FT. EDWARD DAM PCB REMNANT DEPOSIT CONTAINMENT

ENVIRONMENTAL MONITORING PROGRAM

CONSTRUCTION MONITORING PLAN

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INTRODUCTION

As part of an agreement between the USEPA and the General Electric Company, construction efforts on the Ft. Edward PCB Remnant Sites are scheduled to begin this summer. These construction activities may have some impact on air and water quality both during and following construction. Construction activities have the potential to disrupt remnant area soils, and may release some PCB contaminated soils to both the river and atmosphere. Consequently, it is necessary to monitor fluctuation of PCB levels in the air and water. This Plan of Study describes efforts to intensively monitor air and water quality in the vicinity of the Remnant Sites during and immediately following construction activities. Following this period of intensive monitoring, post-construction monitoring will be conducted at the existing baseline monitoring level of effort.

MONITORING STRATEGY

To assess the immediate impacts of remediation construction activities, waterborne PCB levels upstream and downstream of the site under construction, as well as airborne PCBs on the site, must be quantified. The construction monitoring program described herein is a supplement to the 1989 and 1990 baseline monitoring programs which will continue in operation. The 1989 and 1990 Baseline Monitoring Plans of Study are attached in Appendix I and Appendix II, respectively. Increased monitoring over and above that specified in the baseline monitoring will involve only the vicinity of the Remnant Sites and the reach of river downstream to the Thompson Island Pool (Figure 1).

This Plan of Study extends the existing baseline air quality monitoring network to include two air sampling locations at the remediation construction sites. The sampling results from these additional sites will establish ambient PCB concentrations, if any, immediately adjacent to construction activities. The existing baseline monitoring sites will continue to provide data on ambient PCB concentrations in the Fort Edward area during the remediation construction phase. The two construction sampling sites will provide supporting documentation for any measured increase in the baseline PCB samplers. Because of the

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slow response time of biological parameters in accumulating PCBs (on the order of days or weeks to detect a change), compared to the rapid fluctuations possible in water, only increased water sampling will be conducted to evaluate immediate construction impacts to the aquatic environment.

Study Area

The study area for the additional air quality monitoring will be on and adjacent to the Remnant Site undergoing construction activity. The study area for the increased water quality monitoring program includes the Hudson River from approximately 100 feet upstream of Remnant Site 2, to about 500 yards downstream of aquatic monitoring station E5A. The intensified water quality monitoring study area is confined to the Remnant Area because sampling sites in the existing aquatic baseline monitoring program are sufficient to detect any downstream effects beyond those additional sites described for this study.

Air Quality Stations. Two mobile air quality samplers will be used to monitor PCB concentrations in and around the construction sites. Unlike the baseline samplers, the mobile units will be designed to permit easy transportation among construction sites. Each sampler will be mounted on a heavy duty wooden skid that can be lifted by a front end loader (or similar piece of construction machinery) and moved to an active construction area.

Water Quality Stations. Seven new water quality stations will be added to the existing baseline monitoring stations to assess construction activity impacts on PCB levels in the Hudson River (Figure 1). Five of these new stations and three of the existing stations (Table 1) will be equipped with an ISCO™ automatic water sampler. These automated sampling stations will be placed immediately upstream and downstream of the remnant area on which construction activities are occurring. Because the river currents will confine most runoff or bank sloughing to the downstream river bank on the side of the river where the runoff occurs, samples will be taken adjacent to the bank areas. The remaining (two) new stations will be added to collect grab water samples. These stations will be downstream of Remnant Site 5; one between the southern edge of the site and existing monitoring station

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E5, and the other in the upstream end of Thompson Island Pool. Additionally, in the event of an unplanned occurrence that could create conditions whereby contaminants could be released to the river resulting from construction activities, grab water samples will be taken at the site of the occurrence.

Monitoring Components

Total PCB and the dominant Aroclor composition of air and water samples will be determined. Additional sediment and aquatic biota samples will not be collected because continuing sampling efforts for the baseline monitoring program are sufficient to assess construction impacts for these parameters. This is because sediment and biotic PCB concentrations will not fluctuate as rapidly as waterborne and airborne PCBs due to the length of time it will take these components to equilibrate with the waterborne PCBs.

Sampling Procedures and Frequency

Air Quality Monitoring. The mobile air samplers will be similar to the existing fixed monitoring systems used in the baseline monitoring program. Briefly, the air monitoring equipment consists of a sample chamber, a critical orifice and a vacuum pump. Ambient air is drawn through the sample chamber by the vacuum pump. The critical orifice regulates the flow rate within a desired range. The sample chamber consists of a filter for collecting particulate matter and an adsorbent (Florisil) for trapping vaporous material. The units will be wired for standard 110 volt power which should be available at each construction site. Depending on the specific location of the sampling stations in relation to the construction areas, it may be possible to run extension cords to the equipment. If that is not possible, a standard construction power drop will be used.

Water Quality Monitoring. Except at stations equipped with an ISCO automatic sampler (Table 1), water samples for PCB chemical analyses and total suspended solids analysis will be collected using a stainless steel Kemmerer water bottle. Hexane-rinsed 1.0L-1.8L glass sample collections bottles with Teflon-lined caps will be used for PCB analysis samples:

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500 mL glass bottles will be used for total suspended solids. (The ISCO sampler will be equipped with 1.8L bottles; grab samples will be placed in 1.0L bottles.)

The sampling frequency at stations having an ISCO sampler will depend on the construction schedule. At stations on a site scheduled for construction activity, daily water samples will be taken one week prior to that activity, throughout construction and for one month following construction activity. These samples will be removed and fresh containers placed in the ISCO sampler every three days (corresponding to the baseline air monitoring schedule). At all other stations, water samples will be taken on a weekly basis.

Chains of Custody. Chain of Custody (COC) forms will be completed by the field crew immediately after air and water sample collection, and will be shipped to the analytical laboratory with the sample. The COC forms will be used to document sample shipping and holding times, as well as the personnel involved with collection, handling and analysis of the samples. COC forms and bottle labels are illustrated in the Quality Assurance Project Plan chapter, Section 7.

Monitoring Schedule

This intensified monitoring program will commence one week prior to construction activity, continue through the construction activity, and end one month after all construction activity ends (weather permitting). This will allow comparisons of pre-construction, construction and post-construction PCB levels. Because the river discharge is high through this area, PCB contaminated soils released by construction activities (if any) are expected to pass through the area of study within one to two weeks. One month of post-construction monitoring under this program provides an additional two weeks of intensified monitoring during which no construction activity effects are anticipated.

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Laboratory Analysis

The Quality Assurance Project Plan (QAPP) for the laboratory analyses are found in the QAPP chapter submitted with the 1989 Baseline Monitoring Plan of Study. Its components are summarized below.

All chemical analyses will be performed by NYSDEC certified analytical laboratories. The analytical chemistry procedures utilized by the laboratories are documented in the QAPP. PCB detection limits for water will be those listed on the Federal Target Compound List (0.5 μg/L).

The selected analytical techniques for determination of PCB concentrations in ambient air are fundamentally equivalent to NIOSH Method 5503. Essentially, the NIOSH method requires a particulate filtration media followed by a sorbent material suitable for the collection of vaporous fractions. The ambient air monitoring requires 24-hour sample durations at higher sample flow rates that the NIOSH method (1 liter/minute). The standard technique has been modified to include a larger sorbent tube, and more durable and reliable vacuum pump/flow control equipment.

Data Analyses

The results of the monitoring programs will be subjected to the appropriate statistical analyses to determine significant differences in PCB concentration over time and between sampling locations.

Reporting

One progress report will be sent after 50% of remediation work has occurred. A final report (with one draft) will be issued as an appendix to the final report for the overall monitoring program.

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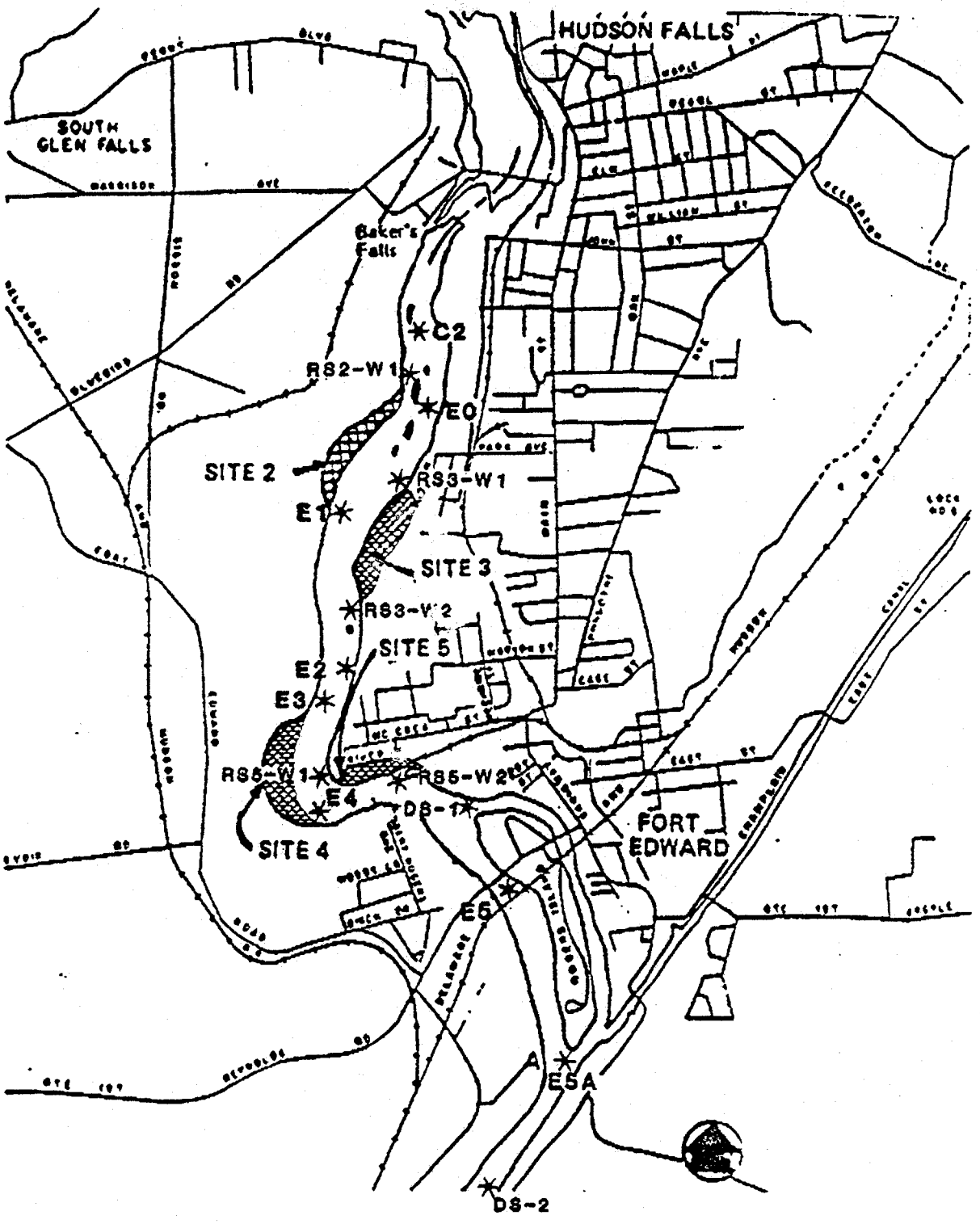
Table 1. **Water Quality Monitoring Stations Equipped with Automated Samplers**

Station	Location
RS2-W1	Upstream of Remnant Site 2
E-1	Downstream of Remnant Site 2
RS3-W1	Upstream of Remnant Site 3
RS3-W2	Downstream of Remnant Site 3
E-3	Upstream of Remnant Site 4
E-4	Downstream of Remnant Site 4
RS5-W1	Upstream of Remnant Site 5
RS5-W2	Downstream of Remnant Site 5



LEGEND

* C -- CONTROL SITE
* E,RS,DS -- EXPERIMENTAL SITES

FIGURE 1

WATER MONITORING STATIONS IN REMNANT AREA

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Meteorological data for the air quality monitoring program will be obtained from the nearest National Weather Service stations.

Monitoring Schedule

Ideally, the baseline monitoring programs should be in operation for at least one year prior to beginning remediation construction. For that reason, the various programs should begin as soon as feasible on their respective schedules. The components of the monitoring program and their respective schedules are summarized in Table 3.

The monitoring schedule and respective sampling frequencies during the construction phase, and thereafter, will be determined when the interim remediation plans and schedule are finalized.

Sample Collection Procedures: Water, Sediment and Biota

Field measurements of pH, dissolved oxygen, temperature, and conductivity will be taken with portable meters (pH-Orion Model 407; dissolved oxygen and temperature - Yellow Springs Instruments Model 54; conductivity, Yellow Springs Instruments Model 33). Instrument logbooks will be maintained with each piece of equipment to document calibrations and maintenance records. Calibration procedures are described in the chapter containing the Quality Assurance Project Plan, Section 8.

Water samples for PCB chemical analyses and suspended sediment analysis will be collected using a Kemmerer water bottle made of brass. Sample collection bottles (1L glass, hexane washed and dried) will be supplied by the analytical laboratory.

Chains of custody (COC) forms will be completed by the field crew immediately after sample collection, and will be shipped to the analytical laboratory with the sample. The COC forms will be used to document sample shipping and holding times, as well as the

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personnel involved with collection, handling and analysis of the samples. COC forms and bottle labels are illustrated in the Quality Assurance Project Plan chapter, Section 7.

Sediment samples will be collected with a petite ponar dredge and placed into hexane-washed sample 1L bottles. Shipping and chain of custody procedures will be identical to those described above for water samples.

Biological samples will be collected using the appropriate procedures for the biota in question (scraping of rocks, or Hester-Dendy multiplate sampler for both periphyton and benthic macroinvertebrates, and Surber sampler for benthic macroinvertebrates). A subsample will be retained for taxonomic analysis, while the composited portion for chemical analysis will be placed in hexane-washed sample bottles, placed in ice chests containing water ice, and shipped to the laboratory using the shipment and COC procedures detailed earlier.

For all environmental matrices, 10% field duplicate samples will be collected and submitted for chemical analyses. Duplicate analyses of batches of approximately 25 fathead minnows will be performed on fish from each holding chamber placed in the river. We do not anticipate the analysis of individual fish or other biota at this time.

Airborne PCB concentrations in the vicinity of the remnant deposits will be sampled at four, fixed stations, composited on a 24-hour per day basis at six-day intervals throughout one "growing season" (March 15-November 15) prior to construction. PCBs will be captured as particulates on a particle filter medium (Teflon) and as a vapor on suitable substrates (e.g. Florisil, Tenax).

Laboratory Analysis

The Quality Assurance Program Plan (QAPP) for the laboratory analyses are found in the QAPP chapter. Its components are summarized below.

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All chemical analyses will be performed by a NYSDEC certified analytical laboratory utilizing U.S. Environmental Protection Agency Contract Laboratory Protocol (CLP) methodologies for chemical analyses and quality assurance procedures. Detection limits will be those listed on the Federal Target Compound List (TCL) (0.5 μg/L for water, 0.08 mg/kg for sediment), or, on the New York State TCL list when it becomes available. No TCL detection limits are available for biological tissue. We anticipate a detection limit of approximately 0.1 μg/g wet weight for tissues.

Additionally, on all tissue and dialysis bag samples and a randomly selected 20% of sediment samples whose total PCB concentrations exceed 2.0 ppm, capillary column gas chromatographic analyses will be performed using the procedure of Brown et al. (1984). This procedure will allow the determination of up to 118 PCB congeners, and will provide valuable information regarding the effectiveness of the site remediation. The use of both CLP and congener specific PCB analyses should permit analytical results to be comparable with previous analyses at the site.

General Electric is willing to split samples with NYSDEC, NYSDOH and/or USEPA for additional verification of analytical results. The NYSDOH has expressed interest in obtaining part per trillion level PCB analyses in water samples. We know of no commercial analytical laboratory capable of this detection limit. However, if NYSDOH is capable of part per trillion level analyses and would desire these data, we will provide samples for analysis.

Sediment samples will be analyzed for total organic carbon and particle size to document the nature of the collected samples. Results of sediment analyses will be expressed on a dry weight (μg/g) basis, although the wet weight of the sediments prior to drying will be available should wet weight results be desired.

All tissue analysis results will be reported on both a dry weight and wet weight (μg/g) basis. However, because many of the existing analyses of tissues from the project vicinity are expressed on a wet weight basis, the wet weight of the tissues prior to drying will be

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available so that calculation of results on that basis can be conducted. Fish in situ assay samples will be analyzed for their lipid content (using a petroleum ether extraction procedure) so that PCB results can also be expressed on a lipid basis. This will provide comparability with much of the existing NYSDEC fish contaminant data from the site.

The selected analytical techniques for determination of PCB concentrations in ambient air are fundamentally equivalent to NIOSH Method 5503. Essentially, the NIOSH method requires a particulate filtration media (e.g., glass fiber filters) followed by a sorbent (e.g., Florisil) material suitable for the collection of vaporous fractions. Because the proposed ambient air analyses will require 24 hour sample durations at slightly higher sample flow rates than the NIOSH method, the standard technique will be modified to include a larger sorbent tube, and more durable and reliable vacuum pump/flow control equipment.

Data Analyses

The results of the respective monitoring programs will be subjected to statistical analyses (analysis of variance and time-series analyses) to determine significant differences in PCB concentration over time and among sampling locations. Correlation analyses will be conducted to determine relationships between levels of PCBs in the monitored components and flows, or by season, and among the monitored components themselves.

Reporting

The findings of the baseline monitoring will be summarized in quarterly progress reports and in an annual monitoring report. The reports will contain quality assurance summaries and reports.

Tasks and Schedule

The remnant area monitoring program is organized into the following four major tasks:

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- Task 1. Program Organization. Under this task (which is now essentially completed) the monitoring program was prepared, organized and negotiated with USEPA, NYSDEC, NYSDOH and NOAA. (Schedule: March to mid-June 1989).

- Task 2. Study Mobilization. Under this task, the sampling station locations are confirmed; the sampling equipment is ordered and/or constructed; and the program is readied for operation. (Schedule: mid-July to early August 1989).

- Task 3. Conduct Monitoring Study. The sampling program described in the POS will be carried out under this task. Harza staff will perform both the aquatic and air quality sampling; Yates & Auberle, Ltd. will supervise and provide quality assurance for the air quality program; and Hazleton Environmental Services will analyze the aquatic samples for Harza and the atmospheric samples for Yates & Auberle. The program will be conducted out of Harza's subsidiary (Stetson-Harza) office in Troy, NY, with Harza support from the Chicago office. Yates & Auberle (contracted to Harza) will supervise the air quality program from their New Jersey office with support from their Chicago office. (Schedule: early August to December 1989).

- Task 4. Reports, Meetings and Agency Consultation. Under this task, the progress reports and annual report of the study findings will be prepared. It is anticipated that two additional meetings would be held with the agencies and four additional meetings held with GE to review the study findings and plan the future (1990) portion of the monitoring program. (Schedule: mid-August to March 1990, but budgeted only to end of December 1989).

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Table 1. Baseline monitoring program aquatic sampling stations, Hudson River, NY.

Station No.	Station Location
C1	Above Sherman Island Dam
C2	Above Remnant Area 1, below Bakers Falls
E0	Above Remnant Area 3
E1	At lower end Remnant Area 2
E2	Below Remnant Area 3
E3	At upper end Remnant Area 4 (above Remnant Area 5)
E4	Below Remnant Areas 4
E5	At USGS Station on Rogers Island
E6	Ft. Miller below dam (below Thompson Is. Pool)
E7	Waterford

Table 2. Baseline air quality monitoring program sampling stations, Hudson River, NY

Station No.	Station Location
A1	Industrial Area south of Baker's Falls, above Remnant Area 2 (control site)
A2	Residential Area east of Remnant Area 3
A3	Residential Area north of Remnant Area 5
A4	Industrial Area east of Remnant Area 5 (control site)

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Table 3. Summary of baseline monitoring program studies, Hudson, River, NY

Parameter	Sampling Stations	Type of Sample	Sampling Frequency	Sampling in 1989	Number of Samples in 1989
Sediment	All except E0 (9)	Grab Sample at 5 locations/site	Quarterly (4 periods)	(2 periods)	90
Water	C1,C2,E0,E5,E6,E7 (6 stations)	Grab Sample (fractioned monthly and on high flow events; estimated 12 fractioned sampling times)	Weekly (March-Nov.; 40 periods)	(18 periods + 2 high flows)	100
	All (5 additional stations)	Grab Sample	Biweekly (March-Nov.; 20 periods)	(9 periods)	45
	All (10)	Dialysis Bags	Biweekly (March-Nov.; 20 periods)	(9 periods)	90
Aquatic Biota					
• Multiplate	All (10) (replicated)	Periphyton and Silt Composite	5-week intervals (March-Nov.; 8 periods)	(3 periods)	60
• Caddisfly	C1,C2,E5,E6,E7 (5 stations) (replicated)	Macroinvertebrate Composite	5-week intervals (June-Sept.; 4 periods)	(2 periods)	20
• Fathead Minnow	C1,C2,E5,E6,E7 (5 stations) (replicated)	Fish Assay Composite	3-week intervals (June-Nov.; 9 periods)	(5 periods)	50
Air Quality	Remnant Area and Controls	Particulate and Gaseous	24-hr composite, 6-day cycle over one "growing season" (9 month minimum)	24-hr composite, 3-day cycle (Aug.-Nov.; 35 periods)	280

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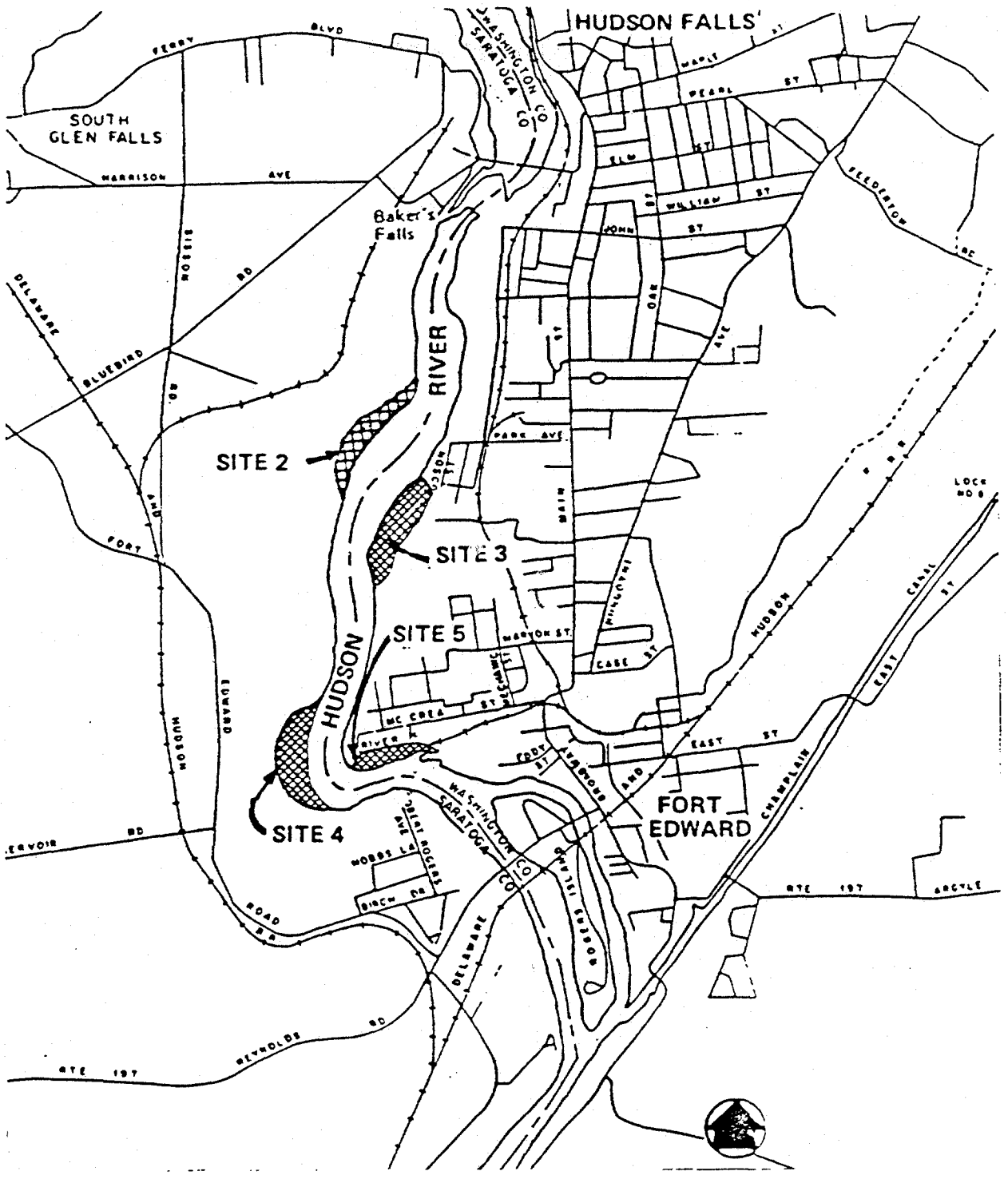

FIGURE 1

REMNANT DEPOSIT SITES

(Metcalf & Eddy 1975)

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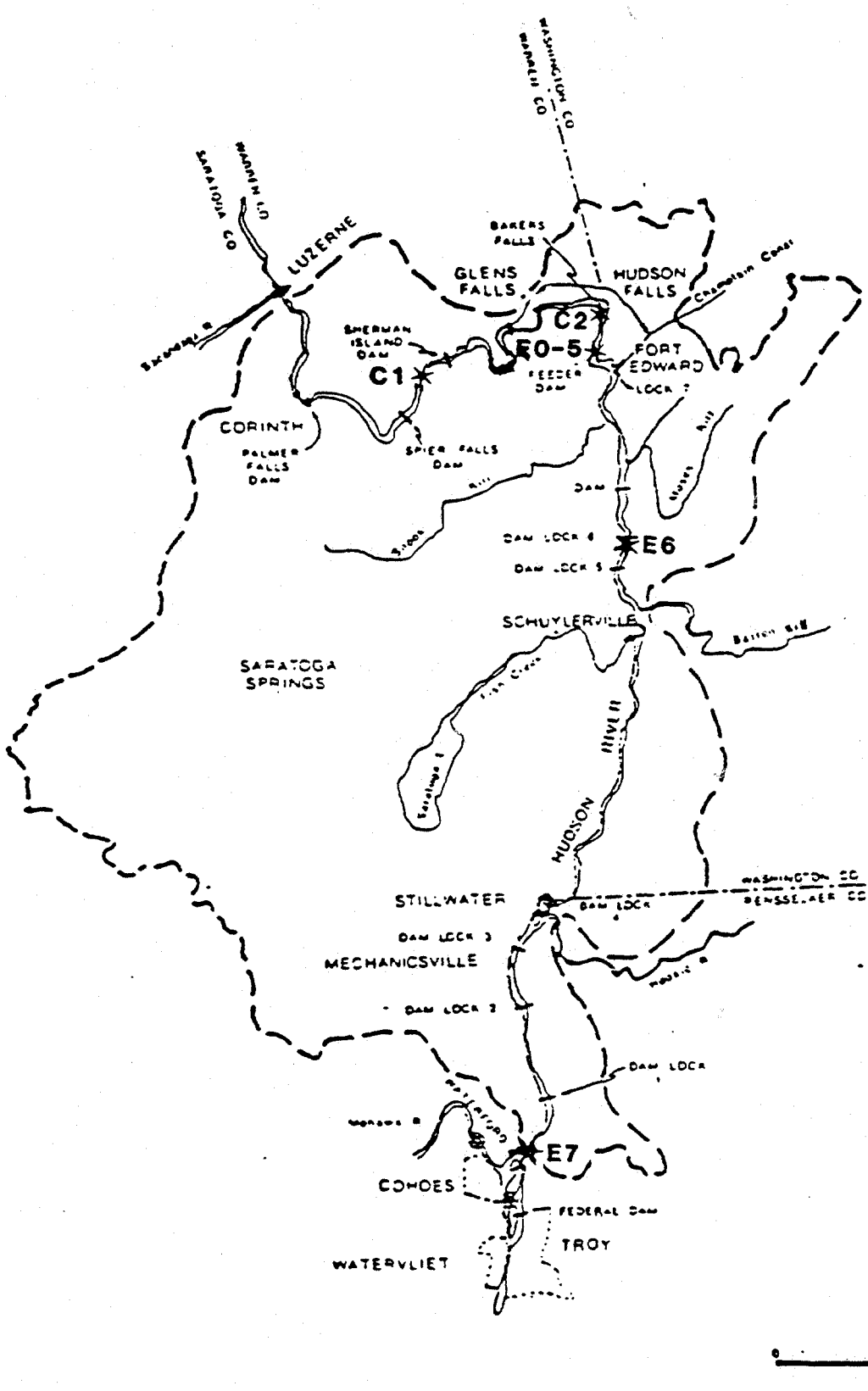

LEGEND

* C -- CONTROL SITE
* E -- EXPERIMENTAL SITE

FIGURE 2

REMNANT REMEDIATION AQUATIC MONITORING STATIONS

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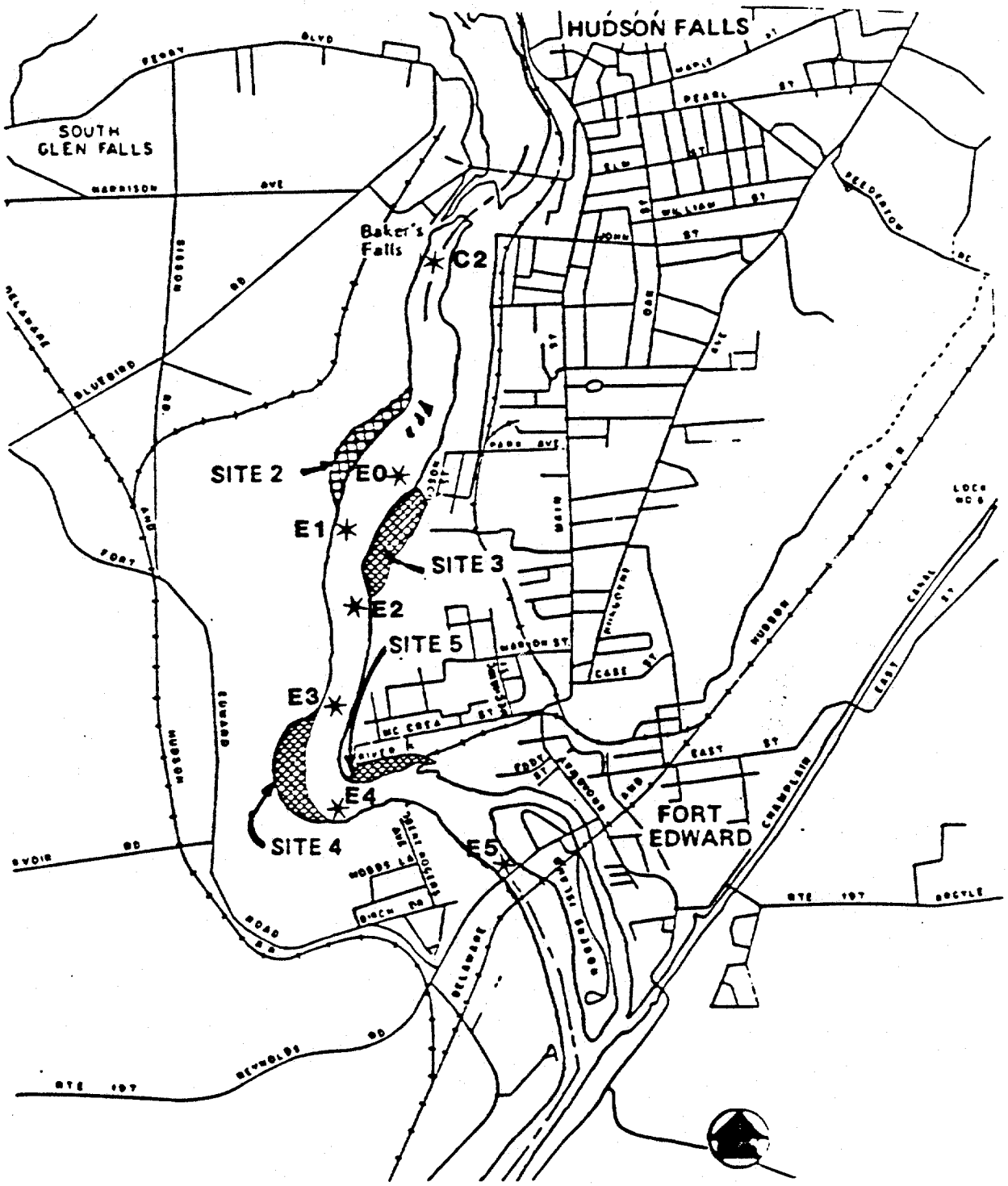

LEGEND

✱C -- CONTROL SITE

✱E -- EXPERIMENTAL SITE

FIGURE 3

AQUATIC MONITORING STATIONS IN REMNANT AREA

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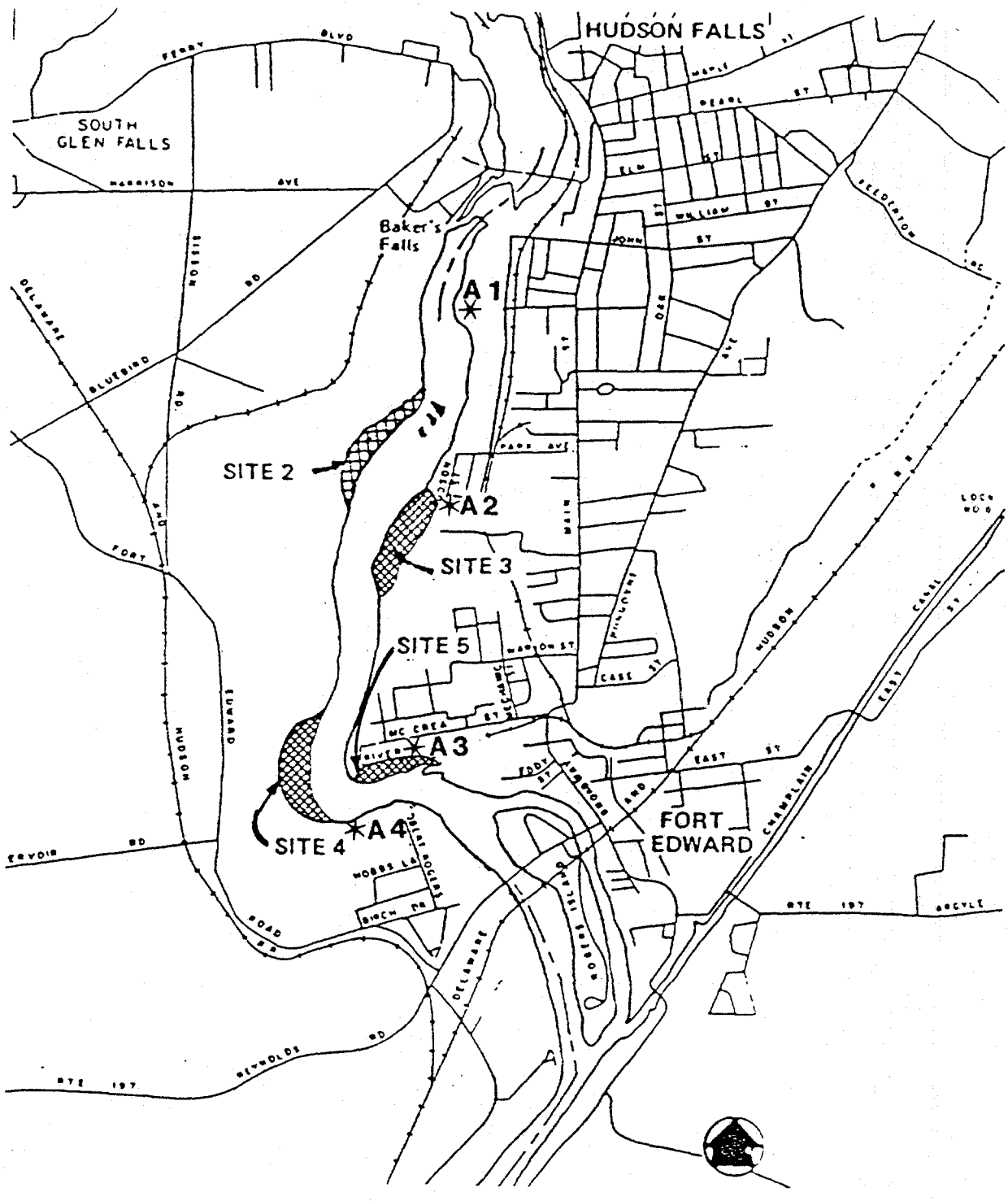

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*A -- FIXED AIR MONITORING SITES

FIGURE 4

AIR QUALITY MONITORING STATIONS

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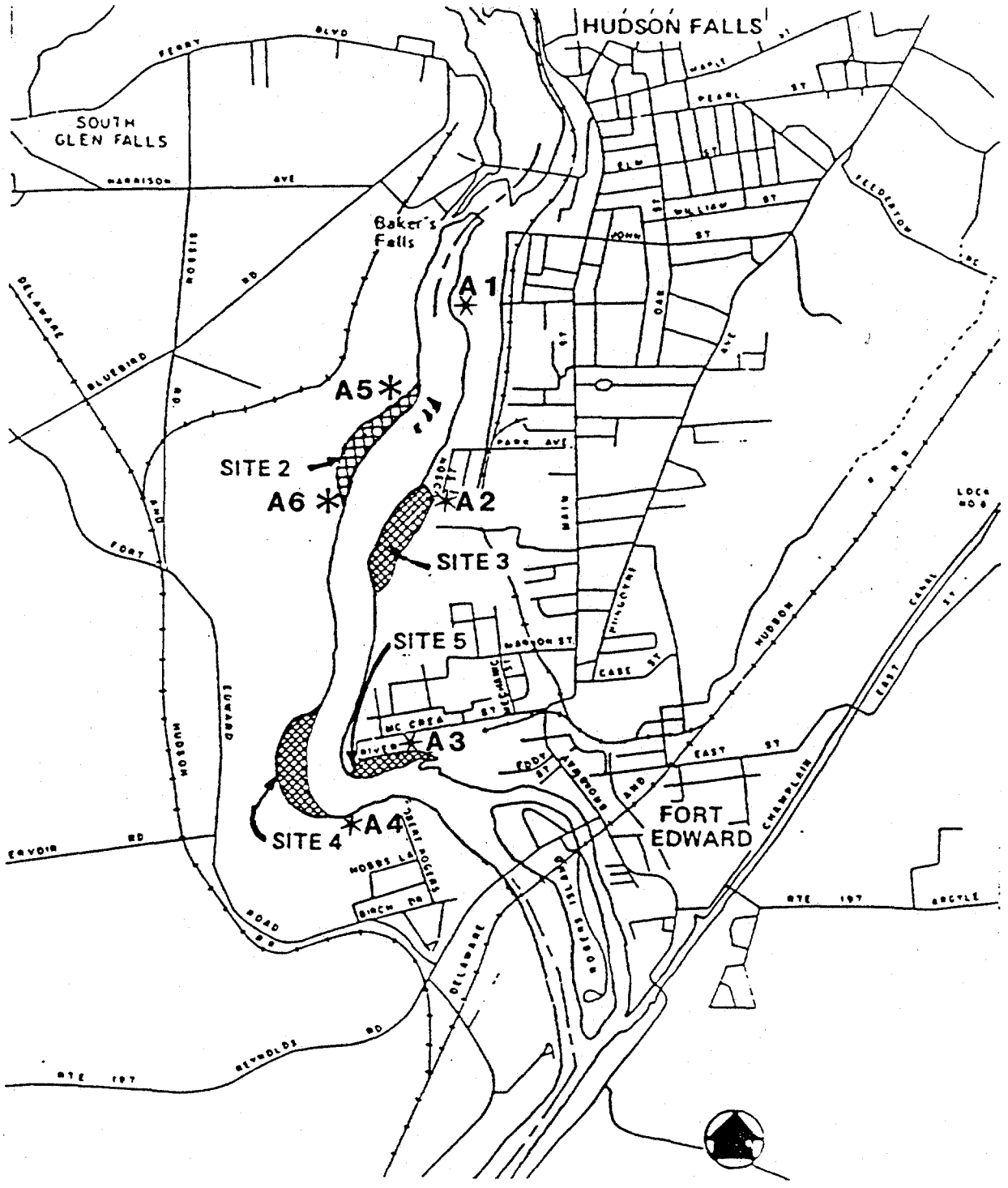

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*A -- MOBILE AIR MONITORING SITES

*A -- FIXED AIR MONITORING SITES

FIGURE 5

AIR QUALITY MONITORING STATIONS

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FT. EDWARD DAM PCB REMNANT DEPOSIT CONTAINMENT ENVIRONMENTAL MONITORING PROGRAM BASELINE STUDIES

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July 1989

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Introduction

The PCB remnant deposits of concern consist of PCB-contaminated sediments and debris remaining after the 1973 removal of Niagara Mohawk's Ft. Edward Dam on the Hudson River. According to Malcolm Pirnie, Inc. (1986), Remnant Site 1 is the remains of an island, while Sites 2 and 4 are on the Saratoga County (west) shore and Sites 3 and 5 are on the Washington County (east) shore (Figure 1). Some remedial actions have already been taken at Sites 2, 3 and 5. In accordance with recommendations by the USEPA (1984), plans are now being formulated for in-place containment of Sites 2, 3, 4 and 5 to serve as an interim remediation measure until a permanent solution can be found.

General Electric Company (GE) is proposing the following environmental monitoring program to determine the effects of the interim remediation measures to be taken on the remnant deposits. Because the details of the remediation activities are not yet complete, only the baseline portion of the monitoring program can be developed at this time. When the construction plans for these remediation measures are completed, the monitoring program can be finalized.

Monitoring Strategy

To determine the effects of the interim remediation activities, the existing (baseline) PCB concentrations and their seasonal variation in the affected environment must be known and quantified. This is accomplished in a pre-construction monitoring program. Monitoring is intensified during the remedial construction activity to determine the immediate effects of those activities and then continued at the baseline level of effort following their completion to measure long-term effects. The monitoring program described herein is directed at determining only the baseline characteristics. This program is patterned after, and uses many of, the same monitoring techniques used by NYSDEC and NYSDOH in their previous Hudson River monitoring studies (NYSDEC 1982, Simpson et al. 1986, Jones and Sloan 1989).

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Study Area

The study area for this monitoring program is limited to the Hudson River (including its water, sediment and aquatic biota) in the general vicinity of the remnant deposits and downstream to Waterford, NY; and to air quality in the immediate vicinity of the exposed remnant areas. Waterford was selected as the downstream limit of aquatic study because Malcolm Pirnie, Inc. (1986) estimated (from data obtained in 1981-1984) that 37 percent of the PCBs found in water samples taken at Waterford emanated from upstream of Ft. Edward. However, most of the monitoring activities are focused in the vicinity of the remnant areas, with monitoring control (non-affected) stations located beyond the influence of those areas.

Proposed Monitoring Stations

Aquatic Stations. A total of ten aquatic stations will be sampled in this monitoring program. The locations of these stations are listed in Table 1, and are shown in Figures 2 and 3. Two control stations (C1 and C2) are proposed. Station C1 is located upstream of the Niagara Mohawk Sherman Island Dam above Glens Falls, and is expected to be essentially free of PCB contamination. Station C2 is located between Bakers Falls and the remnant deposits, and, based on previous studies, is expected to contain some PCB contamination. The remaining eight stations will be used to characterize the existing conditions in the vicinity of the remnant areas and downstream. Five of these stations are interspersed among the remnant deposits to measure the PCB contribution to the river from each remnant deposit. Three additional stations between the remnant deposit area and the Troy Dam will be sampled to characterize the contribution of the remnant deposit area to the PCB flux at downstream locations.

Air Quality Stations. Airborne PCB concentrations in the immediate vicinity of the remnant area will be monitored. Air quality monitoring stations will be located to measure maximum potential PCB concentrations at the nearest residential receptors, as well as long-term concentrations immediately upstream and downstream of the remnant area. A total of four, fixed air quality stations will be sampled in the baseline monitoring program. The

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locations of these stations are given in Table 2, and are shown in Figure 4. Two stations (A1 and A4) will serve as controls, depending on wind direction. In addition, there will be two (or more) air quality mobile stations established to supplement the fixed air quality monitoring stations during construction. An illustration of the locations of these mobile stations during construction activities at Remnant Site 2 are shown in Figure 5 as Stations A5 and A6.

Several tasks are involved in locating and constructing the fixed-site ambient air sampling network. Preparations for the construction and siting of the sampling stations are currently in progress. Yates & Auberle, Ltd. project management personnel have visited the remediation areas to initiate arrangements for installation of the required facilities. Generally, these requirements include: (i) identification of suitable sites for the fixed-location monitors; (ii) consideration of electrical power access or battery provisions; and (iii) arrangements with local contractors for the construction of weather enclosures, electrical fixtures, and security fencing. The on-site construction activities will commence immediately following the acquisition of land lease agreements by GE for the identified sampling locations.

Monitoring Components

The PCB concentrations of the following aspects of the affected environment will be monitored:

- Sediment
- Water
- Aquatic biota
- Air quality

The frequency and locations of sampling are different for each of these parameters. PCB concentrations will fluctuate more rapidly in some components (for example, water) than in others (e.g., sediments). The level of baseline sampling effort is designed to be commensurate with the expected rate of change so as to provide adequate data to

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characterize the seasonal variation in PCB concentrations in each component.

Sediments. The remediation activities are expected to affect only surficial sediment PCB concentrations. Capping the remnant deposits will greatly reduce (and likely eliminate) their contribution of PCB to the river and atmosphere. However, given the complexity of sediment dynamics and rates of deposition, the effects of this reduction in PCB are likely to be seen only gradually in the sediments. Therefore, five surface grab samples will be taken at each monitoring station (where there is sediment) at quarterly (seasonal) intervals. This is considered to be adequate to characterize the existing (baseline) conditions. (Substrate conditions at some stations, however, may limit the number of sediment samples obtainable. Further, no sediment samples will be taken at station E0 because the bottom is bedrock.)

Water. Because of the reduction of PCBs in runoff, capping the remnant deposits may result in relatively rapid reductions in PCB concentrations in the water immediately downstream of the remnant areas. However, existing data show that PCB concentrations in water vary considerably over time. Thus, to provide an adequate database to characterize the remnant area as a whole as well as the existing variation due to each remnant area over time, the existing water PCB concentrations will be determined in weekly grab samples at five monitoring stations (C1, C2, E5, E6 and E7) and biweekly at all stations throughout the ice-free season (March-November). Water samples will be analyzed for dissolved and suspended PCB fractions once each month at stations C1, C2, E5, E6 and E7, and during high flow events at all stations. (It is assumed that the flow-dependent water quality monitoring program conducted by the USGS will be continuing.) Fractionation will be through a 0.45 micron filter.

Because PCB concentrations at some stations may be below analytical detection limits (the detection limit of EPA Method 608 is 0.065 ppb PCB in distilled water, but is expected to be 0.1 ppb PCB in environmental samples), the grab water samples will be supplemented with solvent-filled dialysis membrane bag monitors (flows permitting). Hexane-filled dialysis bags have been found to accumulate and magnify the concentration of PCB in water (Sodergren 1987), thus increasing the capability to detect PCBs at a site. However, because the concentration factors for the bags are unknown, the dialysis bag results will be used

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qualitatively to determine the presence of PCBs (and, if PCBs are sufficiently concentrated in the bags, the congeners present) in water at the site. The dialysis bags will be suspended mid-depth at the sites to have representative exposure to the water column, and will be monitored at all stations on a biweekly basis.

Aquatic Biota. Because one of the principal purposes of the interim remediation effort is to reduce the PCB concentration in Hudson River biota, the major biotic components (periphyton, macroinvertebrates and fish) will be monitored. Each of these components represents a trophic level in the aquatic ecosystem. The changes in PCB levels in each component are needed to fully evaluate the effects of the interim remediation measures. To establish a database sufficient for documenting the interim remediation impacts, the following sampling programs on aquatic biota will be conducted:

- Multiplate (Hester-Dendy) composited sampling (replicated) for periphyton, silt and some macroinvertebrate species at all stations at five-week intervals during the ice-free season (March-November).

- Caddisfly sampling (replicated) in riffle areas above and below the remnant deposit reach (Stations C1, C2, E5, E6 and E7) at five-week intervals from June-September.

- Fathead minnow in situ exposure replicated monitoring at five stations (C1, C2, E5, E6 and E7) at up to three-week intervals from June-November.

The multiplate and caddisfly sampling will follow the methods of Simpson, et al (1986). Fathead minnow in situ monitoring will follow the method of Jones and Sloan (1989). The multiplate samplers and fathead minnow assay containers will be suspended mid-depth to provide representative exposures in the water column.

Air Quality. The pre-remediation PCB background sampling program is planned to be conducted in two segments. Since it is now projected that the remediation project may begin in later summer/early fall of 1990, background sampling will initially commence in

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August, 1989. This initial sampling will be performed on a three-day frequency, and will be suspended for the winter season in November, 1989. Sampling will resume in March/April, 1990 on a six-day sampling cycle, with the entire pre-remediation sampling program concluding in August, 1990.

Using the proposed sampling schedule, background PCB concentrations in the remediation area can be characterized for one full construction season prior to the onset of activity. Moreover, the accelerated sampling frequency proposed for the 1989 period allows for the acquisition of an equivalent number of samples as would normally be collected in one full remediation season. In this manner, if the remediation project schedule were to be revised to incorporate an earlier starting date, the ambient air background data collected during 1989 would exhibit mean sampling-related errors statistically comparable to those experienced in one full season of remediation.

Ambient air sampling during the remediation effort will be intensified with the incorporation of mobile monitoring stations to be located within the remediation zones. The primary objective of these stations will be to evaluate potential worker exposure in the immediate area of the PCB containment activities. Samples will be collected from all sites (i.e., fixed and mobile) during the entire PCB containment project. The fixed site samplers will be housed in weather-proof shelters with in situ electrical provisions.

Additional Environmental Measurements

The following environmental parameters will be measured (or obtained) in association with the aquatic monitoring programs:

- River discharge (cfs at Ft. Edward USGS gage)
- Air and water temperature (°C)
- Dissolved oxygen (mg/L)
- pH (standard units)
- Conductivity (μmhos/cm)
- Suspended sediment (mg/L)

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FT. EDWARD DAM PCB REMNANT DEPOSIT CONTAINMENT ENVIRONMENTAL MONITORING PROGRAM CONTINUATION OF BASELINE STUDIES - 1990

Prepared by

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March 1990

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Introduction

The PCB remnant deposits being contained as an interim remediation measure consist of PCB-contaminated sediments and debris remaining after the 1973 removal of Niagara Mohawk's Ft. Edward Dam on the Hudson River. Although Malcolm Pirnie, Inc. (1986), identified five remnant deposits, only four can identified today. Remnant Site 1, formerly an island, appears to be gone. The remaining sites are on the riverbanks. Sites 2 and 4 are on the Saratoga County (west) shore and Sites 3 and 5 are on the Washington County (east) shore. Some remedial actions have already been taken at Sites 2, 3 and 5. In accordance with an agreement between the USEPA and the General Electric Company (GE), efforts are now being conducted for in-place containment of Sites 2, 3, 4 and 5. No action is planned to contain the remains of Remnant Site 1.

In 1989 GE began a baseline environmental monitoring program to provide a basis to evaluate the effects of the interim remediation measures. Because little was known about the existing distribution of PCBs in the area and the details of the remediation activities were not yet complete, the 1989 baseline monitoring program provided only a general characterization of the Hudson River in the Ft. Edward area. Although the construction plans for the remediation measures are now complete, the schedule for actual construction is still not definite. Nevertheless, the monitoring program requires revision, based on the findings of the 1989 program.

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Monitoring Strategy

To determine the immediate and long-term effects of the interim remediation activities, the levels of PCB and their seasonal variation in the affected environment must be quantified. The monitoring program described herein is principally a continuation of the 1989 monitoring effort and is directed at determining only the baseline characteristics in the study area. (A revised Plan of Study will be prepared for monitoring during construction activities.) However, based on the findings of the 1989 program, new baseline monitoring stations have been added to the program and, in some instances, the sampling effort has been intensified to better identify specific sources of PCB upstream and downstream of the construction activities. Monitoring will be intensified prior to, during and immediately following the remedial construction activity to determine the initial effects of those activities. The level of effort would then be reduced and eventually stopped when PCB concentrations downstream of the remnant areas show no further change.

Study Area

The study area for the aquatic monitoring program includes the Hudson River in the general vicinity of the remnant deposits and downstream (including the lower Mohawk River) to below the Troy Dam. Air quality will be monitored in the immediate vicinity of the exposed remnant areas. The downstream limit of the aquatic study was extended below Troy because the 1989 program showed detectable PCB levels at Waterford and the extent to which the upper river contributes PCBs to the lower river is unknown. However, most

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of the monitoring activities are focused in the vicinity of the remnant areas, with monitoring control (non-affected) stations located beyond the influence of those areas.

Proposed Monitoring Stations

Aquatic Stations. A total of 17 aquatic stations will be sampled in this monitoring program. The locations of these stations are listed in Table 1, and are shown in Figures 1 through 6. Six "control" stations (C1, GF1, GF2, GF3, GF4 and C2) upstream of the remnant sites are proposed. All but one of these stations (C2) are located upstream of the GE outfall at Hudson Falls. Station C1 is located upstream of the Niagara Mohawk Sherman Island Dam above Glens Falls, and has been found to be essentially free of PCB contamination. Stations GF1, GF2, GF3 and GF4 are located between the Sherman Island Dam and Bakers Falls. Station C2 is located below Bakers Falls but upstream of the remnant deposits. Based on the 1989 studies, levels of PCB at C2 indicated the presence of substantial PCB contamination upstream. Consequently, the four new control stations (GF1, GF2, GF3 and GF4) are proposed to identify and characterize the source areas of the PCBs detected at Station C2. The remaining stations are used to characterize the existing conditions in the vicinity of the remnant areas and downstream. Five of these stations are interspersed among the remnant deposits to measure the PCB contribution to the river from each remnant deposit. Additional stations between the remnant deposits and the Troy Dam will be sampled to evaluate the contribution of PCBs from the remnant deposit area to PCB levels at downstream locations. As noted, a new station, HR1, will evaluate the contribution of PCBs to the lower river (below Troy) and another new station,

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MR1, will evaluate any contribution of the PCB levels at HR1 coming from the Mohawk River.

Air Quality Stations. Airborne PCB concentrations in the immediate vicinity of the remnant area will continue to be monitored. Air quality monitoring stations are located to measure maximum potential PCB concentrations at the nearest residential receptors, as well as long-term concentrations immediately upstream and downstream of the remnant area. A total of five, fixed air quality stations are to be sampled in the baseline monitoring program. The locations of these stations are given in Table 2, and are shown in Figure 7. Two stations (A1 and A4) serve as controls, depending on wind direction. Station A5 measures background ambient air PCB levels at a remote location. During 1989, Sites A2, A4 and A5 were made operational; access problems precluded establishing Stations A1 and A3.

Several tasks remain to be completed for the fixed-site ambient air sampling network. Yates & Auberle, Ltd. project management personnel have visited the remediation areas and have identified the suitable sites for the fixed-location monitors. However, before arrangements with local contractors for the construction of weather enclosures, electrical fixtures, and security fencing can be completed, land lease agreements must be obtained by GE for the remaining two sampling locations (A1 and A3).

Monitoring Components

The PCB concentrations of the following components of the affected environment will be monitored:

- Sediment
- Water
- Aquatic biota
- Air Quality

Sediments. The remediation activities are expected to affect only surficial sediment PCB concentrations. However, based on the findings of the 1989 sampling, substantial levels of PCBs occur in sediments upstream of the remnant deposits. Transport of these sediments into the remnant area reach of the Hudson River (and downstream) could easily mask any improvements effected by the capping activities. Further, given the complexity of sediment dynamics and rates of deposition, the effects of a reduction in leaching and scouring of PCBs from the remnants are likely to be seen only gradually in the sediments.

To adequately characterize temporal changes in sediment PCB concentrations, up to five surface grab samples will be taken at each monitoring station (where there is sediment) at quarterly (seasonal) intervals. Based on the 1989 studies, however, substrate conditions at stations in the remnant area reach of river limit the number of sediment samples obtainable. Where sediments are obtained, the particle size of the sediment samples will be determined, in addition to PCB concentrations, to evaluate the susceptibility of the sediments to downstream transport.

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Water. Because of the reduction of PCBs in runoff and leachate, capping the remnant deposits is expected to result in relatively rapid reductions in PCB concentrations in the water immediately downstream of the remnant areas. However, no detectable PCB concentrations were found in unfiltered water samples collected from August to November 1989. The earlier part of this period of sampling was generally characterized by below average flows (monthly average discharges of 3080 cfs and 4059 cfs at the Ft. Edward USGS gage during August and September, respectively). Although the average October and November discharges (5741 cfs and 8319 cfs, respectively) exceeded the annual average discharge (5180 cfs) and heavy runoff should have occurred during those months (which were quite rainy), flows were still below spring runoff levels. Historically, waterborne PCBs have been detected during the spring runoff. Thus, to provide an adequate database to characterize waterborne PCBs coming from (and through) the remnant area reach of river as a whole, as well as the existing variation due to each remnant deposit during spring, PCB concentrations in water will be determined in weekly grab samples at all stations during March-May. During the remainder of the sampling period (June-November), water samples will be taken biweekly at all stations. In addition to conventional PCB and total suspended solids analyses, water samples will be analyzed for dissolved and suspended PCB fractions once each month. Fractionation will be through a 0.45 micron filter.

Because waterborne PCB concentrations in the 1989 program were below analytical detection limits, the grab water samples will continue to be supplemented with solvent-filled dialysis membrane bag monitors (flows permitting). Hexane-filled dialysis bags were found in the 1989 program to accumulate and magnify the concentration of PCB in water,

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thus increasing the ability to detect waterborne PCBs at a site. However, because the concentration factors for the bags are unknown, the dialysis bag results will continue to be used qualitatively to determine the presence of PCBs in water at the site. The dialysis bags will be suspended mid-depth at the sites to have representative exposure to the water column, and will be monitored at all stations on a biweekly basis.

Aquatic Biota. Because one of the principal objectives of the interim remediation effort is to reduce the PCB concentration in Hudson River biota, the major biotic components (periphyton, macroinvertebrates and fish) will continue to be monitored by means of the following sampling programs:

- Multiplate (Hester-Dendy) composited sampling (replicated) for periphyton, silt and some macroinvertebrate species at all stations at five-week intervals, conditions permitting (March-November).

- Caddisfly sampling (replicated) in riffle areas above and below the remnant deposit reach (Stations GF4, C2, E5, E6 and E7) at five-week intervals from June-September.

- Fathead minnow in situ exposure replicated monitoring at six stations (C1, GF4, C2, E5, E6 and E7) at three-week intervals from June-November.

The multiplate and caddisfly sampling will follow the methods of Simpson, et al (1986). Fathead minnow in situ monitoring will follow the method of Jones and Sloan (1989). The

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multiplate samplers and fathead minnow assay containers will be suspended mid-depth to provide representative exposures in the water column.

Air Quality. The pre-construction PCB background sampling program will commence in March 1990 at Stations A2, A4, and A5, and as soon as access for the air sampling stations can be obtained at A1 and A3. Sampling will be performed on a three-day frequency, and will be suspended for the winter season in late November, 1990, depending on the weather conditions at the time.

Using the proposed air quality sampling schedule, background PCB concentrations in the remediation area can reliably be characterized prior to the onset of construction activity. The accelerated sampling frequency during 1989 and 1990 allows for the acquisition of an equivalent number of samples as would normally be collected in one full remediation season. In this manner, even if the remediation construction schedule were to be revised, the ambient air background data would exhibit mean sampling-related errors statistically comparable to those experienced in one full season of monitoring.

Additional Environmental Measurements

The following environmental parameters will again be measured (or obtained) in association with the aquatic monitoring programs:

- River discharge (cfs at Ft. Edward, Green Island and Cohoes USGS gages)
- Air and water temperature (°C)
- Dissolved oxygen (mg/L)

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- pH (standard units)
- Conductivity (μmhos/cm)
- Total suspended solids (mg/L)

Meteorological data for the air quality monitoring program will be obtained from the National Weather Service Station at Albany.

Monitoring Schedule

Ideally, the baseline monitoring programs would be in operation for at least one year prior to beginning remediation construction. However, the proposed construction schedule would preclude this. For that reason, the various programs need to begin as soon as feasible on their respective schedules to obtain the maximum amount of pre-construction data. The components of the baseline monitoring program described herein and their respective schedules are summarized in Table 3. The monitoring schedule and respective sampling frequencies during the construction phase, and thereafter, will be determined when the remediation construction schedule is finalized.

Sample Collection Procedures: Water, Sediment and Biota

Field measurements of pH, dissolved oxygen, temperature, and conductivity will be taken with portable meters (pH-Orion Model 407; dissolved oxygen and temperature - Yellow Springs Instruments Model 54; conductivity, Yellow Springs Instruments Model 33). Instrument logbooks will be maintained with each piece of equipment to document

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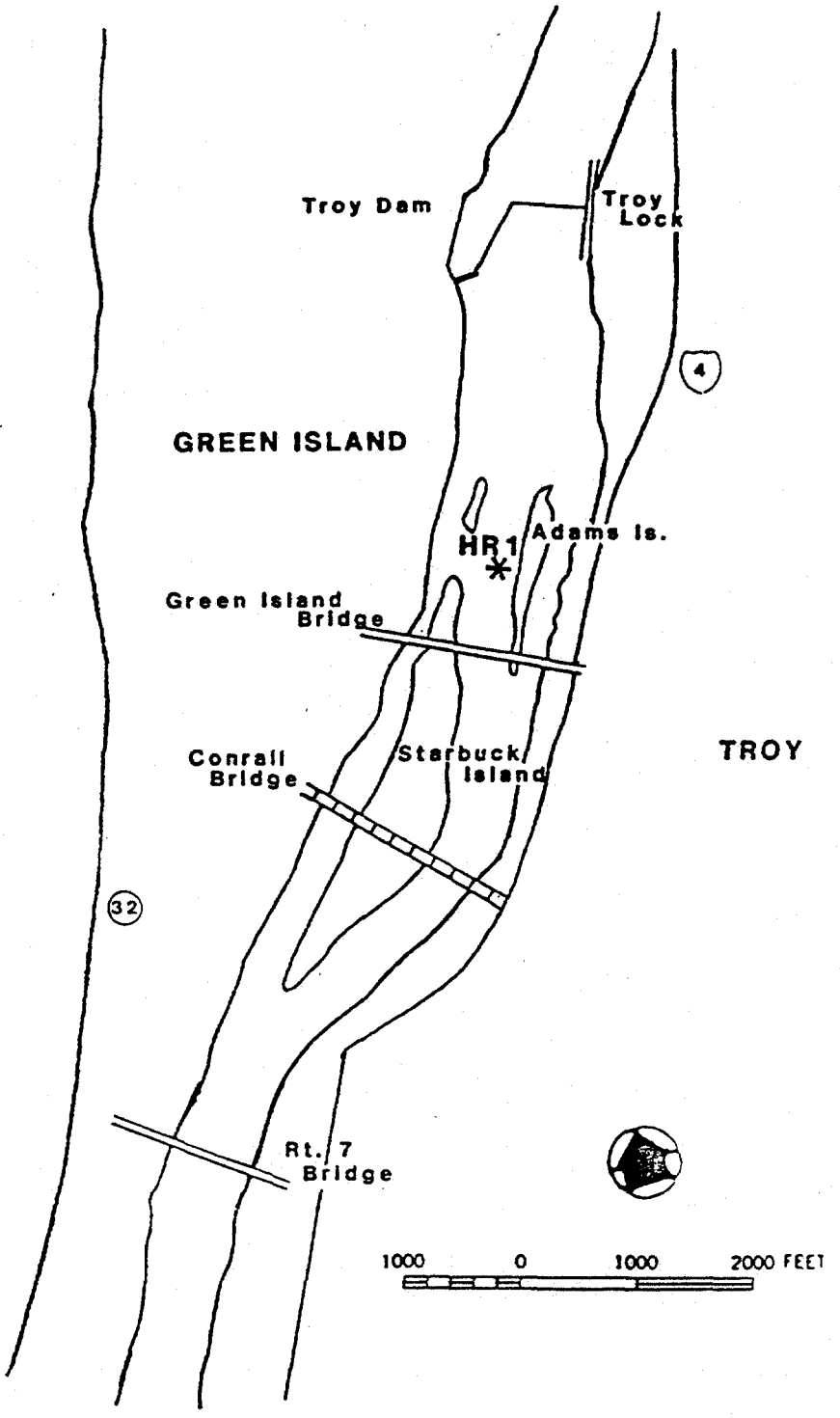

FIGURE 6

AQUATIC MONITORING STATION (HR1)

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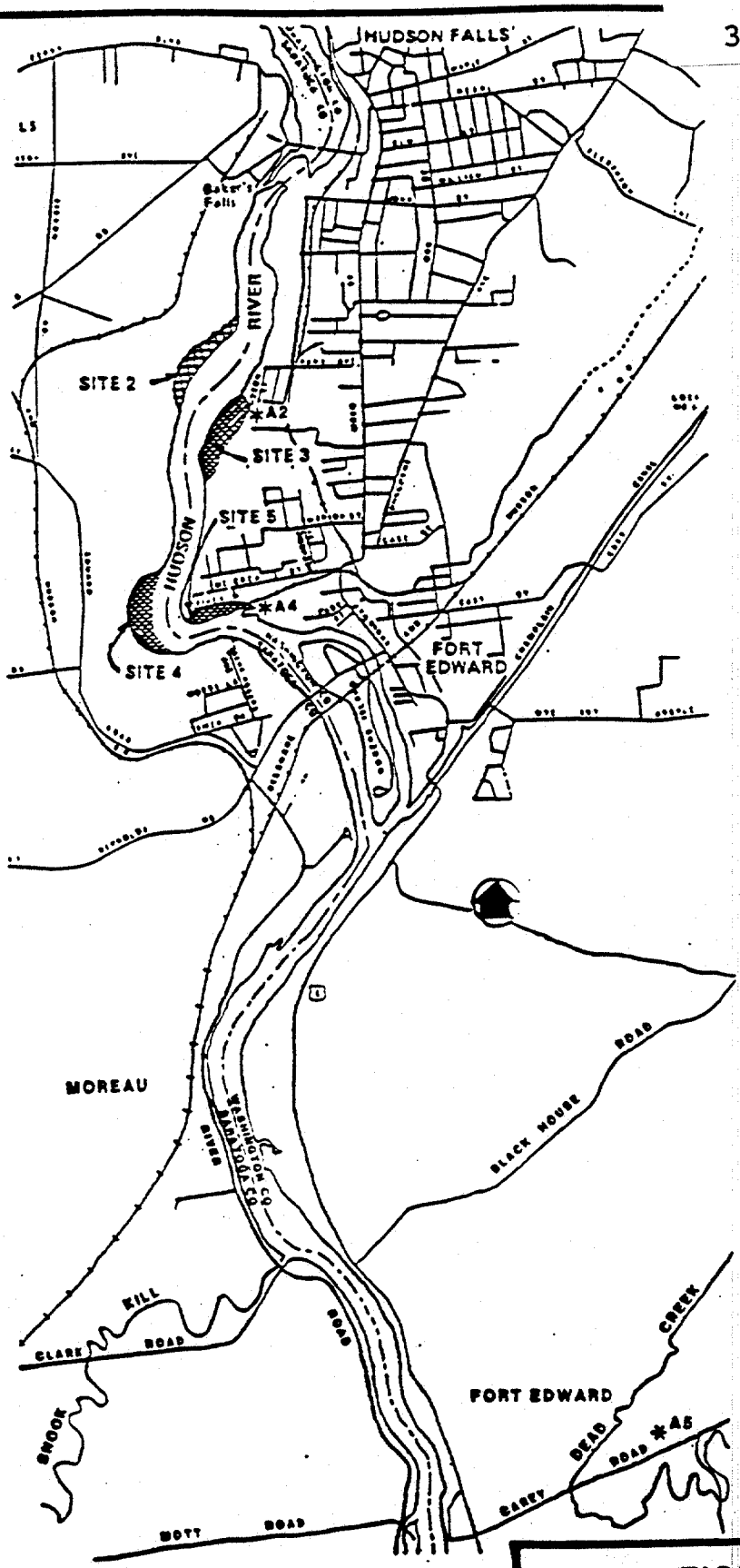

LEGEND

*A -- FIXED AIR MONITORING SITES

FIGURE 7

AIR QUALITY MONITORING STATION

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calibrations and maintenance records. Calibration procedures are described in the chapter containing the Quality Assurance Project Plan, Section 8.

Water samples for PCB chemical analyses and total suspended solids analysis will be collected using a stainless steel Kemmerer water bottle. Hexane-rinsed glass sample collection bottles (1L) with Teflon-lined caps will be used for PCB analyses; 500 mL glass bottles will be used for total suspended solids.

Chains of custody (COC) forms will be completed by the field crew immediately after sample collection, and will be shipped to the analytical laboratory with the sample. The COC forms will be used to document sample shipping and holding times, as well as the personnel involved with collection, handling and analysis of the samples. COC forms and bottle labels are illustrated in the Quality Assurance Project Plan chapter, Section 7.

Sediment samples will be collected with a petite ponar dredge and placed into hexane-rinsed 1L glass sample bottles having Teflon-lined caps. Shipping and chain of custody procedures will be identical to those described above for water samples.

Biological samples will be collected using the appropriate procedures for the biota in question (scraping of rocks, or Hester-Dendy multiplate sampler for both periphyton and benthic macroinvertebrates, and Surber sampler for benthic macroinvertebrates). A subsample will be retained for taxonomic analysis, while the composited portion for chemical analysis will be placed in hexane-washed sample bottles, placed in ice chests

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containing water ice, and shipped to the laboratory using the shipment and COC procedures detailed earlier.

For all environmental matrices, 10% field duplicate samples will be collected and submitted for chemical analyses. Duplicate analyses of batches of approximately 25 fathead minnows will be performed on fish from each holding chamber placed in the river. The analysis of individual fish or other biota is not planned.

Airborne PCB concentrations in the vicinity of the remnant deposits will be sampled at the five, fixed stations, composited on a 24-hour per day basis at three-day intervals throughout the "growing season" (March 15-November 15). Particulate PCBs will be captured on a particle filter medium (glass fiber) and vaporous PCB will be absorbed in a Florisil substrate.

Laboratory Analysis

The Quality Assurance Project Plan (QAPP) for the laboratory analyses are found in the QAPP chapter submitted with the 1989 Baseline Monitoring POS. Its components are summarized below.

All chemical analyses will be performed by NYSDEC certified analytical laboratories. The analytical chemistry procedures utilized by the laboratories are documented in the QAPP. PCB detection limits will be those listed on the Federal Target Compound List (TCL) (0.5

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µg/L for water, 0.08 mg/kg for dry weight sediment). No TCL detection limits are available for biological tissue; however, a detection limit of approximately 0.1 µg/g dry weight was attained for tissues collected in 1989.

On all tissue and dialysis bag samples and a randomly selected number of sediment samples whose total PCB concentrations exceed 2.0 ppm, capillary column gas chromatographic analyses will be performed using the procedure of Brown et al. (1984). This procedure will allow the determination of up to 118 PCB congeners, and will provide valuable information regarding the effectiveness of the site remediation. Additionally, the percent dry weight of each sediment sampling passing a Number 200 sieve will be determined.

Results of sediment PCB analyses will be expressed on a dry weight (µg/g) basis, although the wet weight of the sediments prior to drying will be available should wet weight results be desired. All tissue analysis results will be reported on both a dry weight and wet weight (µg/g) basis. However, because many of the existing analyses of tissues from the project vicinity are expressed on a wet weight basis, the wet weight of the tissues prior to drying will be available so that calculation of results on that basis can be conducted. Fish in situ assay samples will be analyzed for their lipid content (using a petroleum ether extraction procedure) so that PCB results can also be expressed on a lipid basis. This will provide comparability with much of the existing NYSDEC fish contaminant data from the site.

The selected analytical techniques for determination of PCB concentrations in ambient air are fundamentally equivalent to NIOSH Method 5503. Essentially, the NIOSH method

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requires a particulate filtration media followed by a sorbent material suitable for the collection of vaporous fractions. The ambient air monitoring requires 24 hour sample durations at higher sample flow rates than the NIOSH method (1 liter/minute). The standard technique has been modified to include a larger sorbent tube, and more durable and reliable vacuum pump/flow control equipment.

Data Analyses

The results of the respective monitoring programs will be subjected to statistical analyses to determine significant differences in PCB concentration over time and among sampling locations. Correlation analyses will be conducted to determine relationships between levels of PCBs in the monitored components and flows, or by season, and among the monitored components themselves.

Reporting

Progress reports, summarizing sampling efforts, will be prepared on a monthly basis. The findings of the baseline monitoring will be summarized in three quarterly progress reports in 1990, and in an annual (with one draft) monitoring report by the end of March 1991. The reports will contain quality assurance summaries and reports.

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It is anticipated that four meetings would be held with the agencies (two in 1990., and two in 1991), and six meetings (three in 1990, three in 1991) held with GE to review the 1989 study findings, the 1990 monitoring program and the findings of the 1990 study.

Task Responsibilities

Harza staff will perform both the aquatic and air quality sampling; Yates & Auberle, Ltd. will supervise and provide quality assurance for the air quality program; Hazleton Environmental Services will analyze the aquatic samples for Harza; and Trinity Chemical Analytical Laboratory will analyze the atmospheric samples for Yates & Auberle. The program will be conducted out of Harza's subsidiary (Stetson-Harza) office in Troy, NY, with Harza support from the Chicago office. Yates & Auberle (contracted to Harza) will supervise the air quality program from their New Jersey office with support from their Chicago office.

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Table 1. Baseline monitoring program aquatic sampling stations, Hudson River, NY, 1990

Station No.	Station Location
C1	Above Sherman Island Dam
GF1	Between Sherman Island Dam and Route I-87 bridge
GF2	Between Route I-87 bridge and Moreau boatramp
GF3	Between Moreau boatramp and Feeder Dam
GF4	Between Portland Cement Quarry Bridge and old Fenimore Dam
C2	Above Remnant Area 1, below Bakers Falls
E0	Above Remnant Area 2
E1	At lower end Remnant Area 2
E2	Below Remnant Area 3
E3	At upper end Remnant Area 4 (above Remnant Area 5)
E4	Below Remnant Area 4
E5	At USGS Station on Rogers Island
E5A	Below Rogers Island
E6	Ft. Miller below dam (below Thompson Is. Pool)
E7	Waterford
MR1	Lower Mohawk River
HR1	Below Troy Dam

Table 2. Baseline air quality monitoring program sampling stations, Hudson River, NY, 1990

Station No.	Station Location
A1	Industrial Area adjacent to Baker's Falls, above Remnant Area 2 (control site)
A2	Residential Area east of Remnant Area 3
A3	Residential Area north of Remnant Area 5
A4	Industrial Area east of Remnant Area 5 (control site)
A5	Farm Area South of Remnant Areas

Table 3. Summary of baseline monitoring program studies, Hudson, River, NY, 1990

Parameter	Sampling Stations	Type of Sample	Sampling Frequency	Number of Samples in 1990
Sediment	All (17 stations)	Grab Sample at 3-5 locations/station	Quarterly (4 periods)	204-340
Water	All (17 stations)	Grab Sample (PCB) (fractioned monthly) and TSS	Weekly (March-May; 10 periods)	340
			Biweekly (June-Nov.; 14 periods)	476
	All (17 stations)	Dialysis Bags	Biweekly (March-Nov.; 20 periods)	340
Aquatic Biota				
• Multiplate	All (17 stations) (replicated)	Periphyton and Silt Composite	5-week intervals (March-Nov.; 8 periods)	272
• Caddisfly	GF4,C2,E5,E6,E7 (5 stations) (replicated)	Macroinvertebrate Composite	5-week intervals (June-Sept.; 4 periods)	40
• Fathead Minnow	C1,GF4,C2,E5, E6,E7 (6 stations) (replicated)	Fish Assay Composite	3-week intervals (June-Nov.; 9 periods)	108
Air Quality	Remnant Area and Controls (5 stations)	Particulate and Gaseous	24-hr composite, 3-day cycle over one "growing season" (9 month minimum)	288

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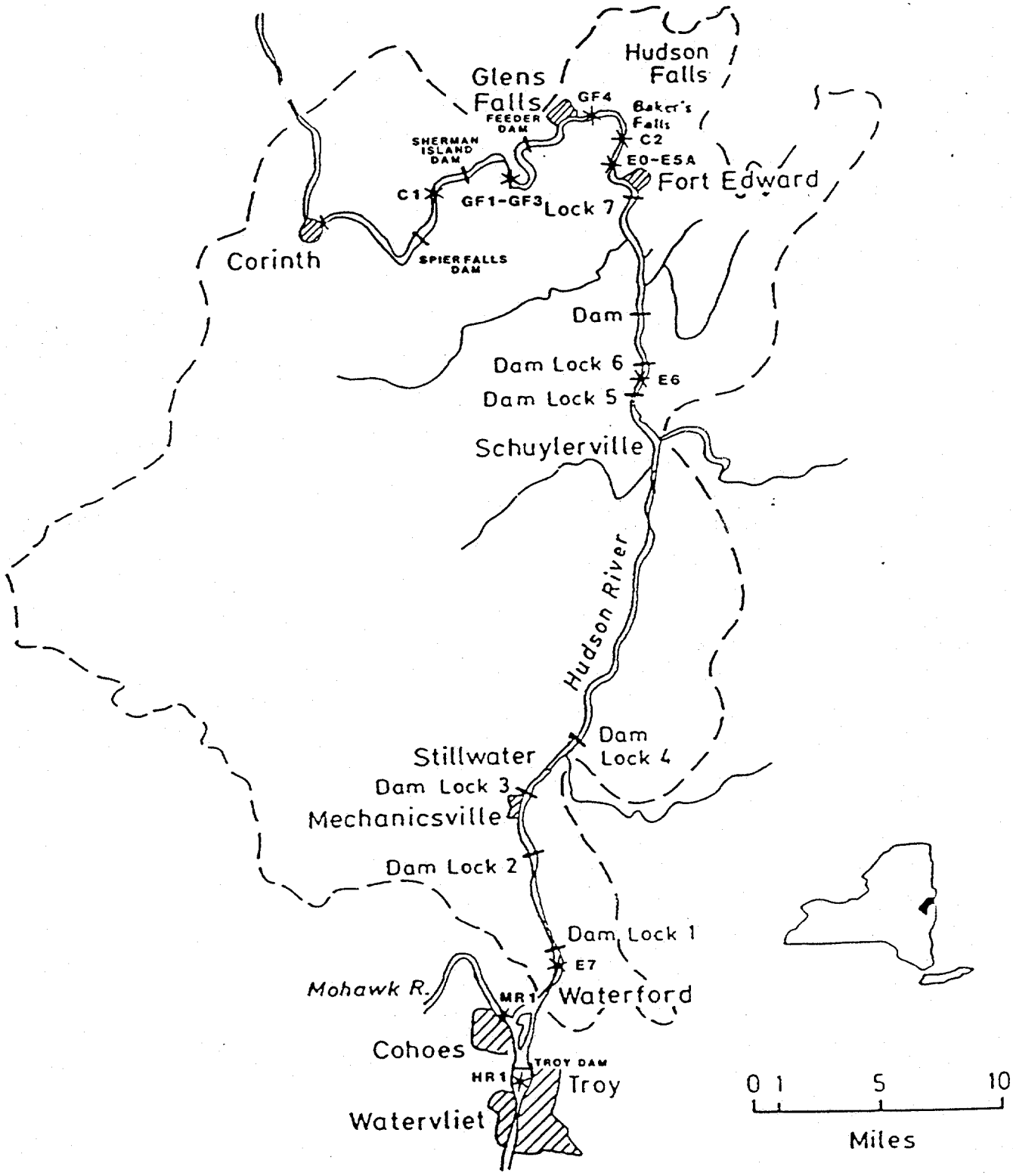

FIGURE 1

REMNANT REMEDIATION AQUATIC MONITORING STATIONS

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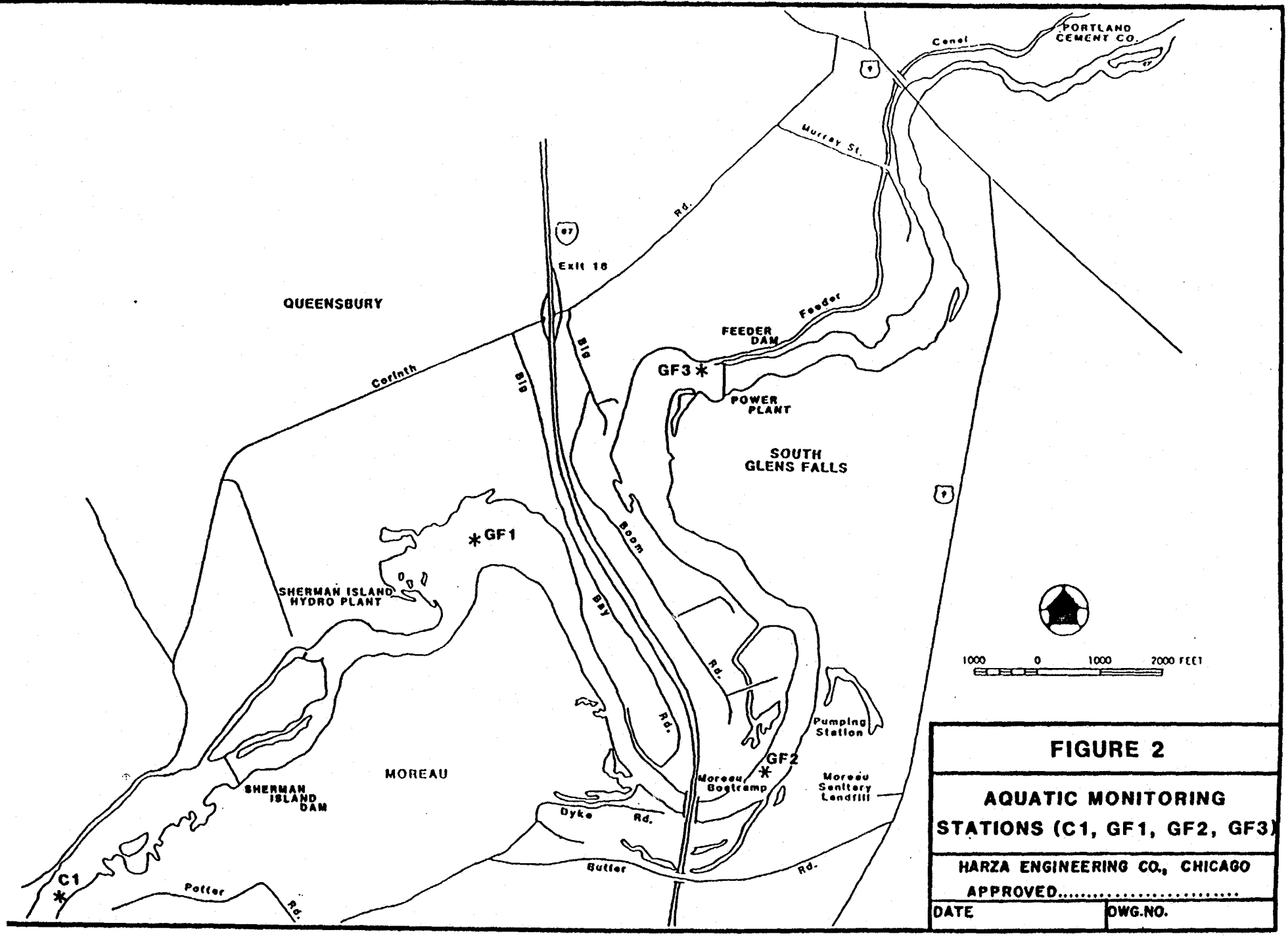

FIGURE 2

AQUATIC MONITORING STATIONS (C1, GF1, GF2, GF3)

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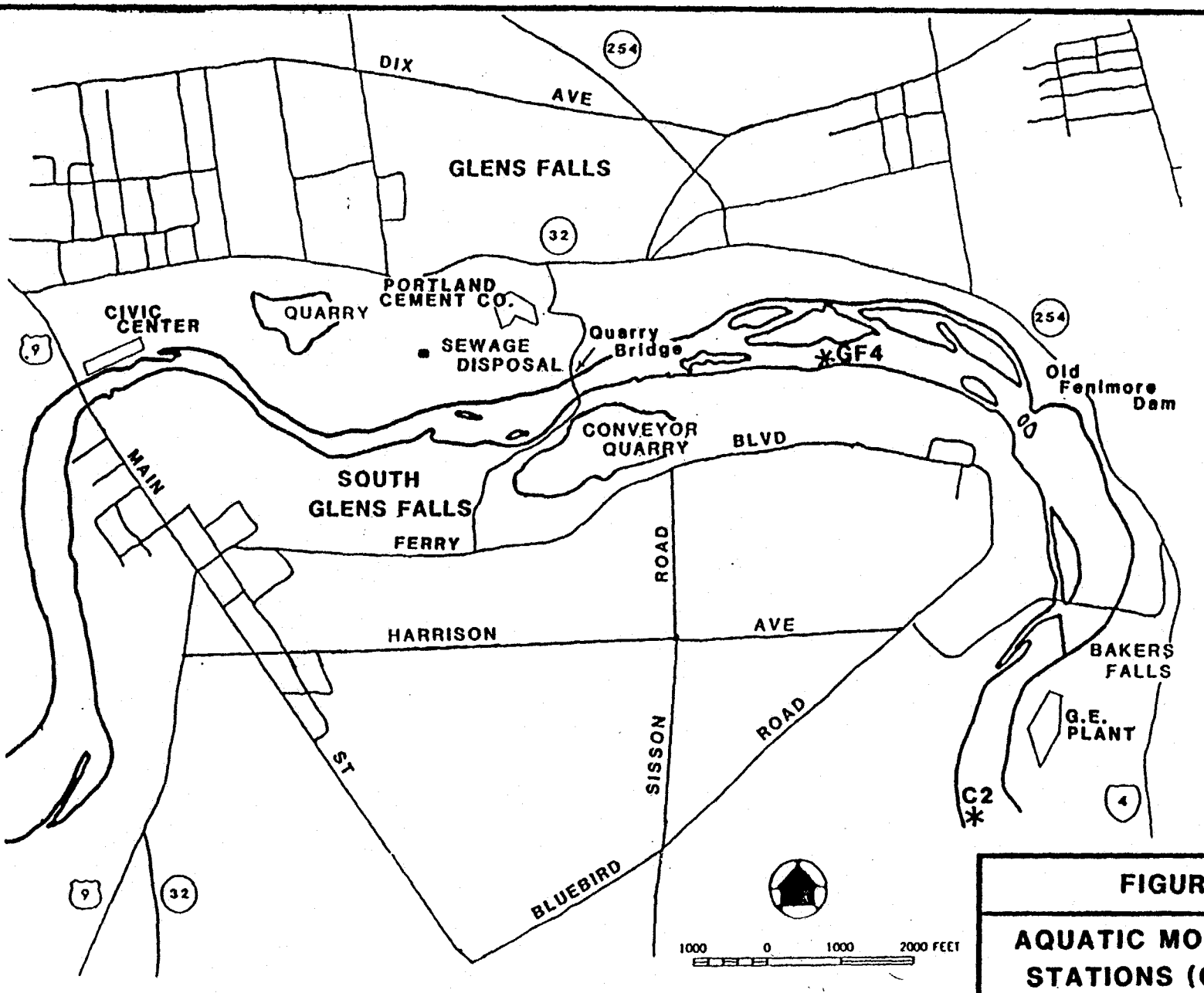

FIGURE 3

AQUATIC MONITORING STATIONS (GF4, C2)

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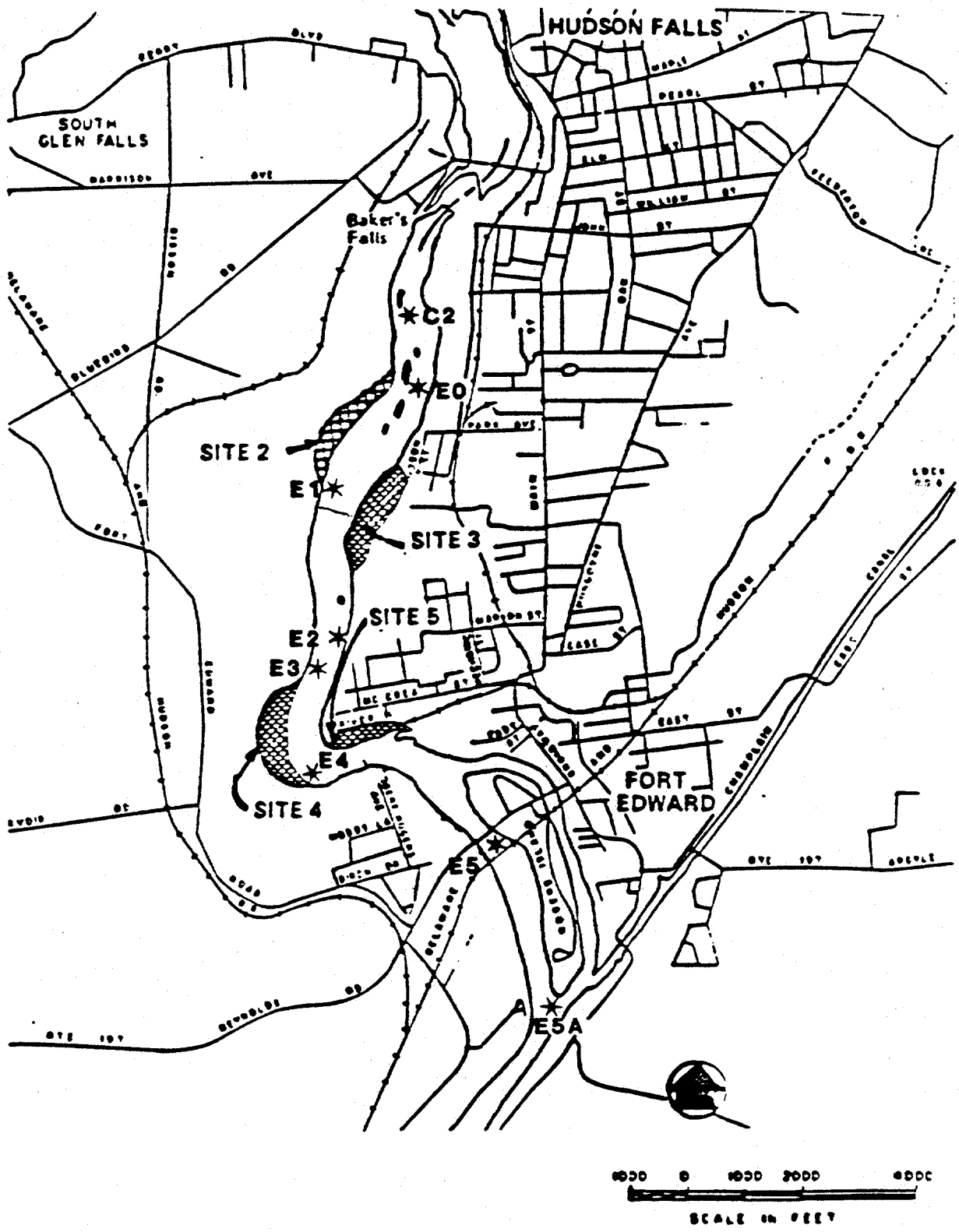

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* C -- CONTROL SITE
* E -- EXPERIMENTAL SITE

FIGURE 4

AQUATIC MONITORING STATIONS IN REMNANT AREA

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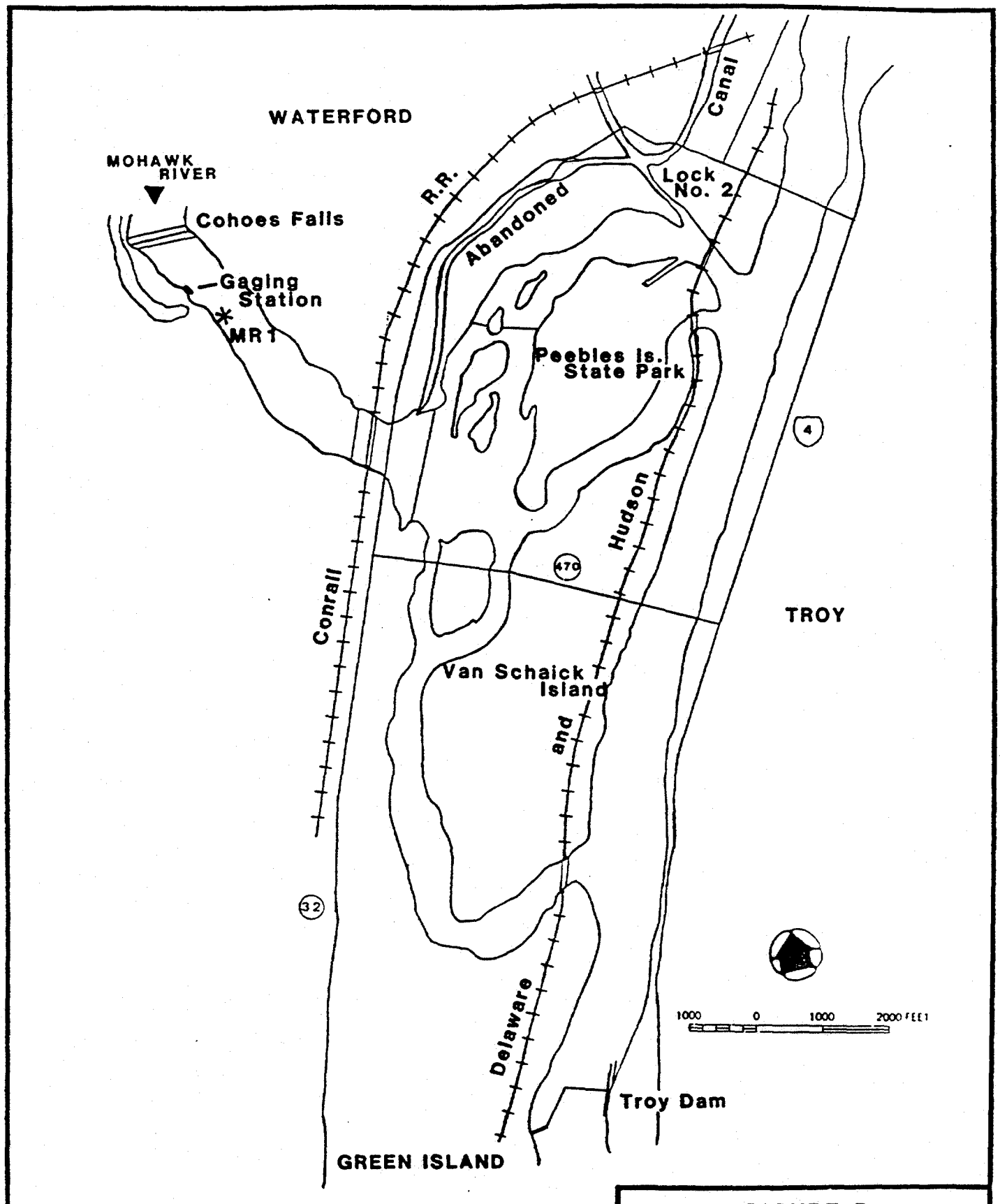

FIGURE 5

AQUATIC MONITORING STATION (MR1)

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