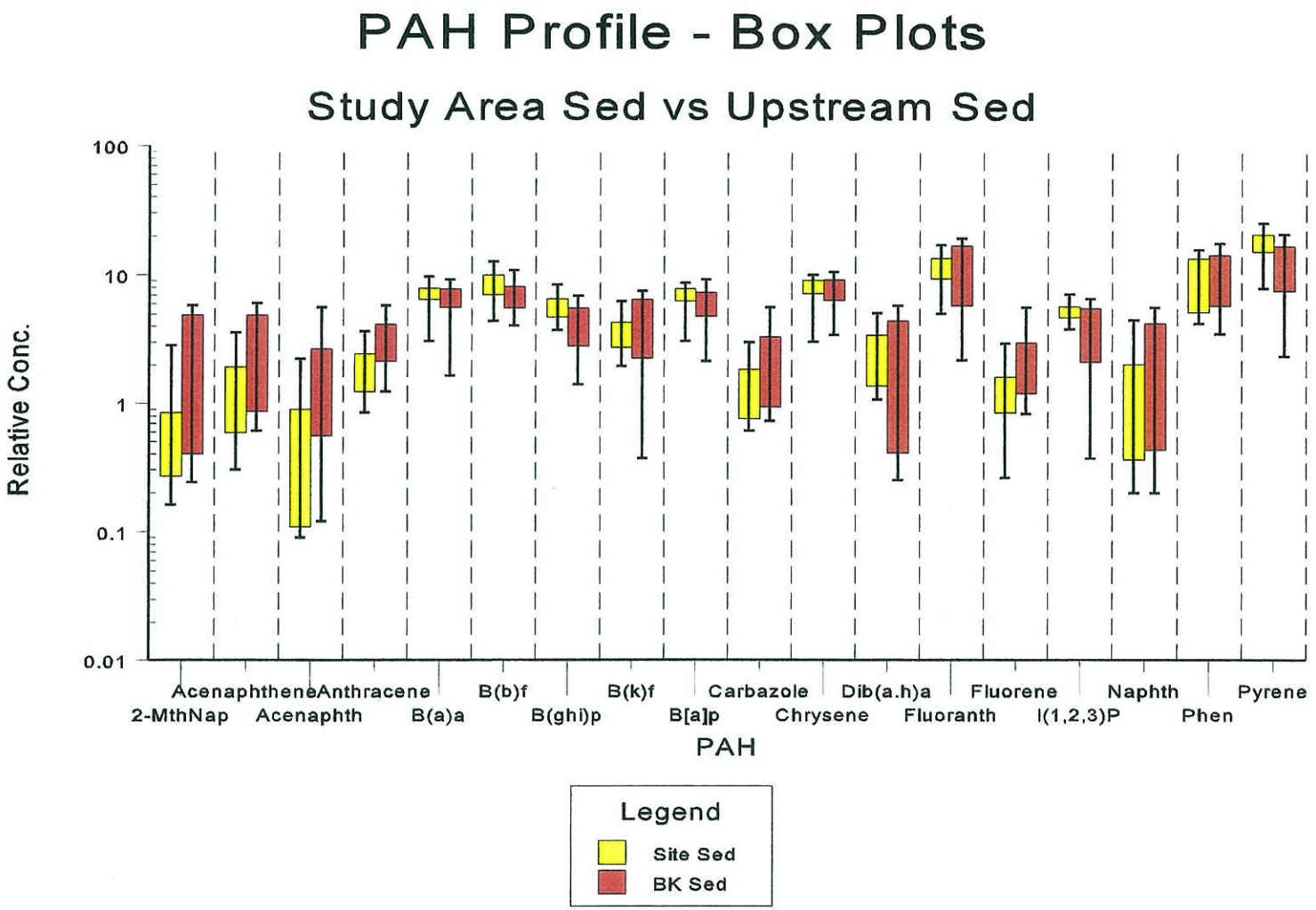
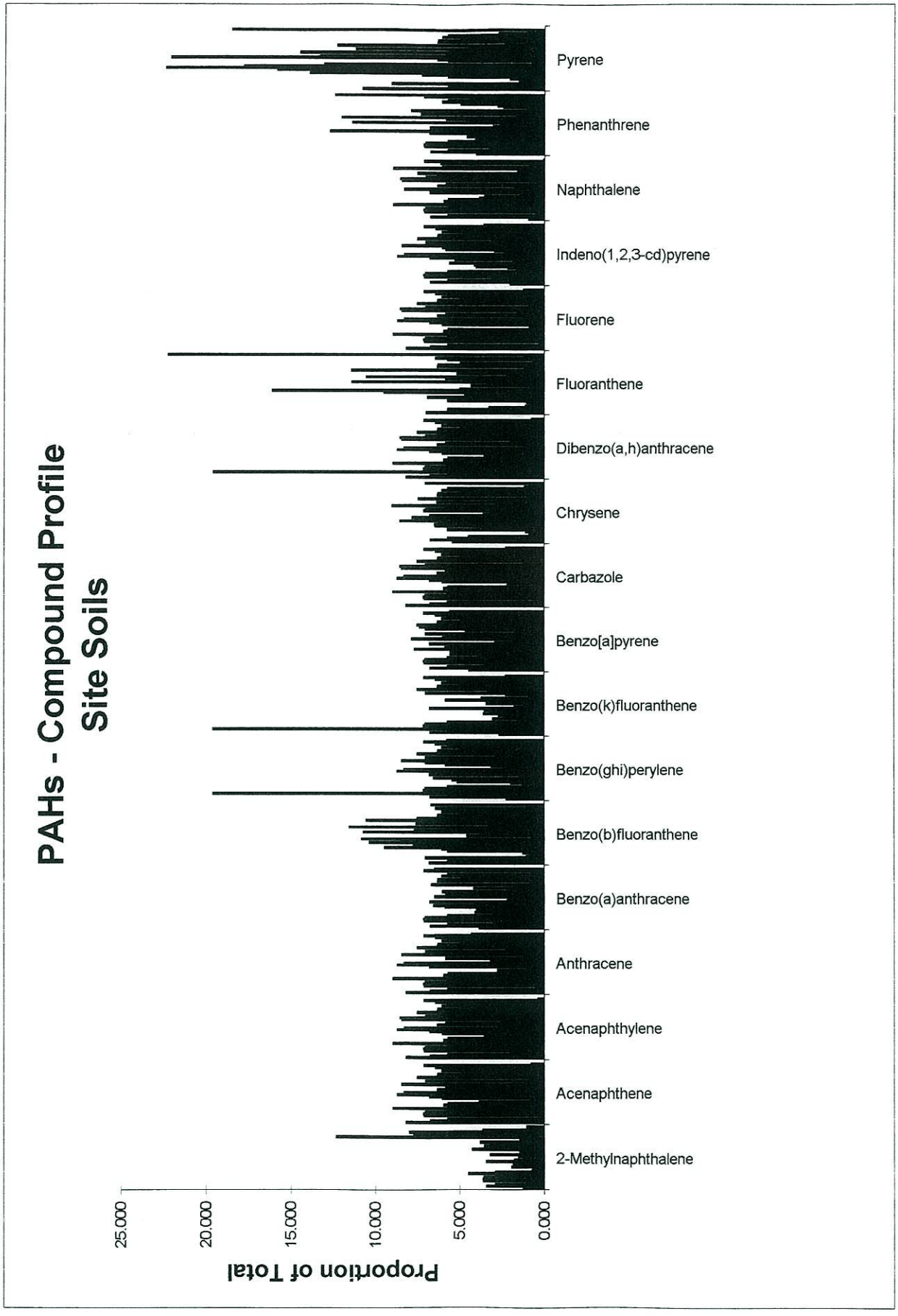

PAH Profile - Box Plots
Study Area Sed vs Upstream Sed
Relative Conc.
100
10
1
0.1
0.01
2-MthNap
Acenaphthene
Acenaphth
Anthracene
B(a)a
B(b)f
B(ghi)p
B(k)f
B[a]p
Carbazole
Chrysene
Dib(a.h)a
Fluoranth
Fluorene
I(1,2,3)P
Naphth
Phen
Pyrene
PAH
Legend
Site Sed
BK Sed

Figure 2-13


PAHs - Compound Profile
Site Soils
Pyrene
Phenanthrene
Naphthalene
Indeno(1,2,3-cd)pyrene
Fluorene
Fluoranthene
Dibenzo(a,h)anthracene
Chrysene
Carbazole
Benzo[a]pyrene
Benzo(k)fluoranthene
Benzo(ghi)perylene
Benzo(b)fluoranthene
Benzo(a)anthracene
Anthracene
Acenaphthylene
Acenaphthene
2-Methylnaphthalene
25.000
20.000
15.000
10.000
5.000
0.000
Proportion of Total

APPENDICES

Appendix 1

Statistical Output for PCA

Principal Component Analysis

25 Observations
17 Variables

Simple Statistics

	HPCDD1RL	HPCDF1RL	HPCDF2RL	HXCDD1RL	HXCDD2RL
Mean	-1.148867566	-1.440628539	-2.235777068	-2.561039700	-2.206015703
StD	0.207592854	0.346336731	0.425426479	0.451871828	0.301252498

	HXCDD3RL	HXCDF1RL	HXCDF2RL	HXCDF3RL	HXCDF4RL
Mean	-2.219126239	-1.945395685	-2.222660634	-2.684645783	-2.369523075
StD	0.419352679	0.444415947	0.448961829	0.524795546	0.421919293

	OCDD1RL	OCDF1RL	PCDD1RL	PCDF1RL	PCDF2RL
Mean	-.2486281009	-1.083828790	-2.548187287	-2.253915467	-2.068881652
StD	0.2308402169	0.265910342	0.483178677	0.554095282	0.484497440

	TCDD1RL	TCDF1RL
Mean	-2.796546644	-2.061550255
StD	0.671119843	0.669082626

Correlation Matrix

	HPCDD1RL	HPCDF1RL	HPCDF2RL	HXCDD1RL	HXCDD2RL	HXCDD3RL
HPCDD1RL	1.0000	0.2685	-.0169	-.0841	0.3022	0.2781
HPCDF1RL	0.2685	1.0000	0.2371	-.0958	0.0296	-.0286
HPCDF2RL	-.0169	0.2371	1.0000	0.6294	0.6234	0.2813
HXCDD1RL	-.0841	-.0958	0.6294	1.0000	0.6785	0.5339
HXCDD2RL	0.3022	0.0296	0.6234	0.6785	1.0000	0.6642
HXCDD3RL	0.2781	-.0286	0.2813	0.5339	0.6642	1.0000
HXCDF1RL	-.0591	0.7813	0.6491	0.2573	0.3240	0.0854
HXCDF2RL	-.0403	0.5777	0.8490	0.5767	0.5383	0.2532
HXCDF3RL	-.0716	-.1878	0.5514	0.8595	0.7090	0.4800
HXCDF4RL	-.0382	0.4120	0.7570	0.6960	0.6796	0.4569
OCDD1RL	0.8235	0.0410	-.1455	-.0213	0.1356	0.1839
OCDF1RL	-.7678	-.0112	-.2325	-.3077	-.4110	-.3774
PCDD1RL	0.0165	-.2068	0.6458	0.8486	0.7539	0.5754
PCDF1RL	-.0862	0.2179	0.9000	0.5750	0.4794	0.1328
PCDF2RL	-.2207	0.3540	0.7691	0.4149	0.4691	0.1600
TCDD1RL	0.0869	0.2212	-.1726	0.0195	0.1675	-.0096
TCDF1RL	-.2710	0.1704	0.6938	0.4316	0.2682	-.0387

Principal Component Analysis

Correlation Matrix

	HXCDF1RL	HXCDF2RL	HXCDF3RL	HXCDF4RL	OCDD1RL	OCDF1RL
HPCDD1RL	-.0591	-.0403	-.0716	-.0382	0.8235	-.7678
HPCDF1RL	0.7813	0.5777	-.1878	0.4120	0.0410	-.0112
HPCDF2RL	0.6491	0.8490	0.5514	0.7570	-.1455	-.2325
HXCDD1RL	0.2573	0.5767	0.8595	0.6960	-.0213	-.3077
HXCDD2RL	0.3240	0.5383	0.7090	0.6796	0.1356	-.4110
HXCDD3RL	0.0854	0.2532	0.4800	0.4569	0.1839	-.3774
HXCDF1RL	1.0000	0.9107	0.2368	0.7696	-.3200	0.0926
HXCDF2RL	0.9107	1.0000	0.5348	0.9176	-.2743	-.0879
HXCDF3RL	0.2368	0.5348	1.0000	0.7423	-.0943	-.2699
HXCDF4RL	0.7696	0.9176	0.7423	1.0000	-.2388	-.1041
OCDD1RL	-.3200	-.2743	-.0943	-.2388	1.0000	-.8164
OCDF1RL	0.0926	-.0879	-.2699	-.1041	-.8164	1.0000
PCDD1RL	0.1604	0.4735	0.8158	0.6508	0.0285	-.3238
PCDF1RL	0.6242	0.8222	0.5298	0.6763	-.2677	-.1914
PCDF2RL	0.8175	0.8597	0.5210	0.7775	-.4641	0.0947
TCDD1RL	0.0685	-.0395	0.0723	0.1217	0.2874	-.0078
TCDF1RL	0.5829	0.6917	0.4600	0.5241	-.4492	0.0263

	PCDD1RL	PCDF1RL	PCDF2RL	TCDD1RL	TCDF1RL
HPCDD1RL	0.0165	-.0862	-.2207	0.0869	-.2710
HPCDF1RL	-.2068	0.2179	0.3540	0.2212	0.1704
HPCDF2RL	0.6458	0.9000	0.7691	-.1726	0.6938
HXCDD1RL	0.8486	0.5750	0.4149	0.0195	0.4316
HXCDD2RL	0.7539	0.4794	0.4691	0.1675	0.2682
HXCDD3RL	0.5754	0.1328	0.1600	-.0096	-.0387
HXCDF1RL	0.1604	0.6242	0.8175	0.0685	0.5829
HXCDF2RL	0.4735	0.8222	0.8597	-.0395	0.6917
HXCDF3RL	0.8158	0.5298	0.5210	0.0723	0.4600
HXCDF4RL	0.6508	0.6763	0.7775	0.1217	0.5241
OCDD1RL	0.0285	-.2677	-.4641	0.2874	-.4492
OCDF1RL	-.3238	-.1914	0.0947	-.0078	0.0263
PCDD1RL	1.0000	0.4357	0.3272	0.1711	0.2727
PCDF1RL	0.4357	1.0000	0.8156	-.4142	0.8737
PCDF2RL	0.3272	0.8156	1.0000	-.2066	0.8040
TCDD1RL	0.1711	-.4142	-.2066	1.0000	-.4099
TCDF1RL	0.2727	0.8737	0.8040	-.4099	1.0000

Principal Component Analysis

Eigenvalues of the Correlation Matrix

	Eigenvalue	Difference	Proportion	Cumulative
PRIN1	7.65136	4.15261	0.450080	0.45008
PRIN2	3.49875	1.26574	0.205809	0.65589
PRIN3	2.23301	0.69602	0.131354	0.78724
PRIN4	1.53699	0.79202	0.090411	0.87765
PRIN5	0.74497	0.37439	0.043822	0.92148
PRIN6	0.37058	0.03505	0.021799	0.94327
PRIN7	0.33552	0.15301	0.019737	0.96301
PRIN8	0.18252	0.02333	0.010736	0.97375
PRIN9	0.15919	0.03785	0.009364	0.98311
PRIN10	0.12134	0.05126	0.007138	0.99025
PRIN11	0.07008	0.01827	0.004122	0.99437
PRIN12	0.05181	0.03114	0.003047	0.99742
PRIN13	0.02067	0.00876	0.001216	0.99863
PRIN14	0.01191	0.00407	0.000701	0.99934
PRIN15	0.00784	0.00598	0.000461	0.99980
PRIN16	0.00186	0.00027	0.000110	0.99991
PRIN17	0.00159	.	0.000094	1.00000

Eigenvectors

	PRIN1	PRIN2	PRIN3	PRIN4	PRIN5	PRIN6
HPCDD1RL	-.018385	0.380142	0.386434	-.214568	-.095974	0.228637
HPCDF1RL	0.104706	-.113673	0.581433	0.180423	-.104142	-.301854
HPCDF2RL	0.326313	-.011540	0.033948	-.147233	0.129766	0.136269
HXCDD1RL	0.278141	0.178227	-.248921	0.058475	0.121711	-.506786
HXCDD2RL	0.263256	0.269166	-.050267	0.099434	-.148086	0.592482
HXCDD3RL	0.155905	0.305782	-.098277	0.094939	-.734433	-.139853
HXCDF1RL	0.263938	-.199777	0.347980	0.154832	-.061590	-.028629
HXCDF2RL	0.335566	-.098375	0.190049	0.053953	0.004432	-.143913
HXCDF3RL	0.275514	0.162011	-.279568	0.094074	0.152010	-.048468
HXCDF4RL	0.335193	0.009100	0.060999	0.222765	-.081995	-.107665
OCDD1RL	-.086167	0.440505	0.262238	-.141600	0.234396	-.095208
OCDF1RL	-.069878	-.427631	-.176870	0.331359	-.180343	0.144746
PCDD1RL	0.252840	0.246397	-.269232	0.143963	0.120400	-.024237
PCDF1RL	0.312867	-.107947	0.017437	-.329173	0.137455	0.016538
PCDF2RL	0.308950	-.203458	0.067280	-.044998	-.063498	0.330400
TCDD1RL	-.030699	0.164123	0.139626	0.663658	0.432593	0.183631
TCDF1RL	0.264957	-.226257	-.036792	-.301091	0.203229	0.037163

Principal Component Analysis

Eigenvectors

	PRIN7	PRIN8	PRIN9	PRIN10	PRIN11	PRIN12
HPCDD1RL	0.142157	-.400717	0.252777	0.273429	0.220601	0.009504
HPCDF1RL	0.002244	0.009400	0.302108	0.048841	0.024591	0.173084
HPCDF2RL	-.588989	0.025208	-.197200	0.001664	0.168860	0.224721
HXCDD1RL	-.001294	0.048200	0.363960	-.369361	0.241783	-.281385
HXCDD2RL	-.019646	0.029390	0.416821	-.365009	-.201713	-.122958
HXCDD3RL	-.017021	0.438365	-.111908	0.145454	0.018897	0.207396
HXCDF1RL	0.003396	0.062103	-.104745	0.019313	-.032831	-.461026
HXCDF2RL	-.071818	-.161564	-.049684	-.044545	-.131134	-.100104
HXCDF3RL	0.549732	-.231849	-.132125	0.034561	0.080113	0.238028
HXCDF4RL	0.133554	-.350988	-.223691	-.011115	-.140414	0.283060
OCDD1RL	-.023264	0.197090	-.172697	-.202286	0.480791	0.105174
OCDF1RL	-.119750	-.171624	0.295260	-.024398	0.583717	0.256656
PCDD1RL	-.361629	-.173404	0.022218	0.566580	0.064255	-.242679
PCDF1RL	-.132484	0.032212	0.080539	-.221293	-.197072	0.431166
PCDF2RL	0.250972	0.145246	-.391630	-.098265	0.391307	-.251266
TCDD1RL	0.015802	0.344224	-.013281	0.073374	-.093069	0.181806
TCDF1RL	0.283802	0.444356	0.358816	0.449242	0.040858	0.069842

	PRIN13	PRIN14	PRIN15	PRIN16	PRIN17
HPCDD1RL	0.235269	0.291440	0.222094	-.159533	-.122612
HPCDF1RL	-.605669	-.072712	-.078415	-.028974	-.010775
HPCDF2RL	-.051911	-.306109	0.294246	-.352080	-.250525
HXCDD1RL	0.088628	0.204641	0.052119	-.189552	-.237929
HXCDD2RL	-.111198	-.257629	-.152731	0.063531	0.052342
HXCDD3RL	0.095388	0.083617	0.122269	-.004465	0.063277
HXCDF1RL	0.255631	-.174991	0.388269	0.488540	-.162855
HXCDF2RL	0.293100	-.015426	-.056583	-.339623	0.741846
HXCDF3RL	-.248743	-.265586	0.432773	0.070639	0.151662
HXCDF4RL	0.289673	-.089494	-.515255	0.035763	-.407660
OCDD1RL	0.115187	-.253411	-.266116	0.317139	0.210889
OCDF1RL	0.185008	-.021519	0.020361	0.162133	0.134660
PCDD1RL	-.245991	0.132153	-.206901	0.289998	0.129653
PCDF1RL	0.001602	0.502436	0.109938	0.436505	0.093700
PCDF2RL	-.278858	0.372832	-.190051	-.162377	-.028059
TCDD1RL	0.140712	0.271869	0.121829	-.126815	-.025959
TCDF1RL	0.207824	-.209579	-.182010	-.074378	-.055034

OBS	SAMP_ID	GROUP	SAMP_DEP	END_DEPT	PRIN1	PRIN2	PRIN3
1	SS-99-31	Z			-3.03512	-5.57243	-5.03096
2	Long Island Sound	H			-2.99034	0.50504	0.19592
3	CSO2	C			-2.89791	-1.09620	1.70786
4	CSO1	C			-2.64128	-0.79361	1.58832
5	GM98-SED11B	G			-2.43983	1.09018	0.18984
6	CSO4	C			-2.20462	0.75220	0.70992
7	CSO3	C			-2.03548	-0.55080	1.61886
8	GM98-SED16	G			-1.83639	0.88877	-0.62572
9	GM98-SED07A	G			-1.78260	2.10236	-0.56311
10	GM98-SED20A	U			-1.42168	2.40194	-0.34181
11	GM98-SED17	U			-1.34527	0.39673	0.50377
12	GM98-SED11A	G			-1.29701	1.05101	0.17627

OBS	HPCDD1R	HPCDF1R	HPCDF2R	HXCDD1R	HXCDD2R	HXCDD3R
1	0.010129466	0.00551117	0.00153943	0.00153943	0.00153943	0.00153943
2	0.111788883	0.03539981	0.00074526	0.00242209	0.0050305	0.00447156
3	0.054895204	0.08386767	0.00213481	0.00083868	0.00289725	0.00144862
4	0.059162621	0.07584951	0.00227549	0.00091019	0.00318568	0.00166869
5	0.092912278	0.02652673	0.00478306	0.00138819	0.00551151	0.00493425
6	0.077854335	0.06228347	0.00198529	0.00132352	0.00338666	0.07785433
7	0.072842322	0.07799279	0.0023545	0.00111839	0.00397322	0.0023545
8	0.072213718	0.02140466	0.00330367	0.00216209	0.00454038	0.00518901
9	0.097144562	0.0204488	0.00316166	0.00162418	0.00859258	0.01223868
10	0.134930938	0.01894141	0.0030817	0.00212825	0.00906634	0.01034329
11	0.101760726	0.02866998	0.00564551	0.00117512	0.00522077	0.00433589
12	0.109636127	0.0323476	0.00464225	0.00170874	0.00735846	0.00713623

OBS	HXCDF1R	HXCDF2R	HXCDF3R	HXCDF4R	OCDD1R	OCDF1R
1	0.00314044	0.00153943	0.00153943	0.00153943	0.07327699	0.87378192
2	0.0037263	0.00186315	0.00167683	0.00149052	0.74525922	0.07452592
3	0.01677353	0.00373592	0.00060232	0.00236354	0.66331704	0.12198934
4	0.0151699	0.00394417	0.0006068	0.00257888	0.66747573	0.11377427
5	0.00461813	0.00277637	0.00068722	0.00214413	0.78068304	0.06432388
6	0.00934252	0.00319203	0.00058391	0.00338666	0.66176184	0.08953248
7	0.01427415	0.00441469	0.00080936	0.00353175	0.66220293	0.11478184
8	0.00458363	0.00216209	0.00216209	0.00216209	0.8042965	0.06097086
9	0.00364611	0.00206273	0.00127486	0.00187915	0.77766644	0.05252436
10	0.00451189	0.00239215	0.00212825	0.00212825	0.75339988	0.04064954
11	0.0071144	0.00396424	0.00088488	0.00315016	0.74683524	0.07309075
12	0.00560527	0.00360515	0.00123464	0.00261744	0.72843823	0.08000474

OBS	PCDD1R	PCDF1R	PCDF2R	TCDD1R	TCDF1R
1	0.00153943	0.00186271	0.00628088	0.00030789	0.01339306
2	0.00037263	0.00245936	0.00283199	0.00034655	0.00558944
3	0.00068619	0.00114365	0.00388841	0.03735924	0.00205857
4	0.00098604	0.00128944	0.00402002	0.04475121	0.00235133
5	0.00189673	0.00273514	0.00305126	0.00064324	0.00038484
6	0.00097318	0.00105103	0.00389272	0.00070069	0.00089532
7	0.0009418	0.00176587	0.0060334	0.02795968	0.00264881
8	0.00242154	0.0023437	0.00369285	0.00111564	0.00527549
9	0.00606835	0.00205508	0.0027792	0.00339114	0.00344213
10	0.00468215	0.00245174	0.00275395	0.00211122	0.00429906
11	0.00198212	0.00454826	0.00458366	0.00107424	0.00596406
12	0.00291375	0.00330884	0.00345699	0.00149145	0.00449409

OBS	SAMP_ID	GROUP	SAMP_DEP	END_DEPT	PRIN1	PRIN2	PRIN3
13	Black Rock Harbor	H			-1.22750	0.18553	0.24168
14	GM98-SED01	G			-1.08372	0.97430	-0.24317
15	GM98-SED01B	G			-0.72928	0.55799	0.06221
16	GM98-SED19	U			-0.08522	1.53083	-0.92802
17	New Bedford Harbor 3	P			0.58238	-0.83177	-0.97941
18	New Bedford Harbor 2	P			1.38053	-1.99791	1.26072
19	GMSED20B	U			1.81322	1.80319	-1.09803
20	New Bedford Harbor 1	P			2.80921	-2.95592	2.22143
21	SS-99-26	Z			3.32385	-3.33122	1.69328
22	SS-99-27	Z			3.82328	1.61857	-1.10578
23	SS-99-27 DUP	Z			4.35738	-0.68464	1.23421
24	SS-99-25	Z			4.56251	0.72951	-0.96846

OBS	HPCDD1R	HPCDF1R	HPCDF2R	HXCDD1R	HXCDD2R	HXCDD3R
13	0.084019493	0.04411023	0.00924214	0.00252058	0.00630146	0.00420097
14	0.08762974	0.02232078	0.0039392	0.00206674	0.0066549	0.0065309
15	0.085498842	0.02687672	0.0048291	0.00197914	0.00661033	0.00633325
16	0.078284765	0.01714809	0.00532549	0.00532549	0.00532549	0.00532549
17	0.048526101	0.01698414	0.0177929	0.00404384	0.00485261	0.00323507
18	0.080268901	0.06689075	0.01296008	0.00209034	0.00209034	0.00167227
19	0.071971913	0.01739809	0.00975229	0.00975229	0.00975229	0.00975229
20	0.058595352	0.17578606	0.01757861	0.0038087	0.00527358	0.00468763
21	0.070981849	0.0824185	0.01864672	0.00061907	0.01267977	0.00472384
22	0.071871716	0.02444316	0.01695088	0.01695088	0.01695088	0.01695088
23	0.073992117	0.18498029	0.01510961	0.00864394	0.00864394	0.00864394
24	0.062467465	0.03544161	0.01821968	0.01821968	0.01821968	0.01821968

OBS	HXCDF1R	HXCDF2R	HXCDF3R	HXCDF4R	OCDD1R	OCDF1R
13	0.00756175	0.00420097	0.00058814	0.00243657	0.67215594	0.14703411
14	0.00698558	0.00307117	0.00206674	0.00211634	0.77296044	0.06158883
15	0.00953945	0.00399786	0.00197914	0.00262434	0.75207315	0.07243652
16	0.00532549	0.00532549	0.00532549	0.00532549	0.79775903	0.04324301
17	0.00533787	0.00485261	0.00129403	0.00153666	0.64701467	0.04529103
18	0.0267563	0.01421428	0.0025084	0.00501681	0.54348735	0.06689075
19	0.00975229	0.00975229	0.00975229	0.00975229	0.75092647	0.04505559
20	0.12890977	0.04101675	0.00046876	0.00820335	0.32227444	0.10547163
21	0.08701803	0.02747283	0.00203871	0.0140472	0.23370556	0.14793065
22	0.01695088	0.01695088	0.01695088	0.01695088	0.62718243	0.05729396
23	0.05895166	0.04442985	0.00864394	0.03111818	0.37341816	0.07796833
24	0.02663543	0.01821968	0.01821968	0.01821968	0.52056221	0.08676037

OBS	PCDD1R	PCDF1R	PCDF2R	TCDD1R	TCDF1R
13	0.00399093	0.00382289	0.00306671	0.00239456	0.00235255
14	0.0028769	0.00252142	0.00822562	0.00162446	0.00682024
15	0.00238684	0.00255705	0.01072694	0.00151602	0.00803531
16	0.00532549	0.00532549	0.00532549	0.0010864	0.00389826
17	0.00177929	0.05823132	0.01132276	0.0001197	0.1277854
18	0.0018395	0.03260924	0.02341176	0.00023412	0.11705881
19	0.00975229	0.00975229	0.00975229	0.00195046	0.00542227
20	0.00169927	0.02871172	0.0328134	0.0002461	0.06445489
21	0.00092488	0.04164434	0.17154983	0.00030954	0.08328868
22	0.01695088	0.01695088	0.01695088	0.00339018	0.02935892
23	0.00864394	0.02178273	0.02472167	0.00172879	0.04857894
24	0.01821968	0.01821968	0.06420267	0.00360056	0.03635259

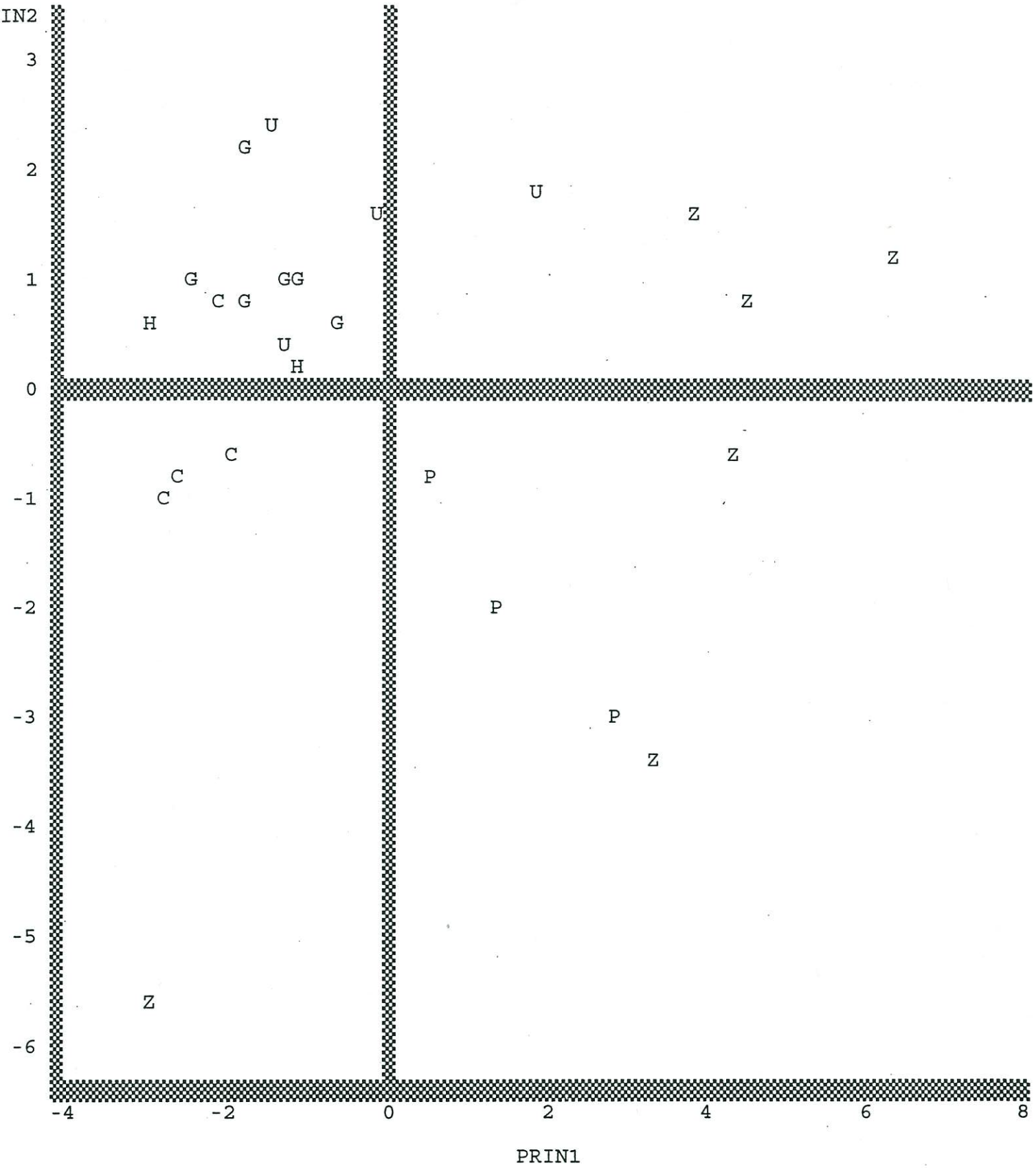
OBS	SAMP_ID	GROUP	SAMP_DEP	END_DEPT	PRIN1	PRIN2	PRIN3
25	SS-99-24	Z			6.40089	1.22636	-1.51983

OBS	HPCDD1R	HPCDF1R	HPCDF2R	HXCDD1R	HXCDD2R	HXCDD3R
25	0.048591231	0.03766762	0.03766762	0.03766762	0.03766762	0.03766762

OBS	HXCDF1R	HXCDF2R	HXCDF3R	HXCDF4R	OCDD1R	OCDF1R
25	0.03766762	0.03766762	0.03766762	0.03766762	0.37968962	0.07533524

OBS	PCDD1R	PCDF1R	PCDF2R	TCDD1R	TCDF1R
25	0.03766762	0.03766762	0.03766762	0.00753352	0.03683893

Plot of PRIN2*PRIN1. Symbol is value of GROUP.



Appendix 2

Statistical Review Supporting Data

O'Brien & Gere + DEC Data - Sediments - Units=mg/kg

Chemical	North Branch				Sanders Creek				Site				South Branch				Upstream				
	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	SBSTD	Freq	Min	Max	Mean
Aluminum	3/3	3070.00	3700.00	3370.00	8/8	521.00	15700.00	9435.13	11/11	4390.00	10300.00	6480.91	18/18	3520.00	25900.00	9164.44	5674.23	1/1	2820.00	2820.00	2820.00
Antimony	4/6	0.23	0.77	0.43	9/10	0.21	0.92	0.65	26/28	0.17	1.70	0.60	20/20	0.40	18.70	1.97	4.00	3/7	0.18	0.69	0.21
Arsenic	6/6	2.90	13.70	8.92	9/10	4.10	19.10	8.81	28/28	2.20	14.10	5.10	20/20	2.90	18.20	5.50	3.43	7/7	1.10	11.30	4.27
Barium	3/3	18.20	36.70	27.67	8/8	7.20	133.00	67.50	11/11	38.20	86.70	55.25	18/18	35.50	316.00	118.32	67.70	1/1	11.20	11.20	11.20
Beryllium	3/3	0.16	0.30	0.22	8/8	0.05	0.87	0.55	11/11	0.26	0.53	0.37	18/18	0.24	1.20	0.50	0.24	1/1	0.19	0.19	0.19
Cadmium	3/3	0.15	0.26	0.22	4/8	0.07	2.50	0.40	11/11	0.25	2.50	0.84	18/18	0.11	10.00	2.22	2.94	1/1	0.27	0.27	0.27
Calcium	3/3	17500	50100	33500	8/8	17800	84700	52863	11/11	11200	105000	43927	18/18	6030	274000	97480	75315	1/1	26800	26800	26800
Chromium	6/6	6.50	20.00	9.53	10/10	1.30	98.20	31.38	28/28	10.90	164.00	38.88	20/20	10.60	75.40	29.03	16.97	7/7	6.60	23.00	12.60
Cobalt	3/3	4	5	5	8/8	0.59	14.30	8.85	11/11	3.90	8.20	5.83	18/18	3.60	15.80	7.63	2.82	1/1	3.00	3.00	3.00
Copper	6/6	9.70	26.10	16.73	10/10	2.50	116.00	38.67	28/28	14.60	128.00	47.86	20/20	23.20	423.00	108.98	116.49	7/7	6.70	42.60	20.00
Cyanide									1/25	1.80	1.80	0.44	1/20	1.20	1.20	0.44	0.19				
Iron	3/3	11900.00	16400.00	13700.00	8/8	1870.00	34600.00	19408.75	11/11	11300.00	18700.00	13700.00	18/18	10100.00	36100.00	18983.33	7197.24	1/1	7920.00	7920.00	7920.00
Lead	6/6	6.50	57.70	16.75	11/11	4.20	401.00	65.98	28/28	6.90	172.00	54.09	20/20	11.10	1170.00	152.98	259.91	7/7	2.50	54.30	17.63
Magnesium	3/3	4700.00	16900.00	11200.00	8/8	6300.00	26500.00	13886.25	11/11	5100.00	23600.00	12164.55	18/18	3490.00	29900.00	14028.33	7343.51	1/1	7320.00	7320.00	7320.00
Manganese					6/6	137.00	475.00	297.67	11/11	167.00	433.00	272.00	15/15	134.00	547.00	345.53	110.16	1/1	151.00	151.00	151.00
Mercury	3/6	0.06	0.07	0.07	4/10	0.06	0.82	0.17	9/28	0.05	0.17	0.08	15/20	0.08	1.10	0.18	0.24	1/7	0.06	0.06	0.07
Nickel	4/6	6.20	15.60	7.13	10/10	1.80	33.80	20.45	28/28	6.50	57.90	18.73	20/20	11.40	56.00	23.99	11.00	7/7	4.50	13.00	9.24
Potassium	3/3	693.00	1130.00	964.33	8/8	139.00	3900.00	2114.88	11/11	423.000	2810.000	1456.09	18/18	599.000	8430.000	1981.11	1820.19	1/1	673.00	673.00	673.00
Selenium	1/6	0.34	0.34	0.19	3/10	0.59	1.20	0.48	17/28	0.45	1.20	0.51	10/20	0.44	2.20	0.73	0.54	6/7	0.39	43.00	6.49
Silver	3/3	0.19	0.31	0.25	4/8	0.21	6.70	1.11	9/11	0.120	1.400	0.60	15/18	0.13	47.90	3.91	11.18				
Sodium	3/3	128.00	322.00	212.33	8/8	127.00	549.00	277.88	11/11	171.00	540.00	293.09	18/18	68.90	1420.00	420.22	334.63	1/1	152.00	152.00	152.00
Thallium	1/3	0.57	0.57	0.35	1/8	0.88	0.88	0.40	1/11	0.60	0.60	0.33	3/18	0.73	0.98	0.46	0.22				
Vanadium	3/3	8.20	11.40	9.53	8/8	1.60	30.60	20.31	11/11	11.000	24.500	15.83	18/18	11.20	50.30	24.03	9.60	1/1	7.90	7.90	7.90
Zinc	6/6	40.40	60.60	48.63	10/10	24.00	568.00	191.69	19/19	59.600	390.00	155.29	19/19	54.80	811.00	256.36	220.71	6/6	35.40	109.00	64.15
2-Methylnaphthalene					4/10	0.06	1.80	0.40	20/24	0.06	3.50	0.48	15/20	0.05	1.20	0.35	0.26	4/7	0.06	5.50	1.00
Acenaphthene	2/6	0.06	0.06	0.16	6/10	0.05	7.80	1.21	21/24	0.08	9.90	1.18	16/20	0.11	2.30	0.76	0.64	5/7	0.06	21.00	3.47
Acenaphthylene					4/10	0.07	0.30	0.19	19/24	0.05	0.28	0.32	17/20	0.12	1.70	0.60	0.48	4/7	0.06	0.13	0.44
Anthracene	3/6	0.05	0.11	0.15	7/10	0.05	10.00	1.62	23/24	0.14	12.00	1.62	18/20	0.08	7.60	1.85	1.79	5/7	0.18	25.00	4.48
Benzo(a)anthracene	3/6	0.15	0.57	0.29	7/10	0.19	25.00	4.04	24/24	0.06	30.00	5.32	19/20	0.06	22.00	5.04	5.25	6/7	0.18	60.00	11.14
Benzo(b)fluoranthene	4/6	0	1	0	7/10	0.22	30.00	4.73	23/24	0.52	27.00	6.10	19/20	0.09	17.00	4.93	4.46	6/7	0.29	66.00	12.53
Benzo(ghi)perylene	4/6	0.06	0.57	0.23	7/10	0.19	5.20	1.47	23/24	0.42	20.00	4.22	18/20	0.09	4.90	1.88	1.31	6/7	0.14	36.00	6.90
Benzo(k)fluoranthene	4/6	0.05	0.37	0.20	7/10	0.19	23.00	3.02	24/24	0.06	13.00	2.54	16/20	0.08	9.10	3.00	3.03	6/7	0.10	20.00	4.02
Benzo[a]pyrene	4/6	0.05	0.67	0.27	7/10	0.13	24.00	3.78	24/24	0.05	27.00	5.01	19/20	0.05	20.00	4.87	4.99	6/7	0.21	50.00	9.38
Carbazole	1/6	0.09	0.09	0.20	6/10	0.078	11.000	1.66	22/24	0.06	10.00	1.25	16/20	0.12	2.80	0.86	0.72	5/7	0.08	20.00	3.63
Chrysene	4/6	0.06	0.80	0.31	7/10	0.30	34.00	5.18	24/24	0.06	29.00	5.55	20/20	0.08	22.00	5.75	5.54	6/7	0.21	59.00	11.14
Dibenzo(a,h)anthracene	1/6	0.16	0.16	0.21	5/10	0.13	1.50	0.45	14/24	0.09	5.90	1.72	4/20	0.76	1.50	0.63	0.73	4/7	0.57	11.00	2.20
Fluoranthene	5/6	0.08	1.20	0.46	7/10	0.04	66.00	9.81	24/24	0.14	57.00	9.69	20/20	0.12	45.00	10.32	10.56	6/7	0.39	130.00	24.44
Fluorene	2/6	0	0	0	6/10	0	8	1	22/24	0	9	1	16/20	0	3	1	1	5/7	0	18	3
Indeno(1,2,3-cd)pyrene	4/6	0.05	0.51	0.23	7/10	0.07	6.60	1.49	23/24	0.40	17.00	3.80	18/20	0.08	4.70	1.61	1.41	6/7	0.13	34.00	6.50
Naphthalene					4/10	0.10	3.40	0.67	19/24	0.06	9.30	1.03	15/20	0.05	2.10	0.48	0.45	4/7	0.07	10.00	1.73
Phenanthrene	3/6	0.22	0.76	0.35	7/10	0.27	61.00	9.50	24/24	0.13	69.00	9.54	19/20	0.07	27.00	6.53	6.60	6/7	0.21	130.00	24.14
Pyrene	5/6	0.08	1.60	0.57	8/10	0.05	49.00	8.55	24/24	0.13	68.00	13.49	20/20	0.13	40.00	9.65	9.65	6/7	0.42	130.00	25.10
Aroclor 1016					2/10	0.03	0.07	0.05	6/30	0.04	5.81	0.52	6/20	0.04	0.06	0.03	0.01				
Aroclor 1242					2/10	0.04	0.05	0.05	6/30	0.02	36.30	1.59	6/20	0.07	1.90	0.13	0.42				
Aroclor 1248	1/6	0.03	0.03	0.02					24/30	0.15	25.00	3.32	7/20	0.05	1.10	0.10	0.24	4/8	0.04	0.20	0.07
Aroclor 1254					4/10	0.08	2.13	0.45	5/30	0.02	2.90	0.47	14/20	0.01	2.00	0.19	0.43	2/8	0.02	0.14	0.04
Aroclor 1260	3/6	0.05	0.09	0.05	7/10	0.02	7.90	1.76	18/30	0.04	1.13	0.46	17/20	0.01	0.86	0.10	0.18	5/8	0.02	0.34	0.10

O'Brien & Gere + DEC Data - Sediments - Units=mg/kg

Chemical	North Branch				Sanders Creek				Site				South Branch				Upstream				
	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	SBSTD	Freq	Min	Max	Mean
1,2-Dichlorobenzene													3/22	0.06	0.16	0.40	0.67				
1,4-Dichlorobenzene									1/41	0.07	0.07	0.29									
2,4-Dimethylphenol					1/10	0.07	0.07	0.21	2/24	0.08	0.17	0.76	1/20	0.05	0.05	0.48	0.68				
2-Methylphenol									1/24	0.073	0.073	0.780									
4-Methylphenol					2/10	0.05	0.11	0.20	7/24	0.05	0.29	0.36	9/20	0.05	0.62	0.44	0.70	2/7	0.05	0.45	0.24
Butyl benzyl phthalate					1/10	0	0	0	2/24	0	1	2	5/20	0	34	2	8				
Di-n-butyl phthalate	1/6	0.05	0.05	0.19																	
Di-n-octyl phthalate					1/10	0.06	0.06	0.32					6/20	0.11	0.75	0.53	0.73				
Dibenzofuran					3/10	0.19	5.60	0.86	20/24	0.08	8.80	0.95	15/20	0.08	2.50	0.72	0.82	4/7	0.12	14.00	2.45
Dimethyl phthalate													1/20	0	0	0	1				
Isophorone													1/20	0	0	0	1				
Phenol									3/24	0	0	0	1/20	0	0	0	1				
bis(2-Ethylhexyl)phthalate (BEHP)	2/6	0.06	0.06	0.17	3/10	0.48	0.94	0.55	3/24	0.05	0.83	1.01	17/20	0.05	12.00	1.89	2.62	1/7	0.13	0.13	2.40
n-Nitrosodiphenylamine					1/10	0.47	0.47	0.25													
1,1-Dichloroethane					1/10	0.001	0.001	0.00					1/20	0.003	0.003	0.01	0.01				
1,1-Dichloroethene													1/20	0.01	0.01	0.01	0.01				
1,2-Dichloroethene					4/8	0.002	0.01	0.01					3/18	0.00	0.01	0.01	0.01				
2-Butanone (MEK)					5/8	0.01	0.10	0.02	2/8	0.01	0.01	0.01	5/18	0.01	0.05	0.01	0.01				
Acetone	3/3	0	0	0	6/8	0	0	0	5/8	0	0	0	13/18	0	0	0	0				
Benzene																		1/7	0.00	0.00	0.00
Carbon disulfide	1/3	0.00	0.00	0.01	4/8	0.00	0.00	0.00	3/8	0.00	0.01	0.01	9/18	0.00	0.02	0.01	0.00	1/1	0.01	0.01	0.01
Chlorobenzene					1/10	0.00	0.00	0.00					2/20	0.00	0.01	0.01	0.01				
Chloroform													1/20	0.00	0.00	0.01	0.01				
Chloromethane													1/20	0.01	0.01	0.01	0.01				
Ethylbenzene					1/10	0.00	0.00	0.01	2/25	0.00	0.00	0.00	2/20	0.00	0.00	0.01	0.01				
Methylene chloride	2/6	0.00	0.01	0.00														2/7	0.07	0.36	0.06
Tetrachloroethene									1/25	0.002	0.00	0.00	1/20	0.00	0.00	0.01	0.01				
Toluene	1/6	0.01	0.01	0.00	2/10	0.00	0.00	0.01					2/20	0.00	0.03	0.01	0.01	2/7	0.01	0.02	0.01
Trichloroethene					3/10	0.00	0.02	0.01	2/25	0.00	0.00	0.00	3/20	0.00	0.00	0.01	0.01	2/7	0.02	0.04	0.01
Vinyl chloride													2/20	0.00	0.01	0.01	0.01				
Xylene (total)					3/10	0	0	0	2/25	0	0	0	1/20	0.007	0.007	0.009	0	2/7	0	0	0
cis-1,2-Dichloroethene																		1/5	0.00	0.00	0.00
TOC	4/4	11,100	26,800	19,600	8/8	20,700	116,000	43,363	20/20	6,720	67,200	39,281	13/13	########	########	########	26,562	6/6	13,700	41,000	21,583

O'Brien & Gere Data - Sediments - Units=mg/kg

Chemical		North Branch				Sanders Creek				Site				South Branch				Upstream			
		Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean
Aluminum	INORGANIC									2/2	4,790	7,210	5,877								
Antimony	INORGANIC	1/3	0.23	0.23	0.35	1/2	0.21	0.21	0.30	17/19	0.17	0.55	0.35	2/2	0.40	0.41	0.40	2/6	0.18	0.23	0.33
Arsenic	INORGANIC	3/3	4.70	13.70	8.12	2/2	9.60	13.00	11.17	19/19	2.20	7.00	4.71	2/2	3.40	3.70	3.55	6/6	2.00	11.30	3.98
Barium	INORGANIC									2/2	55.40	63.70	59.41								1.00
Beryllium	INORGANIC									2/2	0.26	0.39	0.32								
Cadmium	INORGANIC									2/2	1.20	1.40	1.30								
Calcium	INORGANIC									2/2	23,300	31,300	27,005								
Chromium	INORGANIC	3/3	6.90	20.00	10.46	2/2	26.10	45.60	34.50	19/19	11.40	153.00	31.32	2/2	14.10	21.20	17.29	6/6	7.60	23.00	12.63
Cobalt	INORGANIC									2/2	3.90	5.50	4.63				1.00				
Copper	INORGANIC	3/3	13.70	26.10	20.53	2/2	28.30	79.70	47.49	19/19	14.60	128.00	46.03	2/2	29.30	55.90	40.47	6/6	6.70	42.60	17.96
Cyanide	INORGANIC									1/19	1.80	1.80	0.92	1/2	1.20	1.20					
Iron	INORGANIC									2/2	11,400	16,300	13,632								1
Lead	INORGANIC	3/3	9.10	10.70	9.81	2/2	34.30	105.00	60.01	19/19	12.40	172.00	50.18	2/2	42.90	57.40	49.62	6/6	2.50	54.30	13.05
Magnesium	INORGANIC									2/2	6,610	6,940	6,773								
Manganese	INORGANIC									2/2	167.00	190.00	178.13								
Nickel	INORGANIC	1/3	15.60	15.60	4.52	2/2	19.10	24.00	21.41	19/19	6.50	57.90	15.80	2/2	11.40	13.20	12.27	6/6	4.50	13.00	9.27
2-Methylnaphthalene	PAH					2/2	0.06	0.41	0.16	18/19	0.06	3.50	0.27	2/2	0.09	0.15	0.12	4/6	0.06	5.50	0.50
Acenaphthene	PAH	2/3	0.06	0.06	0.13	2/2	0.31	1.90	0.77	19/19	0.08	9.90	0.58	2/2	0.36	0.50	0.42	4/6	0.17	21.00	1.13
Acenaphthylene	PAH					1/2	0.07	0.07	0.21	16/19	0.05	0.25	0.19	2/2	0.15	0.23	0.19	3/6	0.10	0.13	0.35
Anthracene	PAH	2/3	0.09	0.11	0.19	2/2	0.52	2.70	1.18	19/19	0.19	12.00	1.05	2/2	0.93	1.10	1.01	4/6	0.66	25.00	1.84
Benzo(a)anthracene	PAH	2/3	0.34	0.57	0.51	2/2	1.60	7.50	3.46	19/19	0.92	30.00	4.21	2/2	3.60	5.50	4.45	5/6	0.18	60.00	3.12
Benzo(b)fluoranthene	PAH	2/3	0.47	1.10	0.70	2/2	2.10	9.10	4.37	19/19	1.50	27.00	5.50	2/2	4.80	7.90	6.16	5/6	0.29	66.00	3.82
Benzo(ghi)perylene	PAH	2/3	0.22	0.57	0.44	2/2	1.10	4.80	2.30	19/19	0.76	20.00	3.66	2/2	2.20	4.90	3.28	5/6	0.14	36.00	2.33
Benzo(k)fluoranthene	PAH	2/3	0.19	0.37	0.36	2/2	0.66	3.10	1.43	19/19	0.55	13.00	2.03	2/2	1.50	2.70	2.01	5/6	0.10	20.00	1.57
Benzo[a]pyrene	PAH	2/3	0.33	0.67	0.53	2/2	1.40	6.80	3.09	19/19	1.00	27.00	4.21	2/2	3.50	5.60	4.43	5/6	0.21	50.00	2.93
Carbazole	PAH	1/3	0.09	0.09	0.35	2/2	0.40	2.30	0.96	18/19	0.12	10.00	0.74	2/2	0.34	0.71	0.49	4/6	0.19	20.00	1.35
Chrysene	PAH	2/3	0.38	0.80	0.59	2/2	1.70	8.10	3.71	19/19	1.20	29.00	4.62	2/2	4.10	6.30	5.08	5/6	0.21	59.00	3.27
Dibenzo(a,h)anthracene	PAH	1/3	0.16	0.16	0.42	2/2	0.16	1.40	0.47	13/19	0.42	5.90	1.34	2/2	0.76	1.30	0.99	4/6	0.57	11.00	1.39
Fluoranthene	PAH	2/3	0.81	1.20	0.87	2/2	2.90	15.00	6.60	19/19	1.90	57.00	7.29	2/2	7.20	11.00	8.90	5/6	0.39	130.00	5.76
Fluorene	PAH	2/3	0.05	0.07	0.13	2/2	0.26	1.80	0.68	19/19	0.09	9.40	0.59	2/2	0.49	0.60	0.54	4/6	0.33	18.00	1.29
Indeno(1,2,3-cd)pyrene	PAH	2/3	0.30	0.51	0.47	2/2	0.07	4.50	0.58	19/19	0.65	17.00	3.27	2/2	2.10	4.30	3.00	5/6	0.13	34.00	2.17
Naphthalene	PAH					2/2	0.10	0.93	0.30	17/19	0.06	9.30	0.46	2/2	0.10	0.19	0.14	4/6	0.07	10.00	0.67
Phenanthrene	PAH	2/3	0.49	0.76	0.63	2/2	2.80	17.00	6.90	19/19	1.00	69.00	5.97	2/2	4.40	6.80	5.47	5/6	0.21	130.00	4.86
Aroclor 1248	PCB	1/3	0.03	0.03	0.09					22/22	0.15	25.00	1.76	2/2	0.06	0.10	0.08	4/7	0.04	0.20	0.12
Aroclor 1254	PCB																	1/7	0.14	0.14	0.19
Aroclor 1260	PCB	3/3	0.05	0.09	0.07	2/2	0.65	1.30	0.92	11/22	0.04	0.51	0.48	2/2	0.03	0.06	0.04	4/7	0.07	0.34	0.16
2,4-Dimethylphenol	SVOC									2/19	0.08	0.17	0.76								
2-Methylphenol	SVOC									1/19	0.07	0.07	0.84								
4-Methylphenol	SVOC									6/19	0.05	0.29	0.45	2/2	0.05	0.15	0.09	2/6	0.05	0.45	0.41
Butyl benzyl phthalate	SVOC					1/2	0.22	0.22	0.60	2/19	0.35	0.61	1.63								
Di-n-butyl phthalate	SVOC	1/3	0.05	0.05	0.28																
Dibenzofuran	SVOC					2/2	0.19	1.30	0.50	18/19	0.08	8.80	0.45	2/2	0.20	0.32	0.25	4/6	0.12	14.00	0.93
Phenol	SVOC									3/19	0.08	0.10	0.60	1/2	0.07	0.07	0.22				
2-Butanone (MEK)	VOC									2/2	0.01	0.01	0.01								
Acetone	VOC									2/2	0.02	0.02	0.02								
Benzene	VOC																	1/6	0.00	0.00	0.02
Chloroform	VOC													1/2	0.00	0.00	0.01				
Ethylbenzene	VOC									1/19	0.00	0.00	0.04	1/2	0.00	0.00	0.01				
Methylene chloride	VOC																	2/6	0.07	0.36	0.08

DEC Data - Sediments - Units=mg/kg

Chemical		North Branch				Sanders Creek				Site				South Branch				Upstream			
		Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean
Aluminum	INORGANIC	3/3	3,070	3,700	3,360	8/8	521	15,700	7,141	9/9	4,390	10,300	6,321	18/18	3,520	25,900	7,927	1/1	2,820	2,820	2,820
Antimony	INORGANIC	3/3	0.65	0.77	0.71	8/8	0.66	0.92	0.77	9/9	0.62	1.70	0.82	18/18	0.72	18.70	1.24	1/1	0.69	0.69	0.69
Arsenic	INORGANIC	3/3	2.90	13.50	7.41	7/8	4.10	19.10	5.94	9/9	2.40	14.10	4.85	18/18	2.90	18.20	5.11	1/1	1.10	1.10	1.10
Barium	INORGANIC	3/3	18.20	36.70	26.58	8/8	7.20	133.00	52.21	9/9	38.20	86.70	52.30	18/18	35.50	316.00	103.36	1/1	11.20	11.20	11.20
Beryllium	INORGANIC	3/3	0.16	0.30	0.21	8/8	0.05	0.87	0.44	9/9	0.28	0.53	0.37	18/18	0.24	1.20	0.45	1/1	0.19	0.19	0.19
Cadmium	INORGANIC	3/3	0.15	0.26	0.21	4/8	0.07	2.50	0.28	9/9	0.25	2.50	0.54	18/18	0.11	10.00	1.14	1/1	0.27	0.27	0.27
Calcium	INORGANIC	3/3	17,500	50,100	30,668	8/8	17,800	84,700	46,741	9/9	11,200	105,000	41,019	18/18	6,030	274,000	60,921	1/1	26,800	26,800	26,800
Chromium	INORGANIC	3/3	6.50	7.90	7.31	8/8	1.30	98.20	18.84	9/9	10.90	164.00	21.12	18/18	10.60	75.40	26.45	1/1	6.60	6.60	6.60
Cobalt	INORGANIC	3/3	4.20	4.70	4.49	8/8	0.59	14.30	6.79	9/9	4.60	8.20	5.96	18/18	3.60	15.80	7.18	1/1	3.00	3.00	3.00
Copper	INORGANIC	3/3	9.70	14.40	11.98	8/8	2.50	116.00	22.72	9/9	14.60	104.00	30.67	18/18	23.20	423.00	80.28	1/1	9.20	9.20	9.20
Iron	INORGANIC	3/3	11,900	16,400	13,569	8/8	1,870	34,600	15,514	9/9	11,300	18,700	13,450	18/18	10,100	36,100	17,806	1/1	7,920	7,920	7,920
Lead	INORGANIC	3/3	6.50	57.70	13.66	9/9	4.20	401.00	23.81	9/9	6.90	122.00	27.11	18/18	11.10	1170.00	74.94	1/1	7.60	7.60	7.60
Magnesium	INORGANIC	3/3	4,700	16,900	9,841	8/8	6,300	26,500	12,080	9/9	5,100	23,600	11,941	18/18	3,490	29,900	12,003	1/1	7,320	7,320	7,320
Manganese	INORGANIC				1.00	6/6	137.00	475.00	277.34	9/9	180.00	433.00	282.93	15/15	134.00	547.00	327.19	1/1	151.00	151.00	151.00
Mercury	INORGANIC	3/3	0.06	0.07	0.06	4/8	0.06	0.82	0.22	9/9	0.05	0.17	0.07	15/18	0.08	1.10	0.17	1/1	0.06	0.06	0.06
Nickel	INORGANIC	3/3	6.20	8.20	7.02	8/8	1.80	33.80	16.14	9/9	9.20	52.60	15.86	18/18	12.90	56.00	23.49	1/1	5.90	5.90	5.90
Potassium	INORGANIC	3/3	693.00	1130.00	942.75	8/8	139.00	3900.00	1595.10	9/9	701.00	2810.00	1498.68	18/18	599.00	8430.00	1576.85	1/1	673.00	673.00	673.00
Selenium	INORGANIC					1/8	1.20	1.20	0.82					8/18	0.44	2.20	0.92				
Silver	INORGANIC	3/3	0.19	0.31	0.25	4/8	0.21	6.70	0.66	7/9	0.12	1.40	0.43	15/18	0.13	47.90	0.95				
Sodium	INORGANIC	3/3	128.00	322.00	197.53	8/8	127.00	549.00	247.59	9/9	171.00	540.00	283.60	18/18	68.90	1420.00	328.48	1/1	152.00	152.00	152.00
Thallium	INORGANIC	1/3	0.57	0.57	0.64	1/8	0.88	0.88	0.82	1/9	0.60	0.60	0.72	3/18	0.73	0.98	0.85				
Vanadium	INORGANIC	3/3	8.20	11.40	9.44	8/8	1.60	30.60	16.21	9/9	11.00	24.50	15.54	18/18	11.20	50.30	22.41	1/1	7.90	7.90	7.90
Zinc	INORGANIC	3/3	40.90	54.40	47.54	8/8	24.00	568.00	110.06					17/17	54.80	811.00	205.91				
2-Methylnaphthalene	PAH					2/8	0.38	1.80	0.70	2/5	0.07	0.10	0.33	13/18	0.05	1.20	0.40				
Acenaphthene	PAH					4/8	0.05	7.80	0.53	2/5	0.19	0.20	0.48	14/18	0.11	2.30	0.69	1/1	0.06	0.06	0.06
Acenaphthylene	PAH					3/8	0.09	0.30	0.37	3/5	0.12	0.28	0.34	15/18	0.12	1.70	0.59	1/1	0.06	0.06	0.06
Anthracene	PAH	1/3	0.05	0.05	0.28	5/8	0.05	10.00	0.50	4/5	0.14	0.72	0.44	16/18	0.08	7.60	1.23	1/1	0.18	0.18	0.18
Benzo(a)anthracene	PAH	1/3	0.15	0.15	0.40	5/8	0.19	25.00	1.02	5/5	0.06	3.20	0.76	17/18	0.06	22.00	2.35	1/1	0.54	0.54	0.54
Benzo(b)fluoranthene	PAH	2/3	0.07	0.13	0.18	5/8	0.22	30.00	1.07	4/5	0.52	2.40	1.18	17/18	0.09	17.00	2.42	1/1	0.40	0.40	0.40
Benzo(ghi)perylene	PAH	2/3	0.06	0.11	0.16	5/8	0.19	5.20	0.65	4/5	0.42	1.80	0.85	16/18	0.09	4.00	1.28	1/1	0.30	0.30	0.30
Benzo(k)fluoranthene	PAH	2/3	0	0	0	5/8	0.19	23.00	0.89	5/5	0.06	2.60	0.68	14/18	0.08	9.10	1.59	1/1	0.51	0.51	0.51
Benzo[a]pyrene	PAH	2/3	0.05	0.14	0.16	5/8	0.13	24.00	0.87	5/5	0.05	2.80	0.69	17/18	0.05	20.00	2.24	1/1	0.51	0.51	0.51
Carbazole	PAH					4/8	0.08	11.00	0.66	4/5	0.06	0.77	0.29	14/18	0.12	2.80	0.72	1/1	0.08	0.08	0.08
Chrysene	PAH	2/3	0.06	0.17	0.19	5/8	0.30	34.00	1.25	5/5	0.06	3.30	0.85	18/18	0.08	22.00	2.48	1/1	0.62	0.62	0.62
Dibenzo(a,h)anthracene	PAH					3/8	0.13	1.50	0.51	1/5	0.09	0.09	0.53	2/18	1.00	1.50	0.87				
Fluoranthene	PAH	3/3	0.08	0.37	0.14	5/8	0.04	66.00	1.22	5/5	0.14	6.70	1.40	18/18	0.12	45.00	4.36	1/1	0.97	0.97	0.97
Fluorene	PAH					4/8	0.07	7.70	0.56	3/5	0.07	0.30	0.34	14/18	0.16	2.70	0.81	1/1	0.09	0.09	0.09
Indeno(1,2,3-cd)pyrene	PAH	2/3	0.05	0.10	0.15	5/8	0.17	6.60	0.67	4/5	0.40	1.90	0.87	16/18	0.08	4.70	0.98	1/1	0.32	0.32	0.32
Naphthalene	PAH					2/8	0.90	3.40	0.85	2/5	0.10	0.13	0.38	13/18	0.05	2.10	0.50				
Phenanthrene	PAH	1/3	0.22	0.22	0.45	5/8	0.27	61.00	1.49	5/5	0.13	3.00	0.83	17/18	0.07	27.00	2.85	1/1	0.70	0.70	0.70
Pyrene	PAH	3/3	0.08	0.32	0.13	6/8	0.05	49.00	1.16	5/5	0.13	5.80	1.55	18/18	0.13	40.00	3.92	1/1	0.92	0.92	0.92
Aroclor 1016	PCB					2/8	0.03	0.07	0.14	6/8	0.04	5.81	0.11	6/18	0.04	0.06	0.14				
Aroclor 1242	PCB					2/8	0.04	0.05	0.14	6/8	0.02	36.30	0.31	6/18	0.07	1.90	0.19				
Aroclor 1248	PCB									2/8	0.22	0.60	0.33	5/18	0.05	1.10	0.20				
Aroclor 1254	PCB					4/8	0.08	2.13	0.31	5/5	0.02	2.90	0.28	14/18	0.01	2.00	0.15	1/1	0.02	0.02	0.02
Aroclor 1260	PCB					5/8	0.02	7.90	0.32	7/8	0.04	1.13	0.15	15/18	0.01	0.86	0.08	1/1	0.02	0.02	0.02
1,2-Dichlorobenzene	SVOC													3/18	0.06	0.16	0.60				
1,4-Dichlorobenzene	SVOC									1/5	0.07	0.07	0.49								
2,4-Dimethylphenol	SVOC					1/8	0.07	0.07	0.50					1/18	0.05	0.05	0.74				
4-Methylphenol	SVOC					2/8	0.05	0.11	0.38	1/5	0.062	0.062	0.485	7/18	0.071	0.620	0.482				
Butyl benzyl phthalate	SVOC													5/18	0.15	34.00	0.80				
Chlorobenzene	SVOC					1/8	0.002	0.002	0.07					2/18	0.00	0.01	0.09				

DEC Data - Sediments - Units=mg/kg

Chemical		North Branch				Sanders Creek				Site				South Branch				Upstream			
		Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean	Freq	Min	Max	Mean
Di-n-octyl phthalate	SVOC					1/8	0.06	0.06	0.50					6/18	0.11	0.75	0.54				
Dibenzofuran	SVOC					1/8	5.60	5.60	0.87	2/5	0.11	0.12	0.38	13/18	0.08	2.50	0.61				
Dimethyl phthalate	SVOC													1/18	0.20	0.20	0.78				
Isophorone	SVOC													1/18	0.07	0.07	0.75				
bis(2-Ethylhexyl)phthalate (BEH	SVOC	2/3	0.06	0.06	0.13	3/8	0.48	0.94	0.68	3/5	0.05	0.83	0.42	17/18	0.05	12.00	0.87	1/1	0.13	0.13	0.13
n-Nitrosodiphenylamine	SVOC					1/8	0.47	0.47	0.64												
1,1-Dichloroethane	VOC					1/8	0.001	0.001	0.06					1/18	0.003	0.003	0.11				
1,1-Dichloroethene	VOC													1/18	0.01	0.01	0.12				
1,2-Dichloroethene	VOC					4/8	0.002	0.01	0.02					3/18	0.00	0.01	0.08				
2-Butanone (MEK)	VOC					5/8	0.01	0.10	0.04					5/18	0.01	0.05	0.07				
Acetone	VOC	3/3	0.01	0.06	0.02	6/8	0.01	0.18	0.08	3/6	0.02	0.07	0.06	13/18	0.01	0.17	0.05				
Carbon disulfide	VOC	1/3	0.003	0.003	0.03	4/8	0.002	0.003	0.02	3/6	0.003	0.01	0.03	9/18	0.002	0.02	0.03	1/1	0.01	0.01	0.01
Chloromethane	VOC													1/18	0.01	0.01	0.11				
Ethylbenzene	VOC					1/8	0.00	0.00	0.07	1/6	0.002	0.002	0.07	1/18	0.002	0.002	0.11				
Methylene chloride	VOC	2/3	0.002	0.01	0.01																
Tetrachloroethene	VOC									1/6	0.002	0.002	0.07	1/18	0.002	0.002	0.11				
Toluene	VOC					1/8	0.00	0.00	0.07					2/18	0.00	0.03	0.10				
Trichloroethene	VOC					3/8	0.00	0.02	0.04	1/6	0.002	0.002	0.07	3/18	0.00	0.00	0.07				
Vinyl chloride	VOC													2/18	0.002	0.006	0.089				
Xylene (total)	VOC					2/8	0.00	0.01	0.06	2/6	0.004	0.01	0.05	1/18	0.01	0.01	0.11				
TOC	ZZZ	1/1	15,100	15,100	15,100	6/6	20,700	116,000	37,635	1/1	32,000	32,000	32,000	11/11	22,000	112,000	47,474				

= Less than OBG Data @ 95 % confidence

= Greater than OBG Data @ 95 % confidence

From: Clare Leary
To: Crawford, Doug; Markert, Maureen
Date: 3/26/01 10:58:12 AM
Subject: Fwd: Re: schedules for eco risk assessment

Attached is a response from Steve regarding the schedule for the BERA WP. From that, I estimate the following schedule:

BERA WP Development March 26 - May 14
OBG Internal review May 14-18
GM reveiw May 23-30
Revisions May 30 - June 7
Submittal to DEC June 12

Mo: Can you think of any other schedule constraints (CO requirements, etc.)? I took a gander at the SRI WP schedule and became totally confused and could only gather that DEC is about 1 year behind on submittal of comments...should I even try to consider that schedule at this point?

CC: Mooney, Stephen; Raza, Aamer

NOAEL
Bird PAH
Fish PAH