

**Hudson River Project  
Sampling and Analysis Program**

**1991 Float Survey 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 FLOAT SURVEY 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 on the upper Hudson River. 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 water column PCB monitoring referred to as the Float Survey Program.

### **1.02 Program Objectives**

The principal objective of the Float Survey Program was to identify potential source areas which may be contributing PCB to the Hudson River. Targeted source areas were the Fort Edward Dam remnant deposit areas located between Ft. Edward and Hudson Falls as well as potential sources upstream of the remnant deposits. The float surveys were designed to monitor a single water mass as it passed these potential sources. A total of five float surveys were performed between June and September, 1991.

## **SECTION 2 - METHODS**

### **2.01 Sample Locations**

Float survey samples were collected from five locations, designated FS-2, FS-3, FS-4, FS-5, and FS-6, near the center of the channel in the reach of the upper Hudson River between Bakers Falls and Rogers Island (Reach 9). Pre-determined sampling locations were selected and marked on shore prior to the first survey. The locations were selected visually to approximately equally space them throughout the remnant deposit reach of the river. The sampling locations are illustrated on Figure 1. On July 25, 1991, an additional location, FS-1A, was sampled in order to evaluate conditions further upstream of FS-2. Because the data generated for location FS-1A was comparable with data generated for location FS-2, location FS-2 was considered representative of conditions upstream of the remnant deposits, and FS-1A was not sampled in subsequent float surveys. The float surveys were coordinated with the Temporal Water Column Monitoring Program (TWCMP) sampling (O'Brien & Gere, 1993b) which provided data for background conditions at the Bakers Falls (Fenimore) Bridge (location FS-1) and other downstream sampling locations on the day of each survey.

### **2.02 Sample Collection Procedures**

Sampling procedures and specifications which were defined in the Quality Assurance Project Plan (QAPP; O'Brien & Gere, 1993a) were followed. Reach 9 of the upper Hudson River is characterized by shallow (one to five feet) rapid flowing water. These conditions limited access by conventional water crafts. Therefore,

samples were collected by launching an inflatable boat below Bakers Falls, paddling into the center of the river, and drifting with the current to Rogers Island. The samples consisted of grab samples collected from near the center of the channel from the surface of the water column. Samples were collected in new, dedicated one gallon glass containers. Upon arrival at Rogers Island, the samples were sub-divided into appropriate containers, chilled to 4°C, and transported to the analytical laboratory. In accordance with the QAPP (O'Brien & Gere, 1993a), samples were assigned a unique sample designation, identifying sample location, date, and time. Standard chain of custody procedures as specified in the QAPP (O'Brien & Gere, 1993a) were followed. The sample collection schedule is included in Table 1. Field logs maintained by sampling personnel are presented in Appendix A.

### **2.03 Laboratory Analysis**

Water column samples collected during float surveys 1 and 2 were analyzed for the following parameters:

- total dissolved solids,
- conductivity,
- alkalinity,
- total suspended solids,
- total organic carbon,
- dissolved organic carbon, and
- total PCB (USEPA method 608, chromatograph interpretation according to Webb and McCall (1973)).

Water column samples collected during float surveys 3, 4, and 5 were analyzed for the following parameters:

- total suspended solids,
- total organic carbon, and
- total PCB (USEPA method 608, chromatograph interpretation according to Webb and McCall (1973)).

Total PCB analyses were performed by Northeast Analytical, Inc. (NEA) located in Schenectady, New York. The remaining analyses were performed by OBG Laboratories, Inc. (OBG Laboratories) located in Syracuse, New York.

#### **2.04 Quality Assurance/Quality Control Sample Collection**

Quality assurance/quality control (QA/QC) samples were collected during each float survey in accordance with the QAPP (O'Brien & Gere, 1993a). These samples included the collection and analysis of matrix spike, blind duplicate, and equipment blank samples. The locations of the matrix spike, blind duplicate, and equipment blank samples were selected on a rotational basis from the five sampling locations. Matrix spike 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 a sample container identical to those used to collect the samples with organic free water obtained from OBG Laboratories. The rinse water was collected and submitted to the laboratory for analysis.

The results of QA/QC analyses are included in Appendices B and C, as indicated in Section 3. The results of the QA/QC sample analyses were used to evaluate the quality of data in the data validation procedure, as discussed in Section 4.01. The QA/QC results indicate that the data generated in this study are usable for qualitative and quantitative purposes.



## **SECTION 3 - DATA PRODUCTION AND REPORTING**

### **3.01 OBG Laboratories, Inc.**

OBG Laboratories was responsible for the analysis of approximately 34 water samples collected during the Float Survey Program. Of these 34 samples, 15 were analyzed for total suspended solids (USEPA method 160.1; USEPA, 1983), specific conductance (USEPA method 205; Clesceri, 1989), total dissolved solids (USEPA method 160.2; USEPA, 1983), total and dissolved organic carbon (USEPA method 415.1; USEPA, 1983), and alkalinity (USEPA method 310.1; USEPA, 1983). The remaining 19 samples were analyzed for total suspended solids and total organic carbon only.

Upon completion of the analyses, OBG Laboratories generated a data report entitled Laboratory Report, General Electric Company, Float Survey, Hudson River, N.Y. This data report was 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 report is presented as Appendix B to this report and contains 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 tables, and
- standards/QC sample (blanks, matrix spikes, duplicates) raw data.

### **3.02 Northeast Analytical, Inc.**

NEA was responsible for the analysis of approximately 39 water column samples collected during the Float Survey Program. These samples were analyzed for total PCB according to USEPA method 608, with chromatograph interpretation according to Webb & McCall (1973). 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 in Appendix C 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 tables, and
- standards/QC sample (blanks, matrix spikes, duplicates) raw data.

## **SECTION 4 - SAMPLING AND ANALYSIS RESULTS**

### **4.01 Data Validation Results**

A computerized method of validation was utilized for evaluation of float survey PCB data. This computerized method was supplemented by a manual validation of 10% of the data. The manual validation served to verify the accuracy of the computer validation. A report summarizing the data validation performed on the 1991 float survey data is in preparation. The following is a summary of the data validation results.

The results of the data validation indicated that 100% of the data generated for the Float Survey Program were usable for quantitative purposes. Data for 6 of 26 samples were qualified as approximate, due to exceedence of relative percent difference criteria for duplicate sample analysis. Approximation of a data point indicates uncertainty in a reported concentration of a chemical due to excursion of method criteria, but not in its assigned identity. Approximation of a data point does not render the value unusable for quantitative or other purposes.

Data validation qualifiers are included on the data summary tables described in Section 4.02. The level of completeness in this data set exceeds the normal level of completeness for work of this nature.

### **4.02 Float Survey Program Sampling and Analysis Results**

The Float Survey Program involved the collection and analysis of water column samples from locations selected within the two mile reach of the upper Hudson River extending from Bakers Falls to the northern tip of Rogers Island, in

Ft. Edward, New York. The analysis of these samples provided data for several parameters including total PCB (quantified according to Webb & McCall (1973)); and conventional parameters, including total and dissolved organic carbon, total suspended solids, total dissolved solids, total alkalinity, and specific conductance. These data are presented on summary tables as follows:

Table 2 - NEA PCB Data Summary, and

Table 3 - OBG Laboratories Conventional Data Summary.

Analytical data for upstream location FS-1 (Fenimore Bridge) generated during the TWCMP are also presented in these tables for comparison purposes. Original laboratory data for FS-1 are included in the Appendices for the TWCMP Data Summary Report (O'Brien & Gere, 1993b).

Original laboratory data for the Float Survey Program, including supporting documentation, are presented in Appendix B (OBG Laboratories data) and Appendix C (NEA PCB data) to this report.

## REFERENCES

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## Tables



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TABLE 1  
GENERAL ELECTRIC COMPANY  
HUDSON RIVER PROJECT  
1991 SAMPLING AND ANALYSIS PROGRAM

FLOAT SURVEY PROGRAM  
SAMPLE COLLECTION SCHEDULE

| Float<br>Survey No. | Sample<br>Location | Date     | Laboratory Analysis * |     |     |     |     |      |        |
|---------------------|--------------------|----------|-----------------------|-----|-----|-----|-----|------|--------|
|                     |                    |          | Total PCB             | TSS | TDS | TOC | DOC | TALK | SPCOND |
| 1                   | FS-2               | 06/26/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-3               | 06/26/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-4               | 06/26/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-5               | 06/26/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-6               | 06/26/91 | X                     | X   | X   | X   | X   | X    | X      |
| 2                   | FS-1A              | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-2               | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-3               | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-4               | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-5               | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
|                     | FS-6               | 07/25/91 | X                     | X   | X   | X   | X   | X    | X      |
| 3                   | FS-2               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-3               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-4               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-5               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-6               | 09/05/91 | X                     | X   |     | X   |     |      |        |
| 4                   | FS-2               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-3               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-4               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-5               | 09/05/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-6               | 09/05/91 | X                     | X   |     | X   |     |      |        |
| 5                   | FS-2               | 09/19/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-3               | 09/19/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-4               | 09/19/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-5               | 09/19/91 | X                     | X   |     | X   |     |      |        |
|                     | FS-6               | 09/19/91 | X                     | X   |     | X   |     |      |        |

## Notes:

\* Total PCB analyzed according to procedures described in Webb and McCall, 1973; TSS - Total Suspended Solids;  
TDS - Total Dissolved Solids; TOC - Total Organic Carbon; DOC - Dissolved Organic Carbon;  
TALK - Total Alkalinity; SPCOND - Specific Conductivity.



TABLE 2  
GENERAL ELECTRIC COMPANY  
HUDSON RIVER PROJECT  
1991 SAMPLING AND ANALYSIS PROGRAM

FLOAT SURVEY PROGRAM  
NEA PCB DATA SUMMARY

| Float Survey No. | Survey Date | Sample Location | Approximate River Mile | Total PCB Concentration (ng/l) | PQL Qualifier | Validation Qualifier |
|------------------|-------------|-----------------|------------------------|--------------------------------|---------------|----------------------|
| 1                | 06/26/91    | FS-1            | 197.0                  | 100 *                          |               |                      |
|                  | 06/26/91    | FS-2            | 196.8                  | 12                             | P             |                      |
|                  | 06/26/91    | FS-3            | 196.4                  | 28                             | P             |                      |
|                  | 06/26/91    | FS-4            | 195.8                  | 18                             | P             |                      |
|                  | 06/26/91    | FS-5            | 195.3                  | 34                             | P             |                      |
|                  | 06/26/91    | FS-6            | 194.7                  | 19                             | P             |                      |
| 2                | 07/25/91    | FS-1            | 197.0                  | <11 **                         | P             | U                    |
|                  | 07/25/91    | FS-1A           | 196.9                  | 31                             | P             | J                    |
|                  | 07/25/91    | FS-2            | 196.8                  | 56                             |               | J                    |
|                  | 07/25/91    | FS-3            | 196.4                  | 33                             | P             | J                    |
|                  | 07/25/91    | FS-4            | 195.8                  | 39                             | P             | J                    |
|                  | 07/25/91    | FS-5            | 195.3                  | 45                             |               | J                    |
|                  | 07/25/91    | FS-6            | 194.7                  | 47                             |               | J                    |
| 3                | 09/05/91    | FS-1            | 197.0                  | 11 **                          | P             |                      |
|                  | 09/05/91    | FS-2            | 196.8                  | 48                             |               |                      |
|                  | 09/05/91    | FS-3            | 196.4                  | 69                             |               |                      |
|                  | 09/05/91    | FS-4            | 195.8                  | 69                             |               |                      |
|                  | 09/05/91    | FS-5            | 195.3                  | 64                             |               |                      |
|                  | 09/05/91    | FS-6            | 194.7                  | 78                             |               |                      |
| 4                | 09/05/91    | FS-1            | 197.0                  | 11 **                          | P             |                      |
|                  | 09/05/91    | FS-2            | 196.8                  | 60                             |               |                      |
|                  | 09/05/91    | FS-3            | 196.4                  | 64                             |               |                      |
|                  | 09/05/91    | FS-4            | 195.8                  | 75                             |               |                      |
|                  | 09/05/91    | FS-5            | 195.3                  | 65                             |               |                      |
|                  | 09/05/91    | FS-6            | 194.7                  | 103                            |               |                      |
| 5                | 09/19/91    | FS-1            | 197.0                  | 17 **                          | P             | J                    |
|                  | 09/19/91    | FS-2            | 196.8                  | 712                            |               |                      |
|                  | 09/19/91    | FS-3            | 196.4                  | 1010                           |               |                      |
|                  | 09/19/91    | FS-4            | 195.8                  | 2586                           |               |                      |
|                  | 09/19/91    | FS-5            | 195.3                  | 1299                           |               |                      |
|                  | 09/19/91    | FS-6            | 194.7                  | 1630                           |               |                      |

\* Total PCBs analyzed according to USGS protocols (US Dept. of Interior, 1972) as part of TWCMP.

\*\* Total PCBs analyzed according to congener-specific protocols (NEA, 1990) as part of TWCMP.

Data Validation Qualifiers: U=elevated detection limit or concentration reduced to less than detection limit due to validation.

J=approximated concentration; P=Practical Quantitation Limit (PQL) qualifier for values between <11 and 44 ppt.

TABLE 3  
GENERAL ELECTRIC COMPANY  
HUDSON RIVER PROJECT  
1991 SAMPLING AND ANALYSIS PROGRAM

FLOAT SURVEY PROGRAM  
OBG LABORATORIES CONVENTIONAL DATA SUMMARY

| Float Survey Number | Date     | Location | Total Suspended Solids (mg/L) | Total Dissolved Solids (mg/L) | Total Organic Carbon (mg/L) | Dissolved Organic Carbon (mg/L) | Total Alkalinity (mg/L) | Specific Conductance (umho/cm) |
|---------------------|----------|----------|-------------------------------|-------------------------------|-----------------------------|---------------------------------|-------------------------|--------------------------------|
| 1                   | 06/26/91 | FS-1     | 130                           | 110                           | 9                           | 9                               | 19                      | 130                            |
|                     | 06/26/91 | FS-2     | 1                             | 130                           | 10                          | 10                              | 22                      | 170                            |
|                     | 06/26/91 | FS-3     | 3                             | 120                           | 11                          | 10                              | 21                      | 160                            |
|                     | 06/26/91 | FS-4     | 4                             | 110                           | 10                          | 10                              | 21                      | 160                            |
|                     | 06/26/91 | FS-5     | 4                             | 120                           | 10                          | 9                               | 22                      | 160                            |
|                     | 06/26/91 | FS-6     | 5                             | 120                           | 10                          | 10                              | 22                      | 160                            |
| 2                   | 07/25/91 | FS-1     | 4                             | 110                           | 14                          | 8                               | 18                      | 110                            |
|                     | 07/25/91 | FS-1A    | 7                             | 91                            | 7                           | 8                               | 19                      | 120                            |
|                     | 07/25/91 | FS-2     | 6                             | 140                           | 8                           | 8                               | 18                      | 120                            |
|                     | 07/25/91 | FS-3     | 6                             | 89                            | 8                           | 7                               | 19                      | 120                            |
|                     | 07/25/91 | FS-4     | 5                             | 110                           | 7                           | 9                               | 18                      | 110                            |
|                     | 07/25/91 | FS-5     | 8                             | 81                            | 8                           | 8                               | 18                      | 120                            |
|                     | 07/25/91 | FS-6     | 5                             | 92                            | 8                           | 8                               | 18                      | 120                            |
| 3                   | 09/05/91 | FS-1     | 2                             | 77                            | 10                          | 12                              | 23                      | 110                            |
|                     | 09/05/91 | FS-2     | 1                             | NA                            | 7                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-3     | 1                             | NA                            | 7                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-4     | 1                             | NA                            | 6                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-5     | 1                             | NA                            | 7                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-6     | 1                             | NA                            | 7                           | NA                              | NA                      | NA                             |
| 4                   | 09/05/91 | FS-1     | 2                             | 77                            | 10                          | 12                              | 23                      | 110                            |
|                     | 09/05/91 | FS-2     | 1                             | NA                            | 9                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-3     | 1                             | NA                            | 8                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-4     | 1                             | NA                            | 24                          | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-5     | 3                             | NA                            | 7                           | NA                              | NA                      | NA                             |
|                     | 09/05/91 | FS-6     | 1                             | NA                            | 7                           | NA                              | NA                      | NA                             |
| 5                   | 09/19/91 | FS-1     | 3                             | 65                            | 14                          | 27                              | 17                      | 97                             |
|                     | 09/19/91 | FS-2     | 1                             | NA                            | 9                           | NA                              | NA                      | NA                             |
|                     | 09/19/91 | FS-3     | 2                             | NA                            | 8                           | NA                              | NA                      | NA                             |
|                     | 09/19/91 | FS-4     | 8                             | NA                            | 4                           | NA                              | NA                      | NA                             |
|                     | 09/19/91 | FS-5     | 8                             | NA                            | 1                           | NA                              | NA                      | NA                             |
|                     | 09/19/91 | FS-6     | 16                            | NA                            | 3                           | NA                              | NA                      | NA                             |

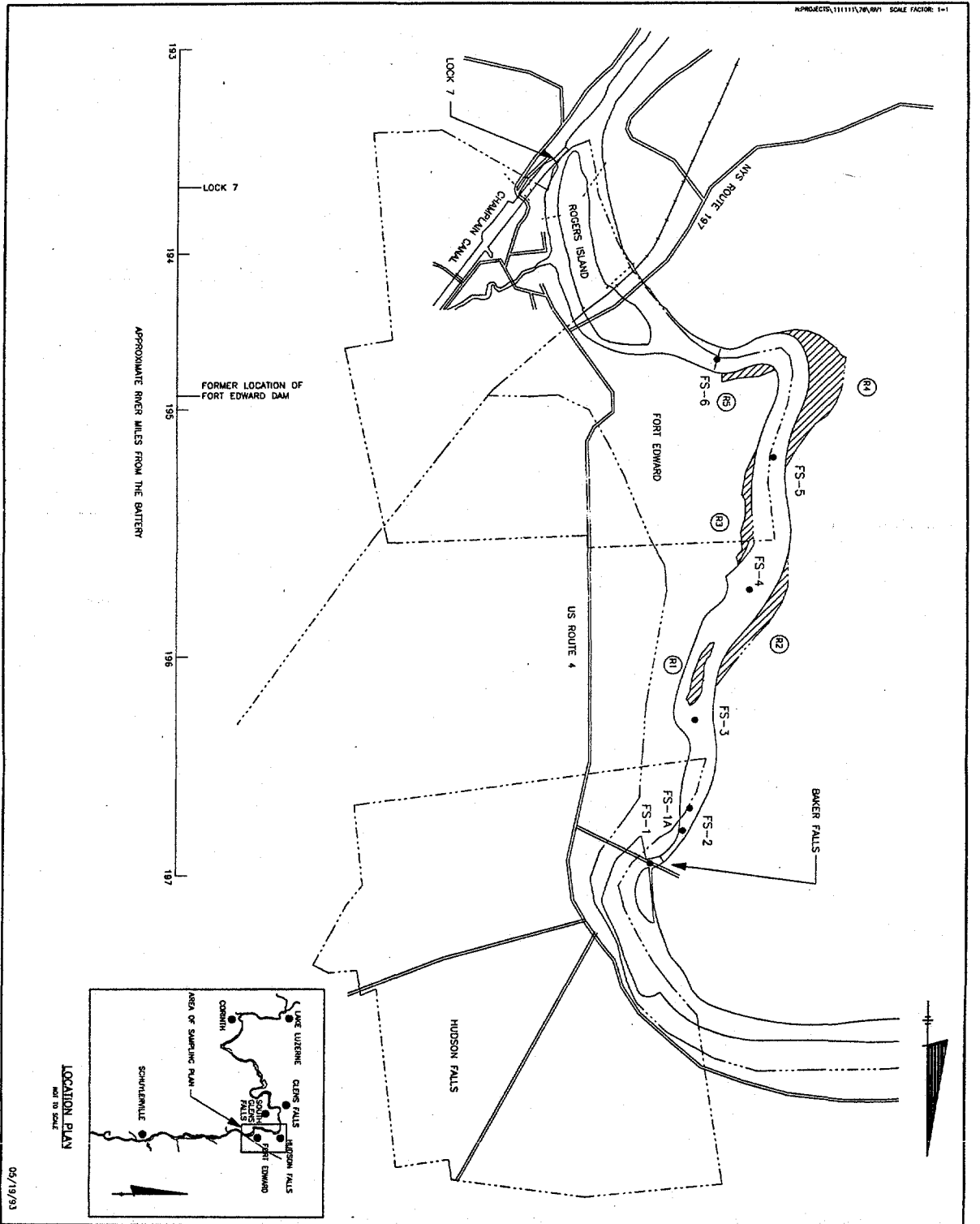
Notes: NA - Not Analyzed

## Figures



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FIGURE 1



**LEGEND**

FS-1  
•  
APPROXIMATE  
SAMPLING LOCATION

(R)  
REMANANT AREA

GENERAL ELECTRIC COMPANY  
HUDSON RIVER PROJECT  
1991 SAMPLING AND ANALYSIS  
PROGRAM

**FLOAT SURVEY PROGRAM  
SAMPLING LOCATIONS**

2000 0 2000

1" = 2000'

MAY 1993

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