UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

DocID 70666

HUDSON RIVER PCBs SITE
REASSESSMENT RI/FS
OVERSIGHT COMMITTEE
WEDNESDAY, OCTOBER 8, 1997
LATHAM, NY

AGENDA

7:30	Welcome and Introductions	Bill McCabe, USEPA
7:45	Landfill/Treatment Facility Siting Survey	Bill McCabe, USEPA
8:15	Update on Reassessment Related Activities	Committee Members
8:45	Update on General Electric's Monitoring	John Haggard, GE John Connelly, HydroQual
9:15	Review of Data Evaluation and Interpretation Report Findings	Ed Garvey, TAMS
9:45	Observer Questions	Bill McCabe, USEPA
	Closing	

ATTACHMENT 1

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ATTACHMENT 2, 1-3

US ENVIRONMENTAL PROTECTION AGENCY
HUDSON RIVER PCBs REASSESSMENT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Community Interaction Program
Hudson River PCBs Oversight Committee Meeting
Latham, NY
October 8, 1997

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Jean Eberhardt	GE	
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TOM SIMMONS	ARMY CORPS of ENGINEERS 700 FEDERAL BLDG KANSAS City MO. 64106	

ATTACHMENT 2, 2-3

US ENVIRONMENTAL PROTECTION AGENCY
HUDSON RIVER PCBs REASSESSMENT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Community Interaction Program
Hudson River PCBs Oversight Committee Meeting
Latham, NY
October 8, 1997

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David Blow	Post-Star	
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William T. Ports	NYSDEC Division of Environmental Remediation 50 Wolf Rd Albany, NY 12233	NYSDEC

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US ENVIRONMENTAL PROTECTION AGENCY
HUDSON RIVER PCBs REASSESSMENT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Community Interaction Program
Hudson River PCBs Oversight Committee Meeting
Latham, NY
October 8, 1[illegible]7

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ATTACHMENT 4
1-23

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

Background

- The flux of PCBs from Thompson Island Pool (TIP) sediments has been estimated based on the increase in PCB concentration from Rogers Island to Thompson Island Dam

- The calculated flux varies seasonally and annually:

  - ❒ **excluding flood events**, the maximum occurs in early summer and the minimum occurs in winter
  - ❒ highest levels are about 5 to 6 lb/d
  - ❒ the summer average is about 2 to 3 lb/d
  - ❒ fluxes were lower in 1995, a year without a spring high flow event.

- GE has contended that the estimated flux is anomalously high, particularly during summer low flow conditions:

  - ❒ diffusion of PCBs from sediments contaminated at the levels observed in 1991 can account for, at most, 0.5 to 1 lb/d

  - ❒ water column data collected at Schuylerville in the late 1980s by the USGS suggest a flux from TIP sediments of 0.2 to 0.4 lb/d

  - ❒ the estimated flux of PCBs from sediments between the TI Dam and Schuylerville is much lower, despite similar sediment PCB levels

1-4
3-23

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

Hypotheses

- Several hypotheses have been proposed to explain such a high flux:

1) *Additional mechanisms that move PCBs from the sediments to the water column*

   - ❐ groundwater inflow
   - ❐ resuspension of sediments

2) *Higher PCB levels in surface sediments than is indicated by the 1991 data*

   - ❐ PCB oil (transported from the vicinity of the GE Hudsons Falls plant site)
   - ❐ oily sediments (scoured from the Allen Mill when the gate structure failed)

3) *Overestimation of the PCB Flux leaving the TIP*

   - ❐ the PCB levels in the shoreline water sampled at Thompson Island Dam are higher than the average level in water passing the dam

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

Program Results

Hypothesis 1:	Additional mechanisms that move PCBs from the sediments to the water column

- The historical contaminated sediments (as measured in 1984) could not sustain the estimated PCB flux to the present time. The surface sediments would have been depleted of PCBs, particularly the lower chlorinated homologs.
- Measured groundwater inflow rates are at least a factor of ten too low to account for the estimated flux.
- TSS changes through the TIP show no evidence of resuspension. Levels are low and do not increase except at the locations of tributaries.

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

Program Results

Hypothesis 2:	Higher PCB levels in surface sediments than is indicated by the 1991 data

- ❐ The particle tracer study indicated a potential for PCB oil to be stored above the TIP under low flow and transported to the TIP, and trapped therein, during flood events.

- ❐ No substantive PCB flux was observed in bed load or in water passing Rogers Island during the 1997 spring high flow event. Such transport may have occurred in earlier years due to greater PCB releases from the Hudsons Falls plant site area.

- ❐ Periodic flooding of Bakers Falls plunge pool transported small quantities of PCBs downstream.

- ❐ PCB concentration changes through the TIP indicated a widespread flux of PCBs from sediments throughout the pool that contributed about 1 lb/d of PCBs to the water column.

- ❐ The observed flux is at or above the limit of what could come from historical sediments, and may indicate some contribution from the Hudsons Falls releases

- ❐ Although localized areas of higher PCB concentration were observed, flow analyses indicated that lack of flushing in these areas was the cause rather than greater flux from sediments.

9-23

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

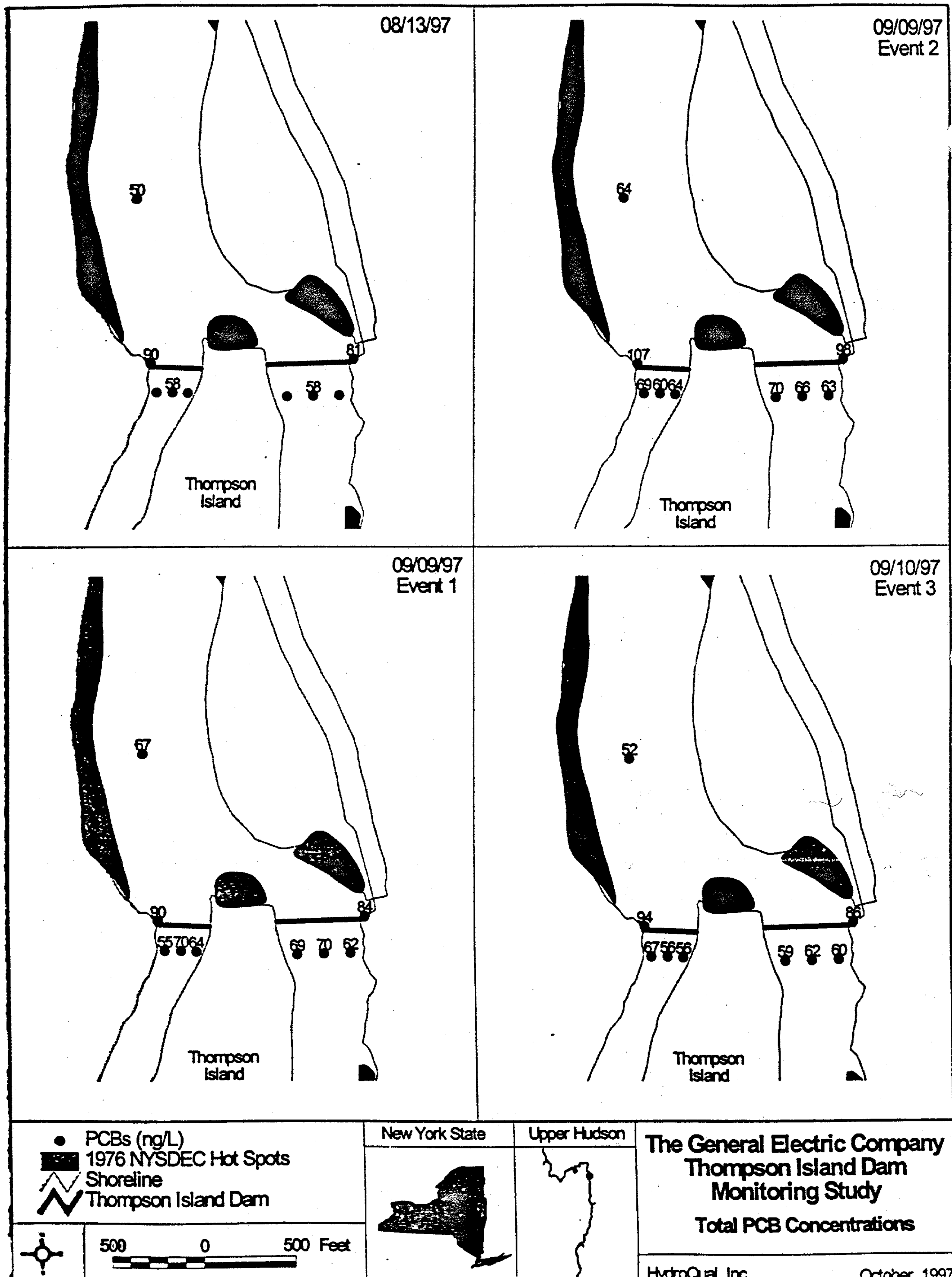
Program Results

Hypothesis 3:	Overestimation of the PCB Flux leaving the TIP

- ❐ samples at the opposite shoreline had PCB levels similar to those at the routine sampling location

- ❐ samples from a transect about 1000 ft. upstream of the dam had PCB concentrations significantly lower than samples taken at the routine sampling location

- ❐ samples in the main flow of the river immediately downstream of the shoreline sampling location had concentrations similar to those measured at the transect upstream of the dam



08/13/97
50
90
81
58
58
Thompson Island
09/09/97 Event 2
64
107
98
69 60 64
70 66 63
Thompson Island
09/09/97 Event 1
67
90
84
55 70 64
69 70 62
Thompson Island
09/10/97 Event 3
52
94
86
67 56 56
59 62 60
Thompson Island
PCBs (ng/L)
1976 NYSDEC Hot Spots
Shoreline
Thompson Island Dam
500 0 500 Feet
New York State
Upper Hudson
The General Electric Company
Thompson Island Dam Monitoring Study
Total PCB Concentrations
HydroQual, Inc.
October, 1997

RESULTS OF THE GENERAL ELECTRIC 1996-97 THOMPSON ISLAND POOL RESEARCH PROGRAM

Next Steps

- Confirm the sampling bias
  - ❐ resample upstream and downstream of the Dam, at the routine station and at Schuylerville
  - ❐ sample water where the Dam abuts Thompson Island

- Confirm that samples taken from the river center just downstream of the Dam represent conditions in water passing the Dam
  - ❐ compare concentrations above and below the dam

- Move routine monitoring to the river center just downstream of the Dam

- Determine the cause of the sampling bias at the TI Dam
  - ❐ test hypothesis that water from upstream shoreline backwater areas is carried alongshore to the sampling location
  - ❐ sample at the following locations:
    - main channel upstream of the Dam
    - backwater area along the shore
    - routine station at the Dam
    - downstream of the Dam

- Investigate whether the TI Dam data can be corrected
  - ❐ do the new data indicate a systematic bias?

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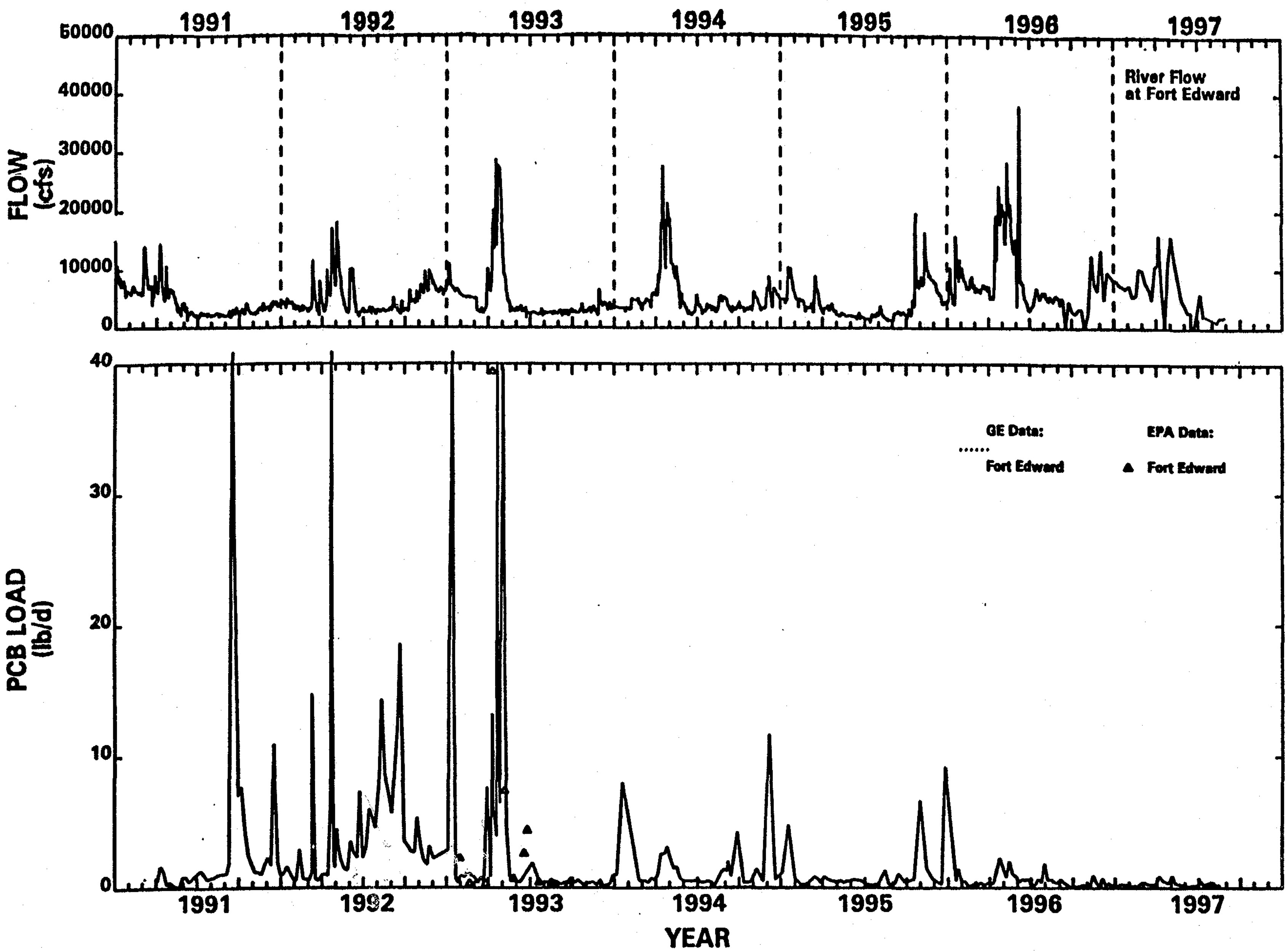
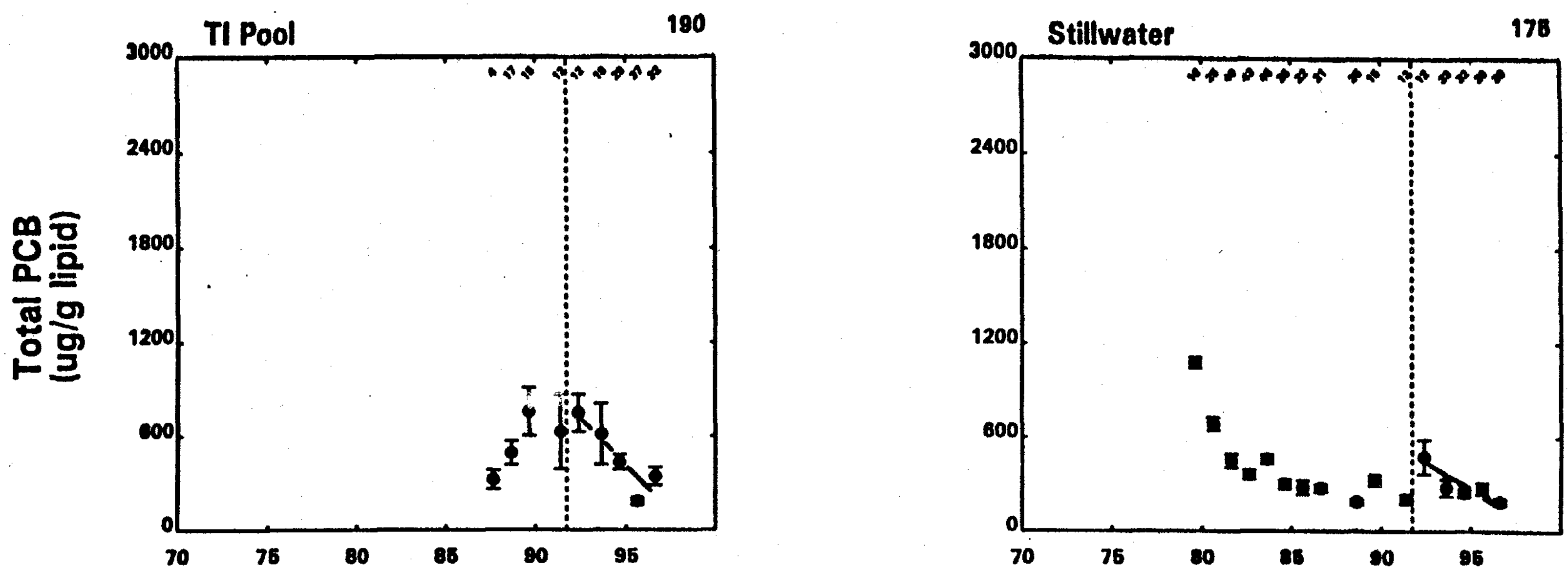


/power2/geco0510/ANALYSIS/WATER/OBG/TEMPORAL/2p2.gdp
DATE: Mon Sep 22 TIME: 17:58:22

Datafiles -- fetl_avgs.bin,FTEDWD.PRN,recent.dat



All sizes
Apr - Sep
All tissues (see database notes)
Males & Females
Mean +/- 2 std errors

Vertical line at Sept 17, 1991
Values are plotted approximately at the midpoint of each season
Number of observations are indicated at the bottom of each panel

Temporal patterns in Total PCB Concentration in PKSD

Tue Aug 26, 1997 15:43:07 /power2/geco0510/OLD_STRUC/geco0330/DATA/SUMMARY [temp9junk]

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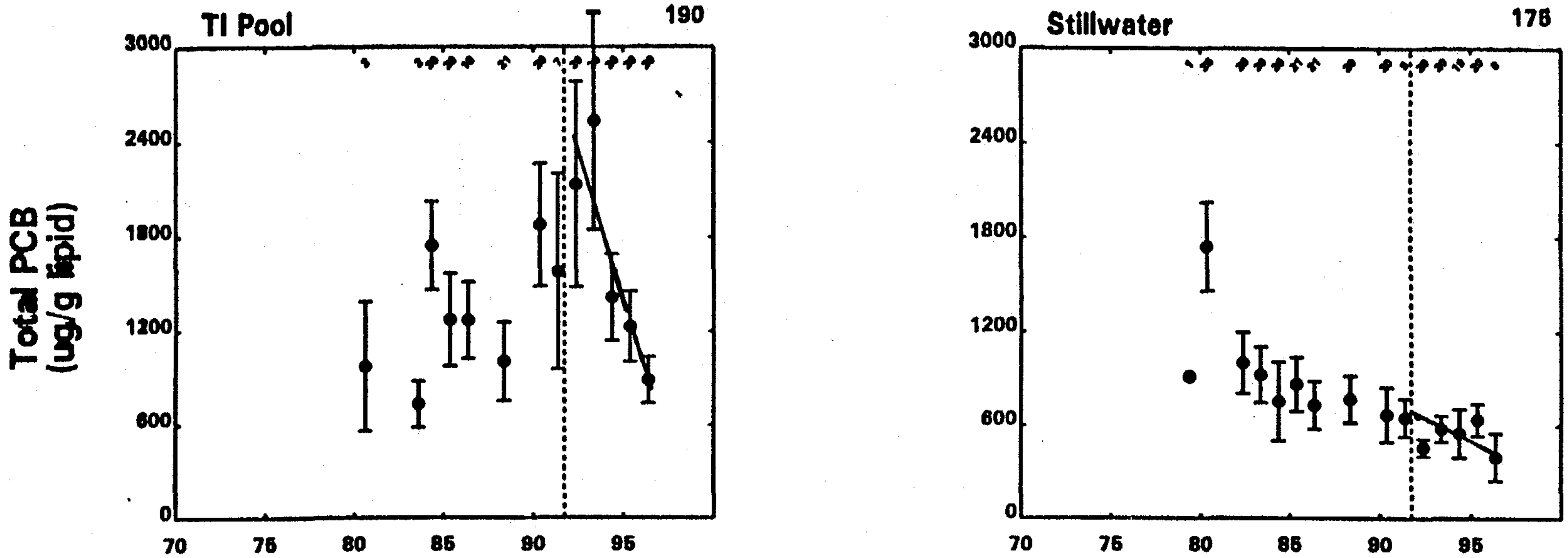

All sizes
Apr - Sep
All tissues (see database notes)
Males & Females
Mean +/- 2 std errors

Vertical line at Sept 17, 1991
Values are plotted approximately at the midpoint of each season
Number of observations are indicated at the bottom of each panel

Temporal patterns in Total PCB Concentration in LMB

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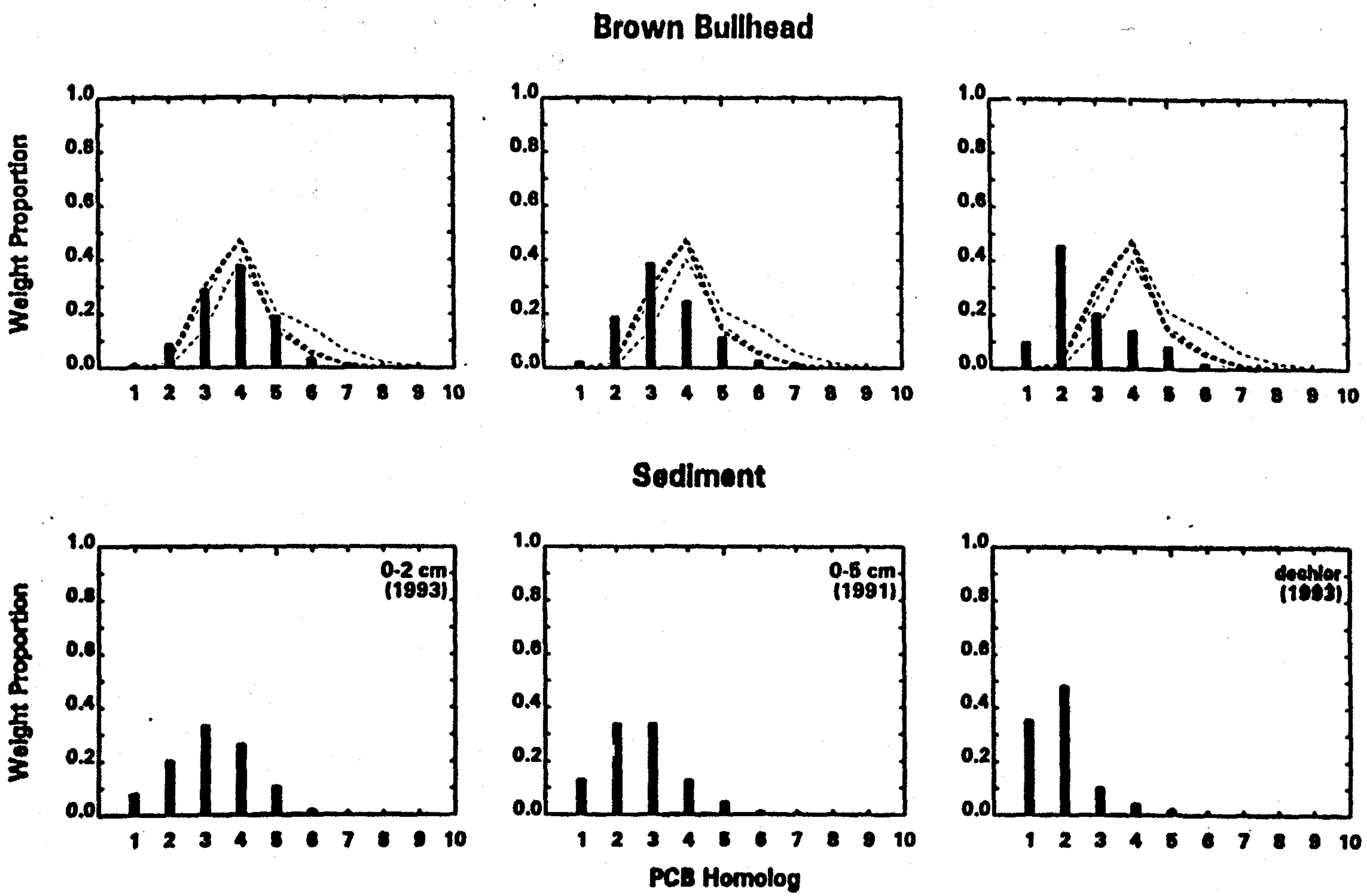
17-23



STEADY STATE FOOD WEB MODEL
BROWN BULLHEAD IN THOMPSON ISLAND POOL

Data: after 1989
light dashed lines: Upper HR, +/-2 std errs
heavy dashed lines: TI Pool
Model: Age 3 Brown Bullhead

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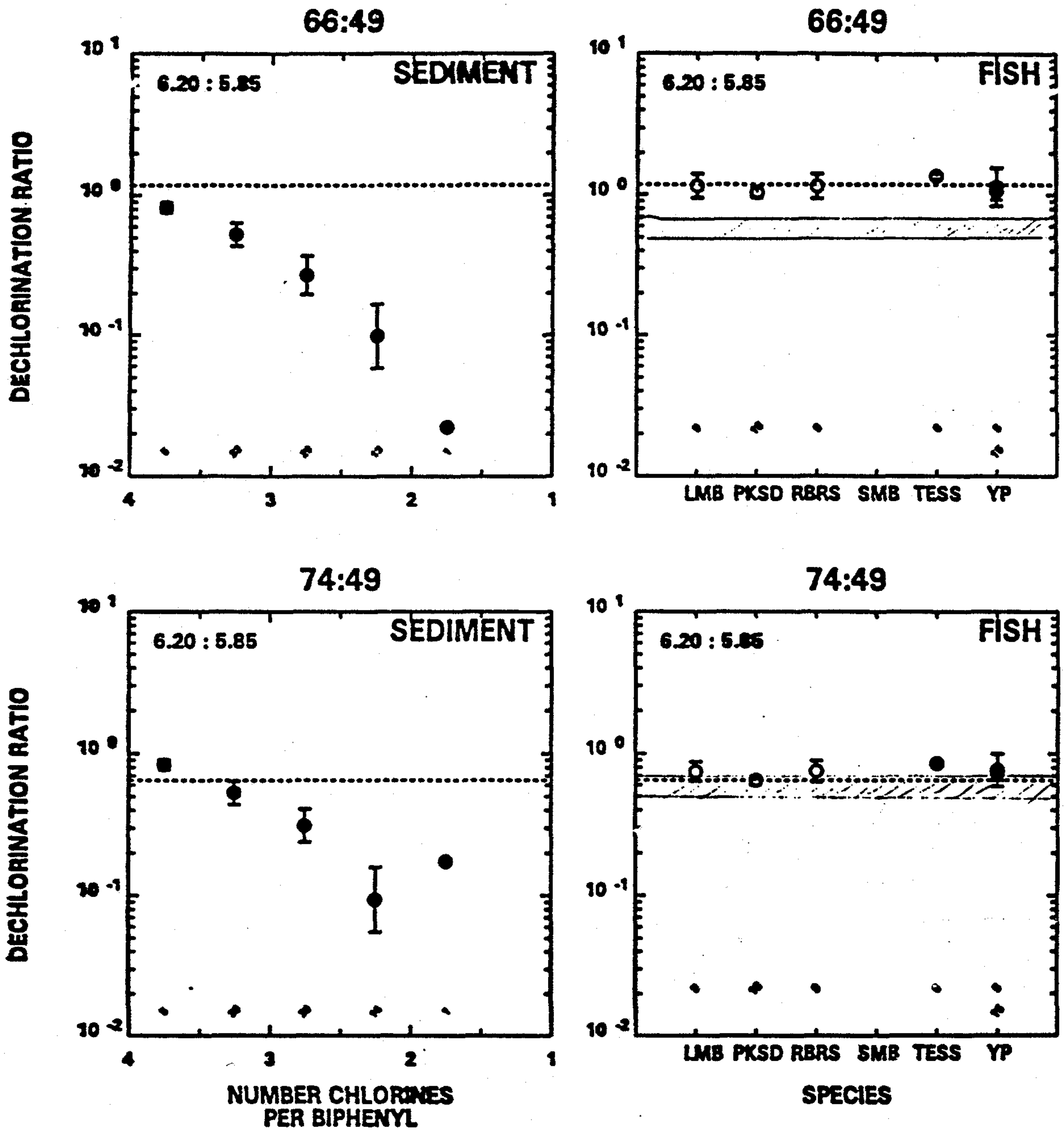

PCB Congener Dechlorination Ratios in Upper Hudson River (RM> =153)
Geometric Mean +/- 2 Standard Errors
Sediment: USEPA Phase II High Resolution Cores 0-40 cm (0.5 CL/BP bins)
Fish: O NOAA
● USEPA Phase II
Horizontal Dashed Line Represents Ratio in Aroclor 1242

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EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency is conducting a study of the Hudson River PCBs Superfund site, reassessing the interim No Action decision the Agency made in 1984. The goal of the Reassessment study is to determine an appropriate course of action for the PCB-contaminated sediments in the Upper Hudson River in order to protect human health and the environment.

During the first phase of the Reassessment, EPA compiled existing data on the site, and conducted preliminary analyses of the data. As part of the second phase, EPA conducted field investigations to characterize the nature and extent of the PCB loads in the Upper Hudson and the importance of those loads to the Lower Hudson. EPA also conducted analyses of data collected by the New York State Department of Environmental Conservation, the U.S. Geological Survey, and the General Electric Company (GE), as well as other private and public agencies.

This report is the third of a series of six volumes that make up the Phase 2 Report. This volume, the Data Evaluation and Interpretation Report, provides detailed descriptions an din-depth interpretations of the water column and dated sediment core data collected as part of the Reassessment. The report helps to provide an improved understanding of the geochemistry of PCBs in the Hudson River. The report does not explore the biological uptake and human health impacts, which will be evaluated in future Phase 2 volumes.

The conclusions presented herein are based primarily on direct geochemical analyses of the data, using conceptual models of PCB transport and environmental chemistry. The geochemical analyses will be complemented and verified to the extent possible by additional numerical analysis via computer simulation. Results of the numerical simulations will be reported in subsequent reports, primarily in the Baseline Modeling Report.

Major Conclusions - The analyses presented in the Data Evaluation and Interpretation Report lead to four major conclusions as follows:

1. The area of the site upstream of the Thompson Island Dam represents the primary source of PCBs to the freshwater Hudson. This includes the GE Hudson Falls and Ft. Edward facilities, the Remnant Deposits area and the sediments of the Thompson Island Pool.

2. The PCB load from the Thompson Island Pool has a readily identifiable homologue pattern which dominates the water column load from the Thompson Island Dam to Kingston during low flow conditions (typically ten months of the year).

3. The PCB load from the Thompson Island Pool originates from the sediments within the Thompson Island Pool.

4. Sediment inventories will not be naturally "remediated" via dechlorination. The extent of dechlorination is limited, resulting in probably less than 10 percent mass loss from the original concentrations.

A weight of evidence approach provides the support for these conclusions, with several different lines of investigation typically supporting each conclusion. The subordinate conclusions and findings supporting each of these major findings are discussed below.

1. The area of the site upstream of the Thompson Island Dam represents the primary source of PCBs to the freshwater Hudson. This includes the GE Hudson Falls and Ft. Edward facilities, the Remnant Deposit area and the sediments of the Thompson Island Pool. Analysis of the water column data showed no substantive water column load increases (*i.e.*, load changes were less than ten percent) from the Thompson Island Dam to the Federal Dam at Troy during ten out of twelve monitoring events. These results indicate the absence of substantive external (*e.g.*, tributary) loads downstream of the Thompson Island Dam as well as minimal losses from the water column in this portion of the Upper Hudson. These results also indicate that PCB transport can be considered conservative over this area, with the river acting basically as a pipeline (*i.e.*, most of the PCBs generated upstream are delivered to the Lower Hudson). Some PCB load gains were noted during spring runoff and summer conditions, which were readily attributed to Hudson River sediment resuspension or exchange by the nature of their homologue patterns. These load gains were notable in that they represent sediment-derived loads which originate outside the Thompson Island Pool, indicating the presence of substantive sediment inventories outside the Pool. The Mohawk and Hoosic Rivers were each found to contribute to the total PCB load measured at Troy. The loading from each of these rivers during the 1993 Spring runoff event could be calculated to be as high as 20 percent of the total load at Troy. However, these loads represent unusually large sediment transport events by these tributaries since both rivers were near or at 100-year flood conditions.

A second line of support for the above conclusion comes from the congener specific analyses of the water column samples which show conformity among the main stem Hudson samples downstream of the Thompson Island Dam and distinctly different patterns in the water samples from the tributaries. These results indicate that the tributary loads cannot be large relative to the main stem load since no change in congener pattern is found downstream of the tributary confluences.

This conclusion is also supported by the results of the sediment core analyses which showed the PCBs found in the sediments of the tributaries to be distinctly different from those of the main stem Hudson. As part of this analysis, two measurement variables related to sample molecular weight and dechlorination product content were shown to be sufficient to clearly separate the PCB patterns found in the sediments of the freshwater Hudson from those of the tributaries, indicating that the tributaries were not major contributors to the PCBs found in the freshwater Hudson sediments and by inference, to the freshwater Hudson as a whole.

When dated sediment core results from the freshwater Hudson were examined on a congener basis, sediment layers of comparable age obtained from downstream cores were shown to contain similar congener patterns to those found in a core obtained at Stillwater just 10 miles downstream of the Thompson Island Dam. Based on calculations combining the homologue patterns found at Stillwater with those of other potential sources (*e.g.*, the Mohawk River) it was found that no less than about 75 percent of the congener content in downstream cores was attributable to the Stillwater core. This suggests that the Upper Hudson is responsible for at least 75 percent of the sediment burden, and by inference, responsible for 75 percent of the water column load at the downstream coring locations. Only in the cores from the New York/New Jersey Harbor was substantive evidence found for the occurrence of additional PCB loads to the Hudson. Even in these areas, however, the Upper Hudson load represented approximately half of the total PCB load recorded by the sediments.

The last line of evidence for this conclusion was obtained from the dated sediment cores wherein the total PCB to cesium-137 (^{137}Cs) ratio was examined in dated sediment layers. Comparing sediment layers of comparable age from Stillwater (10 miles downstream of the Thompson Island Dam) to Kingston (100 miles downstream of the Thompson Island Dam), the data showed the sediment PCB to ^{137}Cs ratios at downstream cores to be readily predicted by those at Stillwater, implying a single PCB source (*i.e.*, the area above the Thompson Island Dam) and quasi-conservative transport between Stillwater and locations downstream. These calculations showed downstream ratios to agree with those predicted from Stillwater to within the limitations of the analysis (±25 percent).

2. The PCB load from the Thompson Island Pool has a readily identifiable homologue pattern which dominates the water column load from the Thompson Island Dam to Kingston during low flow conditions (typically 10 months of the year). Evidence for the first part of this conclusion stems largely from the Phase 2 water column sampling program which provided samples above and below the Thompson Island Pool. In nearly every water column sampling event, the homologue pattern of the water column at the Thompson Island Dam was distinctly different from that entering the Thompson Island Pool at Rogers Island. In addition, the Phase 2 and GE monitoring data both showed increased water column PCB loads at the downstream station, relative to the upstream station, particularly under lower flow conditions. Based on the monitoring data collected from June 1993 to the present, water column concentrations and loads typically doubled and sometimes tripled during the passage of the river through the Pool. Thus, a relatively large PCB load originating within the Thompson Island Pool is clearly in evidence in much of the Phase 2 and GE data. This load was readily identified as a mixture of less chlorinated congeners relative to those entering the Pool.

The importance of this load downstream of the Thompson Island Dam is demonstrated by the Phase 2 water samples collected downstream of the Dam. These samples indicate the occurrence of quasi-conservative transport of water column PCBs (*i.e.*, no apparent net losses or gains) throughout the Upper Hudson to Troy during much of the Phase 2 sampling period. This finding is based on the consistency of homologue patterns and total PCB load among the downstream stations relative to the Thompson Island Dam load. Thus, the region above the Thompson Island Dam is responsible for setting water column concentrations and loads downstream of the Dam to Troy. During the low flow conditions seen in the Phase 2 sampling period, as well as in most of the post-June 1993 monitoring data collected by GE, the Thompson Island Pool was responsible for the majority of the load at the Dam. Thus, the Thompson Island Pool load represents the largest fraction of the water column load below the Dam during at least 10 months of the year, corresponding to low flow conditions.

The importance of this load for the freshwater Lower Hudson is derived from a combination of the water column and the sediment core results discussed above. Specifically, the water column results show the Thompson Island Pool to represent the majority of the water column load during much of the year throughout the Upper Hudson to Troy. The dated sediment core results show the Upper Hudson to represent the dominant load to the sediments of the Lower Hudson and, by inference, to the water column of the Lower Hudson. Since the majority of the Upper Hudson load is derived from the Thompson Island Pool, the Thompson Island Pool load represents the majority of the PCB loading to the entire freshwater Hudson as well.

3. The PCB load from the Thompson Island Pool originates from the sediments within the Thompson Island Pool. The PCB homologue pattern present in the water column at the Thompson Island Dam is distinctly different from that which enters the Thompson Island Pool at Rogers Island. This change in pattern was nearly always accompanied by a doubling or tripling of the water column PCB load during the Phase 2 sampling period and subsequent monitoring by GE. This pattern change and load gain occurred as a result of passage through the Pool. With no known substantive external loads to the Pool, the sediments of the Pool were considered the most likely source of these changes. Upon examination of the PCB homologue and congener patterns present in the sediment cores collected from the Thompson Island Pool and elsewhere, it became clear that the sediment PCB characteristics closely matched those found in the water column at the Thompson Island Dam and sampling locations downstream during most of the Phase 2 sampling period. On the basis of this PCB "fingerprint" it was concluded that the Thompson Island Pool sediments represented the major source to the water column throughout much of the year as discussed above.

Two possible mechanisms for transfer of PCBs to the water column from the sediment were explored and found to be consistent with the measured water column load changes. The first mechanism involved porewater exchange, *i.e.*, the transport of PCB to the water column via the interstitial water found within the river sediments. This mechanism was examined using sediment-to-water partition coefficients developed from the Phase 2 water column samples. These coefficients were used to estimate the homologue patterns found in porewater from the Thompson Island Pool sediments. These patterns were then compared with the measured water column patterns at the Thompson Island Dam. On this basis it was demonstrated that this mechanism is generally capable of yielding the water column homologue patterns seen. This analysis suggested that if porewater exchange is the primary exchange mechanism, then sediments with relatively low levels of dechlorination are the likely candidates for the Thompson Island Pool source.

The alternate mechanism, resuspension of Thompson Island Pool sediments, was also shown to be capable of yielding the water column patterns seen. Since this mechanism works by directly adding sediments to the water column, sediment homologue patterns were directly compared to the those of the water column at the Thompson Island Pool. The close agreement seen between the sediment and water column homologue patterns demonstrated the viability of this mechanism. If resuspension is the primary sediment-to-water exchange mechanism, then the responsible sediments must have comparatively high levels of dechlorination, since the water column homologue pattern at the Thompson Island Dam contains a relatively large fraction of the least chlorinated congeners.

As part of the investigation of Hudson River sediments, a relationship between the degree of dechlorination and the sediment concentration was found such that sediments with higher PCB concentrations were found to be more dechlorinated than those with lower concentrations, regardless of age. This relationship had important implications for the nature of the sediments involved in the sediment-water exchange mechanisms. For porewater exchange, which indicated a low level of dechlorination in the responsible sediments, the sediment concentrations had to be relatively low, although no absolute concentration could be established. For resuspension, the sediment concentrations had to be relatively high (*i.e.*, greater than 120,000 g/kg (120 ppm)) in order to attain the level of dechlorination necessary to drive the Thompson Island Pool load. This in turn suggested that older sediments, particularly the relatively concentrated ones found in the previously identified hot spots are the likely source for this Pool load via the resuspension mechanism. Given the complexities of sediment-water column exchange, it is probable that the current Thompson Island Pool load is the result of some combination of both mechanisms.

Recent large releases from the Bakers Falls area may have also yielded sediments with sufficient concentration so as to undergo substantive alteration and potentially yield some portion of the measured load via resuspension. However, the mechanism for rapid burial and subsequent resuspension is unknown. It is also conceivable that these materials could be responsible for a portion of the load if porewater exchange is the driving mechanism. However, the presence of such deposits is undemonstrated and must still be viewed in light of the prior, demonstrably large PCB inventory.

In this assessment, neither porewater exchange nor resuspension was evaluated in terms of the scale of the flux required to yield the measured Thompson Island Pool load. Such an evaluation will be completed as part of the Baseline Modeling Report.

4. Sediment inventories will not be naturally "remediated" via dechlorination. The extent of dechlorination is limited, resulting in probably less than 10 percent mass loss from the original concentrations. Evidence for this conclusion is principally derived from the dated sediment core data obtained during the Phase 2 investigation. These data show that dechlorination of PCBs within the sediments of the Hudson River is theoretically limited to a net total mass loss of 26 percent of the original PCB mass deposited in the sediment. This is because the dechlorination mechanisms which occur within the sediment are limited in the way they can affect the PCB molecule, thus limiting the effectiveness of the dechlorination process. In fact, although theoretically limited to 26 percent , the actual estimated mass loss is much less, in the range of only 10 percent based on the sediment core results (the mean mass loss for the high resolution sediment core results was eight percent).

A second finding was obtained from the core data which supports this conclusion as well. In core layers whose approximate year of deposition could be established, no correlation was seen between the degree of dechlorination and the age of the sediment. If dechlorination were to continue indefinitely, such a correlation would be expected, with the oldest sediments showing the greatest degree of dechlorination. Instead, a relationship was found between the degree of the dechlorination and the PCB concentration in the sediment, such that the most concentrated samples had the greatest degree of dechlorination. Also, sediments below 30,000 g/kg (30 ppm) showed no predictable degree of dechlorination, suggesting that the PCBs in sediments with less than 30 ppm are largely left unaffected by the dechlorination process. These findings indicate that the dechlorination process occurs relatively rapidly, within perhaps five to ten years of deposition but then effectively ceases, leaving the remaining PCB inventory intact. These results also indicate that the dechlorination process is generally limited to the areas of the Upper Hudson where concentrations are sufficient to yield some level of dechlorination. For those areas characterized by concentrations less than 30 ppm, dechlorination is not expected to have any effect at all. Thus, dechlorination cannot be expected to yield further substantive reductions of the Hudson River PCB inventory beyond the roughly ten percent reduction already achieved.

An important related finding concerning the Upper Hudson sediments was obtained from the geophysical survey completed during the Phase 2 investigation. This survey showed a general correlation between areas of fine-grained sediment and the *hot spot* areas previously defined by NYSDEC. Since PCBs have a general affinity for fine-grained sediments, it can be assumed that the fine-grained sediment areas mapped by the geophysical survey represent the same

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PCB-contaminated zones mapped by NYSDEC. This indicates that the *hot spot* areas previously mapped by NYSDEC are largely still intact and have not been completely redistributed by high river flows.

Ancillary Conclusions

In addition to the conclusions described above, there are several additional findings which have important implications for the understanding of PCB transport in the Hudson River. These are discussed briefly below. More extensive discussions of these conclusions can be found in the summary discussions contained within each chapter.

- Erratic releases of apparently unaltered PCBs above Rogers Island, probably from the GE Hudson Falls facility, dominated the load from the Upper Hudson River during the period September 1991 to May 1993. The load at Rogers Island now represents about a third of the total load at the Thompson Island Dam.

- The unaltered PCB load originating above Rogers Island is predominantly Aroclor 1242 with approximately 4% Aroclor 1254 and 1% Aroclor 1260.

- The annual net Thompson Island Pool load ranged from 0.36 to 0.82 kg/day over the period April 1991 to October 1995, representing between 20 to 70% of the total load at the Thompson Island Dam based on data obtained by GE. During the period of June 1993 to October 1995, the net Thompson Island Pool load varied between 50 to 70% of the total load at the Thompson Island Dam.

- The Upper Hudson area above the Thompson Island Dam, *i.e.*, the Hudson Falls and Fort Edward facilities, the Remnant Deposit area and the Thompson Island Pool, has represented the largest single source to the entire freshwater Hudson for the past 19 years, representing approximately 77 to 91% of the load at Albany in 1992 - 1993 based on water column measurements.

- While the homologue pattern in the freshwater Hudson is dominated by the homologue pattern from the Thompson Island Pool, minor changes in the PCB pattern downstream of the Thompson Island Dam have been observed. The resulting water column patterns resemble those seen in downstream sediments and associated porewater. However, it is unclear whether this change is the result of subsequent downstream sediment-water exchange or *in situ* water column processes (*e.g.*, aerobic degradation), given the temporal dependence. In particular, the congener pattern seen at the Thompson Island Dam is preserved throughout the Upper Hudson during winter and spring but appears to undergo modification during summer conditions when biological activity is high but energy for sediment-water exchange is low. Porewater exchange may be important under these conditions.

- Water-column PCB transport occurs largely in the dissolved phase, in the Upper Hudson, representing 80% of the water-column PCB inventory during 10 to 11 months of the year.

- Dissolved-phase and suspended-matter PCB water-column concentrations at the Thompson Island Dam and downstream appear to be at equilibrium as defined by a two-phase model dependent on temperature and the particulate organic carbon content.

- Evidence suggests that the Upper Hudson River PCB load can be seen as far downstream as RM -1.9. The contribution is estimated to represent about half of the total PCB loading to the New York/New Jersey Harbor.

- Two estimates were made of the PCB inventory sequestered in the sediments of the Thompson Island Pool, based on the 1984 NYSDEC data. The first estimate, based on a technique called polygonal declustering, yielded an estimate of 19.6 metric tons (the original NYSDEC estimate was 23.2 by M. Brown *et al.*, 1988). The second, based on a geostatistical technique called kriging, yielded an estimate of 14.5 metric tons.

- An analysis of the side-scan sonar 500 kHz signal and the 1984 NYSDEC sediment PCB survey indicated that the acoustic signal could be used to predict the level of sediment PCB contamination. Acoustic data can be used to separate areas of assessed low PCB levels (mean concentration of 14.6 mg/kg) from areas of relatively high PCB contamination (mean concentration of 48.4 mg/kg). Based on this correlation and corresponding changes in river cross-sectional area, maps were created delineating the likely distribution of contaminated sediments within the region of the river surveyed.

- The extent of dechlorination in the sediments was found to be proportional to the log of the total PCB concentration and had no apparent time dependence. Sediments as old as 35 years were found where little or no dechlorination was present.

- Below a concentration of 30,000 g/kg, dechlorination mass loss did not occur predictably and was frequently 0%. Dechlorination mass loss of greater than 10% of the original total PCB concentration was limited to sediments having greater than 30,000 g/kg of total PCBs.

- Some sediments, particularly those in the freshwater Lower Hudson, show substantively higher molecular weights and lower fractions of BZ#1, 4, 8, 10 and 19. These conditions may be the result of aerobic degradation during transport from the Upper Hudson.

- Regardless of the sediment type or mechanism, the sediments of the Thompson Island Pool have historically contributed to the water column PCB load and will continue to do so for the foreseeable future. It is unlikely that the current loading levels will decline rapidly in light of their relatively constant annual loading rates over the last three years.

In conclusion, the sediments of the Thompson Island Pool strongly impact the water column, generating a significant water column load whose congener pattern can often be seen throughout the Upper Hudson. The Phase 2 investigation has also found a number of sediment structures via the geophysical investigation which closely resemble the *hot spot* areas defined previously by NYSDEC. These hot spot-related structures appear to be intact in spite of the time between the Phase 2 and NYSDEC studies. Given the strong linkage between sediment and water, the large inventory of PCBs in the Upper Hudson, and the apparent lack of significant reduction in PCB concentrations via *in situ* degradation, it is unlikely that the water column PCB levels downstream of the Thompson Island Dam will substantially decline beyond current levels until the active sediments are depleted of their PCB inventory or remediated. The time for depletion appears to be on the scale of a decade or more and will be investigated further through the planned computer simulations.

ATTACHMENT B, 1-15

New York State Canal Corporation

200 Southern Boulevard
Post Office Box 189
Albany, New York 12201-0189

Canal Operations

Matthew P. Behrmann
Director

Office of Canal Maintenance and Operations

John M. King, P.E.
Director

Phone (518) 471-5010
TDD/TTY 1-800-253-6244
Fax (518) 471-5023

September 22, 1997

Mr. Douglas Tomchuck
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

RE: Hudson River Reassessment

Dear Mr. Tomchuck:

As you are aware, the State of New York is mandated under the State Constitution to maintain navigation within the Hudson River portion of the Champlain Canal. A portion of the river from Troy to Fort Edward is contaminated with PCB's which are currently being studied under the Hudson River PCB Reassessment RI/FS. The Canal Corporation needs to dredge this portion of the river to maintain the proper depth for both commercial and recreational navigation in the Canal System. We request your assistance since we need to proceed with dredging for navigational purposes in the Hudson River prior to your decision on sediment remediation, now scheduled for December 1999. We also request that your decision on the PCB contaminated sediments incorporate both the present and future dredging needs for navigational use of the river.

Enclosed is a listing of the areas and approximate volumes where we have identified dredging is required for proper navigation in the river. The estimated 437,000 cubic yards of sediments in this portion of the river needs to be removed and handled properly as quickly as possible.

Should you have questions regarding this matter, please contact me at (518)471-5020.

Sincerely yours,

John R. Dergosits, P.E.
Canal Environmental Engineer
Canal Operations and Maintenance

Enclosure
cc: W. Ports - NYSDEC, Albany

10.10906

CHAMPLAIN CANAL

LOCATION OF THE BLOCKAGE R = RED BUOY W = GREEN BUOY	THE DEPTH OF WATER IN THE DEEPEST PART OF THE CHANNEL	LOCATION OF THE DEEPEST WATER IN THE CANAL CHANNEL	VOLUME CUBIC YARDS
W1-W5	10'[1]	East or Middle of Channel	
W5-W7	11'[1]	West or Middle of Channel	30.000
R10-R14	11'[1]	East or Middle of Channel	
R16-R18	12'	East Side of Channel	15,000
R18-R22	10'[1]	Middle of Channel	15.000
Lock C1-R28	11'	East or Middle of Channel	9.000
W31-W37	12'	East or Middle of Channel	3.550
R38-R38A	12'	Middle of Channel	750
R42-W43	12'	East or Middle of Channel	600
W43-Lock C2	11'	Middle of Channel	2.000
Lock C2-R48	10'	Middle of Channel	4.000
R48-R56	11'	Middle of Channel	8.000
R56-R62A	11'	Middle of Channel	5.100
W65-Lock C3	11'	Middle of Channel	1.000
Lock C3-R68	11'[2]	Middle of Channel	12.700
2 R68-R72A	7'[2]	Middle of Channel	6.000
R72A-R74	8'[2]	Middle of Channel	8.400
W77-W81	12'	Middle of Channel	960
W83-R80	12'	East or Middle of Channel	1.700
W87-R88	11'	West Side of Channel	4.500
R90-R92	11'	Middle of Channel	33.500
W107-W109	11'	Middle of Channel	7.2[illegible]
R112-W115	11'	East or Middle of Channel	4.500
R128	12'	West or Middle of Channel	2.200
W133	12'	East or Middle of Channel	2.200
W137	12'	East or Middle of Channel	2.200
R140	12'	West or Middle of Channel	1.700
Lock C5-R160	12'	Middle of Channel	9.335
1 R160-R166	11'	East or Middle of Channel	25.000
R166-W169	12'	West or Middle of Channel	7.500
W173-W175	12'	East or Middle of Channel	2.600
R180-R180A	12'	West or Middle of Channel	550
W177-Lock C6	11'	West or Middle of Channel	1.600
Lock C6-R190	11'	Middle of Channel	27.000
W189	12'	East or Middle of Channel	1.900
R196-W197	11'	Middle of Channel	2.500
3 W197-W205	10'	Middle of Channel	30.000
R204-R210	12'	Middle of Channel	2.800
4 R210-W219	10'	Middle of Channel	82.300
W225-Ft. Edward Terminal	6'	Middle of Channel	61.736
		TOTAL	437.106

NOTES:

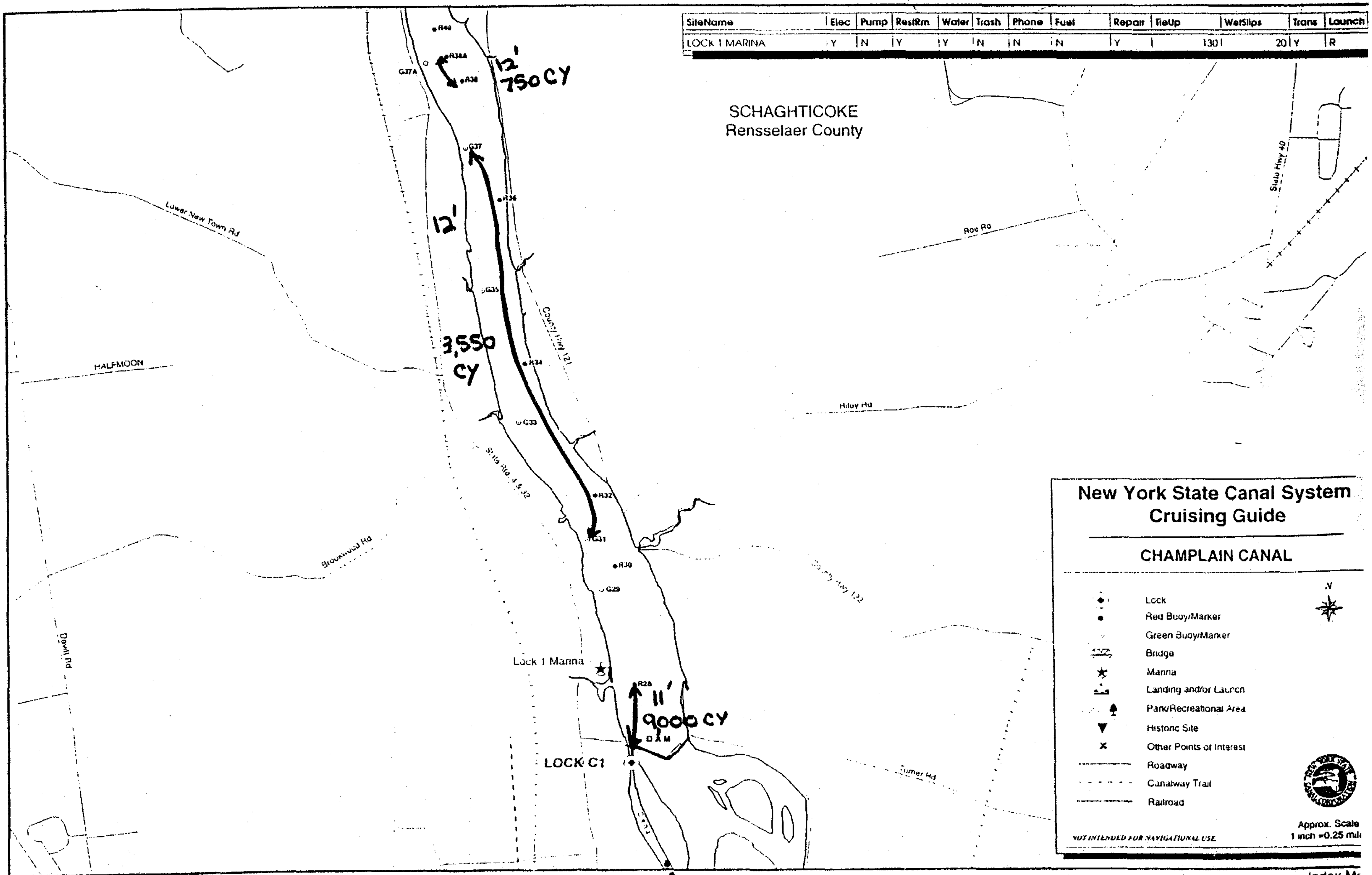
1 Pool depth is 1.7' deeper than shown due to flashboards at the Troy Federal Dam.

2 Pool depth is 3.0' deeper than shown due to movable dam at Mechanicville Hydroelectric facility.

1 - Immediate Need

10.10907

SiteName	Elec	Pump	RestRm	Water	Trash	Phone	Fuel	Repair	TieUp	WetSlips	Trans	Launch
LOCK 1 MARINA	Y	N	Y	Y	N	N	N	Y	130	20	Y	R



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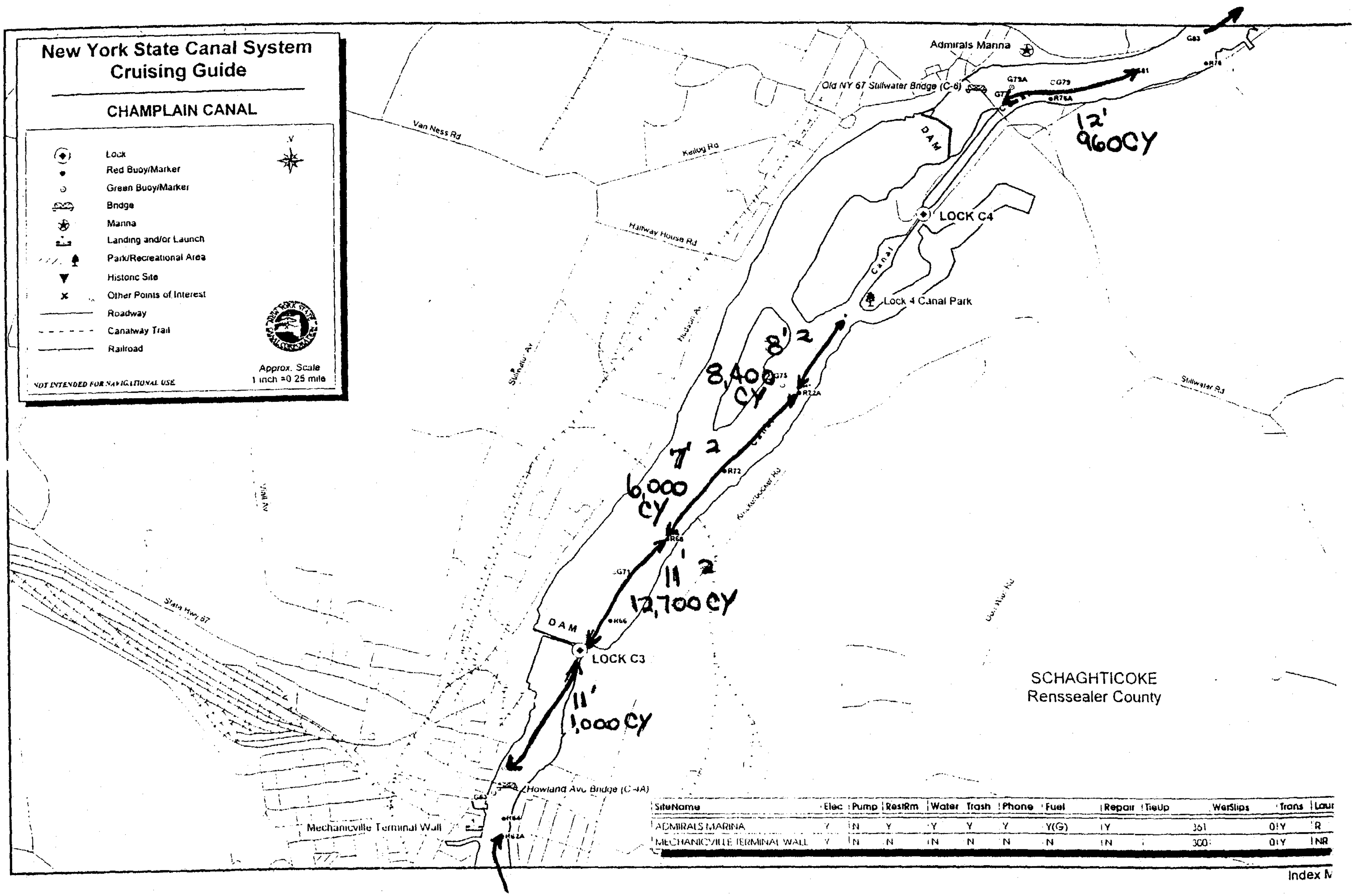
10.10908

10.10909



SiteName	Elec	Pump	RestRm	Water	Trash	Phone	Fuel	Repair	TieUp	WetSlips	Trans	Lau
ADMIRALS MARINA	Y	N	Y	Y	Y	Y	Y(G)	Y		361	0 Y	R
MECHANICVILLE TERMINAL WALL	Y	N	N	N	N	N	N	N		300	0 Y	NR

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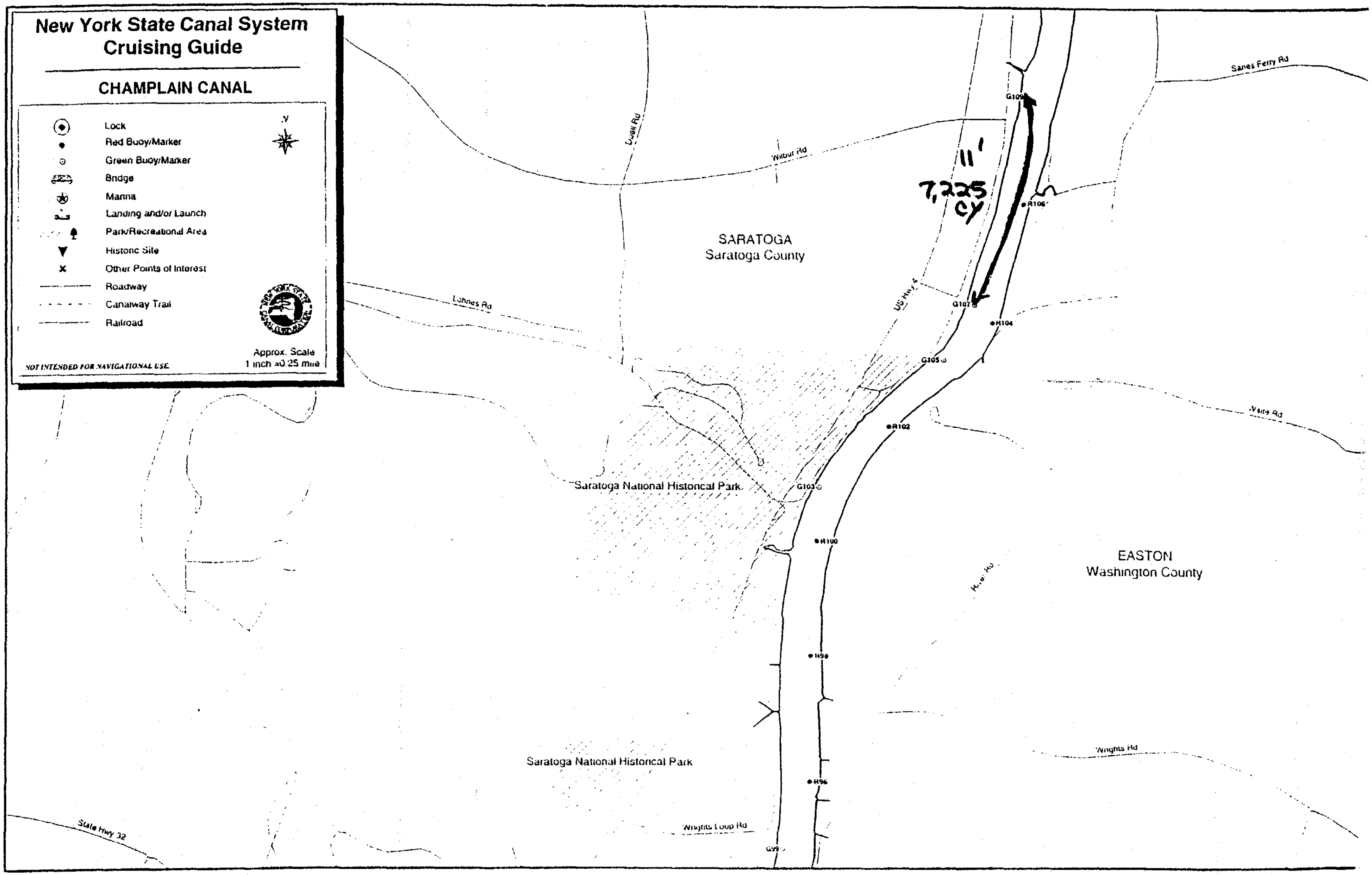
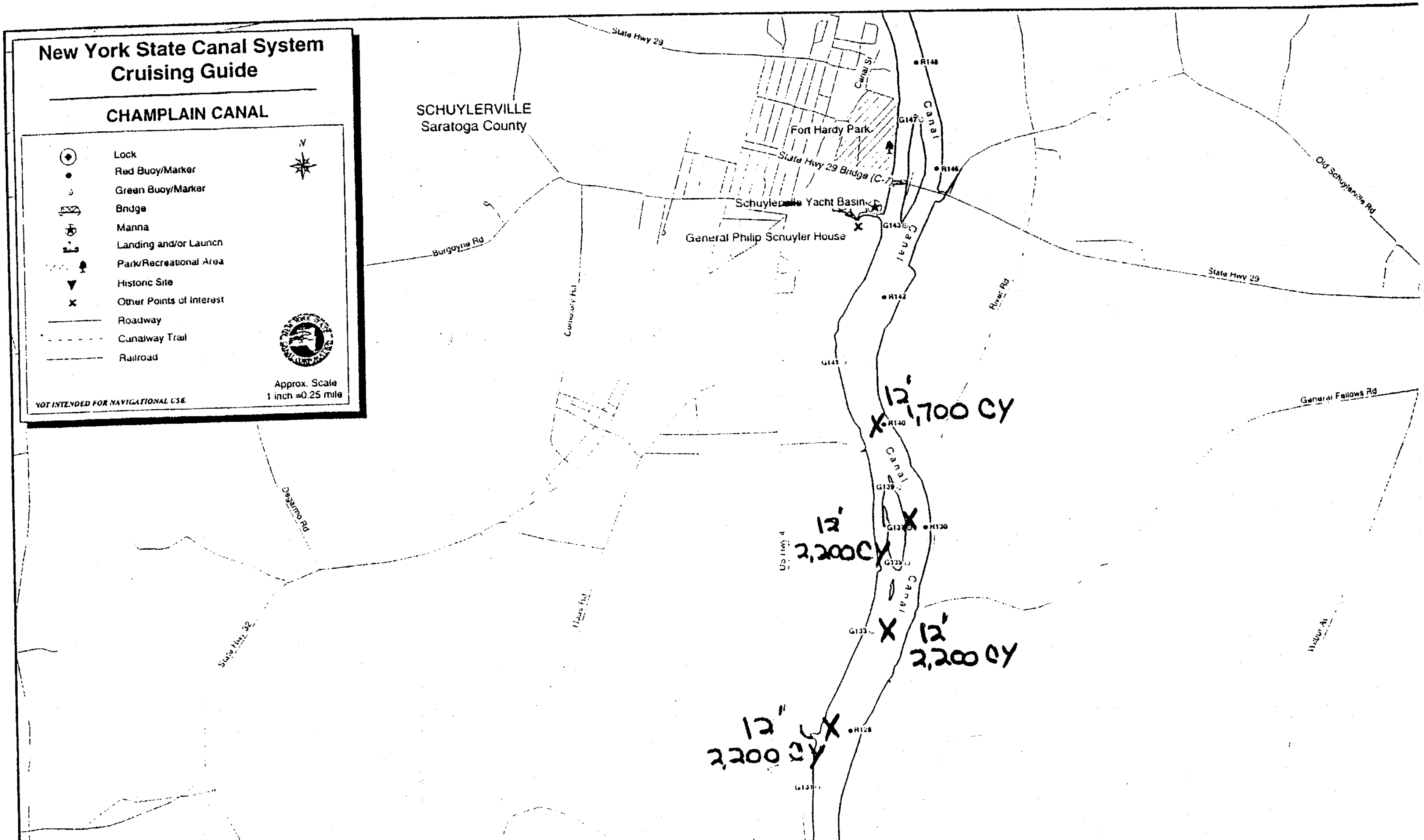


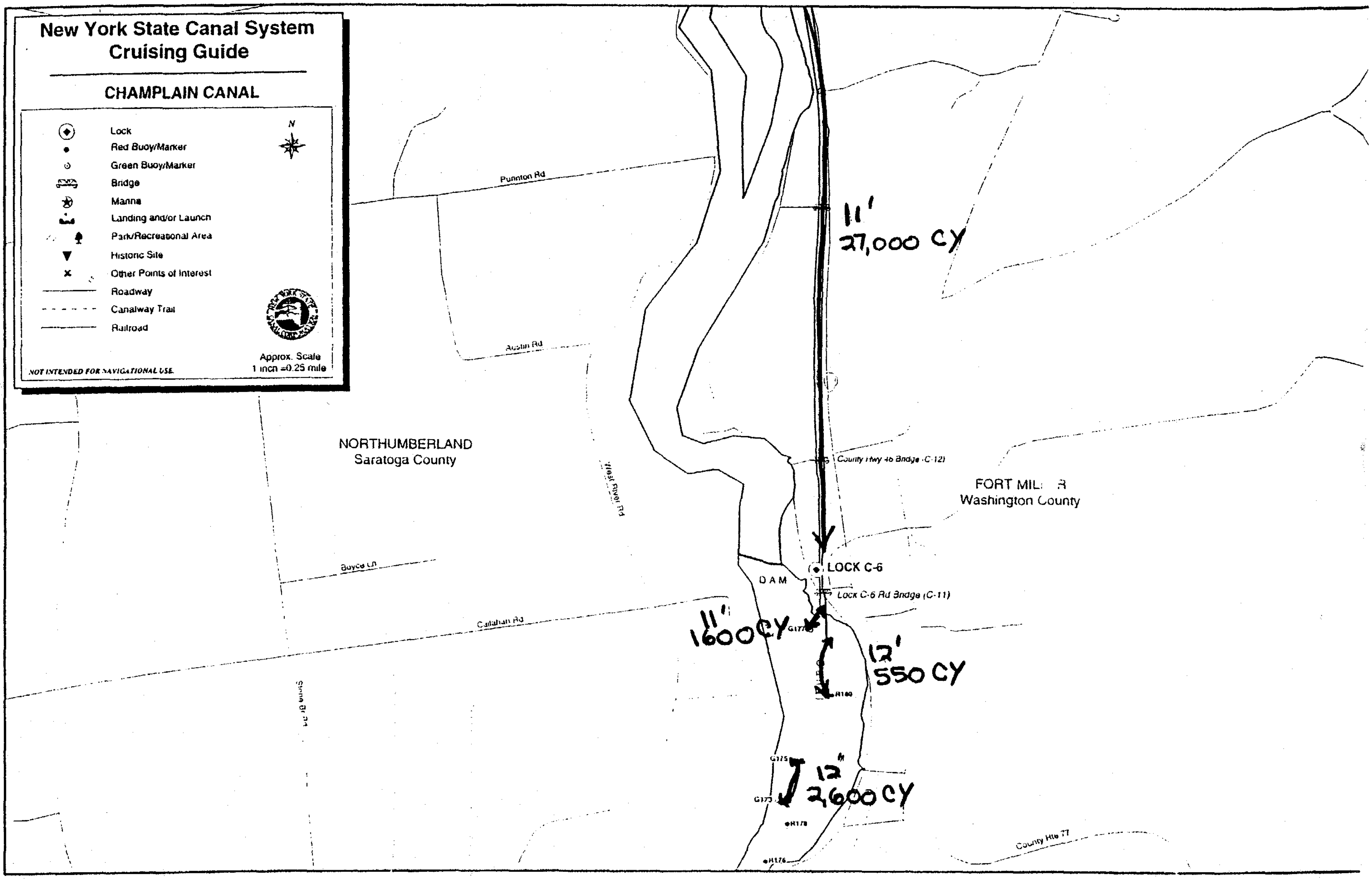
Index Map

10.10910

10.10911



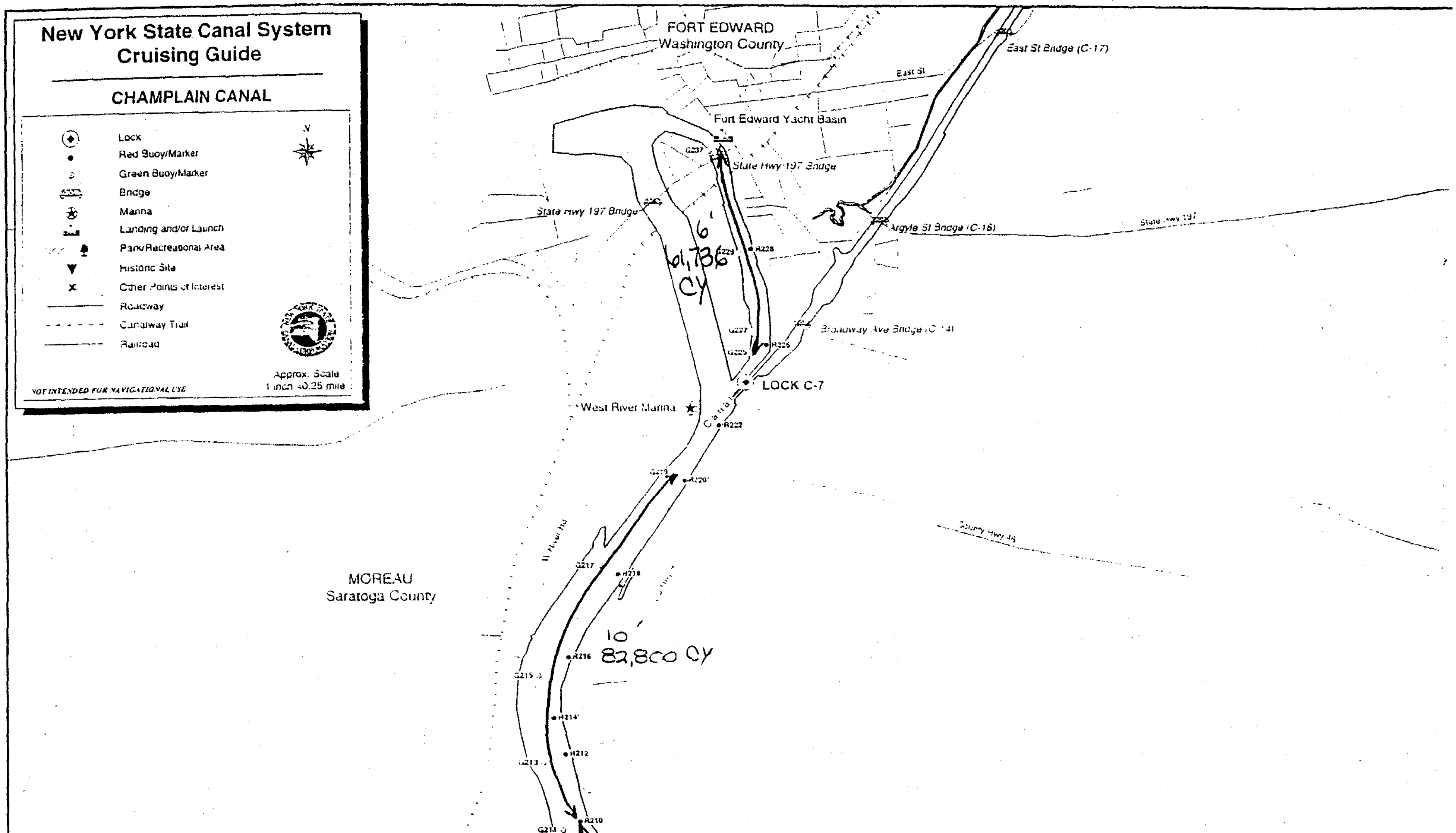
SiteName	Elec	Pump	RestRm	Water	Trash	Phone	Fuel	Repair	TieUp	WetSlips	Trans	Launch
SCHUYLERVILLE YACHT BASIN	Y	Y	Y	Y	N	Y	Y (G&D)	Y	1,200	52	Y	NR



Index Map

10.10912

10.10913



SiteName	Elec	Pump	RestRm	Water	Trash	Phone	Fuel	Repair	TieUp	WetSlips	Trans	La
FORT EDWARD YACHT BASIN	Y	N	N	Y	N	Y	N	N		200	0 Y	NO
WEST RIVER MARINA	Y	Y	Y	Y	N	N	Y(G&D)	Y		-1	0 Y	NR

Index Ma