SAMPLING and ANALYSIS PLAN
ADDENDUM

1997 Thompson Island Pool Monitoring Hudson River Project

General Electric
Corporate Environmental Programs
Albany, New York

August 1997

O'BRIEN & GERE
ENGINEERS, INC.

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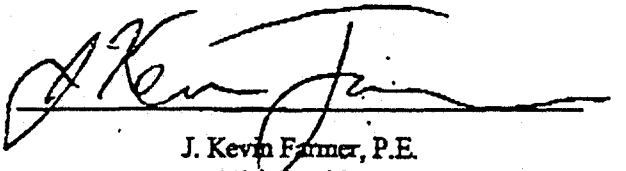

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August 1997

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in association with

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1. Overview

This sampling and analysis plan addendum (SAP Addendum) describes the Thompson Island Pool monitoring activities to be performed on the upper Hudson River during August 1997 (Figure 1-1). The plan was developed on behalf of the General Electric Company (General Electric) by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) in association with HydroQual, Inc.

1.2. Background

General Electric is conducting an extensive investigation during 1997 to evaluate potential causes for the anomalous PCB loading in the Thompson Island Pool. PCB loading attributable to diffusive flux based on principles of equilibrium partitioning is not sufficiently high to account for the water column PCB concentrations measured at Thompson Island Dam (HydroQual 1995).

The Thompson Island Pool Monitoring Program is a component of the *1997 Water Column Monitoring Study*, being conducted by General Electric. The *1997 Water Column Monitoring Study* consists of the High Flow Monitoring Program (HydroQual and O'Brien & Gere 1997), the Ground Water Seepage Investigation (HydroQual *et al.* 1997), and the Hydro Facility Operations and Thompson Island Pool Monitoring (O'Brien & Gere and HydroQual 1997). This SAP addendum consists of an additional investigation to supplement preliminary results of the Thompson Island Pool monitoring previously conducted in 1997 (General Electric 1997).

Several hypotheses have been developed to account for the anomalous PCB loading (HydroQual and O'Brien & Gere 1997):

- The mass and concentration of PCBs entering the Thompson Island Pool are greater than the mass and concentration measured at the Rogers Island monitoring station due to pulsed loadings from the Bakers Falls area or due to PCB transport in the bedload; either of which is undetected by water column monitoring.

- PCB concentrations measured at the Thompson Island Dam monitoring station are greater than the PCB concentrations present throughout the total river flow as it passes over the dam.
- Ground water inflow to the Thompson Island Pool is transporting PCBs from buried sediment to the water column.
- PCB concentrations in surficial sediment are greater than surface sediment data as a result of a release of PCBs from the Allen Mill
- Significant quantities of PCBs are entering the Thompson Island Pool between Rogers Island and the Thompson Island Pool from areas such as dredge spoil sites.
- Resuspension of surficial sediment contributes a significant quantity of PCBs into the Thompson Island Pool water column.

Several sampling and analysis programs have been performed, or are being performed, to evaluate these hypotheses (O'Brien & Gere 1996a; O'Brien & Gere and HydroQual 1997; HydroQual and O'Brien & Gere 1997; HydroQual and O'Brien & Gere 1996; HydroQual and O'Brien & Gere 1996b). The monitoring presented in this SAP Addendum will assist in evaluating the accuracy and representativeness of data collected at the Thompson Island Dam monitoring station at the west abutment of the dam (HRM 188.5). The HRM 188.5 sampling station at the dam is routinely sampled along with weekly water column sampling conducted for the Post-Construction Remnant Deposit Monitoring Program (PCRDMP) (O'Brien & Gere 1997a, 1996b).

Preliminary monitoring results suggest that PCB concentrations at the dam are approximately a factor of two times higher than those measured within the main channel approximately 1000 ft upstream of the dam (Figures 1-2 and 1-3, Table 1-1). TSS concentrations also appear elevated at the dam (Figure 1-4 and Table 1-1). It is unclear whether these data accurately represent PCB loading at the dam (Figures 1-2, 1-3 and 1-4, and Table 1-1).

Table 1-1. *Preliminary results comparing HRM 188.5 and Transect TIP-18 data*

Sample date	HRM 188.5 west		Transect TIP-18		HRM 188.5W/TIP Comparison	
	PCB	TSS	PCB	TSS	PCBs	TSS
09/18/96	119	5.6	48	2.5	2.5	2.3
10/29/96	86	2.6	48	2.1	1.8	1.2
06/04/97	82	2.0	58	1.7	1.4	1.2
06/17/97	204	4.2	92	1.7	2.2	2.5
06/30/97	196	2.7	125	2.2	1.6	1.2
07/14/97	NC	NC	NC	NC	–	–
07/28/97	82	NC	48	NC	1.7	–
Median	119	2.7	53	2.1	1.7	1.2
Mean	128	3.4	70	2.0	1.9	1.7
Std. deviation	52	1.5	32	0.3	–	–
Minimum	82	2.0	48	1.7	1.4	1.2
Maximum	204	5.6	125	2.5	2.5	2.5

Notes:
NC = Analysis not completed
For Transect TIP-18, results of multiple sampling station across the transect were averaged.

Source: O'Brien & Gere Engineers, Inc.

1.2. Objectives

The objective of this study is to assess whether water column PCB concentrations measured at the Thompson Island Dam monitoring station are representative of water column PCB concentrations across the Thompson Island Dam.

2. Thompson Island Pool monitoring program

The sampling described in this SAP Addendum will be conducted as a time-of-travel sampling event. Sampling times for a single parcel of water in the reach of the river between Transect TIP-18 and Schuylerville (Figure 1-1) will be based on time-of-travel estimates and field measurements. The time-of-travel estimates will be developed based on United States Geological Survey (USGS) studies (1969). Velocity and depth field measurements will be taken at the sampling stations. In addition, the flow measured at the USGS gaging station in Fort Edward will be monitored during the sampling event.

2.1. Sampling locations and collection procedures

Water column samples will be obtained from seven sampling stations (Figure 1-1 and Table 2-1). Sampling will consist of time-composite aliquots collected at each station hourly over a 4-hr sampling period. At the Thompson Island Dam sampling stations (HRM 188.5E and W), samples will consist of surface, grab aliquots (Figure 1-1). At the other sampling stations (TIP 18-C, Thompson Island Dam profile stations in the east and west channels downstream of the dam, and Fort Miller and Schuylerville sampling stations), it is anticipated that depth-integrated aliquots will be collected using a Kemmerer sampler (Figure 1-1). Water depths at each sampling station will be recorded. If water depths are insufficient to allow the use of a Kemmerer sampler, depth-integrated samples will be collected by submerging a sample bottle in the river at these stations. At each sampling station, sampling equipment will be cleaned prior to use according to the procedures presented in the FSP Addendum (O'Brien & Gere 1996). Sampling equipment will not be cleaned between sampling rounds at a given sampling station.

Table 2-1. *Sample locations and collection procedures*

Site Location	Location Description	Approx. River Mile	Sample Collection
TIP - 18C	1000 ft upstream of Thompson Island Dam	HRM 188.6	Depth-integrated composite sample collected at middle of river from a boat
Thompson Island Dam - West	Just upstream of Thompson Island Dam	HRM 188.5W	Grab sample collected from edge of west dam abutment
Thompson Island Dam - East	Just upstream of Thompson Island Dam	HRM 188.5E	Grab sample collected from edge of east dam abutment
Downstream of Thompson Island Dam - West channel	Center of channel, as close to dam as practical to obtain representative sample	HRM 188.48W	Depth-integrated composite sample collected at center of west channel from a boat
Downstream of Thompson Island Dam - East channel	Center of channel, as close to dam as practical to obtain representative sample	HRM 188.48E	Depth-integrated composite sample collected at center of east channel from a boat
Fort Miller		HRM 186.3	Depth-integrated composite sample collected from a boat
Schuylerville	Route 4 bridge	HRM 181.4	Depth-integrated composite sample collected at middle of river from the bridge or from a boat

Note: HRM = Hudson River Mile. Mile 0.0 is located at the Battery in New York City

Source: O'Brien & Gere Engineers, Inc.

Specific sample collection and handling procedures for the water column characterization are consistent with those presented in the FSP (O'Brien & Gere 1992a), QAPP (O'Brien & Gere 1992b), and HASP (O'Brien & Gere, 1992c), as addended for the 1995 River Monitoring Test (O'Brien & Gere 1995, 1996a). Additional details of the field sampling program were provided in an addendum to the FSP included in the 1995 report (O'Brien & Gere 1996b) for the PCRDMP.

2.2. Analytical testing

Analyses of water samples collected for the water column characterization are summarized in Table 2-2, below. A subset of samples may be analyzed for PCBs by method NEA608CAP modified to include an independent separation

and quantification of congeners contained in method NEA608CAP peaks 5, 8 and 14 (BZ4 and BZ10, BZ5 and BZ8, and BZ18 and BZ15, respectively) on a CP-SIL5-C18 capillary column. Analyses will be performed by Northeast Analytical, Inc. (NEA) in Schenectady, New York, with the exception of chlorophyll-a analysis which will be subcontracted by NEA. It is assumed that QA/QC samples collected for the routine PCRDMP will be sufficient for evaluation of the PCB and TSS data quality of the samples collected for this monitoring program.

Table 2-2. *Analytical testing*

Parameter	Method	Sample bottle	Preservation	Hold Times	Field QA/QC
PCBs	NEA608CAP	1-L glass	none	7 days to extraction, 40 days to analysis	PCRDMP[1] Duplicate, Equipment blank
Total suspended solids (TSS)	USEPA 160.2	1-L plastic	none	7 days	PCRDMP
Total solids (TS)	USEPA 160.3	250-ml plastic	none	7 days	Duplicate
Total organic carbon (TOC)	USEPA 415.2	250-ml plastic	1-ml 1/1 H_2SO_4	28 days	Duplicate
Particulate organic carbon (POC)	USEPA 415.1	1-L plastic	none	14 days	Duplicate
Chlorophyll-a	Standard Method 10200H3	1-L glass covered w/ Al foil	none	ASAP	Duplicate

Notes:
[1] Samples collected for this monitoring program will be analyzed along with routine PCRDMP samples; QA/QC samples collected for PCRDMP analyses will be sufficient to evaluate analytical performance.

Source: O'Brien & Gere Engineers, Inc.

Specific analytical procedures for the water column characterization are consistent with those presented in the QAPP (O'Brien & Gere 1992b). It is assumed that PCB data generated for the Thompson Island Pool sampling will be included with the PCRDMP samples as a completely data validatable deliverable package.

3. Deliverables

Results of this monitoring will be included in a non-interpretive data summary report that will include a description of the objectives, methods, and data associated with the completion of the 1997 Thompson Island Pool monitoring.

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GENERAL ELECTRIC COMPANY-HUDSON RIVER PROJECT FIGURE 1-1
1997 WATER COLUMN MONITORING STUDY

THOMPSON ISLAND POOL MONITORING PROGRAM SAMPLING STATIONS

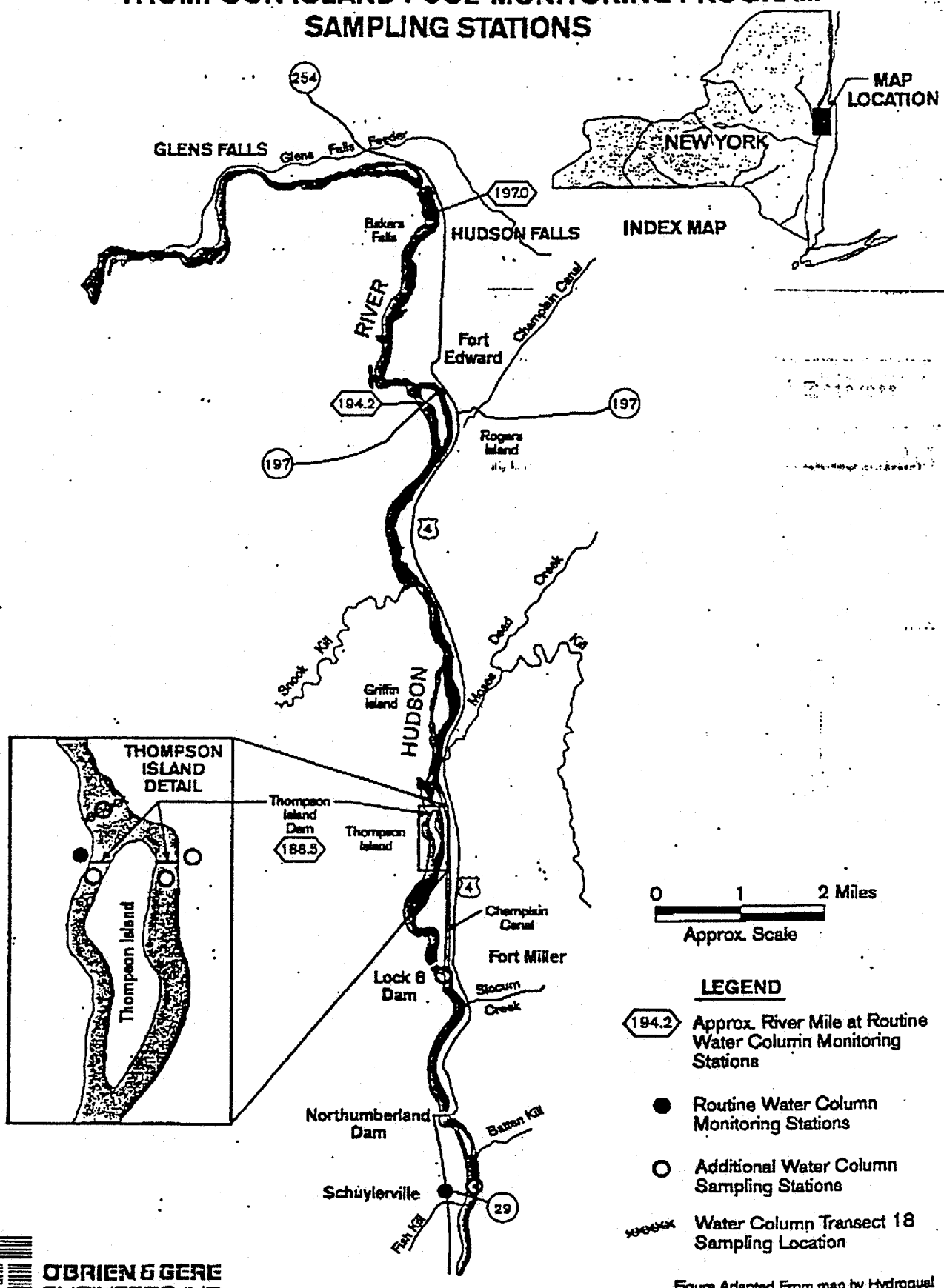

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Figure Adapted From map by Hydroqual
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FIGURE 1-2

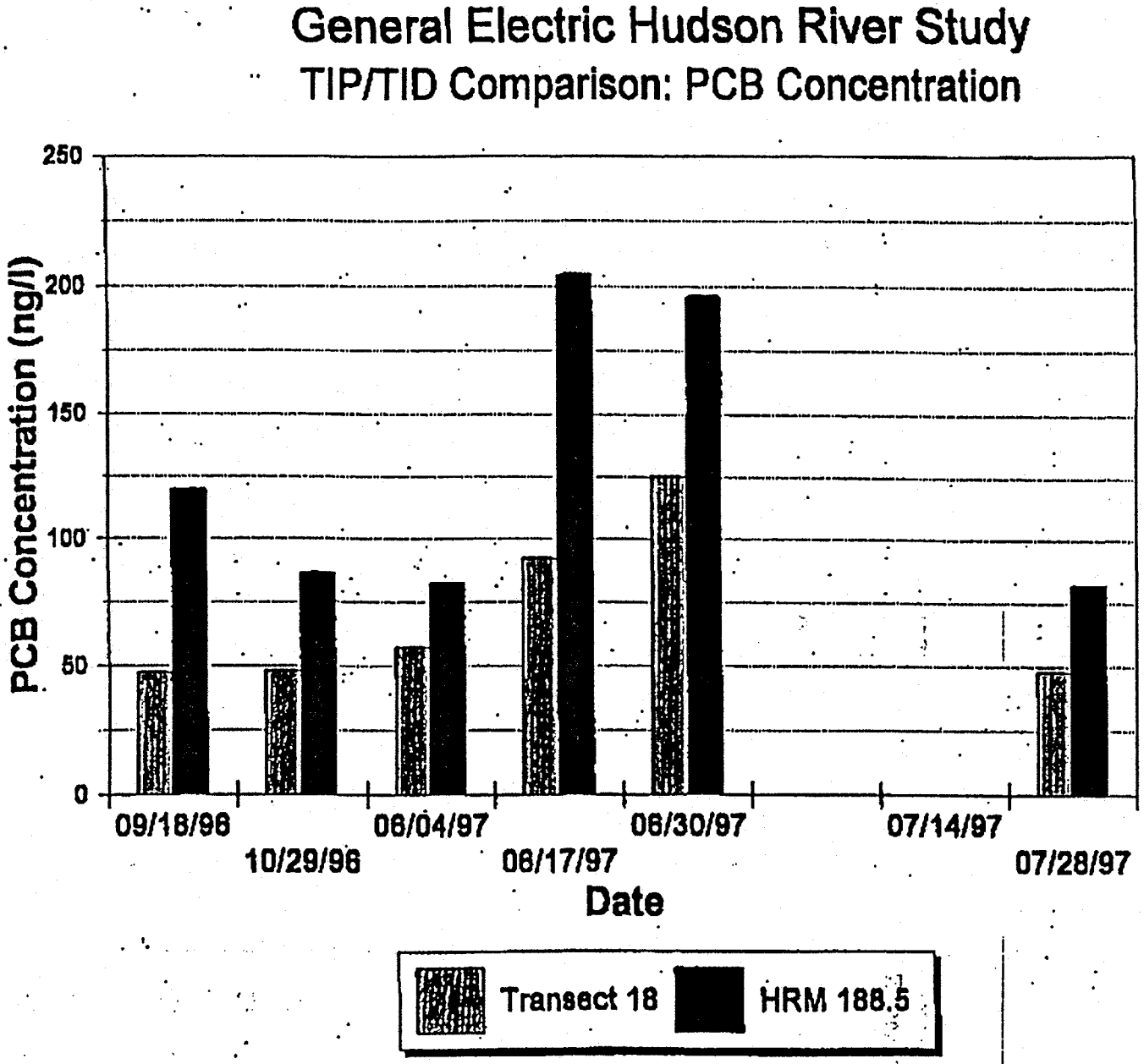

FIGURE 1-3

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TIP/TID Comparison: PCB Concentration

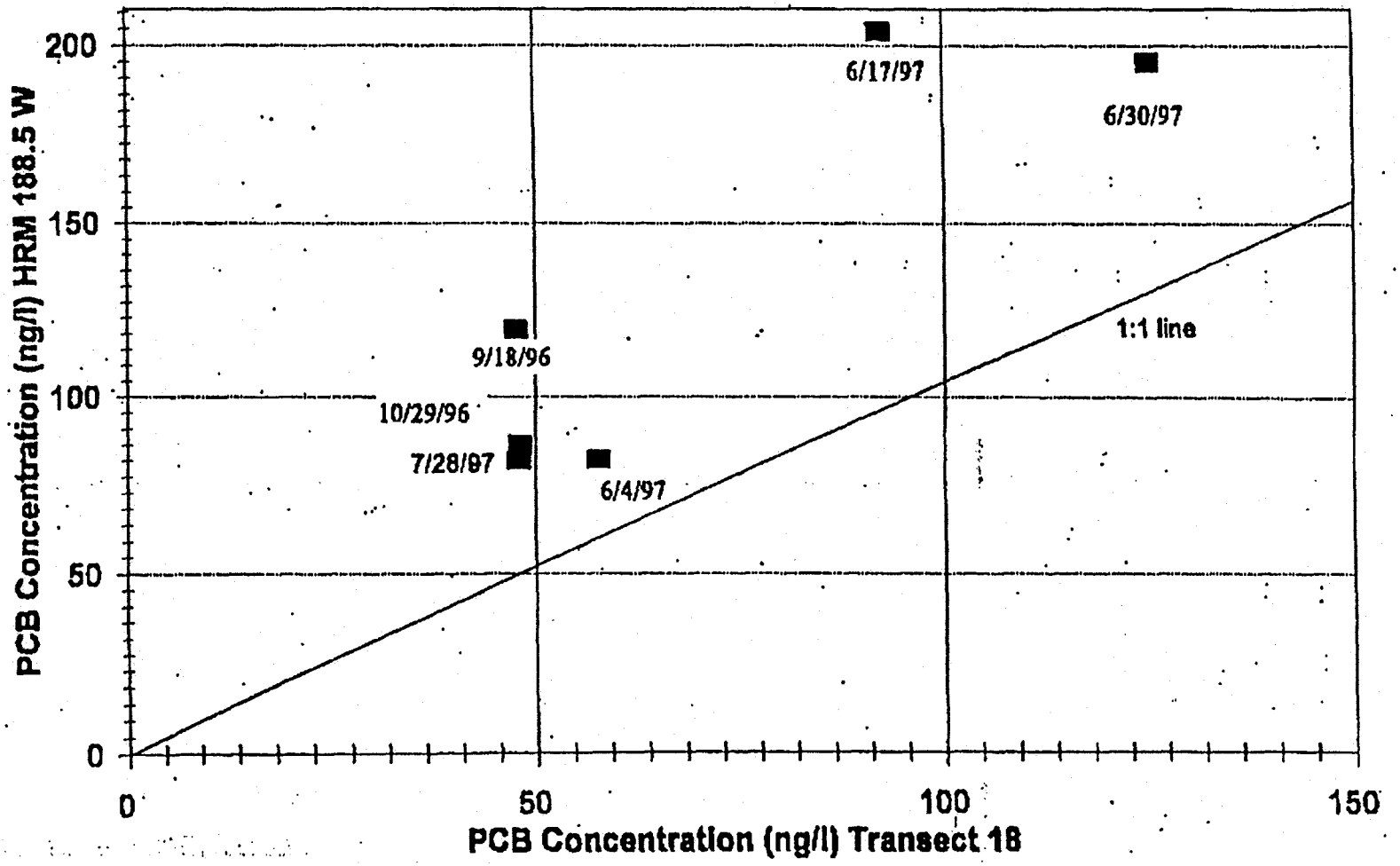

FIGURE 1-4

General Electric Hudson River Study

TIP/TID Comparison: TSS Concentration