DATA SUMMARY REPORT

70015

Hudson River Project
Sampling and Analysis Program

1991-1992 High Flow Water Column Monitoring Program

General Electric Company
Corporate Environmental Programs
Albany, New York

May 1993

O'BRIEN & GERE
ENGINEERS, INC.

DATA SUMMARY REPORT

HUDSON RIVER PROJECT
SAMPLING AND ANALYSIS PROGRAM

1991-1992 HIGH FLOW WATER COLUMN MONITORING PROGRAM

GENERAL ELECTRIC COMPANY
CORPORATE ENVIRONMENTAL PROGRAMS
ALBANY, NEW YORK

MAY 1993

O'BRIEN & GERE ENGINEERS, INC.
5000 BRITTONFIELD PARKWAY
SYRACUSE, NEW YORK 13221

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SECTION 1 - INTRODUCTION

1.01 Background

O'Brien & Gere Engineers, Inc. (O'Brien & Gere) conducted field studies and related activities in a 40 mile reach of the upper Hudson River extending from Bakers Falls in Hudson Falls, New York to Troy, New York. This work was prompted by the PCB Reassessment Remedial Investigation and Feasibility Study (RRI/FS) being performed on the upper Hudson River by the U.S. Environmental Protection Agency (USEPA). The work being performed by USEPA in conjunction with the Hudson River RRI/FS is described in their Phase I Report (USEPA, 1991) and the Final Phase 2 Work Plan and Sampling Plan (USEPA, 1992). This report presents a summary of the High Flow Water Column Monitoring Program conducted in Spring 1992 by O'Brien & Gere. The High Flow Water Column Monitoring Program consisted of water column sampling and analysis activities on the upper Hudson River.

The Hudson River typically experiences an annual Spring flood due to snowmelt and precipitation during March and April. Elevated flow rates can cause scouring of the river bed, leading to resuspension of sediments. Previous studies by the United States Geological Survey (USGS; Turk and Troutman, 1981) indicated that flow rates above approximately 22,000 cubic feet per second (cfs) at the Waterford USGS gaging station induce scour conditions in the river. This flow rate is equivalent to approximately 13,000 cfs at Ft. Edward. Historical review of National Weather Service and USGS climatological and flow records for the upper Hudson River drainage basin conducted by O'Brien & Gere indicated that the flow

rate peaks during the first 48 to 72 hours of a flood event. The sources of suspended solids to the water column during flood events exceeding 14,000 cfs at Fort Edward likely include scouring of the river bed, but also tributary loading. The latter is important because it would contribute little, if any, polychlorinated biphenyl (PCB) to the river.

This program was performed in accordance with the quality assurance project plan (QAPP) prepared for the project (O'Brien & Gere, 1993a). The remainder of this report presents a brief background, program objectives, sampling and analysis methods, and analytical data in tabular format.

1.02 Program Objectives

The principal objective of the High Flow Water Column Monitoring Program was to monitor the effect of elevated flow rate on sediment resuspension and water column PCB concentrations in the upper Hudson River. Corollary objectives are:

- evaluate the impact of elevated PCB loading from the alleged Bakers Falls source observed in Fall 1991 on PCB concentrations during the 1992 Spring high flow event, and
- monitor short-term solids loading from tributaries to the Hudson River during the 1992 Spring high flow event.

These objectives were accomplished by collecting and analyzing multiple samples per day from numerous stations within the upper Hudson River during the Spring 1992 high flow event.

SECTION 2 - METHODS

2.01 Sampling Approach

A predicted flow of greater than 13,000 cfs at the Fort Edward USGS monitoring station was the criterion used to evaluate the high flow monitoring event. Flow rates and weather patterns were monitored during the Spring of 1992 to predict a high flow event which met this criterion. To predict the onset of a high flow event, daily contact was made with the National Weather Service in Albany, N.Y. The National Weather Service has the capability to predict the stage-height at the Fort Edward USGS Gaging Station based on expected precipitation in the upper Hudson River drainage basin. Other factors, including snow melt and ice conditions, also affect flow rates. These factors, in conjunction with National Weather Service predictions, were utilized to initiate a high flow monitoring event.

Two high flow events were studied in 1992. A brief description of each event is described below:

- High Flow Event 1 - March 12, 1992: This high flow event was caused by the breaking of an ice jam in Warrensburg, New York. The river flow peaked and receded within 24 hours. O'Brien & Gere Engineers collected one round of samples at the Baker's Falls (Fenimore) Bridge, the Rt. 197 Bridge, and the Thompson Island Dam. Sampling was terminated because of the rapid decline in river flow rate.
- High Flow Event 2 - April 23-24, 1992: This high flow event was caused by moderately heavy rains accompanied by snow melt. The river flow rate at the Fort Edward USGS gaging station peaked on

April 24, 1992, exceeding 18,000 cfs. Flow began to recede during the evening of April 24, 1992. O'Brien & Gere Engineers initiated sampling on April 23, 1992; sampling locations described in Section 2.02 were sampled up to four times per day through April 24, 1992. Sampling locations were subsequently sampled twice per week for two consecutive weeks after peak flow was achieved, beginning April 28, 1992.

Routine weekly sampling conducted as part of the Temporal Water Column Monitoring Program (TWCMP; O'Brien & Gere, 1993b) was utilized to establish baseline conditions prior to and after each high flow monitoring event. Routine TWCMP sampling was conducted approximately weekly during the Spring 1992 season and included sampling prior to the high flow events on March 11 and April 22, 1992.

2.02 Sampling Locations and Frequency

In order to achieve the project objectives, sampling locations were selected throughout the stretch of the upper Hudson River as well as in tributaries. The sampling locations utilized for the High Flow Water Column Monitoring Program included those used for the TWCMP (six stations along the upper Hudson River and two tributaries), as well as Moses Kill and Snook Kill tributaries. Sampling locations are described in Table 1. Five of the TWCMP Hudson River sampling stations are located on bridges. These bridge locations include Hudson Falls (abandoned Fenimore (Bakers Falls) Bridge), Fort Edward (Rt. 197), Schuylerville (Rt. 29), Stillwater, and Waterford (Rt. 4). The abandoned Fenimore Bridge is located

adjacent to Bakers Falls (upstream of the remnant deposits). The sixth station is located at the western end of the Thompson Island Dam at the southern extreme of the Thompson Island Pool. The two TWCMP tributary sampling locations are located on the Hoosic River and Battenkill. The Moses Kill and the Snook Kill are tributaries to the Thompson Island Pool and were sampled to evaluate suspended solids loading to the Thompson Island Pool. Sampling locations are illustrated on Figure 1.

The Rt. 197, Thompson Island Dam, Moses Kill, and Snook Kill sampling locations were sampled four times per day from initiation of the high flow sampling event until peak flow was attained. The remaining sampling locations (Fenimore Bridge, Rt. 29, Stillwater, Rt. 4, Hoosic River, and Battenkill) were sampled twice per day during this initial sampling period. Following peak flow, each sampling station, with the exception of Moses Kill and Snook Kill, was sampled twice per week for two weeks.

2.03 Flow Monitoring

Flow monitoring was conducted on a daily basis prior to initiation of a high flow monitoring event. This daily flow monitoring consisted of obtaining instantaneous flow measurements at the Fort Edward USGS gaging station. These instantaneous measurements were obtained from the National Weather Service, which also provided 24-hour predictions of stage height at Fort Edward. Weekly instantaneous flow measurements were obtained by O'Brien & Gere Engineers' personnel at the Stillwater USGS gaging station. These measurements were obtained

by reading the staff gage at the gaging station and using USGS rating tables to estimate flow rate.

Once a high flow monitoring event was initiated, flow measurements were obtained at the Stillwater gaging station each time a round of samples was collected. In addition, instantaneous flow measurements were taken at the Fort Edward gaging station. Preliminary mean daily flow data were obtained from the USGS for the Fort Edward, Stillwater, and Waterford gaging stations subsequent to the completion of the high flow monitoring events. These data were used to supplement the instantaneous measurements collected by O'Brien & Gere personnel.

Flow estimation was required to assess the impact of Moses Kill and Snook Kill on the suspended solids loading to the river. To facilitate flow estimation of these tributaries during high flow sampling events, bathymetric surveys were performed from the Rt. 4 bridge (Moses Kill) and the West River Road bridge (Snook Kill). These bathymetric surveys included taking manual depth measurements at five foot intervals across each tributary. A benchmark was marked on the center of each bridge to serve as a future reference point to measure the surface elevation of the water in each tributary. During the April 23-24 high flow event, water elevation data were collected during each round of sampling. In addition, velocity measurements were collected with a Marsh McBirney velocity meter (Model 201) at mid-depth at three locations across each tributary during each round of sampling. These data were used to calculate the area of flow and velocity of each tributary, which were subsequently used to develop a flow rate for the Moses Kill and the Snook Kill in cubic feet per second. The results of the flow monitoring activities

are summarized on Table 1. Tributary flow measurements were not obtained during the March 12 high flow event due to ice cover.

2.04 Sample Collection Procedures

Sampling procedures for the High Flow Water Column Monitoring Program were consistent with those employed for the TWCMP, which are defined in the Quality Assurance Project Plan (QAPP; O'Brien & Gere, 1993a). Water column samples were collected from near the center of the channel off bridges at each station, with the exception of Thompson Island Dam, Hoosic River, and Battenkill. Surface water was sampled off the west wing wall of the dam at the Thompson Island Dam sampling location. Grab samples were obtained from the shore at the Hoosic River and Battenkill sampling locations. At bridge locations, samples consisted of vertically stratified composites made up of discrete aliquots collected at three foot intervals throughout the water column. Grab samples were collected while facing upstream, to avoid potential influence that sediment suspension by personnel during sampling would have on waterborne PCB measurements.

Water column samples were collected using a Kemmerer Bottle sampler. This Kemmerer Bottle sampler was a 1.2 liter stainless steel cylinder equipped with a triggering device and closeable silicone stoppers. The Kemmerer Bottle was lowered to the desired depth in the water column in the open position, followed by the release of a mechanical messenger which triggered the closure of the silicone stoppers. The sampler was then retrieved and an aliquot discharged to a stainless steel compositing container. Once an aliquot had been collected from each desired depth and placed in the compositing container, composite samples were placed in

appropriate sample containers, preserved, stored in coolers, and transported to the analytical laboratory. Samples were assigned a unique sample designation, identifying sample location, date, and time. Standard chain of custody procedures were followed. Sample handling procedures were as specified in the QAPP (O'Brien & Gere, 1993a). A time frame specific sample collection schedule is presented in Table 1. Field logs maintained by sampling personnel are presented as Appendix A to this report.

2.05 Laboratory Analysis

Samples collected from the six TWCMP Hudson River stations were submitted for congener-specific PCB, total suspended solids (TSS), and total organic carbon (TOC) analysis. Samples collected from Battenkill and Hoosic River were submitted for congener specific PCB and TSS analysis. Samples collected from Moses Kill and Snook Kill were submitted for TSS analysis only. PCB analyses were performed by Northeast Analytical, Inc. (NEA) located in Schenectady, New York. TSS and TOC analyses were performed by OBG Laboratories, Inc. (OBG Laboratories) located in Syracuse, New York. OBG Laboratories also performed PCB analysis on two duplicate samples from Thompson Island Dam (May 1) and Bakers Falls (May 8). The following analytical methods were used:

Parameter	Analytical Method
Congener-specific PCB	NEA-608CAP, Rev. 3.0 (NEA, 1990)
TSS	USEPA Method 1601. (USEPA, 1983
TOC	USEPA Method 415.1 (USEPA, 1983)

Details of analytical protocols are described in the QAPP (O'Brien & Gere, 1993a).

2.06 Quality Assurance/Quality Control Sample Collection

Quality assurance/quality control (QA/QC) samples were collected in accordance with the QAPP (O'Brien & Gere, 1993a). These samples included the collection and analysis of matrix spike, matrix spike duplicate, blind duplicate, and equipment blank samples. The locations of the matrix spike, matrix spike duplicate, blind duplicate, and equipment blank samples were selected on a rotational basis from the sampling locations. Matrix spike and matrix spike duplicate samples were duplicate samples which were submitted to the laboratory. The laboratory spiked the samples with a known quantity of analyte, then analyzed the sample and recorded the percent recovery. Blind duplicate samples consisted of duplicate water samples submitted to the laboratory without indication of where the samples were collected. Equipment blank samples were prepared in the field by rinsing the Kemmerer Bottle sampler with organic free water obtained from OBG Laboratories. The rinse water was collected and submitted to the laboratory for analysis.

The results of the QA/QC sample analyses will be used to validate the data generated for this program. The results of QA/QC analyses are included in Appendices B, C and D.

SECTION 3 - DATA PRODUCTION AND REPORTING

3.01 OBG Laboratories, Inc.

OBG Laboratories was responsible for the analysis of 85 water samples, excluding QA/QC samples, collected during the High Flow Water Column Monitoring Program. Each of the samples were analyzed for TSS; 55 samples were analyzed for TOC; and two samples were analyzed for PCBs by OBG Laboratories, as discussed in Section 2.05.

Upon completion of the analyses, OBG Laboratories generated three data reports. These data reports were prepared in a manner which was consistent with New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP) Category B reporting requirements. The data reports are presented as Appendix B to this report and contain the following components:

- title page,
- sign-off sheet,
- table of contents,
- case narrative,
- sample result form,
- chain of custody forms,
- sample log-in sheet,
- internal sample control record (internal sample tracking sheet),
- duplicate summary table,
- method blank summary table,
- sample raw data,

- standards summary table, and
- standards/QC samples (blanks, matrix spikes, duplicates) raw data.

Data for samples collected on March 11, 1992 and April 22, 1992 as part of the TWCMP were not included in the OBG Laboratories High Flow Monitoring Program data packages but are presented in Table 2 of this report for the purpose of data comparison. These data are presented in the TWCMP Report (O'Brien & Gere, 1993b).

3.02 Northeast Analytical, Inc.

NEA was responsible for the analysis of 65 water column samples, excluding QA/QC samples, collected during the High Flow Water Column Monitoring Program. These samples were analyzed for congener-specific PCBs, as discussed in Section 2.05. NEA produced a reporting package and quality control program which adhered to the guidelines set forth in the NYSDEC ASP Superfund PCB/pesticide requirements. These raw data reports are presented as Appendix D to this report and contain the following components:

- title page,
- sign-off sheet,
- table of contents,
- case narrative,
- sample result forms,
- chain of custody forms,
- sample log-in sheet,

- internal sample control record (internal sample tracking sheet),
- duplicate summary table,
- method blank summary table,
- sample raw data,
- standards summary table, and
- standards/QC samples (blanks, matrix spikes, duplicates) raw data.

Data for samples collected on March 11, 1992 and April 22, 1992 as part of the TWCMP were not included in the NEA High Flow Monitoring Program data packages but are presented in Table 2 of this report for data comparison purposes. These data are presented in the TWCMP Report (O'Brien & Gere, 1993b).

SECTION 4 - SAMPLING AND ANALYSIS RESULTS

4.01 Data Validation

Data generated during the Spring 1992 High Flow Water Column Monitoring Program is undergoing validation. When completed, the results of the data validation will be presented in a report. A computerized method of validation will be utilized for evaluation of the data, supplemented by a manual validation of 10% of the data. The manual validation will serve to verify the accuracy of the computer validation.

4.02 High Flow Water Column Monitoring Program Sampling and Analysis Results

The High Flow Water Column Monitoring Program involved the collection and analysis of water column samples from locations selected within the upper Hudson River and tributaries. The analysis of these samples provided data for several parameters including congener-specific PCB and conventional parameters, including TSS and TOC. Data are presented on summary tables as follows:

Table 2 - OBG Laboratories Conventional Data and NEA PCB Data Summary,

Table 3 - OBG Laboratories PCB Data Summary, and

Table 4 - Thompson Island Pool Tributary TSS Loading Summary.

Table 2 contains the following data: sampling date, location, and time; approximate river flow rate and method of flow estimation; TOC, TSS, and total PCB concentrations; and PCB homolog distributions on a weight percent basis. Table 3 presents total PCB concentrations for duplicate samples analyzed by OBG

Laboratories. Table 4 presents TSS concentrations, measured velocities at three locations in the Snook Kill and Moses Kill tributaries, calculated average velocities, average flow areas, calculated flow rates, and calculated solids loading rates for various dates and times.

Approximate river flow rates ranged from 5,930 cfs to 33,000 cfs. TSS concentrations in the river ranged from 3 mg/l to 45 mg/l. TOC concentrations in the river ranged from 4 mg/l to 250 mg/l. The range of total PCB concentrations in the river was <11 ng/l to 1,883 ng/l. The PCBs identified were predominantly Aroclor 1242.

Original laboratory data, including supporting documentation, are presented in Appendices B and C (OBG Laboratories data), and D (NEA PCB data) to this report.

REFERENCES

Northeast Analytical, Inc. Method NEA-608CAP, Rev. 3.0, June 1990. (Includes guidelines set forth in *Quality Assurance Plan.* Green Bay Mass Balance Study, I. PCBs and Dieldrin, USEPA Great Lakes National Program Office. Prepared by Deborah L. Swackhamer, Quality Assurance Coordinator, Field and Analytical Methods Committees, University of Minnesota, December 11, 1987 (Appendix B)).

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Tables

TABLE 1
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
SAMPLING LOCATIONS

Sampling Site	Location Description	Approximate Hudson River Mile
Fenimore Bridge	Fenimore Hudson Falls, NY	197.0
Rt. 197	Rt. 197 Bridge; Fort Edward, NY	194.2
Snook Kill	West River Road Bridge; Moreau, NY	-
Thompson Island	Western end of Thompson Island Dam at southern extreme of Thompson Island Pool	188.5
Moses Kill	Rt. 4 Bridge; Fort Edward, NY	-
Battenkill	Along northern shore, approximately 1 mile upstream of confluence with Hudson River	-
Rt. 29	Rt. 29 Bridge; Schuylerville, NY	182.0
Stillwater	Stillwater Bridge; Stillwater, NY	168.5
Hoosic	Along southern shore, approximately 1.5 miles upstream of confluence with Hudson River	-
Rt. 4	Rt. 4 Bridge; Waterford, NY	157.8

TABLE 2
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES CONVENTIONAL DATA AND NEA PCB DATA SUMMARY

Sampling Information			Approximate Flow	Note	TOC	TSS	Total PCBs	Homolog Distribution (weight %)									
Date	Site	Time	(cfs)		(mg/L)	(mg/L)	(ng/l)	Mono	Di	Tri	Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca
March 11	Fenimore Bridge	09:10	5,930	1	11	5	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	09:40	5,930	1	11	4	38	0.0	7.2	38.9	31.3	15.6	7.0	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	10:00	5,930	1	9	40	74	6.0	14.6	36.5	24.4	11.8	6.6	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	10:45	--		--	6	--	--	--	--	--	--	--	--	--	--	--
	Rt. 29	11:30	7,770	2	14	45	77	3.8	14.8	39.6	25.5	10.7	5.8	0.0	0.0	0.0	0.0
	Stillwater	12:20	7,770	2	12	23	73	10.0	18.6	36.9	22.0	9.4	3.1	0.0	0.0	0.0	0.0
	Hoosic	12:45	--		--	19	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 4	13:30	10,700	3	13	32	69	8.4	14.8	34.1	25.4	11.9	5.5	0.0	0.0	0.0	0.0
March 12	Fenimore Bridge	16:30	11,400	1	9	19	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	17:00	11,400	1	250	25	239	0.0	9.7	40.6	37.3	9.1	3.3	0.0	0.0	0.0	0.0
	Thompson Island	17:45	11,400	1	20	33	330	0.0	9.3	44.2	36.1	8.1	2.4	0.0	0.0	0.0	0.0
April 22	Fenimore Bridge	10:00	11,000	1	6	4	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	10:45	11,000	1	12	3	125	0.0	9.6	42.1	35.1	8.9	4.2	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	11:45	11,000	1	10	10	87	0.0	11.7	37.8	37.2	9.6	3.7	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	12:30	--		--	9	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	13:00	13,200	2	7	10	84	0.0	12.5	38.0	33.8	10.7	5.1	0.0	0.0	0.0	0.0
	Stillwater	13:30	13,200	2	6	13	66	0.0	14.1	36.7	33.3	10.8	5.1	0.0	0.0	0.0	0.0
	Hoosic	13:45	--		--	25	11	0.0	0.9	22.4	38.7	28.4	9.6	0.0	0.0	0.0	0.0
	Rt. 4	14:15	17,400	3	6	12	57	0.0	11.9	35.4	35.2	11.1	6.4	0.0	0.0	0.0	0.0

1 Flow estimated based on daily mean flow at Ft. Edward USGS Gaging Station.
2 Flow estimated based on daily mean flow at Stillwater USGS Gaging Station.
3 Flow estimated based on daily mean flow at Waterford USGS Gaging Station.
4 Flow estimated based on instantaneous flow at Stillwater USGS Gaging Station.
5 Flow estimated based on instantaneous flow profile.

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TABLE 2
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES CONVENTIONAL DATA AND NEA PCB DATA SUMMARY

Sampling Information			Approximate Flow	Note	TOC	TSS	Total PCBs	Homolog Distribution (weight %)									
Date	Site	Time	(cfs)		(mg/L)	(mg/L)	(ng/l)	Mono	Di	Tri	Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca
April 23	Fenimore Bridge	15:30	16,000	4	7	14	<11	--	--	--	--	--	--	--	--	--	--
		18:30	16,500	4	9	24	11	0.0	0.0	17.3	36.6	36.9	9.1	0.0	0.0	0.0	0.0
	Rt. 197	15:35	16,000	4	10	14	502	0.0	11.0	38.7	36.0	9.5	4.0	0.8	0.0	0.0	0.0
		17:45	16,500	4	24	14	923	0.0	11.5	43.1	35.9	6.8	2.3	0.4	0.0	0.0	0.0
	Snook Kill	16:10	101	5	--	11	--	--	--	--	--	--	--	--	--	--	--
		18:00	112	5	--	8	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	16:45	16,000	4	12	11	931	0.0	10.4	40.3	38.2	7.8	2.9	0.5	0.0	0.0	0.0
		18:20	16,500	4	8	11	634	0.0	12.1	42.4	34.8	7.1	2.9	0.7	0.0	0.0	0.0
	Moses Kill	17:15	179	5	--	14	--	--	--	--	--	--	--	--	--	--	--
		18:45	329	5	--	15	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	16:25	--		--	10	<11	--	--	--	--	--	--	--	--	--	--
		19:00	--		--	6	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	16:30	20,000	4	7	28	1533	0.7	10.7	41.2	35.9	8.0	2.8	0.7	0.0	0.0	0.0
		19:10	21,000	4	9	20	1805	0.7	9.3	41.6	36.6	8.0	3.1	0.7	0.0	0.0	0.0
	Stillwater	17:00	20,000	4	10	36	429	1.6	9.3	37.5	38.7	9.3	2.9	0.7	0.0	0.0	0.0
		19:25	21,000	4	8	32	739	1.0	7.0	36.2	39.8	10.1	4.4	1.4	0.0	0.0	0.0
	Hoosic	17:30	--		--	23	<11	--	--	--	--	--	--	--	--	--	--
		19:50	--		--	28	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 4	18:00	30,000	4	7	28	176	0.0	6.9	37.8	40.3	11.3	3.7	0.0	0.0	0.0	0.0
		20:20	31,500	4	8	25	221	0.0	9.8	40.3	37.7	9.4	2.8	0.0	0.0	0.0	0.0

1 Flow estimated based on daily mean flow at Ft. Edward USGS Gaging Station.
2 Flow estimated based on daily mean flow at Stillwater USGS Gaging Station.
3 Flow estimated based on daily mean flow at Waterford USGS Gaging Station.
4 Flow estimated based on instantaneous flow at Stillwater USGS Gaging Station.
5 Flow estimated based on instantaneous flow profile.

TABLE 2
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1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES CONVENTIONAL DATA AND NEA PCB DATA SUMMARY

Sampling Information			Approximate Flow	Note	TOC	TSS	Total PCBs	Homolog Distribution (weight %)									
Date	Site	Time	(cfs)		(mg/L)	(mg/L)	(ng/l)	Mono	Di	Tri	Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca
April 24	Fenimore Bridge	07:20	17,500	4	9	19	<11	--	--	--	--	--	--	--	--	--	--
		13:30	18,500	4	8	12	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	07:30	17,500	4	16	17	322	0.0	12.1	41.5	35.2	7.4	2.8	1.1	0.0	0.0	0.0
		09:40	17,500	4	9	20	227	0.0	12.1	39.4	34.7	9.2	3.4	1.2	0.0	0.0	0.0
		13:10	18,500	4	9	19	555	0.0	13.8	41.8	33.9	7.2	2.9	0.5	0.0	0.0	0.0
		15:15	18,000	4	9	19	223	0.0	10.5	39.9	35.7	8.5	3.9	1.6	0.0	0.0	0.0
	Snook Kill	07:45	112	5	--	15	--	--	--	--	--	--	--	--	--	--	--
		10:10	129	5	--	17	--	--	--	--	--	--	--	--	--	--	--
		13:25	129	5	--	31	--	--	--	--	--	--	--	--	--	--	--
		15:25	146	5	--	8	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	08:10	17,500	4	7	21	536	1.7	9.6	36.2	37.2	9.7	4.4	1.2	0.0	0.0	0.0
		10:35	18,500	4	11	17	386	1.7	11.0	40.7	34.4	7.4	3.8	1.0	0.0	0.0	0.0
		13:35	18,500	4	8	28	1119	0.6	12.3	42.1	34.1	7.3	2.8	0.7	0.0	0.0	0.0
		15:40	18,000	4	9	29	1883	0.8	14.1	42.4	33.0	6.8	2.4	0.5	0.0	0.0	0.0
	Moses Kill	08:35	478	5	--	18	--	--	--	--	--	--	--	--	--	--	--
		11:05	448	5	--	19	--	--	--	--	--	--	--	--	--	--	--
		14:20	448	5	--	16	--	--	--	--	--	--	--	--	--	--	--
		16:10	448	5	--	16	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	08:45	--		--	10	<11	--	--	--	--	--	--	--	--	--	--
		14:10	--		--	7	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	09:00	22,000	4	9	24	648	1.4	10.3	36.8	36.8	9.6	4.2	0.9	0.0	0.0	0.0
		14:15	22,000	4	10	27	594	1.3	11.2	39.8	36.2	7.8	3.2	0.7	0.0	0.0	0.0

1 Flow estimated based on daily mean flow at Ft. Edward USGS Gaging Station.
2 Flow estimated based on daily mean flow at Stillwater USGS Gaging Station.
3 Flow estimated based on daily mean flow at Waterford USGS Gaging Station.
4 Flow estimated based on instantaneous flow at Stillwater USGS Gaging Station.
5 Flow estimated based on instantaneous flow profile.

320710

TABLE 2
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES CONVENTIONAL DATA AND NEA PCB DATA SUMMARY

Sampling Information			Approximate Flow	Note	TOC	TSS	Total PCBs	Homolog Distribution (weight %)									
Date	Site	Time	(cfs)		(mg/L)	(mg/L)	(ng/l)	Mono	Di	Tri	Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca
April 24 (cont.)	Stillwater	09:30	22,000	4	12	40	751	1.7	11.3	39.8	35.0	8.3	3.2	0.8	0.0	0.0	0.0
		14:40	22,000	4	8	32	785	1.3	10.4	38.8	36.6	8.5	3.7	0.7	0.0	0.0	0.0
	Hoosic	10:00	--		--	18	<11	--	--	--	--	--	--	--	--	--	--
		15:15	--		--	14	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 4	10:30	32,000	4	7	44	777	1.1	10.6	39.9	36.1	8.4	3.3	0.6	0.0	0.0	0.0
		15:40	33,000	4	9	35	746	0.9	9.7	39.0	37.4	8.8	3.6	0.7	0.0	0.0	0.0
April 28	Fenimore Bridge	09:00	12,400	4	8	10	41	0.0	0.2	25.1	42.7	20.4	11.6	0.0	0.0	0.0	0.0
	Rt. 197	09:30	12,400	4	7	7	38	0.0	10.2	36.4	29.3	14.5	9.6	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	10:00	12,400	4	10	7	98	6.7	14.7	36.1	31.9	7.1	3.5	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	10:30	--		--	11	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	10:45	15,500	4	8	7	113	3.7	13.6	37.2	33.3	7.7	4.5	0.0	0.0	0.0	0.0
	Stillwater	11:15	15,500	4	10	8	108	2.9	13.4	38.2	35.4	6.9	3.2	0.0	0.0	0.0	0.0
	Hoosic	12:15	--		--	10	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 4	12:45	22,900	4	8	10	112	3.0	12.5	37.6	36.4	7.5	3.0	0.0	0.0	0.0	0.0
May 1	Fenimore Bridge	09:55	7,480	1	5	7	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	10:35	7,480	1	5	6	41	0.0	12.7	42.3	33.6	9.1	2.3	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	11:35	7,480	1	5	6	111	6.7	13.9	34.8	32.0	8.2	4.4	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	12:10	--		--	10	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	12:25	9,580	2	5	6	90	4.2	13.9	37.4	32.0	8.1	4.5	0.0	0.0	0.0	0.0

1 Flow estimated based on daily mean flow at Ft. Edward USGS Gaging Station.
2 Flow estimated based on daily mean flow at Stillwater USGS Gaging Station.
3 Flow estimated based on daily mean flow at Waterford USGS Gaging Station.
4 Flow estimated based on instantaneous flow at Stillwater USGS Gaging Station.
5 Flow estimated based on instantaneous flow profile.

TABLE 2
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES CONVENTIONAL DATA AND NEA PCB DATA SUMMARY

Sampling Information			Approximate Flow	Note	TOC	TSS	Total PCBs	Homolog Distribution (weight %)									
Date	Site	Time	(cfs)		(mg/L)	(mg/L)	(ng/l)	Mono	Di	Tri	Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca
May 1 (cont.)	Stillwater	12:50	9,580	2	5	7	97	4.7	15.3	36.9	30.0	8.6	4.6	0.0	0.0	0.0	0.0
	Hoosic	13:20	--		--	11	13	0.0	0.5	21.5	36.0	30.5	11.5	0.0	0.0	0.0	0.0
	Rt. 4	13:55	12,000	3	4	8	100	4.5	14.6	37.2	32.2	7.6	4.0	0.0	0.0	0.0	0.0
May 5	Fenimore Bridge	09:40	15,900	1	7	10	14	0.0	0.5	17.3	37.4	31.4	13.4	0.0	0.0	0.0	0.0
	Rt. 197	10:20	15,900	1	6	8	54	0.0	12.7	36.7	32.9	10.2	7.5	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	10:50	15,900	1	7	11	149	12.7	15.1	33.7	27.6	7.2	3.7	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	11:10	--		--	8	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	11:30	19,700	2	7	12	186	2.0	10.3	39.0	36.1	9.2	3.5	0.0	0.0	0.0	0.0
	Stillwater	12:00	19,700	2	7	16	218	2.5	11.5	40.6	34.5	7.5	3.5	0.0	0.0	0.0	0.0
	Hoosic	12:45	--		--	33	34	0.0	4.3	23.8	39.2	19.9	12.9	0.0	0.0	0.0	0.0
	Rt. 4	13:45	25,000	3	6	24	230	2.3	11.8	39.8	35.7	7.8	2.7	0.0	0.0	0.0	0.0
May 8	Fenimore Bridge	09:50	13,200	1	5	8	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 197	10:10	13,200	1	5	7	47	0.0	11.5	36.7	35.1	14.0	2.7	0.0	0.0	0.0	0.0
	Snook Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Thompson Island	11:20	13,200	1	5	17	94	8.1	15.9	35.8	27.9	8.4	4.0	0.0	0.0	0.0	0.0
	Moses Kill	--	--		--	--	--	--	--	--	--	--	--	--	--	--	--
	Battenkill	12:00	--		--	5	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 29	12:10	15,900	2	5	5	119	4.8	14.7	36.2	31.3	8.3	4.7	0.0	0.0	0.0	0.0
	Stillwater	12:40	15,900	2	5	6	135	6.0	14.3	37.5	31.2	7.8	3.2	0.0	0.0	0.0	0.0
	Hoosic	13:00	--		--	15	<11	--	--	--	--	--	--	--	--	--	--
	Rt. 4	13:40	19,900	3	8	4	125	4.1	13.8	38.2	31.8	8.5	3.6	0.0	0.0	0.0	0.0

1 Flow estimated based on daily mean flow at Ft. Edward USGS Gaging Station.
2 Flow estimated based on daily mean flow at Stillwater USGS Gaging Station.
3 Flow estimated based on daily mean flow at Waterford USGS Gaging Station.
4 Flow estimated based on instantaneous flow at Stillwater USGS Gaging Station.
5 Flow estimated based on instantaneous flow profile.

320712

TABLE 3
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
OBG LABORATORIES PCB DATA SUMMARY

Date	Location	PCB Conc. (ng/L)
5/01/92	Thompson Island Dam	72
5/08/92	Fenimore Bridge	12

TABLE 4
GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM

HIGH FLOW WATER COLUMN MONITORING PROGRAM
THOMPSON ISLAND POOL TRIBUTARY TSS LOADING SUMMARY

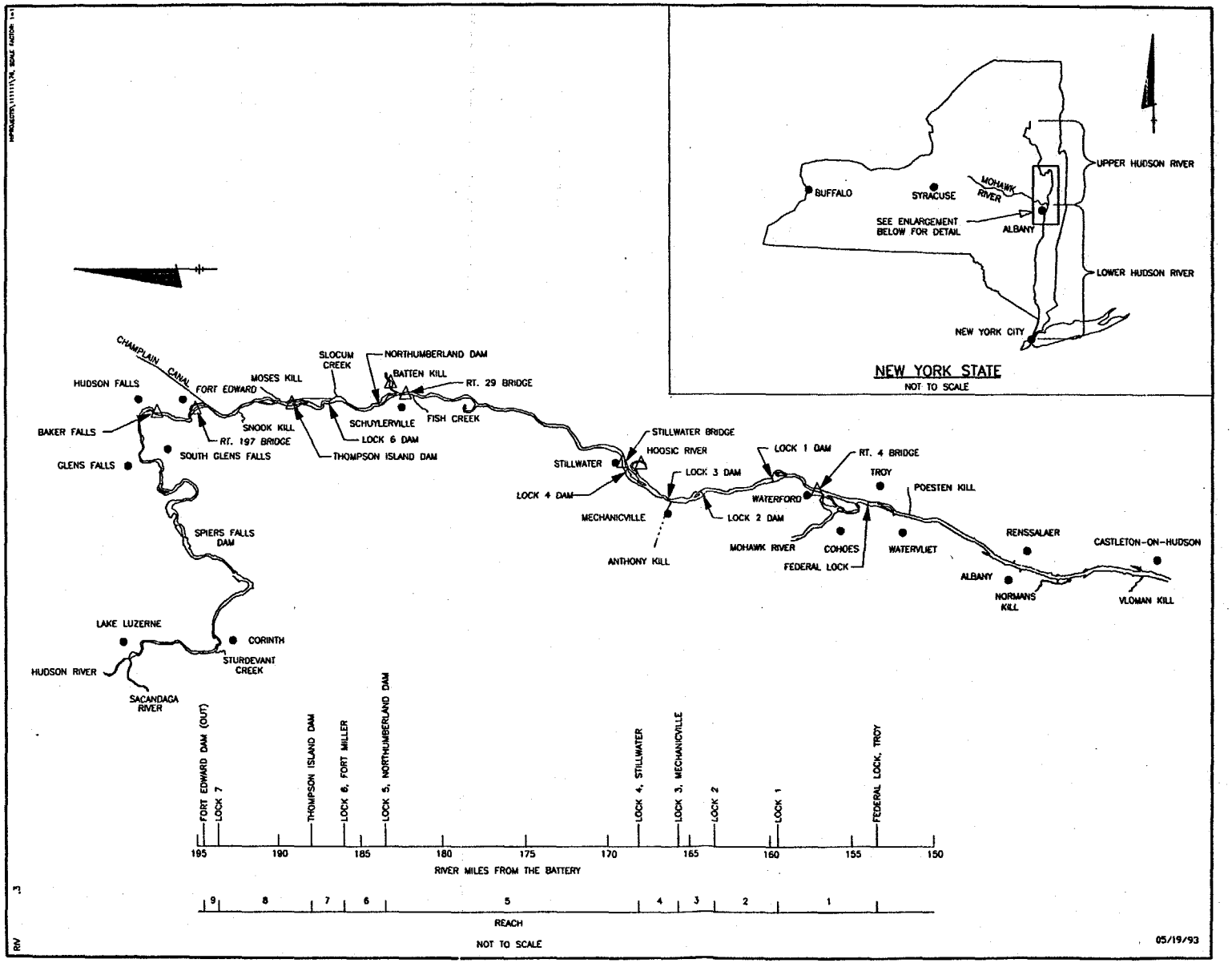
Site	Date	Time	TSS (mg/l)	Velocity at stream location * 1/4	1/2	3/4	Average velocity (ft/sec)	Avg. Area of Flow (ft2)	Calculated Flow Rate (cfs)	Solids Loading Rate (kg/day)
Snook Kill	4/23/92	16:10	11	0.19	0.20	0.20	0.20	516	101	2730
	4/23/92	18:00	8	0.20	0.20	0.25	0.22	516	112	2190
	4/24/92	07:45	15	0.20	0.20	0.25	0.22	516	112	4100
	4/24/92	10:10	17	0.20	0.25	0.30	0.25	516	129	5360
	4/24/92	13:25	31	0.20	0.25	0.30	0.25	516	129	9780
	4/24/92	15:25	8	0.25	0.30	0.30	0.28	516	146	2860
Moses Kill	4/23/92	17:15	14	0.10	0.15	0.05	0.10	1792	179	6130
	4/23/92	18:45	15	0.25	0.20	0.10	0.18	1792	329	12000
	4/24/92	08:35	18	0.25	0.25	0.30	0.27	1792	478	21000
	4/24/92	11:05	19	0.30	0.30	0.15	0.25	1792	448	20800
	4/24/92	14:20	16	0.30	0.25	0.20	0.25	1792	448	17500
	4/24/92	16:10	16	0.30	0.25	0.20	0.25	1792	448	17500

* Fractions represent approximate distance from shore with respect to total stream width.

320714

Figures

FIGURE 1



LEGEND

▲ HIGH FLOW WATER COLUMN MONITORING PROGRAM SAMPLING LOCATIONS

GENERAL ELECTRIC COMPANY
HUDSON RIVER PROJECT
1992 SAMPLING AND ANALYSIS PROGRAM
HIGH FLOW WATER COLUMN MONITORING PROGRAM

HUDSON RIVER
RIVER LOCATION MAP

5 0 5
1" = 5 MILES

MAY 1993

O'BRIEN & GERE ENGINEERS, INC.

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