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WATER SAMPLING AND ANALYSIS

TASK 1

INSTREAM CONTAMINANT STUDY

DOE/OR/21444--T1

DE85 013501

Prepared for

U.S. Department of Energy
Oak Ridge, Tennessee
Under Interagency Agreement No. DE-AI05-84OR21444

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Office of Natural Resources and Economic Development
Tennessee Valley Authority
April 1985

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TASK 1

WATER SAMPLING AND ANALYSIS
INSTREAM CONTAMINANT STUDY

1.0 INTRODUCTION

On November 3, 1983, the Oak Ridge Task Force under direction of the Tennessee Division of Water Management, approved conceptual workplans prepared by four subgroups of the Task Force. These workplans addressed potential offsite contamination problems associated with the Department of Energy (DOE) facilities near Oak Ridge, Tennessee. The conceptual workplans were transmitted to DOE on November 14, 1983. DOE subsequently authorized the Tennessee Valley Authority (TVA) to prepare a technical workplan covering the instream water, sediment, fish, and floodplain sampling approved by the Task Force (1). The Instream Contaminant Study workplan was submitted to DOE in February of 1984 and the work authorized by Interagency Agreement No. DE-AI05-84OR21444, TVA Contract No. TV-64095A, between DOE and TVA, and approved by the TVA Board of Directors on April 30, 1984.

This is the first of five task reports on the Instream Contaminant Study. It presents the results of field measurements, sample collections, and laboratory analyses of surface waters downstream of the DOE facilities. Included are the results of one baseflow survey and two storm event surveys conducted from May through November 1984. Sampling of a third storm was conducted on April 5 and 6, 1985. The results of this storm event survey will be reported in the Task 3 report (Sediment Transport).

The Task 1 report presents the water data collected and the procedures for collecting, handling, and analyzing the samples. Results are summarized in graphs and tables that include available criteria, standards, and background levels. The procedures and data are discussed for clarification, but the implications of the data have not been assessed. All data are presented in Appendices I, II, and III.

1.1 PURPOSE

The purpose of Task 1 of the Instream Contaminant Study is to define the hydrologic characteristics and mercury concentrations in East Fork Poplar Creek and Bear Creek for sediment transport predictions. A limited number of water quality samples were collected to determine the presence of other contaminants which might be added to ongoing monitoring programs. Flow measurements were made and/or water samples collected from the Clinch River, East Fork Poplar Creek, Bear Creek, Poplar Creek, and lower White Oak Creek during one baseflow condition and from East Fork Poplar Creek, Bear Creek, and Mill Branch during two stormflow conditions. The results of a third stormflow survey conducted April 5 and 6, 1985, will be reported in the Task 3 report.

1.2 SCOPE

The baseflow survey consisted of field measurements and sample collections at nine stations: Clinch River Miles (CRM) 24.0, 23.0, 15.0, 10.0, and 6.8; East Fork Poplar Creek Mile 14.36; Bear Creek Mile 7.4; White Oak Creek Mile 0.4; and Poplar Creek Mile 13.8. Six of these stations were

included in the interagency agreement approved April 30, 1984. Three stations (CRM 24.0 and 6.8, and Poplar Creek Mile 13.8) were added in May of 1984 to provide supplemental data requested by the Oak Ridge National Laboratory (ORNL). Baseflow field measurements included dissolved oxygen (DO), temperature, pH, conductivity, alkalinity, and water level. Laboratory analyses included selected metals, nutrients, priority pollutants, oil and grease, solids, turbidity, hardness, and radiological parameters (1).

The stormflow surveys involved sampling and laboratory analyses of mercury, suspended solids, turbidity, particle size distribution, specific gravity, and radiological parameters. Streamflow and precipitation data were also collected during each stormflow survey. Stormflow sampling stations were located at East Fork Poplar Creek Miles 14.36, 10.0, 6.8, 3.3, and 0.03; Mill Branch Mile 0.2 (a tributary to East Fork Poplar Creek); and Bear Creek Mile 0.55.

2.0 SAMPLING STATIONS AND PARAMETERS

2.1 BASEFLOW WATER QUALITY SURVEY

The location and description of each baseflow sampling station are given in Table 1 and shown in Figure 1. Table 2 lists the laboratory and field parameters which were analyzed, the total number of analyses, and the

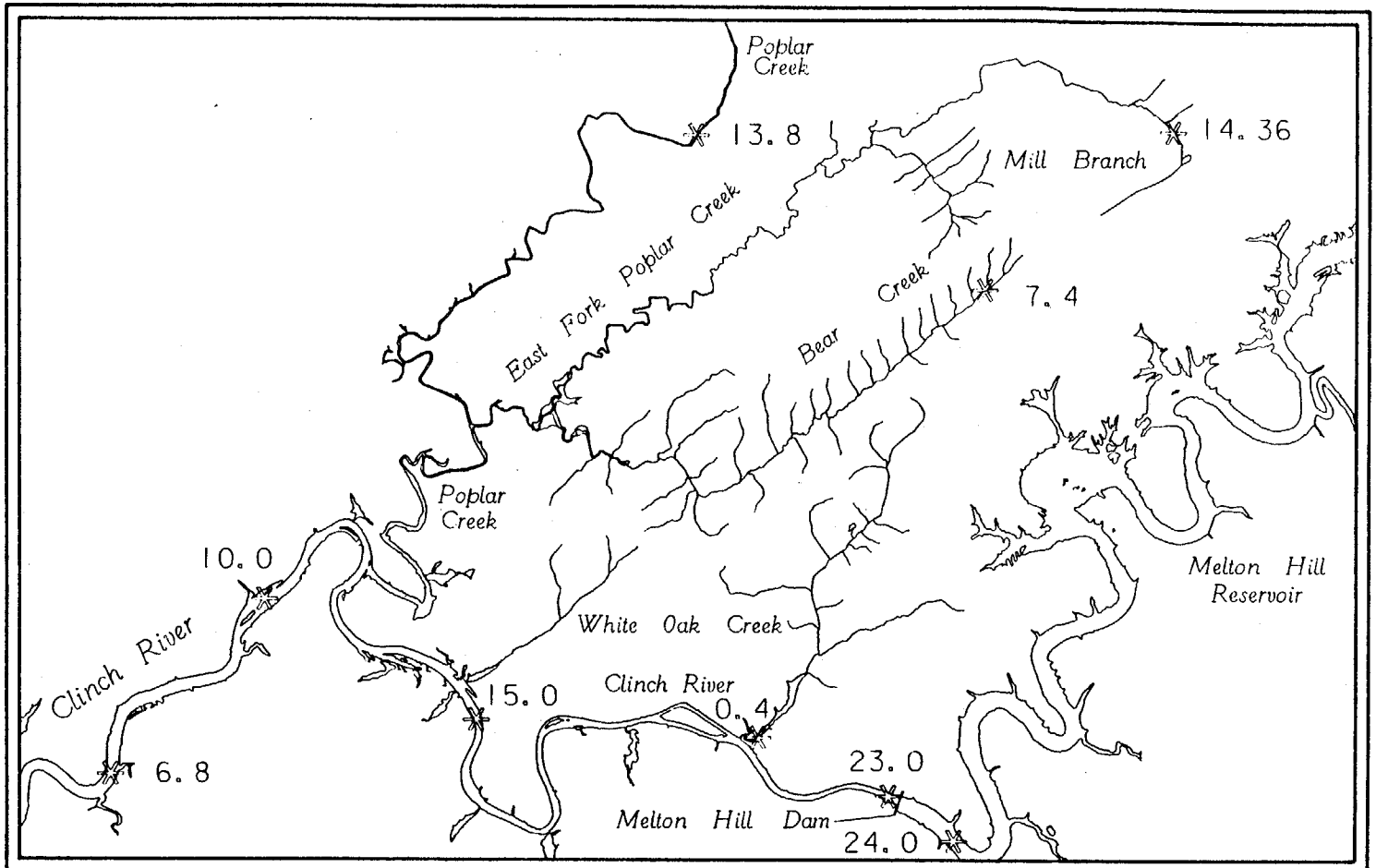

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FIGURE 1

INSTREAM CONTAMINANT STUDY - TASK 1

BASEFLOW SURVEY - SAMPLING LOCATIONS

10 000 0 10 000 20 000 FEET
2 0 2 4 6 KILOMETERS

N

LEGEND:
BASEFLOW SAMPLES

FEBRUARY, 1985

TABLE 1

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW WATER QUALITY SURVEY - SAMPLING SITE DESCRIPTIONS

Stream	Mile	Description
East Fork Poplar Creek	14.36	Below New Hope Pond diversion point into East Fork Poplar Creek
Bear Creek	7.40	Upstream of eastern most gate to landfill areas on north side of Bear Creek Valley Road
White Oak Creek	0.40	Downstream of weir
Clinch River	23.00	Immediately below Melton Hill Dam
Clinch River	15.00	Between White Oak Creek and Poplar Creek
Clinch River	10.00	Downstream of Poplar Creek
Clinch River	6.80[1]	Watts Bar Reservoir
Clinch River	24.00[1]	Melton Hill Reservoir, immediately above Melton Hill Dam
Poplar Creek	13.80[1]	Below Indian Creek near USGS stream gage

[1]Stations added as a supplement to the original interagency agreement.

TABLE 2

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW ANALYSES

Parameter	Number of Analyses[1]	Number of Duplicate Analyses
Field Analyses		
Dissolved Oxygen	4	0
Temperature	4	0
pH	4	0
Conductivity	4	0
Alkalinity	6	1
Reservoir Profile[2] (DO, temp., pH, and conductivity	2	0
Stream Stage	3	0
Laboratory Analyses		
Turbidity	4	1
Total Suspended Solids	4	1
Total Volatile Suspended Solids	3	1
Hardness	3	1
Nutrients:		
(a) NH_3-N	3	1
(b) NO_2+NO_3-N	3	1
(c) Total Kjeldahl N	3	1
(d) Total P	3	1
Oil and Grease		
Priority Pollutants:		
(a) Volatile Organics	3	1
(b) Base/Neutral Compounds	3	1
(c) PCBs	3	1
(d) Cyanide	3	1
(e) Total Phenol	3	1
Priority Pollutant Metals (As, Be, Cd, Cr, Cu, Pb, Tl, Ni, Ag, Zn, Sb, Se):		
(a) Total	6	1
(b) Dissolved	3	0
Radiological Analyses		
(a) Gross Alpha	6	1
(b) Gross Beta	6	1
(c) Gamma Spectroscopy	6	1
(d) Tritium (^3H)	6	1
(e) Sr 90, Pu 238 and 239, Tc 99, Np 237, Th 232 and 228, U 238, 234 and 235[3]	1	0
Lithium	3	1
Aluminum	3	1
Mercury:		
Total	7	1
Dissolved	7	1

[1]Number does not include duplicate analyses.

[2]Reservoir profiles of DO, temperature, pH, and conductivity were measured in situ using a HYDROLAB System 8000 field monitor.

[3]Analyses performed by ORNL.

duplicate analyses conducted for each parameter. All samples were collected at surface depth except at Clinch River Miles (CRM) 24.0 and 6.8 which were sampled at depths of 7 and 5 meters, respectively.

2.2 STORMFLOW SURVEYS

The location and description of the seven stormflow sampling stations are given in Table 3 and shown in Figure 2. Also given in Table 3 are the types of sampling and stream gaging equipment used at each location. Table 4 lists the parameters which were analyzed for both the first and second storm events. Also given are the different sample collection methods associated with each parameter and the total number of samples analyzed.

3.0 PROCEDURES AND METHODOLOGY

3.1 FIELD PROCEDURES

All water samples were obtained in accordance with applicable sample collection, handling, and preservation procedures as described in the TVA Field Operations Natural Resource Engineering Procedures Manual (2).

3.1.1 BASEFLOW SURVEY

The baseflow water quality survey was conducted on May 30-31, 1984. The Clinch River sampling stations were sampled on May 30; all other locations were sampled on May 31.

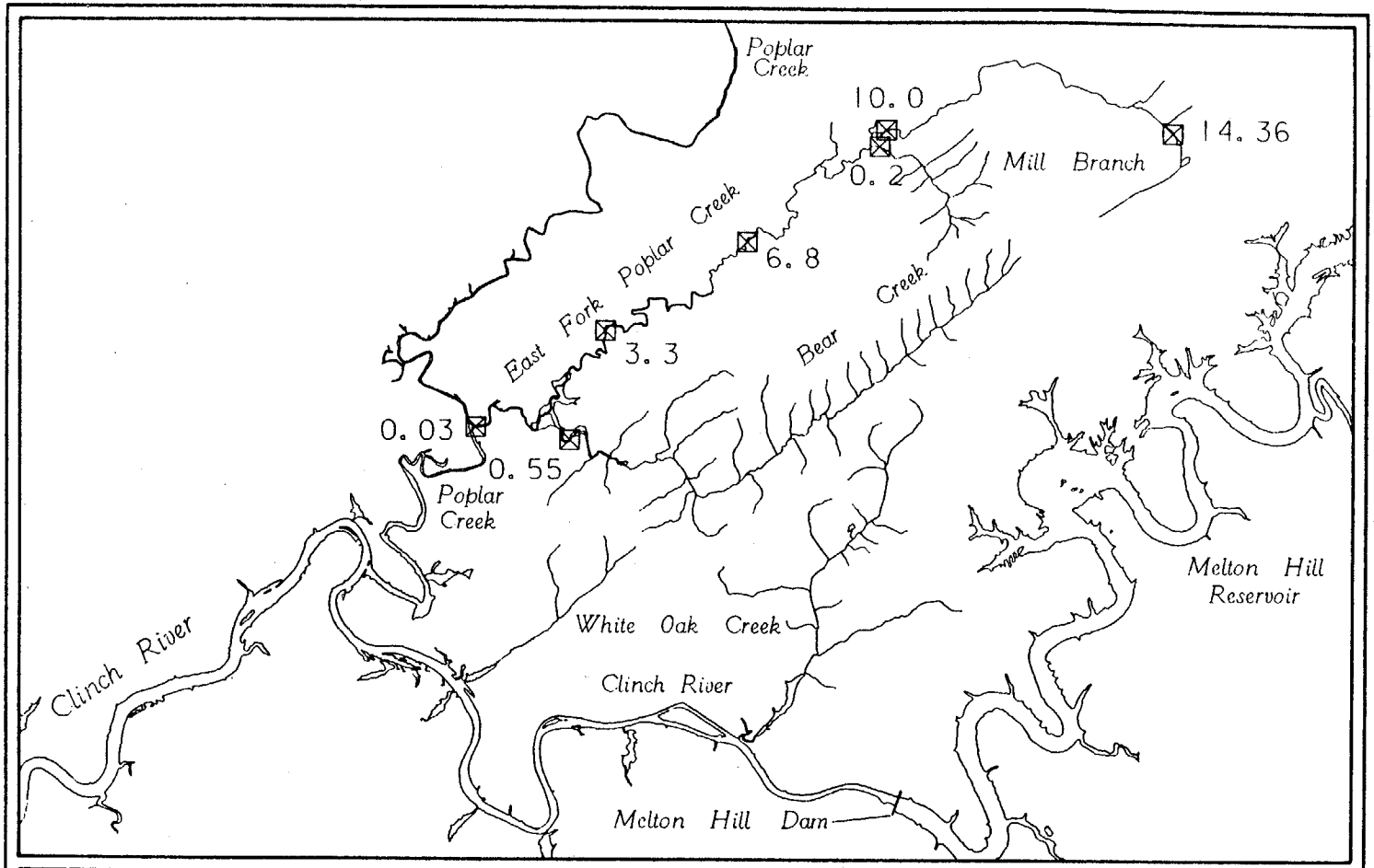

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FIGURE 2

INSTREAM CONTAMINANT STUDY - TASK 1

STORMFLOW SURVEYS - SAMPLING LOCATIONS

10 000 0 10 000 20 000 FEET
2 0 2 4 6 KILOMETERS

N

LEGEND:
STORMFLOW SAMPLES

FEBRUARY, 1985

TABLE 3

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW SAMPLING LOCATIONS AND EQUIPMENT DESCRIPTIONS

Stream	Mile	Description	
		Site	Equipment Used
East Fork Poplar Creek	14.36	Below New Hope Pond division point into East Fork Poplar Creek	PS 69 automatic water sampler, FW-2 stream gage recorder and staff gage. Depth integrated sampler.
East Fork Poplar Creek	10.0	Upstream of Wiltshire Drive bridge	Same as EFPCM 14.36 plus bedload sampler.
East Fork Poplar Creek	6.8	Downstream of Gum Hollow Road bridge at Oak Ridge Country Club Golf Course	FW-2 stream gage recorder and staff gage. Depth integrated and fixed stage water samplers.
East Fork Poplar Creek	3.3	USGS Gaging Station	Same as EFPCM 10.0 plus USGS stream gage.
East Fork Poplar Creek	0.03	Upstream of confluence with Poplar Creek	FW-2 stream gage recorder and staff gage. Depth integrated water sampler.
Mill Branch	0.2	Upstream 1000' of confluence with East Fork Poplar Creek	Same as EFPCM 6.8.
Bear Creek	0.55	Upstream from the influence from East Fork Poplar Creek backwater	Same as EFPCM 14.36.

TABLE 4

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW ANALYSES

Parameter	Sample Collection Method		Number of Analyses[1] Storm #1	Storm #2
Total Suspended Solids	Automatic PS 69		19	31
	Manual-Depth Integ.		36	37
	Fixed Stage		0	4
	Time Composite		4	5
		TOTAL	59	77
Total Volatile Suspended Solids	Automatic PS 69		19	31
	Manual-Depth Integ.		0	0
	Fixed Stage		0	4
		TOTAL	19	35
Turbidity	Automatic PS 69		19	31
	Manual-Depth Integ.		6	0
	Fixed Stage		0	4
		TOTAL	25	35
Mercury (Total and Dissolved)	Automatic PS 69		18	27
	Manual-Depth Integ.		6	0
		TOTAL	26	27
Radiological Analyses (Gross Alpha, Gross Beta, Gamma Spectroscopy)	Grab		4	4
Suspended Sediment Particle Size Analyses (mg/L greater than 62, 125, 500, and 2,000 micrometers and total suspended solids)	Time Composite		7	7
Suspended Sediment Specific Gravity	Time Composite		7	7
Bedload Particle Size Analyses (percent finer than 0.25 in., and 2,000, 500, 125, and 62 micrometers)	Spatial Composite		4	4
Bedload Specific Gravity	Spatial Composite		4	4
Streamflow	FW-2 Stream Gage Recorder and Staff Gage		Continuous Record	Continuous Record

[1]Number of analyses does not include duplicate analyses.

Samples for nitrate+nitrite nitrogen analyses were recollected at Bear Creek Mile 7.4 on June 26 after laboratory analyses of the May 31 sample revealed a nitrate+nitrite nitrogen concentration of 240 mg/L as N. The June 26 sample had a concentration of 380 mg/L. Samples for cyanide and total phenols analyses were recollected on September 9 at all locations due to inadequate sample preservation.

All samples were collected at mid-channel and surface depth except at Clinch River Miles 24.0 and 6.8 where samples were collected at mid-depth in the reservoir and at White Oak Creek Mile 0.4 which was sampled on the left bank. Dissolved oxygen (DO), pH, temperature, and conductivity were measured in situ using a HYDROLAB System 8000 field monitor. These measurements were made as reservoir profiles at Clinch River Miles 24.0 and 6.8 by taking measurements at the surface, at one meter increments to ten meters depth, and at three meter increments from ten meters to the reservoir bottom.

3.1.2 STORMFLOW SURVEYS

3.1.2.1 EQUIPMENT INSTALLATION AND DESCRIPTION

As part of a separate interagency agreement with DOE, TVA conducted planning sessions and field inspections to select stormflow sampling sites and equipment for each site.

As part of the Instream Contaminant Study, twenty flow measurements were made at the selected sampling sites to develop flow rating curves for each location where stream gages were to be installed. Stream gaging stations, including FW-2 streamflow recorders, stilling wells, gage houses, walkways, and staff gages were then installed at the sites. Stream gage installation was completed in May 1984.

The PS 69 automatic water sampler which was used to collect stormwater samples for suspended sediment and total and dissolved mercury analyses was installed in 8 feet by 10 feet portable buildings at four sites (Table 3). The sampler intake lines were anchored in the stream at a 45 degree angle downstream, with the intake openings cut parallel to the flow. Operation of the samplers was initiated automatically during a storm event by float switches mounted in the stream at preset stages. After initiation of sampling, the PS 69 samplers collected samples at preset time intervals over the duration of the storm event. Each sampler was tied electrically to a sampling event marker on a FW-2 streamflow recorder at each station to indicate when each sample was collected. The sampling intervals were adjusted, as necessary, during a storm event to best cover the event period. Table 5 lists the initial sampling stage at which the float swtiches were set, the intake location, and the sampling intervals for each PS 69 sampling station. Installation of the PS 69 samplers was completed in July 1984.

TABLE 5

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW SURVEYS - PS 69 AUTOMATIC WATER SAMPLERS -
OPERATION DATA

Stream	Mile	Sampling[1] Interval (Min)	Initial Sampling[2] Stage (Ft)	Intake Location
East Fork Poplar Creek	14.36	5.60	0.40	1/2' off creek bed 12' from right waters edge (RWE)
East Fork Poplar Creek	10.0	5.60	1.00	3/4' off creek bed 12' from RWE
East Fork Poplar Creek	3.3	11.25	2.00	3/4' off creek bed 19' from RWE
Bear Creek	0.55	11.25	0.60	3/4' off creek bed 15' from RWE

[1]Adjusted in the field to obtain representative samples across the storm hydrograph.

[2]Stage refers to corresponding reading on the station staff gage.

TABLE 6

INSTREAM CONTAMINANT STUDY - TASK 1
FIXED-STAGE WATER SAMPLERS - OPERATION DATA

Stream	Mile	Staff Gage Reading of Sampler Intakes (Ft)	Stream Bank of Sampler
East Fork Poplar Creek	6.8	1.5, 2.5, 3.5 4.0, 4.5, 5.0	Right
Mill Branch	0.2	1.25, 1.75, 2.00 2.25, 2.50	Left

Fixed-stage water samplers which were used for collecting suspended sediment samples were installed at two sites (Table 3). These samplers consisted of wooden frames which were anchored in the streambed. Sample bottles were mounted on the frames with intakes at fixed elevations. Samples were collected during a storm event as the stream stage rose to the level of the bottle intake. Table 6 lists the sample intake stages for each fixed-stage water sampler and its location in the stream channel.

Depth integrated samplers were used at all sites for collecting suspended sediment samples. These samplers were operated manually by placing a sample bottle inside the sampler and lowering the sampler into the stream to a depth near the channel bottom and then retrieving the sampler. As the sampler was lowered and retrieved, water filled the sample bottle through an intake opening in the sampler. Fins on the sampler ensured that the sampler intake was pointed upstream as the sample bottles were filled.

A bedload sampler was used at two sites for collecting bedload sediment. The sampler consisted of a metal frame with a rectangular inlet to which a fabric bedload bag was attached. The sampler was lowered using an electric winch to the channel bottom with the inlet directed upstream. The bedload bag was allowed to fill with sediment for ten minutes. The sampler was then retrieved and the contents removed and placed in plastic bags.

Precipitation data were collected using a Belfort recording rain gage installed in the Bear Creek basin near Bear Creek Mile 3.0. Installation of this rain gage was completed in August 1984. Additional rainfall data were collected by a private rainfall observer.

3.1.2.2 STORM EVENT SAMPLING

Sampling of the first storm event was conducted on October 22-23, 1984. Rainfall began at approximately 7 a.m. on October 22 and ended at approximately 6 p.m. on October 23. Samples were collected from 5 p.m. on October 22 to 6 a.m. on October 23. The criteria for initiation of the storm event was a minimum of one inch of rainfall. The criteria for ending the storm event was recession of the creek stage at East Fork Poplar Creek Mile 3.3 to a predetermined level as measured by the station FW-2 streamflow recorder. Rainfall intensity was not constant over the duration of the event but consisted of periods of intense rainfall followed by periods of moderate to no rainfall. Total rainfall during the storm event was 2.0 inches.

Sampling of the second storm event was conducted on November 10-11, 1984. Rainfall began at approximately 11 a.m. on November 10 and ended at approximately 6 p.m. on the same day. Samples were collected from 1 p.m. on November 10 to 2 a.m. on November 11. The stormflow survey was initiated when rains were sufficient to maintain a stream stage of 0.70 feet at East Fork Poplar Creek Mile 14.36. The criteria for ending

the storm event was identical to that used for the first storm event. Rainfall intensity was similar to the first storm event and totaled 1.4 inches.

The PS 69 samples were removed from the sampler following the storm event. Samples collected at various times over the rising limb, peak, and receding limb of the hydrograph were selected for analysis (i.e., mercury, TSS, TVSS, and turbidity--Table 4). During the first storm event, the PS 69 sampler at East Fork Poplar Creek Mile 14.36 experienced a pump motor malfunction as the storm event began. Depth integrated samples were collected hourly to replace those from the inoperative PS 69 sampler. These samples were used for the analyses of all required parameters except radioactivity which was collected as a discrete grab sample.

Fixed-stage samples were collected at EFPCM 6.8 and Mill Branch Mile 0.20 during both storm events. Only samples for the second storm event were analyzed, however, since sufficient samples during the first storm event were collected using the depth integrated sampler. The fixed-stage samples were removed from the sampler after recession of the stormflow and poured into appropriate sample containers.

Depth integrated samples for total suspended solids analyses were collected at all stations during the stormflow surveys. These samples were collected at three to five predetermined points across the stream and

composited in a one-gallon sampler container. At sites where PS 69 samplers were located (Table 3), depth integrated samples were collected at a minimum of three times over the duration of the storm event: once on the rising limb of the hydrograph, once near the peak, and once during the recession of stormflow. At sites with no PS 69 samplers, hourly depth integrated samples were collected. Samples for particle size analyses of suspended sediment were obtained by compositing equal volumes from the depth integrated samples collected at a site.

Bedload samples were collected at EFPCM 3.3 and 10.0 (Table 3). These samples were taken at five points across the stream and composited in a plastic bag. Two composite samples were collected for each storm event. The first composite sample was collected in a traverse from the left bank of the stream to the right. The second composite was collected in a traverse from the right to left bank.

Radiological samples were collected once during each storm event at EFPCM 14.36, 10.0, 3.3, and Bear Creek Mile 0.55. Six-liter grab samples were collected at mid-channel near the peak of the streamflow.

All samples for laboratory analyses were processed (e.g., filtration, preservation) and shipped on ice to the TVA Laboratory Branch in Chattanooga or to the TVA Western Area Radiological Laboratory (WARL) in Muscle Shoals.

3.2 LABORATORY PROCEDURES

3.2.1 SAMPLE COLLECTION, SHIPPING, AND RECEIVING

Samples were collected and shipped along with field data sheets to the TVA Laboratory Branch in Chattanooga or to the TVA Western Area Radiological Laboratory (WARL) in Muscle Shoals (Appendix IV - Figure 1). Upon receipt in the laboratory, samples were inventoried, irregularities noted, and the samples logged into the computer system. Blind laboratory duplicates were prepared by splitting thoroughly homogenized samples. These split samples were also logged into the computer system.

3.2.2 LABORATORY ANALYSES AND DATA REPORTING

A flow chart showing laboratory and data reporting steps is given in Appendix IV - Figure 2. Samples and blanks were analyzed in accordance with standard TVA laboratory procedures (3). Specific references, type of analysis, and detection limits for the analytical procedures are listed in Appendix IV. The Laboratory Branch Intralaboratory Quality Control Program was followed by analyzing approximately ten percent of the samples in duplicate and, when possible, spiking ten percent of the samples.

Results from accuracy and precision quality control samples were plotted on control charts. If a result was outside the control limits, the samples were resubmitted for analyses.

All analytical data were recorded in laboratory notebooks, calculations checked, analysis approved, and results forwarded to the Quality Assurance Coordinator (QAC). The QAC summarized the blind laboratory and field duplicates along with the reference samples. If the data indicated a problem, corrective actions were taken. If possible, the samples were resubmitted for analysis.

The QAC compared the blind laboratory duplicates with the field duplicates. If there was a significant difference between the laboratory and field variability, the QAC notified the Project Manager of homogeneity problems. The QAC also "flagged" all questionable data with appropriate qualifying remarks.

3.3 DATA STORAGE

The QAC forwarded the approved data to the Task Leader who prepared a report of results which was submitted to data processing. The data were keypunched, verified, and stored on the EPA-STORET data system. Completed printouts of data were forwarded to the responsible Task Leader who reviewed the printout for reasonableness and approved final printout of data.

3.4 QUALITY CONTROL

A complete discussion of the TVA Quality Assurance Program is given in Reference 4.

3.4.1 INTRALABORATORY CONTROL CHARTS

3.4.1.1 EVALUATION OF ACCURACY

Data for accuracy control charts were generated by analyzing actual samples spiked with known amounts of the analyte. The percent recovery was determined, and 100 percent was subtracted from the recovery to obtain the percent bias. Percent bias values were plotted on control charts that indicated upper and lower warning and control limits.

Warning and control limits for accuracy control charts were calculated from actual recovery data obtained from analysis of large batches of samples (nominally, at least 20 values). Using the individual percent bias values, the mean ($\bar{x}$) and the standard deviation (SD) were calculated. Warning and control limits were established as $\bar{x} \pm 1$ SD and $\bar{x} \pm 2$ SD, respectively.

Two consecutive observations or repeated results outside the warning limits required an examination of the system to prevent it from going out of control. The analysis was judged "out of control" when any point fell outside the control limits. Standard policy was to reanalyze all samples determined during any period shown to be out-of-control.

3.4.1.2 EVALUATION OF PRECISION

Data for precision control charts were generated by analyzing actual samples in duplicate. The difference between the two values was multiplied by 0.89 to obtain the approximate standard deviation (3). The standard deviation multiplied by 100 divided by the mean of the duplicate values yielded the relative standard deviation in percent (percent RSD). The percent RSD values were plotted on control charts that indicate warning and control limits.

Warning and control limits for precision control charts were calculated from actual precision data obtained from analyses large batches of samples (nominally, at least 20 values). Using the individual relative standard deviation values, the mean ($\overline{x}$) and standard deviation (SD) were calculated. Warning and control limits were established as $\overline{x}$ + 1 SD and $\overline{x}$ + 2 SD, respectively.

Two consecutive observations or repeated results outside the warning limit required corrective action. The analysis was judged out-of-control when any value fell outside the control limits. Standard policy was to reanalyze all samples determined during a period shown to be out-of-control.

3.4.2 REFERENCE SAMPLES

Standard reference materials supplied by National Bureau of Standards (NBS), Eastman Kodak Company, and Environmental Protection

Agency (EPA) were analyzed (when certified material was available) with each set of Oak Ridge samples. These results were used to provide a measure of the accuracy of the overall data set.

TVA's Western Area Radiological Laboratory (WARL) participates in twelve or more of the laboratory intercomparison studies conducted by EPA's Las Vegas laboratory. The results from this intercomparison are presented in the annual environmental operating reports for TVA's nuclear power plants. WARL also analyzes crosscheck samples produced by TVA's laboratory quality control program for nuclear radiochemical laboratories.

3.4.3 BLIND DUPLICATE SAMPLES

3.4.3.1 BLIND FIELD DUPLICATES

Duplicate samples were periodically collected and shipped to the Laboratory Branch. These samples were inserted blind into the analytical stream along with the other samples. The relative standard deviation was calculated from these duplicate data as described in Section 3.4.1.2.

3.4.3.2 BLIND LABORATORY DUPLICATES

The Quality Assurance Coordinator prepared a second aliquot from an original sample by splitting the sample after it had been thoroughly mixed. These samples were also inserted blind into the analytical stream. The relative standard deviation was calculated from these duplicate data as described in Section 3.4.1.2.

The WARL routinely checks radiochemical procedures by analyzing quality control samples comprising approximately 10 percent of the laboratory sample load. These quality control checks include blind laboratory duplicates, blanks, backgrounds, counting standards, work station routine spikes, blind spikes, and in-house crosschecks.

3.4.4 EPA SPLIT SAMPLES

Approximately five percent of all sediment samples were thoroughly homogenized and a representative aliquot sent to the EPA Region IV Laboratory and/or the EPA Eastern Environmental Radiation Facility (EERL) for analysis of the same parameters analyzed on the original sample. EPA split samples were submitted incrementally throughout the project to ensure early detection and correction of any analytical problem. Interlaboratory split data were analyzed using percent relative error to determine if bias existed between the TVA and EPA laboratories. This procedure is as follows:

Percent relative error is defined as the difference between two replicate samples divided by the mean of the samples expressed as percent. It is calculated as follows:

$$\% \text{ Relative Error} = \frac{\{\text{EPA Result} - \text{TVA Result}\}}{\{\text{EPA Result} + \text{TVA Result}\}} \times 200$$

Percent relative error can vary only between -200 and +200. A helpful way of conceptualizing relative error is to consider its relationship to the ratio of the two laboratories. This relationship can be calculated as follows:

$$\text{Ratio } \frac{\text{EPA Result}}{\text{TVA Result}} = \frac{\{200 + \%\text{ relative error}\}}{\{200 - \%\text{ relative error}\}}$$

Representative values are as follows:

Ratio EPA Result / TVA Result	% Relative Error	Ratio EPA Result / TVA Result	% Relative Error
0	-200	∞	200
0.01	-196	100	196
0.10	-164	10	164
0.20	-138	5	133
0.33	-100	3	100
0.50	- 67	2	67
0.67	- 40	1.5	40
0.83	- 18	1.2	18

4.0 RESULTS AND DISCUSSION

4.1 BASEFLOW SURVEY

Analytical results are given in Appendix I. Available standards, criteria, and background data are summarized in Tables 7 and 10.

4.1.1 GENERAL WATER QUALITY

The results of field analyses (DO, temperature, pH, conductivity, and alkalinity); physical analyses (turbidity and solids); and aluminum, hardness, and nutrient analyses are summarized in Table 8. Comparison of

TABLE 7

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW SURVEY - CRITERIA AND SELECTED DATA FOR CHEMICAL AND PHYSICAL PARAMETERS IN WATER

Parameter (Units)	TN Source Standards[1]	EPA Drinking Water Standards[2,3]	Aquatic Life[4] 24 Hr Avg	Aquatic Life[4] Maximum	Mean Concentrations of Tributary Streams to Upper Tennessee River[5]
GENERAL WATER QUALITY					
Temperature (°C)	30.0	-	-	-	15.0
Dissolved Oxygen (mg/L)	-	-	5.0[6]	-	8.8
pH (Standard Units)	6.9	6.5-8.5	6.5-9.0	-	-
Conductivity (μmho/cm)	-	-	-	-	192.0
Turbidity (NTU)	-	1.0	-	-	9.5
Total Suspended Solids (mg/L)	-	-	-	-	13.0
Volatile Suspended Solids (mg/L)[10]	-	-	-	-	-
Total Alkalinity (mg/L)[10]	-	-	-	-	-
Total Hardness (mg/L as $CaCO_3$)	-	-	-	-	126.0
Nitrate+Nitrate Nitrogen (mg/L)	10 (as NO_3-N)	10 (as NO_3-N)	-	-	0.39
Ammonia Nitrogen (mg/L)	-	-	-	0.02[7]	0.09
Total Kjeldahl Nitrogen (mg/L)	-	-	-	-	0.19
Total Phosphorus (mg/L)	-	-	-	-	0.04
Aluminum (μg/L)	-	-	-	-	761.0
Oil and Grease (mg/L)	-	-	-	-	6.0
Cyanides (mg/L)	200.0	-	3.5	52.0	0.01
METALS					
Antimony (μg/L)[10]	-	-	-	-	-
Arsenic (μg/L)	50.0	50.0	40.0	440.0	<3.9
Beryllium (μg/L)	-	-	5.3	130.0	<10.0
Cadmium (μg/L)	10.0	10.0	0.025[8]	3.0[8]	<1.8
Chromium (μg/L)	50.0	50.0[9]	-	100.0[9]	<4.2
Copper (μg/L)	1,000.0	1,000.0	5.6	22.0[8]	47.0
Lead (μg/L)	50.0	50.0	3.8[8]	170.0[8]	<16.8
Lithium (μg/L)	-	-	-	-	<10.0
Mercury (μg/L)	0.2	2.0	0.2	4.1	<0.4
Nickel (μg/L)	100.0	-	96.0[8]	1,800.0[8]	<48.0
Selenium (μg/L)	10.0	10.0	35.0	260.0	<8.0
Silver (μg/L)	50.0	50.0	-	4.1[8]	<10.0
Thallium (μg/L)[10]	-	-	-	-	-
Zinc (μg/L)	5,000.0	5,000.0	47.0	320.0	126.0

[1]Tennessee Drinking Water Source Standards, 1983.

[2]National Interim Primary Drinking Water Standards, 40 CFR Part 141.

[3]National Secondary Drinking Water Standards, 40 CFR Part 143.

[4]EPA Water Quality Criteria for the Protection of Aquatic Life. Criteria listed are from EPA's Quality Criteria for Water (1976) ("Red Book") and from EPA's 1980 Water Quality Criteria for Priority Pollutants (see 45 FR 79318-79341, November 28, 1980).

[5]Average concentrations in water for streams tributary to the Tennessee River between miles 424 and 652; 43 sampling locations - 1960 to 1983, TVA STORET data.

[6]The 5.0 mg/L criteria for dissolved oxygen is a minimum value rather than a 24-hour average.

[7]0.02 as unionized ammonia. See EPA's 1976 Quality Criteria for Water, p. 16 for further explanation.

[8]Values calculated for a hardness of 100 mg/L using the equations given in 45 FR 79318-341. Increasing hardness generally decreases toxicity of these metals.

[9]National Interim Primary Drinking Water Standard is 50 μg/L for hexavalent chromium (Cr^{+6}). The criteria listed for aquatic life, irrigation, and livestock are for total chromium, which was the species measured in this study.

[10]No applicable criteria available.

TABLE 8

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW SURVEY - FIELD, PHYSICAL, ALUMINUM, HARDNESS, AND NUTRIENT ANALYSES RESULTS

Parameter (Units)	East Fork Poplar Creek Mile 14.36	Bear Creek Mile 7.4	White Oak Creek Mile 7.4	Poplar Creek Mile 13.8	Clinch River Mile 24.0	Clinch River Mile 6.8
Temperature (^{o}C)	22.4	17.0	17.6	14.0	15.5[1]	14.7[1]
Dissolved Oxygen (mg/L)	8.3	9.3	6.2	9.2	12.3[1]	11.1[1]
pH (Standard Units)	8.1	7.9	7.4	7.7	8.3[2]	7.7[2]
Conductivity (μmhos/cm)	454.0	>2000.0	395.0	230.0	280.0[1]	-
Alkalinity (mg/L as $CaCO_3$)	115.0	176.0	110.0	49.0	96.0	-
Turbidity (NTU)	3.5	1.6	22.0	-	-	-
Total Suspended Solids (mg/L)	5.0	2.0	18.0	-	-	-
Total Volatile Suspended Solids (mg/L)	2.0	2.0	3.0	-	-	-
Hardness (mg/L as $CaCO_3$)	170.0	1000.0	160.0	-	-	-
Aluminum (μg/L)	60.0	140.0	205.0	-	-	-
Organic Nitrogen (mg/L)	0.57	0.21	0.29	-	-	-
Total Ammonia Nitrogen (mg/L)	0.11	0.17	0.13	-	-	-
Unionized Ammonia Nitrogen (mg/L)	0.007	0.005	0.001	-	-	-
Nitrate+Nitrite Nitrogen (mg/L)	3.8	240.0	0.83	-	-	-
Total Phosphorus (mg/L)	0.66	<0.01	0.18	-	-	-

[1]Mean values from a reservoir profile.

[2]Maximum values in a reservoir profile.

these data with Table 7 indicates that most data are within the range of existing standards, criteria, and background levels. Nitrate+nitrite nitrogen concentrations at Bear Creek Mile 7.4 are excessive with values of 240 mg/L and 380 mg/L. During the sampling periods activities were underway at Y-12 to neutralize the S-3 ponds and contain future releases. Hardness and conductivity at Bear Creek Mile 7.4 were also in excess of background data with values of 1000 mg/L as $CaCO_3$ and greater than 2000 μmhos/cm, respectively. Conductivity at East Fork Poplar Creek Mile 14.36, White Oak Creek Mile 0.4, and Clinch River Mile 24.0 were in excess of background data with values of 454, 395, and 280 μmhos/cm, respectively. Turbidity and suspended solids at White Oak Creek Mile 0.4 exceeded background data with values of 22 NTU for turbidity and 18 mg/L for suspended solids (mean values of duplicate samples).

4.1.2 PRIORITY POLLUTANT ORGANICS

Analyses for priority volatile organics, acid extractables, base/neutrals, pesticides, and PCBs indicated that none of these compounds were present above the analytical detection limits and no evidence of their presence below the detection limit was shown. Total phenols were detected at Bear Creek Mile 7.4 and White Oak Creek Mile 0.4 with values of 6 mg/L and 3 mg/L (mean value of duplicate samples) at each station, respectively. No standards or background data are available for comparison, however. All results are reported in Appendix I - Table 1 by reporting the detection

limit value followed by a "U" indicating no evidence of the parameter below the detection limit, or by a "M" indicating evidence of parameter presence below the detection limit that could not be quantified.

4.1.3 OIL AND GREASE AND CYANIDE

Oil and grease and cyanide were below detection limits in all samples. Results are presented in Appendix I - Table 1 by reporting the detection limit value followed by a "U" indicating no evidence of the parameter at the detection limit.

4.1.4 METALS

Results of metal analyses (Appendix I - Table 1) show that most metal concentrations were below detection limits and/or available standards and background data. Exceptions are given in Table 9. Values which substantially exceeded background concentrations were total mercury at East Fork Poplar Creek Mile 14.36 with a concentration of 2.5 μg/L and total cadmium at Bear Creek Mile 7.4 with a concentration of 26 μg/L.

4.1.5 RADIOLOGICAL PARAMETERS

A total of seven surface water samples including one field duplicate were collected during the baseflow survey for radiological analyses (Appendix I - Table 1). In addition, one sample was collected for analyses of transuranics and other radionuclides (Table 2) by ORNL. A summary of the significant results are given in Table 10 along with the applicable drinking water standards as outlined in 40 CFR 141. Maximum

TABLE 9

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW SURVEY - METAL CONCENTRATIONS EXCEEDING STANDARDS, CRITERIA, OR BACKGROUND LEVELS

Parameter (Units)	East Fork Poplar Creek Mile 14.36	Bear Creek Mile 7.4	White Oak Creek Mile 0.4	Clinch River Mile 24.0
Total Mercury (μg/L)	2.5	-	<0.3[1]	0.3
Total Cadmium (μg/L)	-	26.0	-	-
Total Chromium (μg/L)	-	-	9.0[1]	-
Total Copper (μg/L)	-	15.0	-	-
Total Lithium (μg/L)	30.0	-	-	-
Total Nickel (μg/L)	-	69.0	-	-
Total Zinc (μg/L)	60.0	-	-	-

[1]Means value of field duplicate samples.

TABLE 10

INSTREAM CONTAMINANT STUDY - TASK 1
BASEFLOW SURVEY - MAXIMUM CONCENTRATIONS OF SIGNIFICANT RADIOISOTOPES IN WATER SAMPLES AND APPLICABLE STANDARDS AND BACKGROUND LEVELS

Isotope	LLD[1] (pCi/L)	Standards and Background Levels (pCi/L)			Concentrations of Significant Isotopes - Baseflow Survey[5] (pCi/L)			
		Drinking Water Standard[2]	MPC[3]	Tenn. River[4]	White Oak Creek	Bear Creek	Clinch River	East Fork Poplar Creek
Gross Alpha	2.0	15	30	4.0	11 (36%)	31 (103%)	3 (10%)	8 (25%)
Gross Beta	2.4	--[6]	3,000	9.6	690 (23%)	330 (11%)	4 (0.1%)	17 (0.6%)
Tritium	330.0	20,000	3,000,000	712.0	544,000 (18%)	500 (0.02%)	500 (0.02%)	400 (0.01%)
Cs-137	5.0	--[6]	20,000	--[7]	68 (0.34%)	--[7]	--[7]	--[7]
Co-60	5.0	--[6]	30,000	--[7]	19 (0.06%)	--[7]	--[7]	--[7]
Sr-90	--	--[6]	300	--[8]	--[8]	--[8]	0.6 (0.2%)	--[8]

[1] Lower limit of detection as calculated by the method developed by Pasternack and Harley and described in HASL-300 and Nuclear Instruments Methods 91, 533-40 (1971).

[2] Interim Primary Drinking Water Regulations as outlined in 40 CRF 141.

[3] Maximum Permissible Concentrations (MPC) recommended by 10 CRF 20 for nonoccupational exposure.

[4] Maximum concentrations reported by TVA in the Tennessee River samples collected in 1981-83.

[5] The percentage of the MPC value is reported in parenthesis.

[6] No standard available.

[7] Isotope not identified in gamma spectral analyses.

[8] Analysis not performed.

permissible concentrations (MPCs) recommended by 10 CFR 20 for nonoccupational exposure are included for comparative purposes, although the MPCs apply only to facilities licensed by the Nuclear Regulatory Commission. The maximum concentrations reported by TVA in water samples collected from the Tennessee River from 1981 to 1983 are also presented for comparison.

Tritium concentrations were by far the most significant of any isotope identified in surface water samples. The maximum concentration reported in White Oak Creek is approximately 75 times the maximum levels reported in the Tennessee River and is 18 percent of the MPC. Concentrations reported in other streams did not exceed the maximum concentration previously observed in the Tennessee River. Only two other radioisotopes were identified and both were found in White Oak Creek. Cesium 137 and cobalt 60 levels in White Oak Creek were less than 1 percent of the MPC. Only one concentration exceeded the corresponding MPC (i.e., the gross alpha concentration at Bear Creek Mile 7.4 which exceeded the MPC by 3 percent). All transuranic isotopes were substantially below MPC levels.

In summary, the highest radiological levels were found in White Oak Creek with concentrations in the Clinch River and East Fork Poplar Creek generally corresponding to levels reported in the Tennessee River. Elevated in gross alpha and gross beta activity were observed in Bear Creek.

4.2 STORMFLOW SURVEYS

Results for the first and second stormflow surveys are given in Appendices II and III, respectively. These data were collected for calibration of a sediment transport model to be presented in the Task 3 report. The following discussion compares the mercury and radiological concentrations during the two storm events with available standards and criteria. Streamflow, suspended sediment, and bedload data are examined relative to their potential impact on sediment transport. The results of a third storm event survey conducted on April 5-6, 1985, will be discussed in the Task 3 report.

4.2.1 STREAMFLOW

Figure 3 presents hydrographs for the rated stations during the first and second storm events. A hydrograph for East Fork Poplar Creek Mile 0.03 was not obtained due to the pool effects of Watts Bar Reservoir. Detailed (expanded scale) plots of each hydrograph and the water levels at East Fork Poplar Creek Mile 0.03 are given in Figure 1 of Appendices II and III. An anamoly apparently exists between the hydrograph for East Fork Poplar Creek 3.3 and the upstream stations. Peak flows at mile 3.3 were significantly less than the peak flows at mile 6.8 for both storm events. An investigation of this occurrence is in progress.

4.2.2 PHYSICAL CHARACTERISTICS OF SUSPENDED SEDIMENT AND BEDLOAD

Specific gravity and particle size results for the 14 suspended sediment and 8 bedload sediment samples collected during the two storm events

FIGURE 3(a)

HYDROGRAPHS FOR RATED STATIONS

OCT 84 OAK RIDGE IN-STREAM CONTAM. STDY

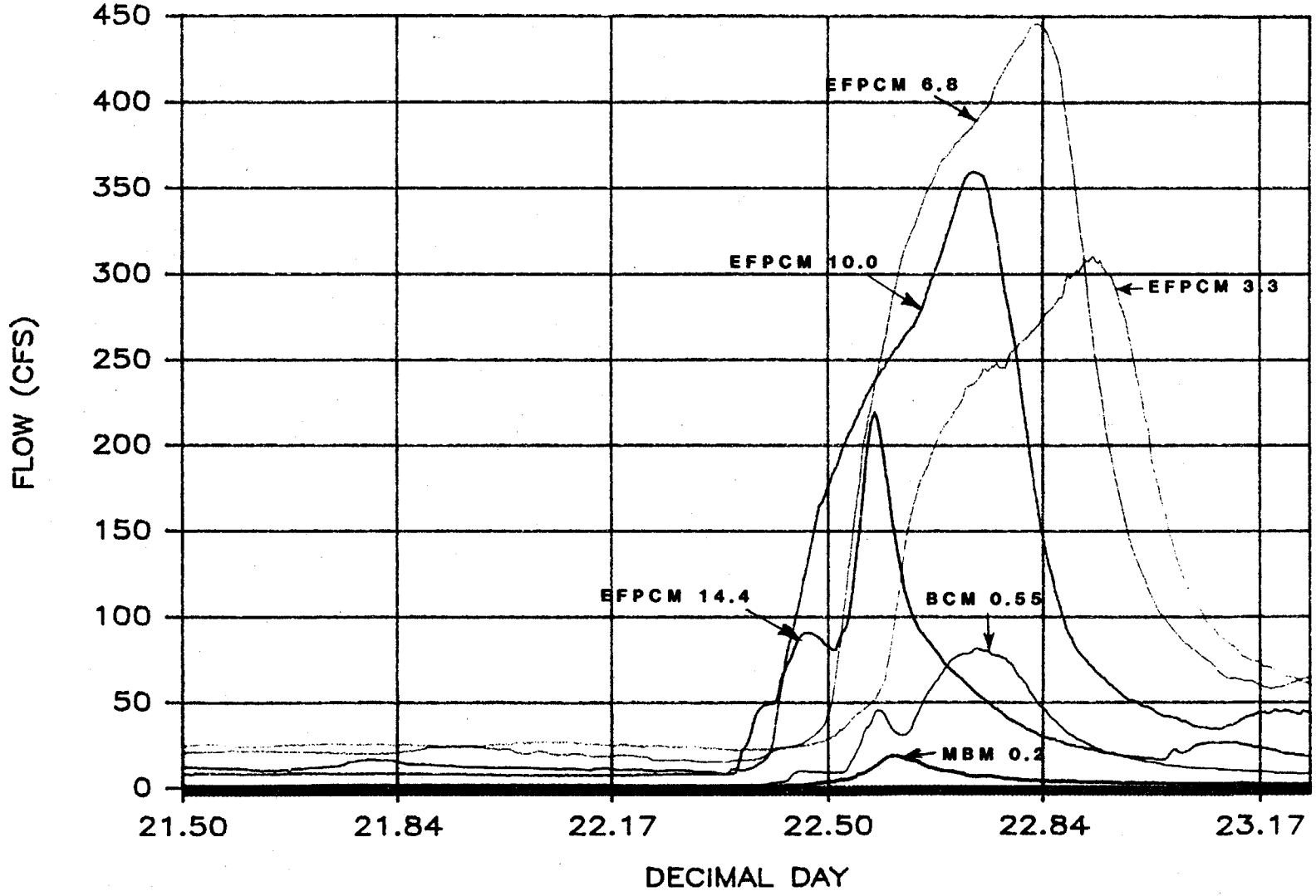
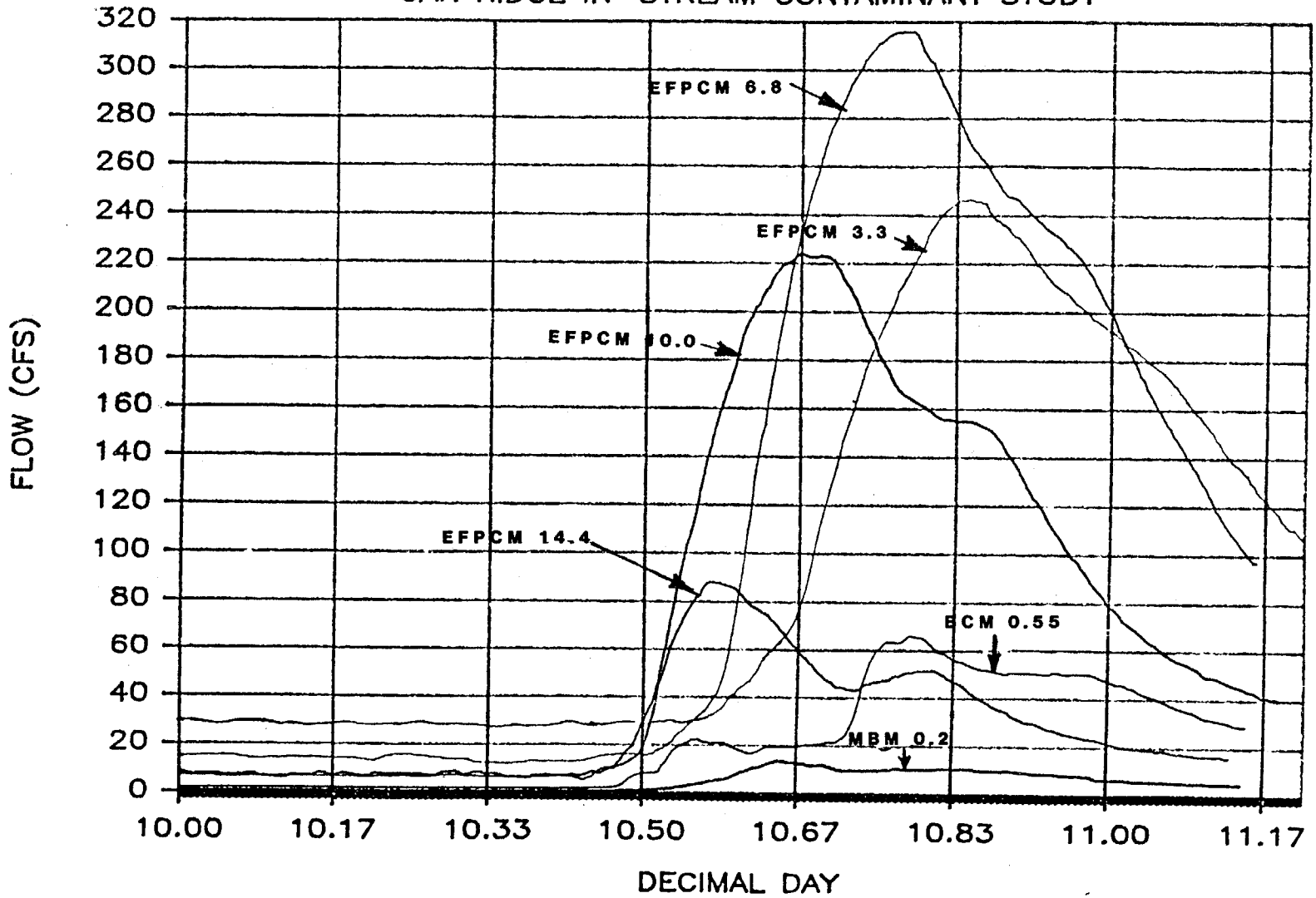


FIGURE 3(b)

HYDROGRAPHS FOR RATED STATIONS—NOV 84

OAK RIDGE IN—STREAM CONTAMINANT STUDY



are given in Tables 11 and 12, respectively. The specific gravity of suspended sediment ranged from 0.79 to 2.07 while the specific gravities of bedload sediment ranged from 1.34 to 2.46. Mehta (5) reports that the specific gravity of sediment are typically are in the range of 2.6 to 2.7 and that lesser values indicate the presence of organic material.

Particle size analyses results for suspended sediment (Table 11) show that the greatest concentrations were in the size ranges less than 62 μm. For bedload sediment, particle size results are reported in terms of percent by weight rather than concentration. Table 12 provides the percent by weight of the total sample in various size ranges (gravel to silt). Although a wide distribution of sediment sizes was present, most of the bedload sediment generally was in the range of coarse sand to gravel (i.e., greater than 500 μm).

Further discussion of the physical characteristics of suspended and bedload sediment and an application of these data in a sediment transport model will be provided in the Task 3 report - (Sediment Transport).

4.2.3 SUSPENDED SEDIMENT

Results of total and volatile suspended solids and turbidity analyses are presented in Table 1 of Appendices II and III for the first and second storm event, respectively. One hundred thirty-six samples were collected

TABLE 11

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW SAMPLING - PHYSICAL CHARACTERISTICS OF SUSPENDED SEDIMENT

Stream	Mile	Storm #[1]	Specific Gravity	Concentration of Suspended Sediment mg/L Greater Than Given Size				
				2000 μm	500 μm	125 μm	62 μm	1 μm[2]
East Fork Poplar Creek	14.36	1	1.55	<0.1	<0.1	1.1	5.3	53
		2	1.24	<0.1	<0.1	1.7	5.0	69
	10.0	1	1.80	0.5	0.9	2.2	5.8	114
		2	1.36	<0.1	1.1	10.5	26.1	210
	6.8	1	1.79	<0.1	<0.1	2.3	16.9	149
		2	1.59	<0.1	1.1	8.7	22.7	170
	3.3	1	1.59	<0.1	0.9	10.7	39.8	348
		2	1.14	<0.1	<0.1	8.3	41.0	150
	0.03	1	2.04	<0.1	0.5	3.5	26.2	260
		2	2.07	<0.1	1.1	10.8	31.1	190
Bear Creek	0.55	1	1.36	<0.1	0.4	2.7	9.7	133
		2	1.04	<0.1	0.2	2.2	7.4	50
Mill Branch	0.2	1	1.54	<0.1	<0.1	0.4	1.54	8
		2	0.79	<0.1	<0.1	0.2	1.60	18

[1] Storm #1 was conducted on October 22-23, 1984. Storm #2 was conducted on November 10-11, 1984.

[2] Concentrations of suspended sediment greater than 1 m are equivalent to the values for total nonfilterable suspended solids.

TABLE 12

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW SAMPLING - PHYSICAL CHARACTERISTICS OF BEDLOAD SEDIMENT[1]

Stream	Mile	Storm[2] #	Traverse[3] #	Specific Gravity	GRAVEL %>0.25 in	FINE GRAVEL % by 0.25 in>wt>2000 µm	COARSE SAND % by 2000 µm>wt>500 µm	MEDIUM TO FINE SAND % by 500 µm>wt>125 µm	VERY FINE SAND % by 125 µm>wt>63%	SILT % by wt<62 µm
East Fork Poplar Creek	10.0	1	A	2.24	0	24.8	25.6	13.6	4.1	31.9
			B	2.18	0	7.2	30.0	26.5	2.4	33.9
		2	A	2.27	20	63.5	13.3	1.8	0.9	0.5
			B	1.36	10.4	10.3	28.5	23.8	5.8	21.2
	3.3	1	A	2.46	21.0	19.3	47.9	7.2	0.5	4.1
			B	2.34	63.2	16.2	13.0	2.5	0.9	4.2
		2	A	2.45	16.5	57.8	8.2	8.1	1.8	7.6
			B	1.34	0	14.6	42.9	26.1	2.6	13.8

[1]Particle size designations obtained from ASCE Manual of Practice No. 54 SEDIMENTATION ENGINEERING, 1975 (6).

[2]Storm #1 was conducted on October 22-23, 1984. Storm #2 was conducted on November 10-11, 1984.

[3]Two samples were collected per station. The first sample was collected as a composite of several points in a traverse from the left bank (looking downstream) to the right bank. The second sample was collected in a traverse from the right bank to the left bank.

for total suspended solids analyses, 54 were collected for volatile suspended solids analyses, and 60 were collected for turbidity analyses.

Figure 2 of Appendices II and III shows total suspended solids and streamflow versus time for the duration of stormflow sampling for the first and second storm events, respectively. The graphs show that total suspended solids concentrations are generally proportional to streamflow. Turbidity values generally increase with increased total suspended solids and streamflow (Appendices II and III). A detailed assessment of the correlation between streamflow and suspended solids concentrations will be presented in the Task 3 report.

4.2.4 MERCURY

The results of total and dissolved mercury analyses for 53 samples collected during the first and second storm events are presented in Table 1 of Appendices II and III, respectively. Figure 3 of Appendices II and III shows total mercury and streamflow versus time for the first and second storm events, respectively. The graphs also show the instances where total mercury concentrations were above the EPA Primary Drinking Water Standard of 2 μg/L and the EPA Water Quality Criteria for the Protection of Aquatic Life (24-hour average) of 0.2 μg/L. Total mercury concentrations for East Fork Poplar Creek were at or above both the drinking water standard and the water quality criteria for aquatic life for most samples collected during both storm events. Total mercury

concentrations for Bear Creek were below the drinking water standard but at or above the water quality criteria for aquatic life for both storm events. Maximum total mercury concentrations were 11 μg/L for both East Fork Poplar Creek Miles 14.36 and 3.3 during the first storm event and 24 μg/L for East Fork Poplar Creek Mile 14.36 during the second storm event.

Dissolved mercury concentrations (Appendices II and III) remained at or slightly above the analytical detection limit of 0.2 μg/L with a maximum concentration of 0.7 μg/L for both East Fork Poplar Creek Mile 10.0 and Bear Creek Mile 0.55 during the first storm event and 0.9 μg/L for East Fork Poplar Creek Mile 3.3 during the second storm event.

Figure 3 (Appendices II and III) shows that in many cases total mercury concentrations are proportional to streamflow and hence suspended sediment. In these cases it appears that mercury is being transported primarily by suspended sediment since dissolved mercury remains relatively constant with increasing streamflow. In other cases this relationship between total mercury and streamflow is not apparent (e.g., East Fork Poplar Creek Mile 3.3 and Bear Creek Mile 0.55 during the first storm event).

4.2.5 RADIOLOGICAL ANALYSES

A total of nine samples were collected for radiological analyses during two storm events (Table 1 - Appendices II and III). A summary of the significant results are given in Table 13. The corresponding maximum permissible concentrations (MPCs), drinking water standards, and Tennessee River background levels are also given for comparison.

All results reported were substantially less than the MPC. Iodine 131 was identified in one sample at approximately two times the lower limit of detection and 5 percent of the corresponding MPC. The only other gamma emitting radionuclides found were lead, bismuth, and protactinium isotopes of the uranium decay series for which no MPCs are available.

4.3 QUALITY CONTROL

4.3.1 BLANKS

Field blanks for priority pollutant analysis were analyzed with samples collected during baseflow conditions. All results were less than the analytical method detection limits.

4.3.2 CONTROL CHARTS

Intralaboratory control charts for all parameters analyzed (with the exception of organic priority pollutants) were maintained as described in Section 3.4.1. All duplicate and spiked samples were either within the

TABLE 13

INSTREAM CONTAMINANT STUDY - TASK 1
STORMFLOW SURVEYS - MAXIMUM CONCENTRATIONS OF SIGNIFICANT RADIOISOTOPES IN WATER SAMPLES AND APPLICABLE STANDARDS AND BACKGROUND LEVELS

Isotope	LLD[1] (pCi/L)	Standards and Background Levels (pCi/L)			Concentrations of Significant Isotopes - Two Stormflow Surveys[5] (pCi/L)	
		Drinking Water Standard[2]	MPC[3]	Tenn. River[4]	Bear Creek	East Fork Poplar Creek
Gross Alpha	2.0	15	30	4.0	8 (27%)	15 (50%)
Gross Beta	2.4	--[6]	3,000	9.6	36 (1%)	55 (2%)
I-131	8.0	--[6]	300	--[7]	--[7]	14 (5%)
Pa-234m	--	--[6]	--	--[7]	--[7]	268

[1] Lower limit of detection as calculated by the method developed by Pasternack and Harley and described in HASL-300 and Nuclear Instruments Method 91, 533-40 (1971).

[2] Interim Primary Drinking Water Regulations as outlined in 40 CFR 141.

[3] Maximum Permissible Concentrations (MPC) recommended by 10 CFR 20 for nonoccupational exposure.

[4] Maximum concentrations reported by TVA in the Tennessee River samples collected from 1981-83.

[5] The percentage of the MPC value is reported in parenthesis.

[6] No standard available.

[7] Isotope not identified in gamma spectral analyses.

"control limits" or when "out-of-control" situations occurred, all the samples within that batch were reanalyzed.

4.3.3 REFERENCE SAMPLES

Reference samples were inserted into the analytical stream as described in Section 3.4.2. These samples were analyzed with the baseflow samples to assess the accuracy of the analytical measurements. The results of these analyses are tabulated in Appendix IV - Table 1.

Excellent recoveries were obtained for all metal and volatile organic analyses. The results for the base neutral and acid extractable compounds, however, showed a wide range of recoveries. A high of 169 percent recovery was obtained for 2-chloronaphthalene as compared to a low of zero percent recovery for 4,6-Dinitro-o-cresol, pentachlorophenol and phenol. These results are typical of the recovery data obtained by other laboratories for the analysis of the organic priority pollutant compounds using EPA method 625. Because of the inefficiency of this method to extract, concentrate, and analyze for many of the organic compounds, the method has been labeled by many as only semi-quantitative. Thus, results reported as less than the detection limit may not necessarily ensure the absence of the material in the environment.

4.3.4 BLIND DUPLICATES (LABORATORY AND FIELD)

Blind field and laboratory duplicates were prepared and inserted into the analytical stream as described in Section 3.4.3. Results of these

duplicate samples are summarized in Appendix IV - Table 2 for nonradiological analyses and in Table 3 for radiological analyses.

The relative standard deviation (RSD) for nonradiological duplicate results were all less than 20 percent with the exception of lead, nickel, zinc, and total phenol. High RSD for these measurements were due to their low concentrations. Generally, the lower the analyte concentration in the sample, the less precise the analytical method and the less meaningful the RSD. Therefore, for samples having concentrations near the detection limit, RSD values of this magnitude can be expected.

The duplicate results for radiological analyses showed reasonable agreement between the two analyses with the error bands for each pair of analyses overlapping. A comparison of the laboratory and field duplicates for both the radiological and nonradiological parameters showed no homogeneity problems.

4.3.5 EPA SPLIT SAMPLES

Split samples were prepared and shipped to the EPA Region IV Laboratory for nonradiological analyses and/or to the EPA Eastern Environmental Radiation Facility (EERF) for radiological analyses as directed in Section 3.4.4. Results of the split samples are summarized in Appendix IV - Tables 4 and 5.

The results of the split water samples with EPA were excellent especially when consideration is given to the low concentration obtained for most parameters. Gross alpha and gross beta analyses did not always correspond within error limits; however, this was not unexpected due to the nonspecific nature of these analyses. The results of split sample analyses indicated there was no significant analytical problems.

4.3.6 CONCLUSIONS

The overall accurracy and precision of the data were adequate and within the interpretative requirements of this study. The agreement between EPA and TVA on the split data was acceptable. The quality control program did, however, reveal certain limitations which must be considered when interpreting the results on the extractable organic priority pollutant data. Because of the inefficiency of the EPA approved methods to extract many of the base neutral and acid extractable compounds, the reviewer of the data should realize that some of the organic compounds which were not detected by this method could be present in the environment.

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APPENDIX I

INSTREAM CONTAMINANT STUDY - TASK 1

BASEFLOW SURVEY RESULTS

TABLE 1

INSTREAM CONTAMINANT STUDY - TASK 1

BASEFLOW SURVEY - FIELD AND LABORATORY ANALYSES RESULTS

STORET RETRIEVAL DATE 85/04/11

476507
35 59 49.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AMBNT/STREAM

DATE FROM TC	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/09	14 57	0001		OK1	90	18.5	520		8.5	6.20		15
84/05/31	15 46	0001	6	OK4	50	22.4	454	3.5	8.3	8.05	115	5
84/06/18	13 00		426	D1	5							
	13 01		429	D10	50							
84/09/13	11 05	0001	4609	OK4								

STORET RETRIEVAL DATE 85/04/11

476507
35 59 49.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/31	15 46	0001	2	5.00U	0.11	0.68	3.80	0.66		170		1
84/05/13	11 05	0001							0.02U			

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLLIUM BE,DISS UG/L	01012 BERYLLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/31	15 46	0001		1U		1.3		2		9		2

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L
84/05/31	15 46	0001		50U		11		1.1		60		1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/09	14 57	0001					2.7	6.6
84/05/31	15 46	0001	60	30		1U	0.2U	2.5

STORET RETRIEVAL DATE 85/04/11

476507
35 59 49.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/09	14 57	0001		OK1								
84/05/31	15 46	0001	6	OK4	7.6	3.0	17.0	3.0	400	110		
84/06/18	13 00		426	01								
	13 01		429	01D								
84/09/13	11 05	0001	4609	OK4								

```
STORET RETRIEVAL DATE 85/04/12
 476507
35 59 49.3 084 14 27.3  1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE          ANDERSON
CLINCH RIVER BASIN        040102
EAST FORK POPLAR CREEK 14.36
132TVAC
        840601      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/AMENT/STREAM
INDEX 1021500  007720  00920  7930   0610   0080
MILES 0953.80 0046.50 567.70 012.00 005.47 014.36   .    .    .    .    .    .
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1546 0001 1105 0001
32101 DICLBRMT                TOTUG/L        10 L
32102 CARBNTET                TOTUG/L        10 L
32104 BRCMOFRM   WHL-WTR       UG/L          10 L
32105 CLCIBRMT                TOTUG/L        10 L
32106 CHLRFORM                TOTUG/L        10 L
32730 PHENOLS     TOTAL        UG/L                      2 U
34010 TOLUENE                TOT UG/L        10 L
34030 BENZENE                TOT UG/L        10 L
34200 ACENAPHT   HYLENE      TOTWUG/L        10 L
34205 ACENAPHT   HENE        TOTWUG/L        10 L
34210 ACROLEIN               TOTWUG/L       100 L
34215 ACRYLONI   TRILE       TOTWUG/L       100 L
34220 ANTHRACE   NE          TOTWUG/L        10 L
34230 BENZBFLU   ORANT TO    TAL UG/L        10 L
34242 BENZO(K)   FLUORANT    TOTWUG/L        10 L
34247 BENZO(A)   PYRENE      TOTWUG/L        10 L
34259 DELTABHC                TOTUG/L      0.01 L
34268 BISCHLCR   OMETHYLE    TOTWUG/L        10 L
34273 BIS2CHLO   ROETHYLE    TOTWUG/L        10 L
34278 BIS2CHLO   ROETHOXY    TOTWUG/L        10 L
34283 BIS2CHLO   ROISOPRO    TOTWUG/L        10 L
34292 NBB PHTH     TOTAL       UG/L          10 L
34301 CHLOROBE   NZENE       TOTWUG/L        10 L
34311 CHLOROET   HANE        TOTWUG/L        10 L
34320 CHRYSENE               TOTWUG/L        10 L
34336 DIETHYLP   HTHALATE    TOTWUG/L        10 L
34341 DIMETHYL   PHTHALAT    TOTWUG/L        10 L
34346 12DIPHEN   YLHYDRAZ    TOTWUG/L        10 L
34351 ENDSULSF                TOTUG/L      0.01 L
34356 B-ENDO     SULFAN      TOTWUG/L      0.01 L
34361 A-ENDO     SULFAN      TOTWUG/L      0.01 L
34366 ENDRINAL   DEHYDE      TOTWUG/L      0.01 L
34371 ETHYLBEN   ZENE        TOTWUG/L        10 L
34376 FLUORANT   HENE        TOTWUG/L        10 L
34381 FLUORENE               TOTWUG/L        10 L
34386 HEXACHLO   ROCYCLOP    TOTWUG/L        10 L
34391 HEXACHLO   ROBUTADI    TOTWUG/L        10 L
34396 HEXACHLO   ROETHANE    TOTWUG/L        10 L
34403 INDENO(1   23CD)PYR    TOTWUG/L        10 L
34408 ISPHRONE                TOTUG/L        10 L
34413 METHYLPR   OMIDE       TOTWUG/L        10 L
34418 METHYLCH   LORIDE      TOTWUG/L        10 L
34423 METHYLEN   ECHLORID    TOTWUG/L        10 L
34428 NITROSOD   IPROPYLA    TOTWUG/L        10 L
34433 NITROSOD   IPHENYLA    TOTWUG/L        10 L
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STORET RETRIEVAL DATE 85/04/12
 476507
35 59 49.3 084 14 27.3  1
BELOW NEW HOPE ROAD DIVERSION POINT
47001 TENNESSEE          ANDERSON
CLINCH RIVER BASIN        040102
EAST FORK POPLAR CREEK 14.36
132TVAC
        840601      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/APENT/STREAM
INDEX 1021500  007720  00920  7930   0610   0080
MILES 0953.80 0046.50 567.70 012.00 006.47 014.36   .     .     .     .     .     .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1546 0001 1105 0001
34438 NITROSOD  IMETHYLA  TOTWUG/L          10 L
34447 NITROBEN  ZENE      TOTWUG/L          10 L
34452 PARACHLO  ROMETACR  TOTWUG/L          10 L
34461 PHENANTH  RENE      TOTWUG/L          10 L
34469 PYRENE              TOTWUG/L          10 L
34475 TETRACHL  OROETHYL  TOTWUG/L          10 L
34488 TRICHLOR  OFLUOROM  TOTWUG/L          10 L
34496 11DICHLO  ROETHANE  TOTWUG/L          10 L
34501 11DICHLO  ROETHYLE  TOTWUG/L          10 L
34506 111TRICH  LOROETHA  TOTWUG/L          10 L
34511 112TRICH  LOROETHA  TOTWUG/L          10 L
34516 1122TETR  ACHLOROE  TOTWUG/L          10 L
34521 BENZO(GH  IDPERYLE  TOTWUG/L          10 L
34526 BENZO(A)  ANTHRACE  TOTWUG/L          10 L
34531 12DICHLO  ROETHANE  TOTWUG/L          10 L
34536 12DICHLO  ROBENZEN  TOTWUG/L          10 L
34541 12DICHLO  ROPROPAN  TOTWUG/L          10 L
34546 12DICHLO  ROETHYLE  TOTWUG/L          10 L
34551 124TRICH  LOROBENZ  TOTWUG/L          10 L
34556 DIBENZ(A  HDANTHRA  TOTWUG/L          10 L
34566 13DICHLO  ROBENZEN  TOTWUG/L          10 L
34571 14DICHLO  ROBENZEN  TOTWUG/L          10 L
34576 2CHLOROE  THYLVINY  TOTWUG/L          10 L
34581 2CHLORON  APHTHALE  TOTWUG/L          10 L
34586 2CHLOROP  HENOL     TOTWUG/L          10 L
34591 2NITROPH  ENOL      TOTWUG/L          10 L
34596 DINOCTPH            TOTUG/L           10 L
34601 24DICHLO  ROPHENOL  TOTWUG/L          10 L
34606 24DIMETH  YLPHENOL  TOTWUG/L          10 L
34611 24DINITR  OTOLUENE  TOTWUG/L          10 L
34616 24DINITR  OPHENOL   TOTWUG/L         100 L
34621 246TRICH  LOROPHEN  TOTWUG/L          10 L
34626 26DINITR  OTOLUENE  TOTWUG/L          10 L
34631 33DICHLO  ROBENZID  TOTWUG/L          25 L
34636 4BROMOPH  ENYLPHEN  TOTWUG/L          10 L
34641 4CHLOROP  HENYLPHE  TOTWUG/L          10 L
34646 4NITROPH  ENOL      TOTWUG/L          10 L
34657 46DINITR  OORTHOCR  TOTWUG/L          50 L
34668 DICHLORO  DIFLUORO  TOTWUG/L          10 L
34671    PCB      1016    TOTWUG/L         0.1 L
34694 PHENOL              TOT UG/L          10 L
34696 NAPTHALE  NE     T  OTWUG/L           10 L
39032 PCP                 TOT UG/L          10 L
39100 B2E PHTH     TOTAL     UG/L           10 L
(SAMPLE CONTINUED ON NEXT PAGE)
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STORET RETRIEVAL DATE 85/04/12
 476507
35 59 49.2 084 14 27.2  1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE          ANDERSON
CLINCH RIVER BASIN        040102
EAST FORK POPLAR CREEK 14.36
132TVAC
        840601      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/AMENT/STREAM
INDEX 1021500  007720  00920  793C   0610   0080
MILES 0952.80 0046.50 567.70 012.00 005.47 014.36   .     .     .     .     .     .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1546 0001 1105 0001
29110 DNB PHTH    TOTAL       UG/L           10 L
29120 BENZIDIN               TOTUG/L         50 L
29175 VINYLCHL   ORIDE      TOT UG/L         10 L
29180 TRICHLOR   ETHYLENE   TOT UG/L         10 L
29300 P,P'DDT               TOT UG/L       0.01 L
29310 P,P'DDD               TOT UG/L       0.01 L
29320 P,P'DDE               TOT UG/L       0.01 L
29330 ALDRIN                TOT UG/L       0.01 L
29337 ALPHABHC               TOTUG/L       0.01 L
29338 BETA BHC               TOTUG/L       0.01 L
29340 GAMMABHC   LINDANE    TOT.UG/L       0.01 L
29350 CHLRDANE   TECH&MET   TOT UG/L       0.01 L
29380 DIELDRIN               TOTUG/L       0.01 L
29390 ENDRIN                TOT UG/L       0.01 L
29400 TOXAPHEN               TOTUG/L        0.5 L
29410 HEPTCHLR               TOTUG/L       0.01 L
29420 HPCHLREP               TOTUG/L       0.01 L
29488 PCB-1221               TOTUG/L        0.1 L
29492 PCB-1232               TOTUG/L        0.1 L
29496 PCB-1242               TOTUG/L        0.1 L
29500 PCB-1248               TOTUG/L        0.1 L
29504 PCB-1254               TOTUG/L        0.1 L
29508 PCB-1260               TOTUG/L        0.1 L
39700 HCB                   TOT UG/L         10 L
77161 1,2DCLPR    TOTAL       UG/L           10 L
```

476514
35 56 14.5 084 20 25.0 1
AT NPDES MONITORING STA. BEAR CR/WHITE WINGS RDS
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 2.8
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735374-0695337

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/09	15 35	0001		OK3	95	13.6	160		9.4	6.60		15
84/06/20	17 00		474	D17	90							

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/09	15 35	0001					0.2U	0.2U

STORET RETRIEVAL DATE 85/04/11

476513
35 58 16.0 084 16 49.8 1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 7.4
132TVAC 840720
0000 FEET DEPTH CSN-RSP 0738620-0695335

/TYPA/AMBNT/STREAM

DATE FROM TC	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/31	16 30	0001	7	OK5	50	17.0	2000L	1.6	9.3	7.86	176	2
84/06/20	16 30		473	D16	50							
	16 31		476	D16D	500							
84/06/26	08 45	0001	796	OK5	50					7.70	174	
	08 46	0001	797	OK5	500							
84/09/13	10 50	0001	4610	OK5								

476513
35 58 16.0 084 16 49.8 1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 7.4
132TVAC 840720
0000 FEET DEPTH CSN-RSP 0738620-0695335

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/31	16 30	0001	2	5.00U	0.17	0.38	240.00	0.01U		1000		1U
84/06/26	08 45	0001					380.00					
	08 46	0001					380.00					
84/09/13	10 50	0001							0.02U			

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/31	16 30	0001		1U		26.0		1U		15		1

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L
84/05/31	16 30	0001		50U		69		0.2U		37		1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/31	16 30	0001	140	10		1U	0.2U	0.2

STORET RETRIEVAL DATE 85/04/11

476513
35 58 16.0 084 16 49.8 1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 7.4
132TVAC 840720
0000 FEET DEPTH CSN-RSP 0738620-0695335

/TYPA/APBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/31	16 30	0001	7	OK5	31.0	16.0	330.0	40.0	500	110		
84/06/20	16 30		473	D16								
	16 31		476	D16D								
84/08/26	08 45	0001	796	OK5								
	08 46	0001	797	OK5								
84/09/13	10 50	0001	4610	OK5								

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STORET RETRIEVAL DATE 85/04/12
 476513
35 58 16.0 084 16 49.8  1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE          ROANE
CLINCH RIVER BASIN        040102
BEAR CREEK 7.4
132TVAC
        840720      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/AMBNT/STREAM
INDEX 1021500  007720  00920  7930   0610   0080   0020
MILES 0952.80 0046.50 567.70 012.00 005.47 001.47 07.40
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1630 0001 1050 0001
32101 DICLBRMT                TOTUG/L        10 L
32102 CARBNTET                TOTUG/L        10 L
32104 BRCMOFRM   WHL-WTR       UG/L          10 L
32105 CLDIBRMT                TOTUG/L        10 L
32106 CHLRFORM                TOTUG/L        10 L
32730 PHENOLS     TOTAL        UG/L                    6
34010 TOLUENE                TOT UG/L        10 L
34030 BENZENE                TOT UG/L        10 L
34200 ACENAPHT   HYLENE      TOTWUG/L        10 L
34205 ACENAPHT   HENE        TOTWUG/L        10 L
34210 ACROLEIN               TOTWUG/L       100 L
34215 ACRYLONI   TRILE       TOTWUG/L       100 L
34220 ANTHRACE   NE          TOTWUG/L        10 L
34230 BENZBFLU   ORANT TO    TAL UG/L        10 L
34242 BENZO(K)   FLUORANT    TOTWUG/L        10 L
34247 BENZO(A)   PYRENE      TOTWUG/L        10 L
34259 DELTABHC               TOTUG/L       0.01 L
34268 BISCHLOR   OMETHYLE    TOTWUG/L        10 L
34273 BIS2CHLO   ROETHYLE    TOTWUG/L        10 L
34278 BIS2CHLO   ROETHOXY    TOTWUG/L        10 L
34283 BIS2CHLO   ROISOPRO    TOTWUG/L        10 L
34292 NBB PHTH    TOTAL       UG/L          10 L
34301 CHLOROBE   NZENE       TOTWUG/L        10 L
34311 CHLOROET   HANE        TOTWUG/L        10 L
34320 CHRYSENE               TOTWUG/L        10 L
34336 DIETHYLP   HTHALATE    TOTWUG/L        10 L
34341 DIMETHYL   PHTHALAT    TOTWUG/L        10 L
34346 12DIPHEN   YLHYDRAZ    TOTWUG/L        10 L
34351 ENDSULSF               TOTUG/L       0.01 L
34356 B-ENDO     SULFAN      TOTWUG/L       0.01 L
34361 A-ENDO     SULFAN      TOTWUG/L       0.01 L
34366 ENDRINAL   DEHYDE      TOTWUG/L       0.01 L
34371 ETHYLBEN   ZENE        TOTWUG/L        10 L
34376 FLUORANT   HENE        TOTWUG/L        10 L
34381 FLUORENE               TOTWUG/L        10 L
34386 HEXACHLO   ROCYCLOP    TOTWUG/L        10 L
34391 HEXACHLO   ROBUTADI    TOTWUG/L        10 L
34396 HEXACHLO   ROETHANE    TOTWUG/L        10 L
34403 INDENO(1   23CD)PYR    TOTWUG/L        10 L
34408 ISPHORNE               TOTUG/L         10 L
34413 METHYLBR   OMIDE       TOTWUG/L        10 L
34418 METHYLCH   LORIDE      TOTWUG/L        10 L
34423 METHYLEN   ECHLORID    TOTWUG/L        10 L
34428 NITROSOD   IPROPYLA    TOTWUG/L        10 L
34433 NITROSOD   IPHENYLA    TOTWUG/L        10 L
(SAMPLE CONTINUED ON NEXT PAGE)
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STORET RETRIEVAL DATE 85/04/12
 476513
35 58 16.0 084 16 49.8  1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE          RCANE
CLINCH RIVER BASIN        040102
BEAR CREEK 7.4
132TVAC
        840720      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/APENT/STREAM
INDEX 1021500  007720  00920  7930   0910   0090   0020
MILES 0953.80 0046.50 567.70 012.00 005.47 001.47 07.40   .      .      .      .      .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1630 0001 1050 0001
34438 NITROSCO  IMETHYLA  TOTWUG/L          10 L
34447 NITROBEN  ZENE      TOTWUG/L          10 L
34452 PARACHLO  ROMETACR  TOTWUG/L          10 L
34461 PHENANTH  RENE      TOTWUG/L          10 L
34469 PYRENE              TOTWUG/L          10 L
34475 TETRACHL  ORDETHYL  TOTWUG/L          10 L
34488 TRICHLOR  OFLUOROM  TOTWUG/L          10 L
34496 11DICHLO  ROETHANE  TOTWUG/L          10 L
34501 11DICHLO  ROETHYLE  TOTWUG/L          10 L
34506 111TRICH  LOROETHA  TOTWUG/L          10 L
34511 112TRICH  LOROETHA  TOTWUG/L          10 L
34516 1122TETR  ACHLOROE  TOTWUG/L          10 L
34521 BENZO(GH  I)PERYLE  TOTWUG/L          10 L
34526 BENZO(A)  ANTHRACE  TOTWUG/L          10 L
34531 12DICHLO  ROETHANE  TOTWUG/L          10 L
34536 12DICHLO  ROBENZEN  TOTWUG/L          10 L
34541 12DICHLO  ROPROPAN  TOTWUG/L          10 L
34546 12DICHLO  ROETHYLE  TOTWUG/L          10 L
34551 124TRICH  LOROBENZ  TOTWUG/L          10 L
34556 DIBENZ(A  H)ANTHRA  TOTWUG/L          10 L
34566 13DICHLO  ROBENZEN  TOTWUG/L          10 L
34571 14DICHLO  ROBENZEN  TOTWUG/L          10 L
34576 2CHLOROE  THYLVINY  TOTWUG/L          10 L
34581 2CHLORON  APHTHALE  TOTWUG/L          10 L
34586 2CHLOROP  HENOL     TOTWUG/L          10 L
34591 2NITROPH  ENOL      TOTWUG/L          10 L
34596 DINOCTPH            TOTUG/L           10 L
34601 24DICHLO  ROPHENOL  TOTWUG/L          10 L
34606 24DIMETH  YLPHENOL  TOTWUG/L          10 L
34611 24DINITR  OTOLUENE  TOTWUG/L          10 L
34616 24DINITR  OPHENOL   TOTWUG/L         100 L
34621 246TRICH  LOROPHEN  TOTWUG/L          10 L
34626 26DINITR  OTOLUENE  TOTWUG/L          10 L
34631 33DICHLO  ROBENZID  TOTWUG/L          25 L
34636 4BROMOPH  ENYLPHEN  TOTWUG/L          10 L
34641 4CHLOROP  HENYLPHE  TOTWUG/L          10 L
34646 4NITROPH  ENOL      TOTWUG/L          10 L
34657 46DINITR  OORTHOCR  TOTWUG/L          50 L
34668 DICHLORO  DIFLUORO  TOTWUG/L          10 L
34671    PCB      1016    TOTWUG/L         0.1 L
34694 PHENOL              TOT UG/L          10 L
34696 NAPTHALE  NE      T OTWUG/L           10 L
39032 PCP                 TOT UG/L          10 L
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STORET RETRIEVAL DATE 85/04/12
 476513
35 58 16.0 084 16 49.8  1
UPSTREAM OF EASTERN MOST GATE TO LANDFILL AREAS
47145 TENNESSEE          ROANE
CLINCH RIVER BASIN        040102
BEAR CREEK 7.4
132TVAC
        840720      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/AMBNT/STREAM
INDEX 1021500  007720  00920  7930   0610   0080   0020
MILES 0953.80 0046.50 567.70 012.00 005.47 001.47 07.40   .    .    .    .    .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)
     INITIAL DATE                          84/05/31  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1630 0001 1050 0001
39110 DNB PHTH    TOTAL       UG/L            10 L
39120 BENZIDIN                TOTUG/L         50 L
39175 VINYLCHL   ORIDE       TOT UG/L         10 L
39180 TRICHLOR   ETHYLENE    TOT UG/L         10 L
39300 P,P'DDT                TOT UG/L       0.01 L
39310 P,P'DDD                TOT UG/L       0.01 L
39320 P,P'DDE                TOT UG/L       0.01 L
39330 ALDRIN                 TOT UG/L       0.01 L
39337 ALPHABHC                TOTUG/L       0.01 L
39338 BETA BHC                TOTUG/L       0.01 L
39340 GAMMABHC   LINDANE     TOT.UG/L       0.01 L
39350 CHLRDANE   TECH&MET    TOT UG/L       0.01 L
39380 DIELDRIN                TOTUG/L       0.01 L
39390 ENDRIN                 TOT UG/L       0.01 L
39400 TOXAPHEN                TOTUG/L        0.5 L
39410 HEPTCHLR                TOTUG/L       0.01 L
39420 HPCHLREP                TOTUG/L       0.01 L
39488 PCB-1221                TOTUG/L        0.1 L
39492 PCB-1232                TOTUG/L        0.1 L
39496 PCB-1242                TOTUG/L        0.1 L
39500 PCB-1248                TOTUG/L        0.1 L
39504 PCB-1254                TOTUG/L        0.1 L
39508 PCB-1260                TOTUG/L        0.1 L
39700 HCB                    TOT UG/L         10 L
77161 1,2DCLPR    TOTAL       UG/L            10 L
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STORET RETRIEVAL DATE 85/04/11

476516
35 53 51.0 084 19 41.0 2
DOWNSTREAM OF WEIR
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
WHITEOAK CREEK 0.4
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735376-0695340

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/31	11 03	0001	8	0K6	99	17.6	395	21.0	6.2	7.40	109	18
	11 04	0001	9	0K6D	99D			22.0			110	17
84/09/13	13 20	0001	4611	0K6								
	13 21	0001	4613	0K6D								

STORET RETRIEVAL DATE 85/04/11

476516
35 53 51.0 084 19 41.0 2
DOWNSTREAM OF WEIR
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
WHITEOAK CREEK 0.4
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735376-0695340

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/31	11 03	0001	3	5.00U	0.13	0.42	0.83	0.20		160		1U
	11 04	0001	3	5.00U	0.12	0.47	0.83	0.17		160		1U
84/09/13	13 20	0001							0.02U			
	13 21	0001							0.02U			

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/31	11 03	0001		1U		0.1U		9		5U		3
	11 04	0001		1U		0.1U		9		5U		3

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L
84/05/31	11 03	0001		50U		4		0.2U		24		1U
	11 04	0001		50U		5		0.2U		30		1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/31	11 03	0001	210	10U		1U	0.2U	0.2U
	11 04	0001	200	10U		1U	0.2U	0.3

STORET RETRIEVAL DATE 85/04/11

476516
35 53 51.0 084 19 41.0 2
DOWNSTREAM OF WEIR
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
WHITEOAK CREEK 0.4
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735376-0695340

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/31	11 03	0001	8	OK6	10.2	3.5	690.0	70.0	540000	53000		
	11 04	0001	9	OK6D	10.8	3.6	690.0	70.0	544000	53000		
84/09/13	13 20	0001	4611	OK6								
	13 21	0001	4613	OK6D								

DATE FROM TO	TIME OF DAY	DEPTH FEET	22606 U-234 TOTAL PCI/L	22607 U-234 ERROR TOTAL	28401 CS-137 TOTAL PC/L	28402 CS-137 ERROR PC/L	29601 CO-60 TOTAL PC/L	29602 CO-60 ERROR PC/L	22150 NP-237 TOTAL PCI/L	22505 TH-228 TOTAL PCI/L	22622 U 235, T OTAL PC /L
84/05/31	11 03	0001			57	5	18	4			
	11 04	0001			68	7	19	2			

STORET RETRIEVAL DATE 85/04/12
476516
35 53 51.0 084 13 41.0 2
DOWNSTREAM OF WEIR
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
WHITEOAK CREEK 0.4
132TVAC
840601 DEPTH 0 DATA LOCKED AFTER 8405
/TYPA/AMENT/STREAM
INDEX 1021500 007720 00920 7930 0750
MILES 0553.80 0046.50 567.70 020.84 000.40

INITIAL DATE					84/05/31		84/05/31		84/09/13		84/09/13	
INITIAL TIME-DEPTH-BOTTOM					1103	0001	1104	0001	1320	0001	1321	0001
32101	DICLBRMT		TOTUG/L		10	L	10	U				
32102	CARENTET		TOTUG/L		10	L	10	U				
32104	BROMOFRM	WHL-WTR	UG/L		10	L	10	U				
32105	CLCIBRMT		TOTUG/L		10	L	10	U				
32106	CHLRFORM		TOTUG/L		10	L	10	U				
32730	PHENOLS	TOTAL	UG/L						4		2	
34010	TOLUENE		TOT UG/L		10	L	10	U				
34030	BENZENE		TOT UG/L		10	L	10	U				
34200	ACENAPHT	HYLENE	TOTWUG/L		10	L	10	U				
34205	ACENAPHT	HENE	TOTWUG/L		10	L	10	U				
34210	ACROLEIN		TOTWUG/L		100	L	100	U				
34215	ACRYLONI	TRILE	TOTWUG/L		100	L	100	U				
34220	ANTHRACE	NE	TOTWUG/L		10	L	10	U				
34230	BENZBFLU	ORANT TO	TAL UG/L		10	L	10	U				
34242	BENZO(K)	FLUORANT	TOTWUG/L		10	L	10	U				
34247	BENZO(A)	PYRENE	TOTWUG/L		10	L	10	U				
34259	DELTABHC		TOTUG/L		0.01	L	0.01	U				
34268	BISCHLOR	OMETHYLE	TOTWUG/L		10	L	10	U				
34273	BIS2CHLO	ROETHYLE	TOTWUG/L		10	U	10	U				
34278	BIS2CHLO	ROETHOXY	TOTWUG/L		10	L	10	U				
34283	BIS2CHLO	ROISOPRO	TOTWUG/L		10	L	10	U				
34292	NBB PHTH	TOTAL	UG/L		10	L	10	U				
34301	CHLOROBE	NZENE	TOTWUG/L		10	L	10	U				
34311	CHLOROET	HANE	TOTWUG/L		10	L	10	U				
34320	CHRYSENE		TOTWUG/L		10	L	10	U				
34336	DIETHYLP	HTHALATE	TOTWUG/L		10	L	10	U				
34341	DIMETHYL	PHTHALAT	TOTWUG/L		10	L	10	U				
34346	12DIPHEN	YLHYDRAZ	TOTWUG/L		10	L	10	U				
34351	ENDSULSF		TOTUG/L		0.01	L	0.01	U				
34356	B-ENDO	SULFAN	TOTWUG/L		0.01	L	0.01	U				
34361	A-ENDO	SULFAN	TOTWUG/L		0.01	L	0.01	U				
34366	ENDRINAL	DEHYDE	TOTWUG/L		0.01	L	0.01	U				
34371	ETHYLBEN	ZENE	TOTWUG/L		10	L	10	U				
34376	FLUORANT	HENE	TOTWUG/L		10	L	10	U				
34381	FLUORENE		TOTWUG/L		10	L	10	U				
34386	HEXACHLO	ROCYCLOP	TOTWUG/L		10	L	10	U				
34391	HEXACHLO	ROBUTADI	TOTWUG/L		10	L	10	U				
34396	HEXACHLO	ROETHANE	TOTWUG/L		10	L	10	U				
34403	INDENO(1	23CD)PYR	TOTWUG/L		10	L	10	U				
34408	ISOPHORONE		TOTUG/L		10	L	10	U				
34413	METHYLBR	OMIDE	TOTWUG/L		10	L	10	U				
34418	METHYLCH	LORIDE	TOTWUG/L		10	L	10	U				
34423	METHYLEN	ECHLORID	TOTWUG/L		10	L	10	U				
34428	NITROSOD	IPROPYLA	TOTWUG/L		10	L	10	U				
34433	NITROSOD	IPHENYLA	TOTWUG/L		10	L	10	U				

(SAMPLE CONTINUED ON NEXT PAGE)

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STORET RETRIEVAL DATE 85/04/12
 476516
35 53 51.0 084 19 41.0  2
DOWNSTREAM OF WEIR
47145 TENNESSEE          ROANE
CLINCH RIVER BASIN        040102
WHITECAK CREEK 0.4
132TVAC
        840601      DEPTH     0 DATA LOCKED AFTER 8405
/TYPA/AMBNT/STREAM
INDEX 1021500  007720  00920  7930   0950
MILES 0553.80 0046.50 567.70 020.84 000.40    .     .     .     .     .     .     .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)
     INITIAL DATE                          84/05/31  84/05/31  84/09/13  84/09/13
     INITIAL TIME-DEPTH-BOTTOM             1103 0001 1104 0001 1320 0001 1321 0001
34438 NITROSOD   IMETHYLA   TOTWUG/L         10 L      10 U
34447 NITROBEN   ZENE       TOTWUG/L         10 L      10 U
34452 PARACHLO   ROMETACR   TOTWUG/L         10 L      10 U
34461 PHENANTH   RENE       TOTWUG/L         10 L      10 U
34469 PYRENE                TOTWUG/L         10 L      10 U
34475 TETRACHL   OROETHYL   TOTWUG/L         10 L      10 U
34488 TRICHLOR   OFLUOROM   TOTWUG/L         10 L      10 U
34496 11DICHLO   ROETHANE   TOTWUG/L         10 L      10 U
34501 11DICHLO   ROETHYLE   TOTWUG/L         10 L      10 U
34506 111TRICH   LOROETHA   TOTWUG/L         10 L      10 U
34511 112TRICH   LOROETHA   TOTWUG/L         10 L      10 U
34516 1122TETR   ACHLOROE   TOTWUG/L         10 L      10 U
34521 BENZO(GH   IDPERYLE   TOTWUG/L         10 L      10 U
34526 BENZO(A)   ANTHRACE   TOTWUG/L         10 L      10 U
34531 12DICHLO   ROETHANE   TOTWUG/L         10 L      10 U
34536 12DICHLO   ROBENZEN   TOTWUG/L         10 L      10 U
34541 12DICHLO   ROPROPAN   TOTWUG/L         10 L      10 U
34546 12DICHLO   ROETHYLE   TOTWUG/L         10 L      10 U
34551 124TRICH   LOROBENZ   TOTWUG/L         10 L      10 U
34556 DIBENZ(A   HDANTHRA   TOTWUG/L         10 L      10 U
34566 13DICHLO   ROBENZEN   TOTWUG/L         10 L      10 U
34571 14DICHLO   ROBENZEN   TOTWUG/L         10 L      10 U
34576 2CHLOROE   THYLVINY   TOTWUG/L         10 L      10 U
34581 2CHLORON   APHTHALE   TOTWUG/L         10 L      10 U
34586 2CHLOROP   HENOL      TOTWUG/L         10 L      10 U
34591 2NITROPH   ENOL       TOTWUG/L         10 L      10 U
34596 DINOCTPH               TOTUG/L         10 L      10 U
34601 24DICHLO   ROPHENOL   TOTWUG/L         10 L      10 U
34606 24DIMETH   YLPHENOL   TOTWUG/L         10 L      10 U
34611 24DINITR   OTOLUENE   TOTWUG/L         10 L      10 U
34616 24DINITR   OPHENOL    TOTWUG/L        100 L     100 U
34621 246TRICH   LOROPHEN   TOTWUG/L         10 L      10 U
34626 26DINITR   OTOLUENE   TOTWUG/L         10 L      10 U
34631 33DICHLO   ROBENZID   TOTWUG/L         25 L      25 U
34636 4BROMOPH   ENYLPHEN   TOTWUG/L         10 L      10 U
34641 4CHLOROP   HENYLPHE   TOTWUG/L         10 L      10 U
34646 4NITROPH   ENOL       TOTWUG/L         10 L      10 U
34657 46DINITR   OORTHOCR   TOTWUG/L         50 L      50 U
34668 DICHLORO   DIFLUORO   TOTWUG/L         10 L      10 U
34671     PCB       1016    TOTWUG/L        0.1 L     0.1 U
34694 PHENOL                TOT UG/L         10 L      10 U
34696 NAPTHALE   NE      T  OTWUG/L          10 L      10 U
39032 PCP                   TOT UG/L         10 L      10 U
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STORET RETRIEVAL DATE 85/04/12
476516
35 53 51.0 084 19 41.0 2
DOWNSTREAM OF WEIR
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
WHITEOAK CREEK 0.4
132TVAC
840601 DEPTH 0 DATA LOCKED AFTER 8405
/TYPA/AMBNT/STREAM
INDEX 1021500 007720 00920 7930 0950
MILES 0953.80 0046.50 567.70 020.84 000.40 . . . . . .
(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE				84/05/31		84/05/31		84/09/13		84/09/13	
	INITIAL TIME-DEPTH-BOTTOM				1103	0001	1104	0001	1320	0001	1321	0001
39110	CNB PHTH	TOTAL	UG/L		10	L	10	U				
39120	BENZIDIN		TOTUG/L		50	L	50	U				
39175	VINYLCHL	ORIDE	TOT UG/L		10	L	10	U				
39180	TRICHLOR	ETHYLENE	TOT UG/L		10	L	10	U				
39300	P,P'DDT		TOT UG/L		0.01	L	0.01	U				
39310	P,P'DDD		TOT UG/L		0.01	L	0.01	U				
39320	P,P'DDE		TOT UG/L		0.01	L	0.01	U				
39330	ALDRIN		TOT UG/L		0.01	L	0.01	U				
39337	ALPHABHC		TOTUG/L		0.01	L	0.01	U				
39338	BETA BHC		TOTUG/L		0.01	L	0.01	U				
39340	GAMMABHC	LINDANE	TOT.UG/L		0.01	L	0.01	U				
39350	CHLRDANE	TECH&MET	TOT UG/L		0.01	L	0.01	U				
39380	DIELDRIN		TOTUG/L		0.01	L	0.01	U				
39390	ENDRIN		TOT UG/L		0.01	L	0.01	U				
39400	TOXAPHEN		TOTUG/L		0.5	L	0.5	U				
39410	HEPTCHLR		TOTUG/L		0.01	L	0.01	U				
39420	HPCHLREP		TOTUG/L		0.01	L	0.01	U				
39488	PCB-1221		TOTUG/L		0.1	L	0.1	U				
39492	PCB-1232		TOTUG/L		0.1	L	0.1	U				
39496	PCB-1242		TOTUG/L		0.1	L	0.1	U				
39500	PCB-1248		TOTUG/L		0.1	L	0.1	U				
39504	PCB-1254		TOTUG/L		0.1	L	0.1	U				
39508	PCB-1260		TOTUG/L		0.1	L	0.1	U				
39700	HCB		TOT UG/L		10	L	10	U				
77161	1,2DCLPR	TOTAL	UG/L		10	L	10	U				

STORET RETRIEVAL DATE 85/04/11

476558
35 59 48.0 084 20 27.0 2
BELOW INDIAN CREEK NEAR USGS STREAM GAGE
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
POPLAR CREEK 13.8
132TVAC 84060R
0000 FEET DEPTH CSN-RSP 0735515-0695417

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/31	17 46	0001	16	0K18	50	14.0	230		9.2	7.70	49	

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/31	17 46	0001									1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/31	17 46	0001	1U	1U	0.1U	0.1U	1U	1U	5U	5U	1	2

STORET RETRIEVAL DATE 85/09/11

476558
35 59 48.0 084 20 27.0 2
BELOW INDIAN CREEK NEAR USGS STREAM GAGE
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
POPLAR CREEK 13.8
132TVAC 840608
0000 FEET DEPTH CSN-RSP 0735515-0695417

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L
84/05/31	17 46	0001	50U	50U	17	18	0.2U	0.2U	5U	10	1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/31	17 46	0001			1U	1U	0.2U	0.2U

STORET RETRIEVAL DATE 85/04/11

476557
35 53 32.0 084 27 49.0 2
WATTS BAR RESERVOIR
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 6.8
132TVAC 840608
0000 FEET DEPTH CSN-RSP 0735514-0695415

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/30	13 03	0001			40	14.7			11.6	7.70		
	13 04	0003			40	14.7			11.5	7.70		
	13 05	0007			40	14.8			11.3	7.70		
	13 06	0010			40	14.8			11.3	7.70		
	13 07	0013			40	14.8			11.1	7.70		
	13 08	0016	15	0K17	40	14.6			10.8	7.70	96	
	13 10	0020			40	14.7			10.8	7.70		
	13 12	0023			40	14.7			10.8	7.70		
	13 14	0026			40	14.7			10.9	7.70		
	13 16	0030			40	14.6			11.1	7.70		
	13 18	0033			40	14.6			11.1	7.70		

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/30	13 08	0016									1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/30	13 08	0016	1U	1U	0.1U	0.1U	1U	1U	5U	5U	1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L

STORET RETRIEVAL DATE 85/04/11

476557
35 53 32.0 084 27 48.0 2
WATTS BAR RESERVOIR
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 6.8
132TVAC 840608
0000 FEET DEPTH CSN-RSP 0735514-0695415

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/30	13 08	0016			1U	1U	0.2U	0.2U

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/30	13 08	0016	15	OK17							0.65	1.90

DATE FROM TO	TIME OF DAY	DEPTH FEET	17517 PB-212 TOTAL PCI/L	17518 PB-212 TOTAL ERROR	22012 PU-238 TOTAL PCI/L	22014 PU-239 TOTAL PCI/L	22100 TC-99 TOTAL PCI/L	22101 TC-99 ERROR TOTAL	22501 TH-232 TOTAL PC/L	22502 TH-232 ERROR PC/L	22601 U-238 TOTAL PC/L	22602 U-238 ERROR PC/L
84/05/30	13 08	0016			0.027K	0.027K	0.73	1.50	0.094	0.038	0.097	0.035

DATE FROM TO	TIME OF DAY	DEPTH FEET	22606 U-234 TOTAL PCI/L	22607 U-234 ERROR TOTAL	28401 CS-137 TOTAL PC/L	28402 CS-137 ERROR PC/L	29601 CO-60 TOTAL PC/L	29602 CO-60 ERROR PC/L	22150 NP-237 TOTAL PCI/L	22505 TH-228 TOTAL PCI/L	22622 U 235, TOTAL PC /L
84/05/30	13 08	0016	1.10	0.14					0.27K	0.027K	0.027K

STORET RETRIEVAL DATE 85/04/11

476519
35 55 16.0 084 26 05.0 2
WATTS BAR RESERVOIR
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 10.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735379-0695346

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3.TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/31	12 00	0001		OK9	2.5	1.7	4.0	1.5	260	100		
84/07/12	09 20		1517	F7								
	09 54		1507	A								
	09 56		1508	B								
	09 57		1509	C								
	09 58		1510	D								
	10 05		4054615R	1								
	10 07		4054623R	2								
	10 05											
CP(S)-			4073375R									
84/07/12	10 07											

STORET RETRIEVAL DATE 85/04/11

476518
35 54 01.0 084 23 15.0 2
BETWEEN WHITEOAK CREEK AND POPLAR CREEK
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 15.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735378-0695345

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/31	12 00	0001		OK8	2.1	1.6	4.0	1.4	500	120		

DATE FROM TO	TIME OF DAY	DEPTH FEET	17517 PB-212 TOTAL PCI/L	17518 PB-212 TOTAL ERROR	22012 PU-238 TOTAL PCI/L	22014 PU-239 TOTAL PCI/L	22100 TC-99 TOTAL PCI/L	22101 TC-99 ERROR TOTAL	22501 TH-232 TOTAL PC/L	22502 TH-232 ERROR PC/L	22601 U-238 TOTAL PC/L	22602 U-238 ERROR PC/L
84/05/31	12 00	0001	5	7								

STORET RETRIEVAL DATE 85/04/11

476509
35 53 11.0 084 18 09.0 2
BELOW MELTON HILL DAM
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 23.0
132TVAC 841116
0000 FEET DEPTH CSN-RSP 0751740-0695482

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	07000 H-3 TOTAL PC/L	07001 H-3,TOTL ERROR PC/L	13501 SR-90 TOTAL PC/L	13502 SR-90 ERROR PC/L
84/05/31	12 00	0001		OK7	0.5	1.1	2.6	1.2	19M	100		

STORET RETRIEVAL DATE 85/04/11

476556
35 52 43.0 084 17 21.0 2
MELTON HILL RESERVOIR
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 24.0
132TVAC 840608
0000 FEET DEPTH CSN-RSP 0735513-0695413

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00010 WATER TEMP CENT	00094 CNDUCTVY FIELD MICROMHO	82079 TURBIDTY LAB NTU	00300 DO MG/L	00400 PH SU	00431 T ALK FIELD MG/L	00530 RESIDUE TOT NFLT MG/L
84/05/30	11 22	0001			50	17.1	280		13.2	8.30		
	11 23	0003			50	16.7	280		13.0	8.30		
	11 24	0007			50	16.7	280		12.9	8.20		
	11 25	0010			50	16.5	280		12.7	8.20		
	11 26	0013			50	16.5	280		12.7	8.20		
	11 27	0016			50	15.8	280		12.6	8.20		
	11 28	0020			50	14.9	280		11.8	7.90		
	11 30	0023	14	OK16	50	14.5	280		11.7	7.90	99	
	11 32	0026			50	14.3	280		11.7	7.80		
	11 34	0030			50	14.3	280		11.8	7.80		
	11 36	0033			50	14.3	280		11.8	7.80		
	11 38	0043			50	13.8	280		11.6	7.80		
84/07/26	13 00		2303	F1	40							

DATE FROM TO	TIME OF DAY	DEPTH FEET	00535 RESIDUE VOL NFLT MG/L	00556 OIL-GRSE FREON-GR MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00665 PHOS-TOT MG/L P	00720 CYANIDE CN-TOT MG/L	00900 TOT HARD CACO3 MG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
84/05/30	11 30	0023									1U	1U

STORET RETRIEVAL DATE 85/04/11

476556
35 52 43.0 084 17 21.0 2
MELTON HILL RESERVOIR
47145 TENNESSEE ROANE
TENNESSEE RIVER BASIN 040101
CLINCH RIVER 24.0
132TVAC 840608
0000 FEET DEPTH CSN-RSP 0735513-0695413

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L
84/05/30	11 30	0023	1U	1U	0.1U	0.1U	1U	1U	5U	5U	1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01057 THALLIUM TL,DISS UG/L	01059 THALLIUM TL,TOTAL UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01095 ANTIMONY SB,DISS UG/L	01097 ANTIMONY SB,TOT UG/L
84/05/30	11 30	0023	50U	50U	2	2	0.2U	0.2U	5U	6	1U	1U

DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	01132 LITHIUM LI,TOT UG/L	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
84/05/30	11 30	0023			1U	1U	0.2U	0.3

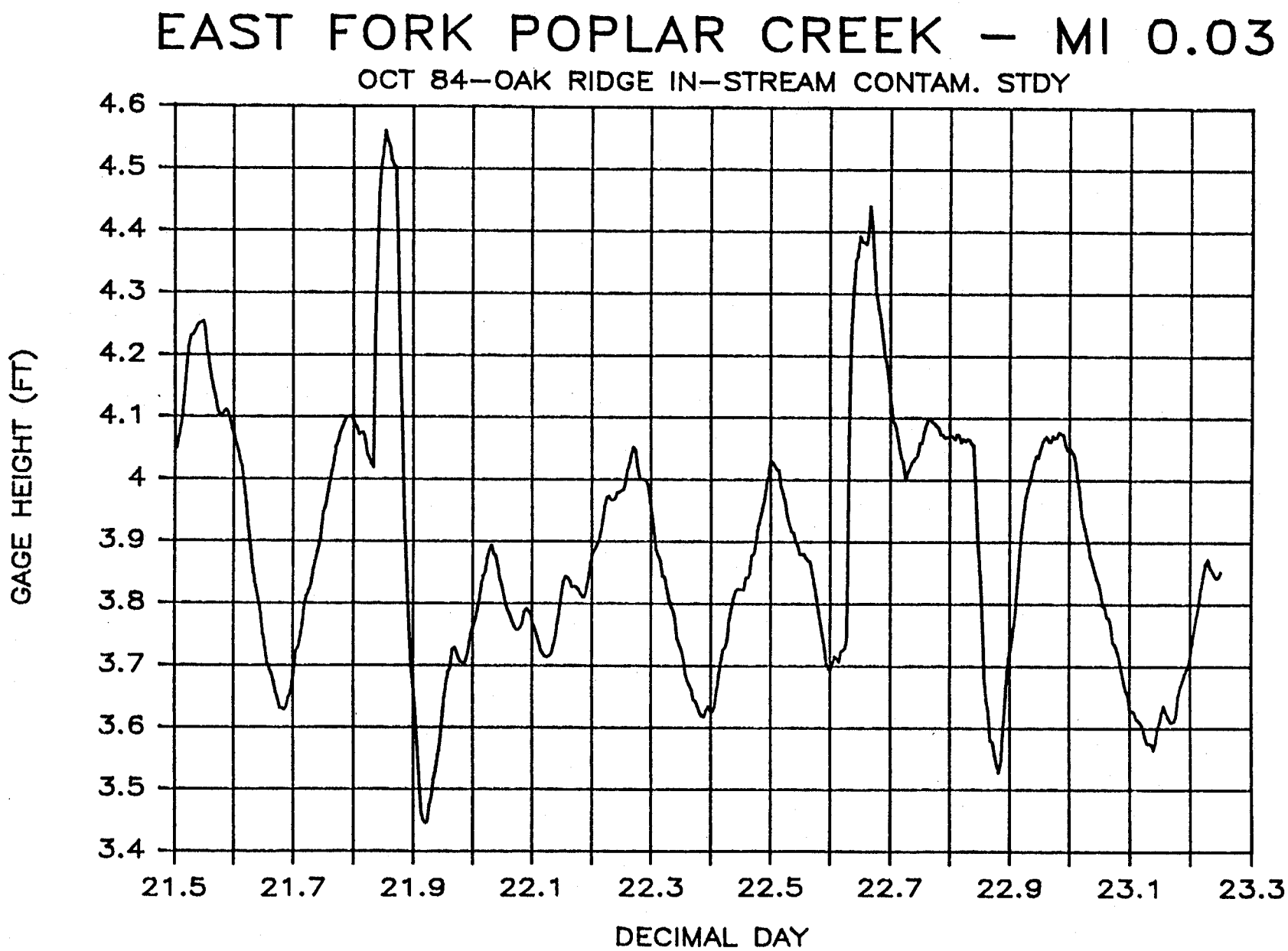
APPENDIX II

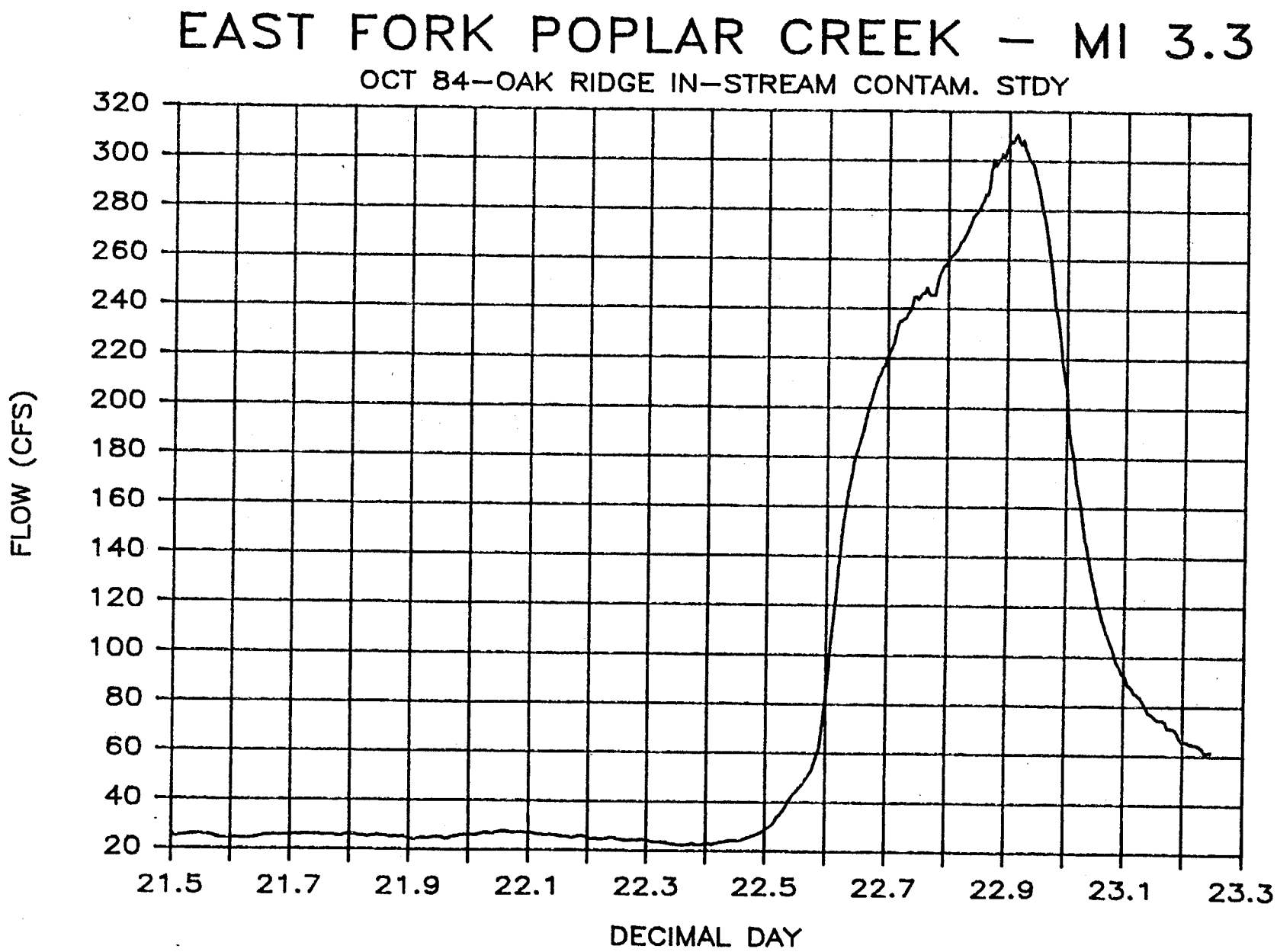
INSTREAM CONTAMINANT STUDY - TASK 1

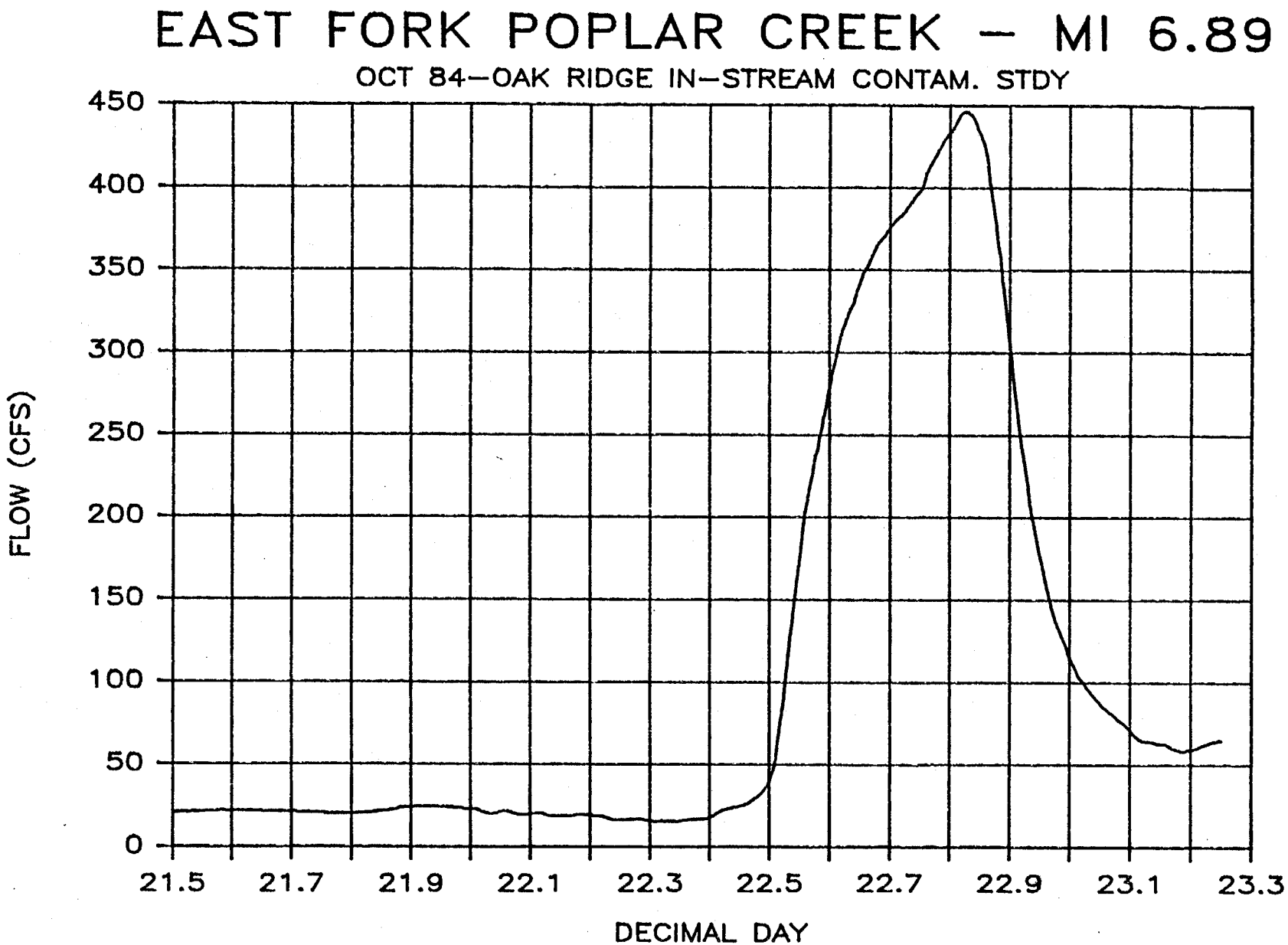
STORMFLOW SURVEY RESULTS - FIRST STORM

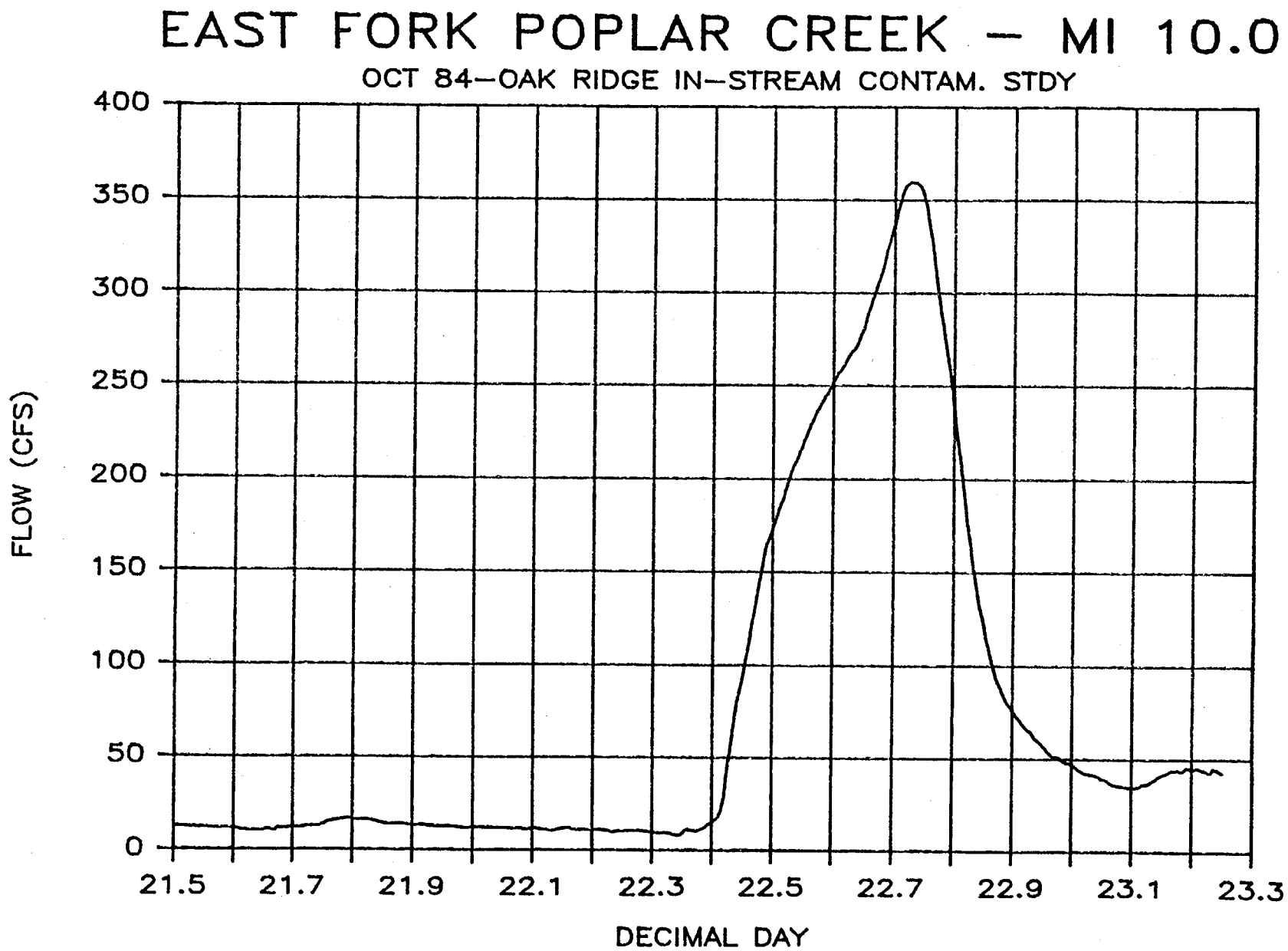
FIGURE 1

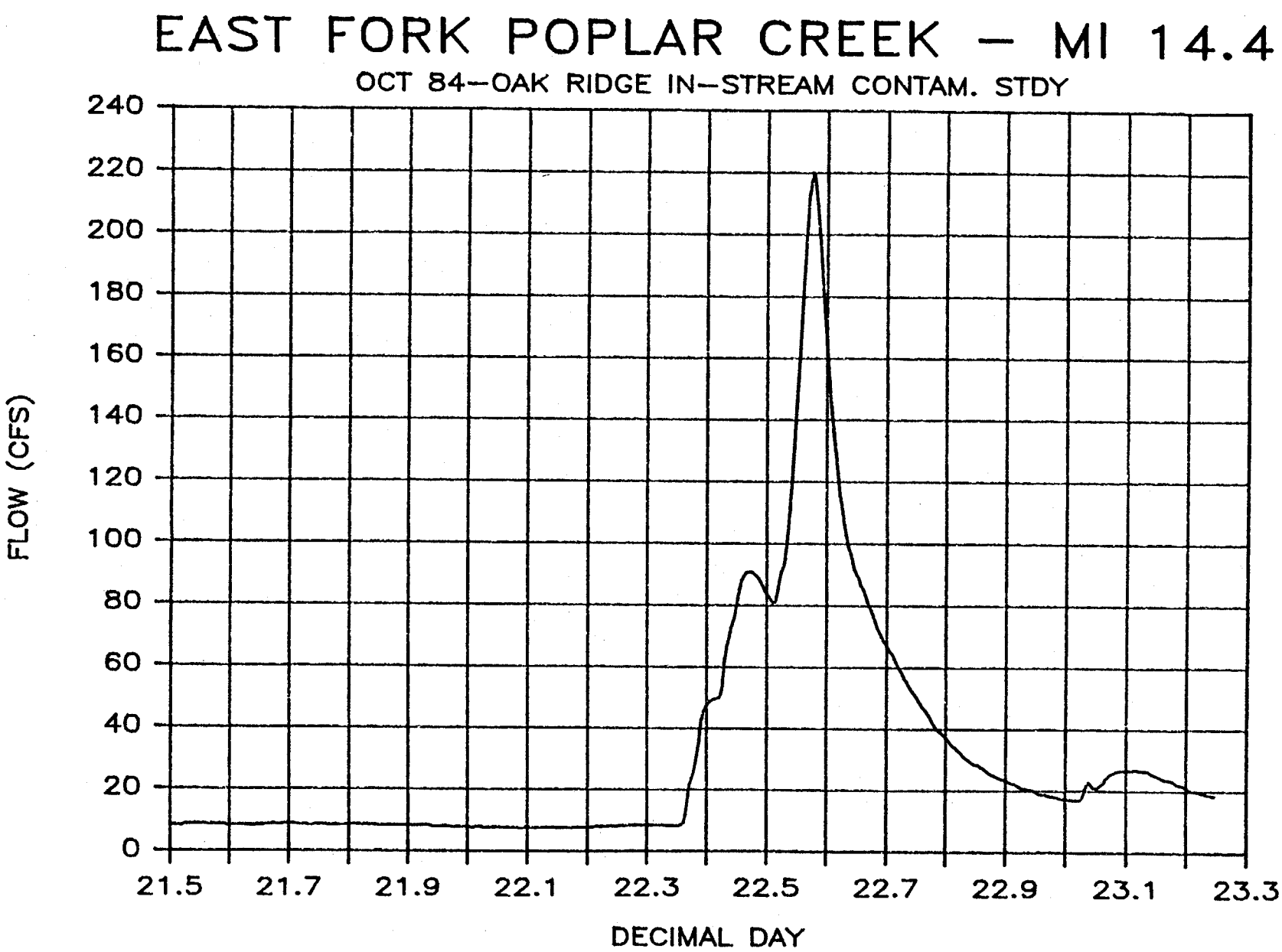
STREAMFLOW RESULTS - FIRST STORM

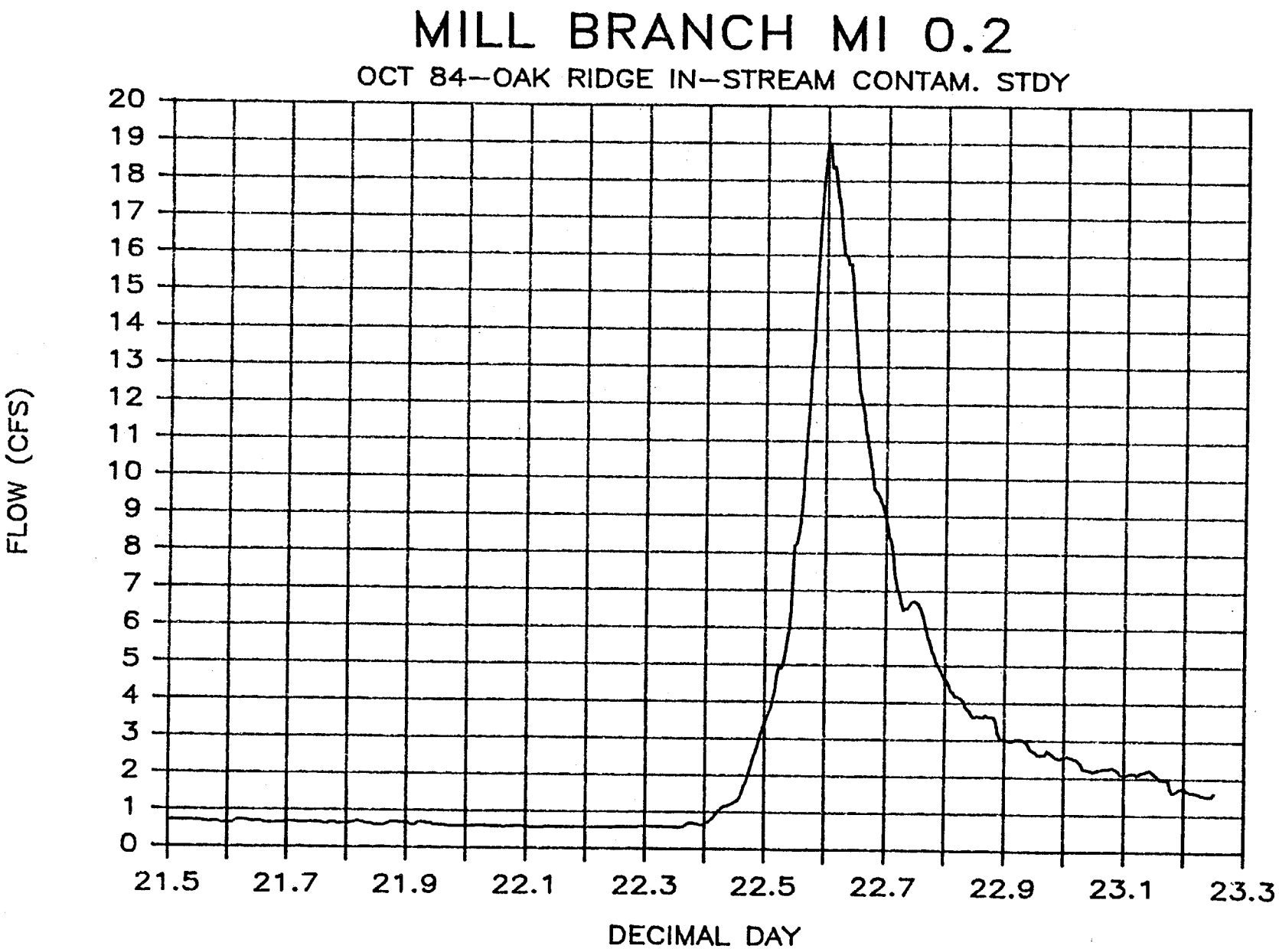

EAST FORK POPLAR CREEK – MI 0.03
OCT 84–OAK RIDGE IN–STREAM CONTAM. STDY
GAGE HEIGHT (FT)
4.6
4.5
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY


EAST FORK POPLAR CREEK – MI 3.3
OCT 84–OAK RIDGE IN–STREAM CONTAM. STDY
FLOW (CFS)
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY


EAST FORK POPLAR CREEK – MI 6.89
OCT 84–OAK RIDGE IN–STREAM CONTAM. STDY
FLOW (CFS)
450
400
350
300
250
200
150
100
50
0
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY


EAST FORK POPLAR CREEK – MI 10.0
OCT 84–OAK RIDGE IN–STREAM CONTAM. STDY
FLOW (CFS)
400
350
300
250
200
150
100
50
0
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY


EAST FORK POPLAR CREEK – MI 14.4
OCT 84–OAK RIDGE IN–STREAM CONTAM. STDY
FLOW (CFS)
240
220
200
180
160
140
120
100
80
60
40
20
0
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY


MILL BRANCH MI 0.2
OCT 84--OAK RIDGE IN-STREAM CONTAM. STDY
FLOW (CFS)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY

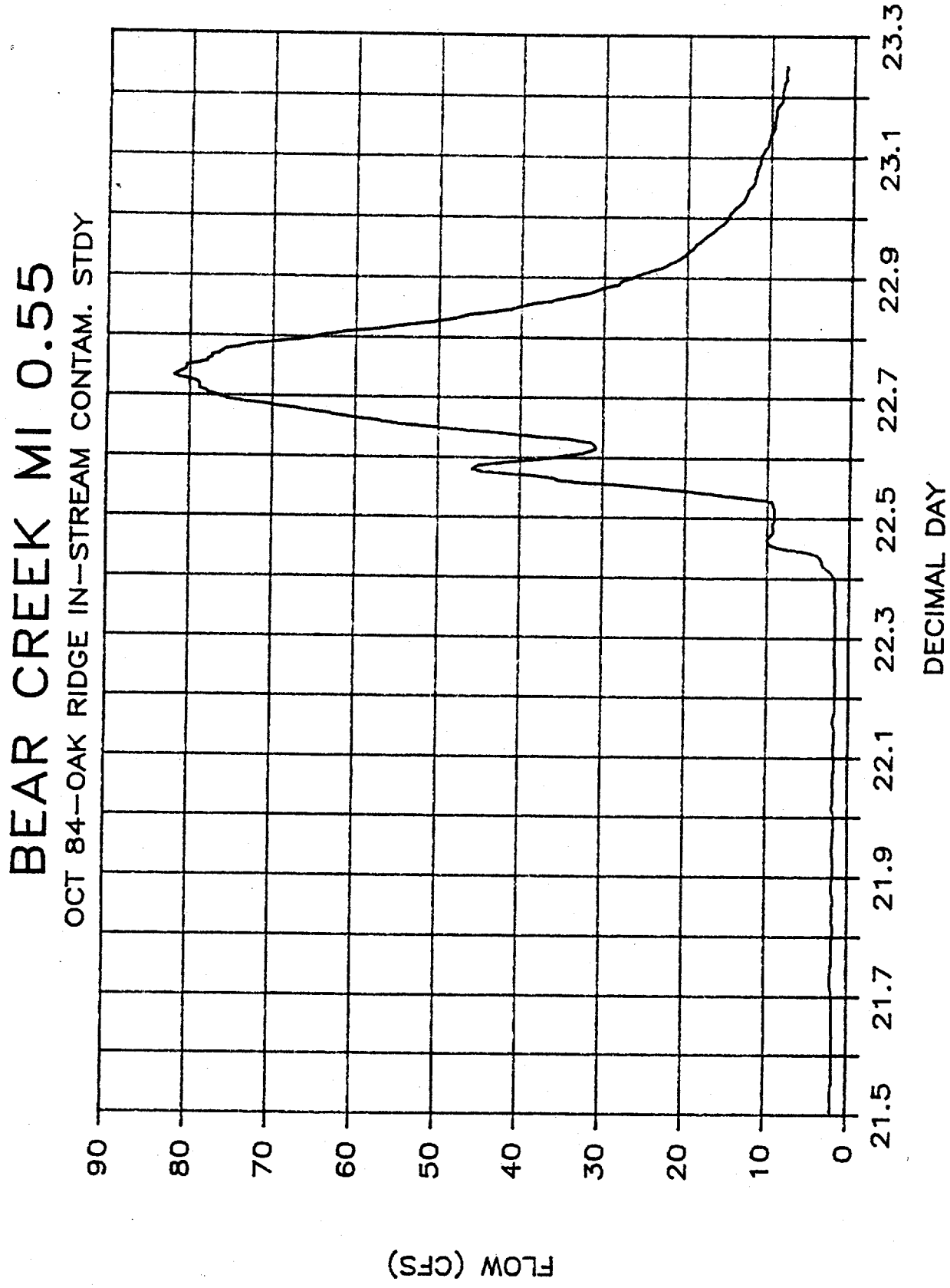
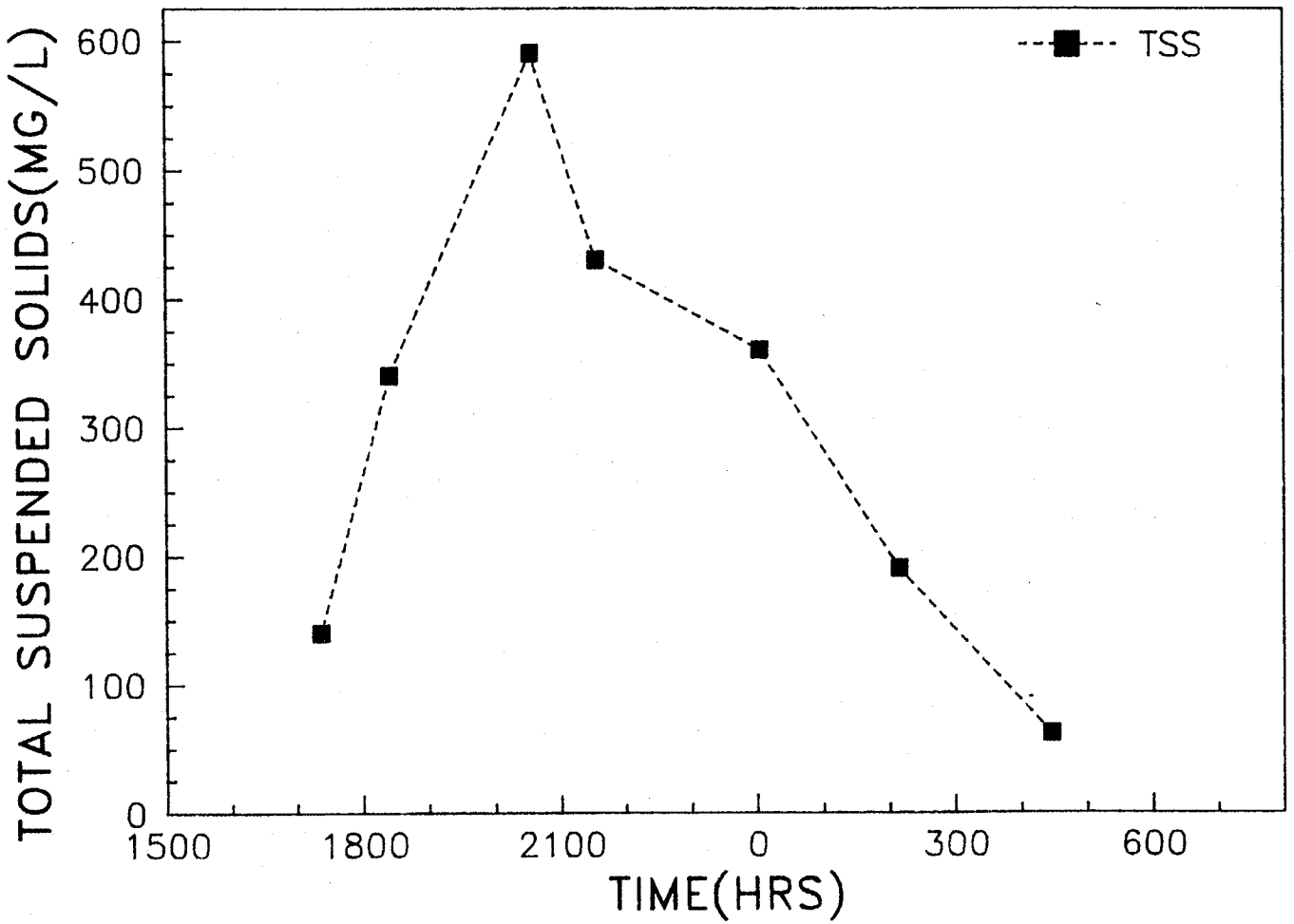

BEAR CREEK MI 0.55
OCT 84—OAK RIDGE IN—STREAM CONTAM. STDY
FLOW (CFS)
90
80
70
60
50
40
30
20
10
0
21.5
21.7
21.9
22.1
22.3
22.5
22.7
22.9
23.1
23.3
DECIMAL DAY

FIGURE 2

TOTAL SUSPENDED SOLIDS AND STREAMFLOW
VERSUS TIME FOR DURATION OF FIRST STORM EVENT
(OCTOBER 22-23, 1984)

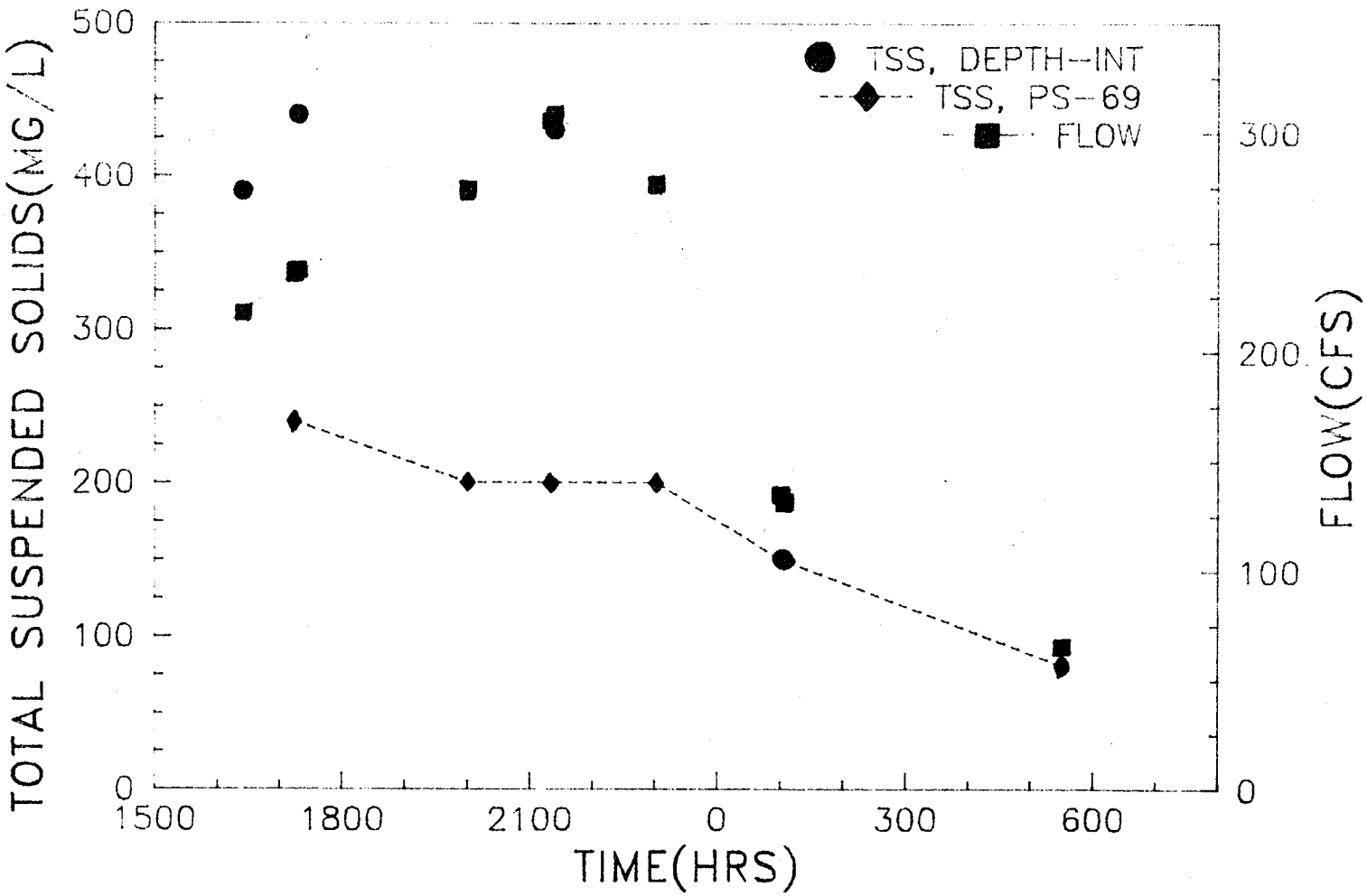
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/19/85

EFPCM 0.03

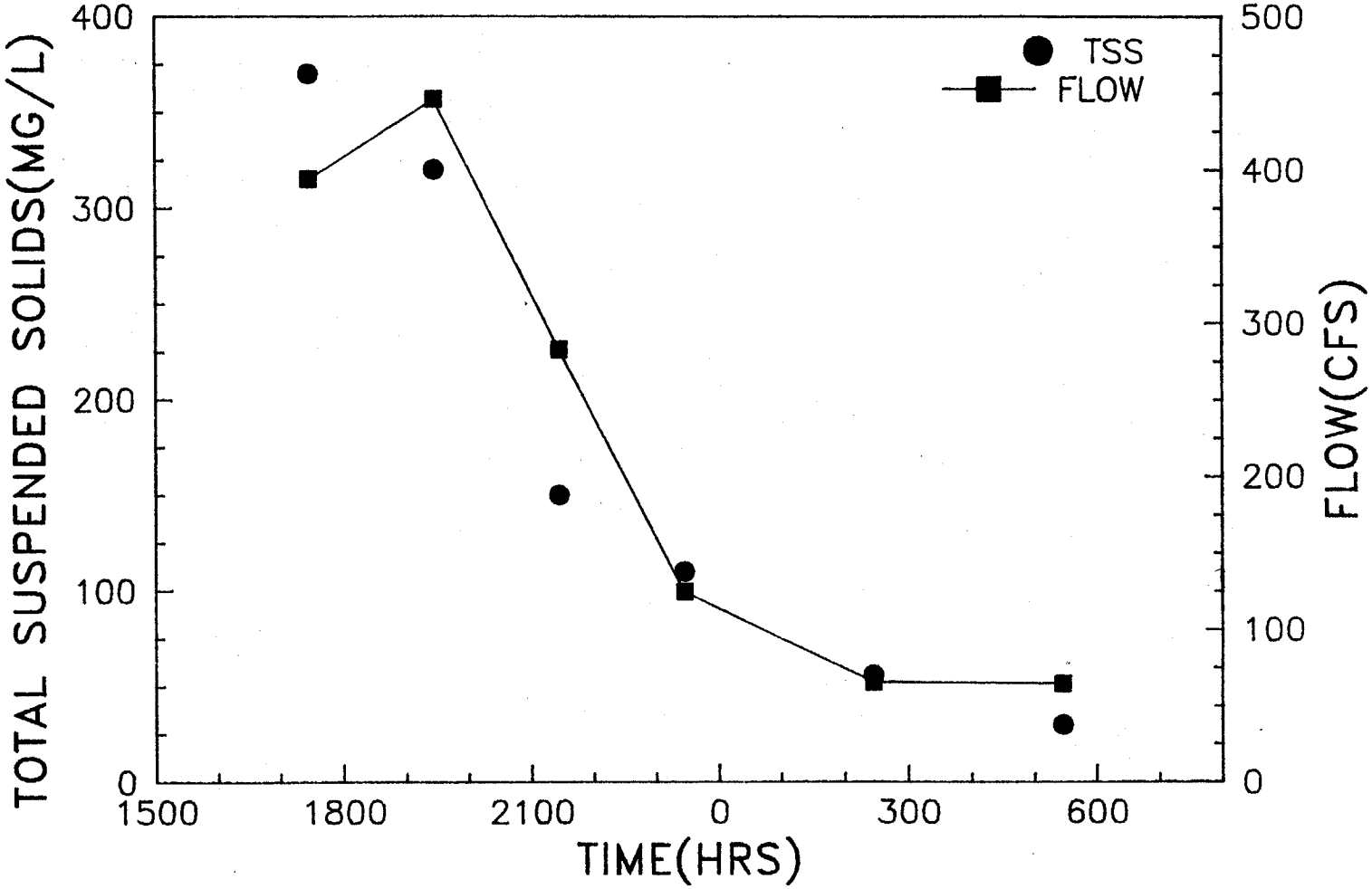
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/11/85

EFPCM 3.3

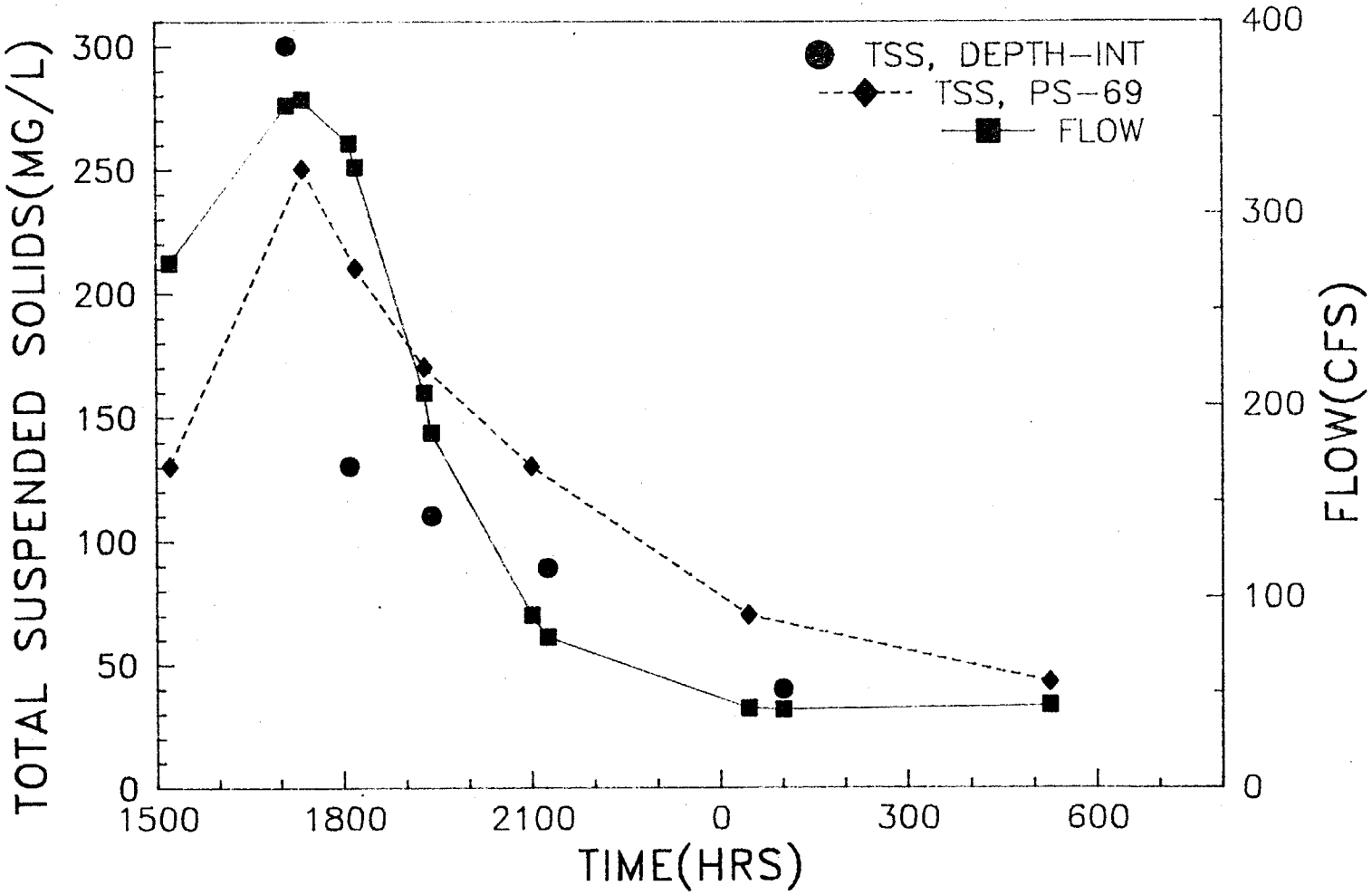
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/11/85

EFPCM 6.8

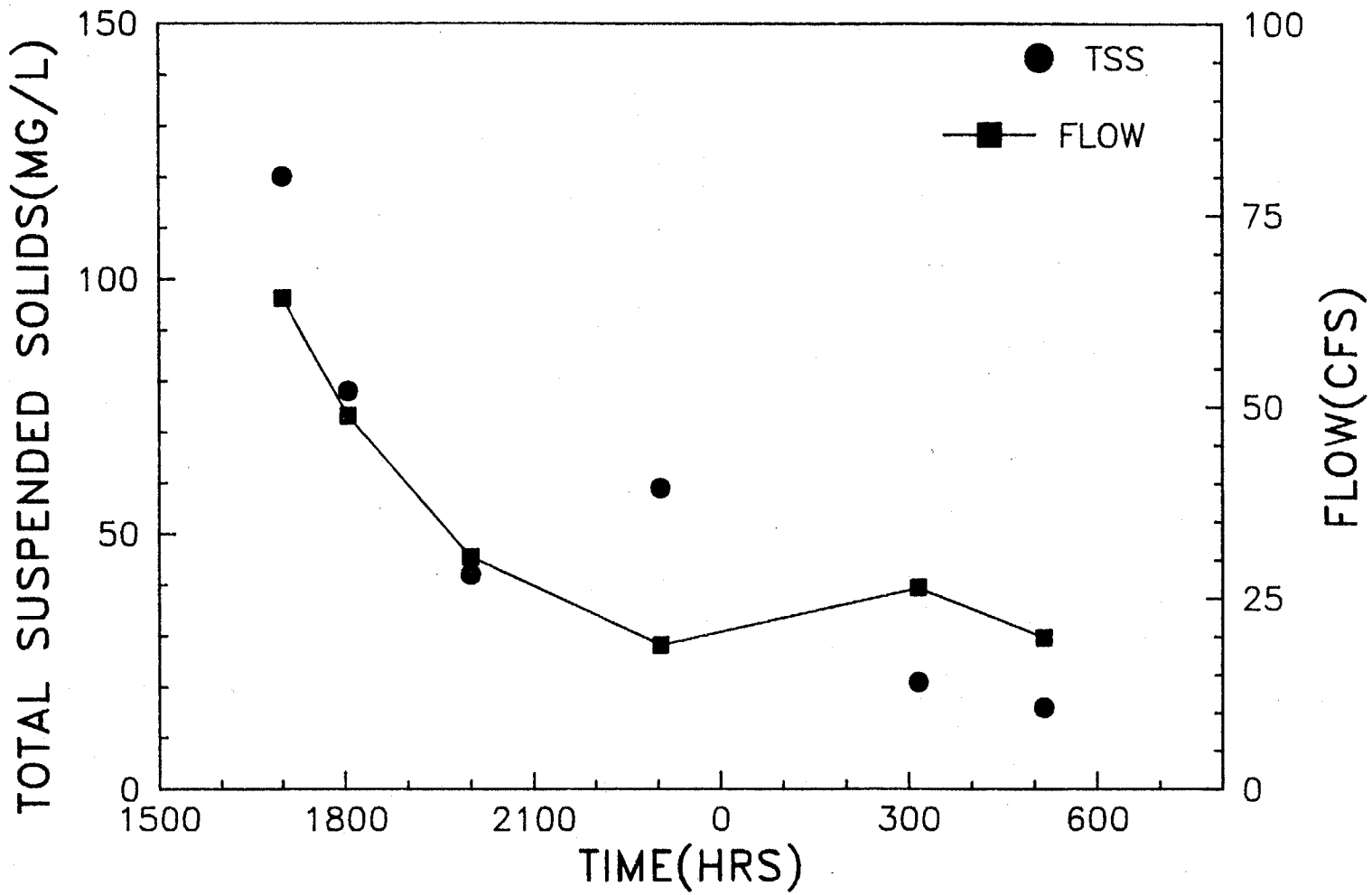
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/11/85

EFPCM 10.0

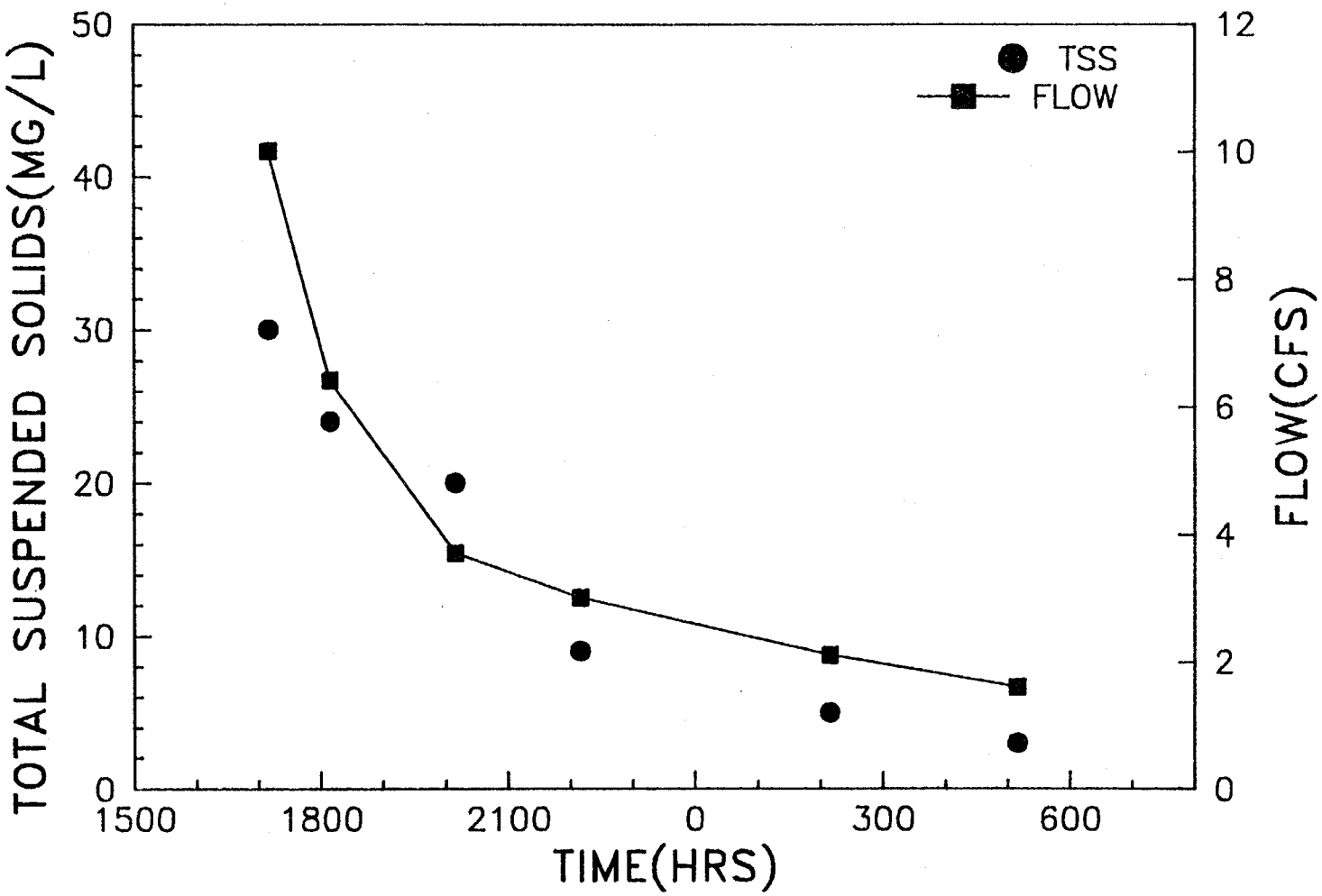
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/19/85

EFPCM 14.4

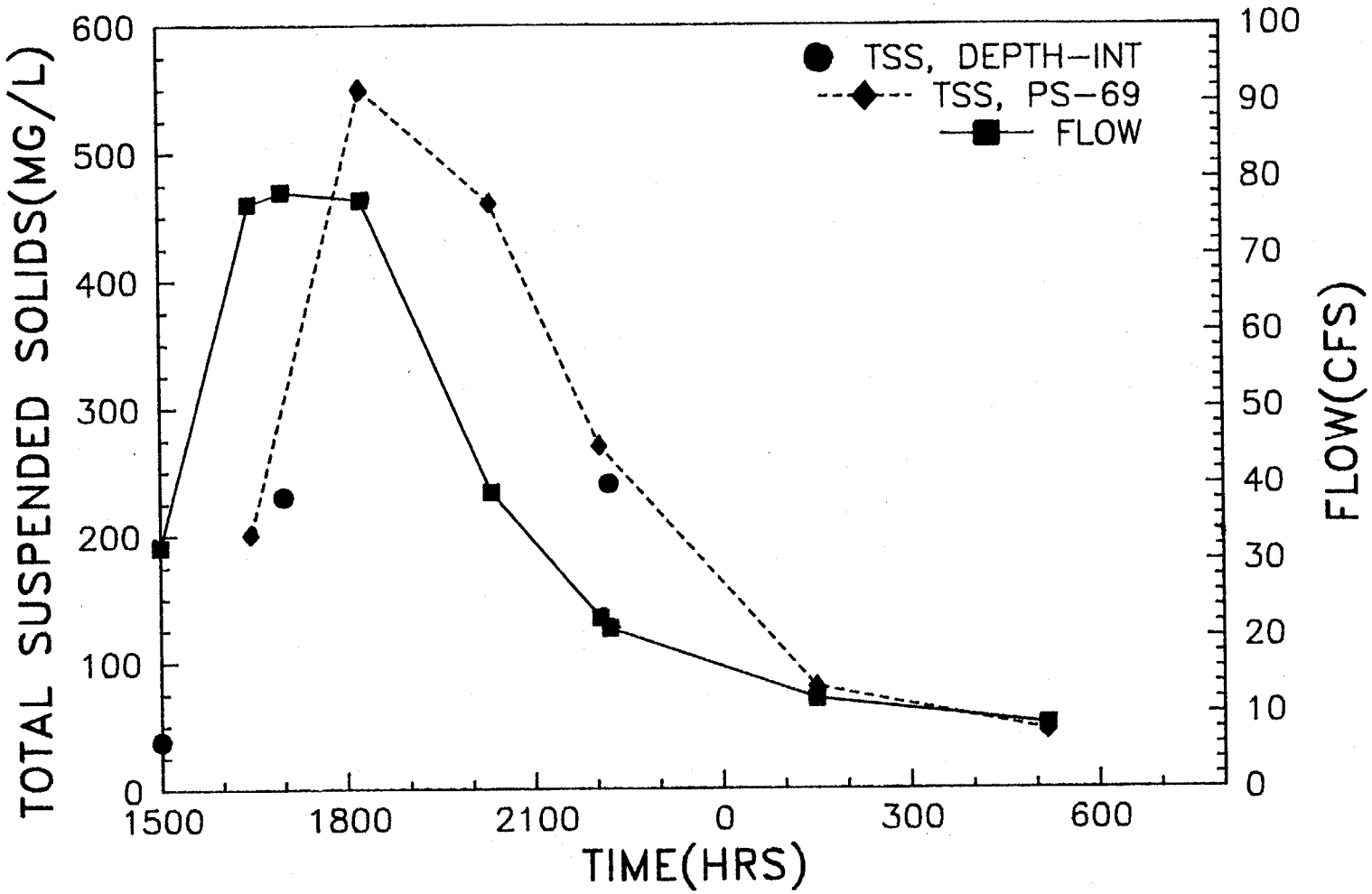
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/11/85

MILL BR. 0.2

INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



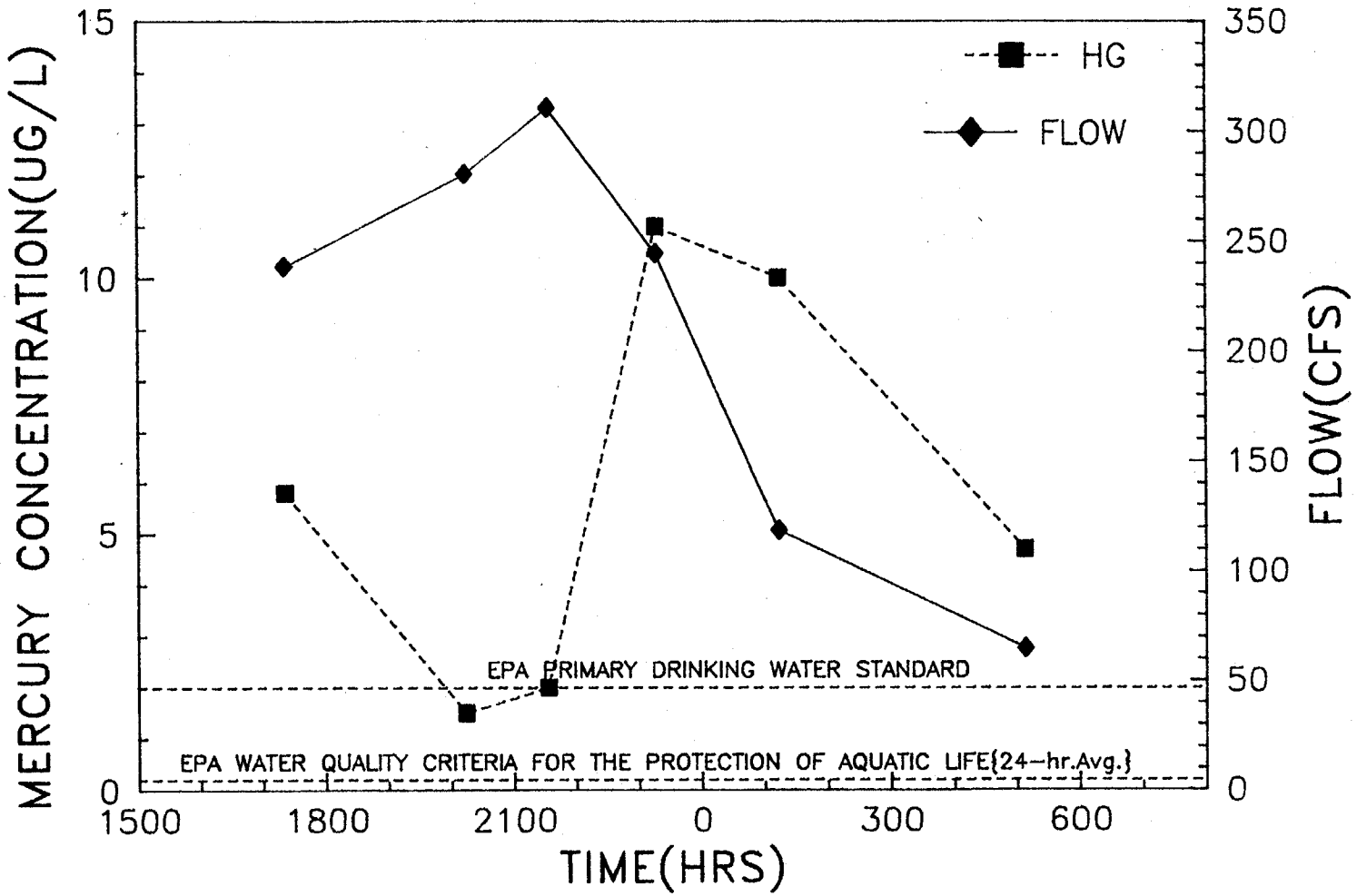
WSDB: 3/11/85

BCM 0.55

FIGURE 3

MERCURY AND STREAMFLOW VERSUS TIME FOR
DURATION OF FIRST STORM EVENT
(OCTOBER 22-23, 1984)

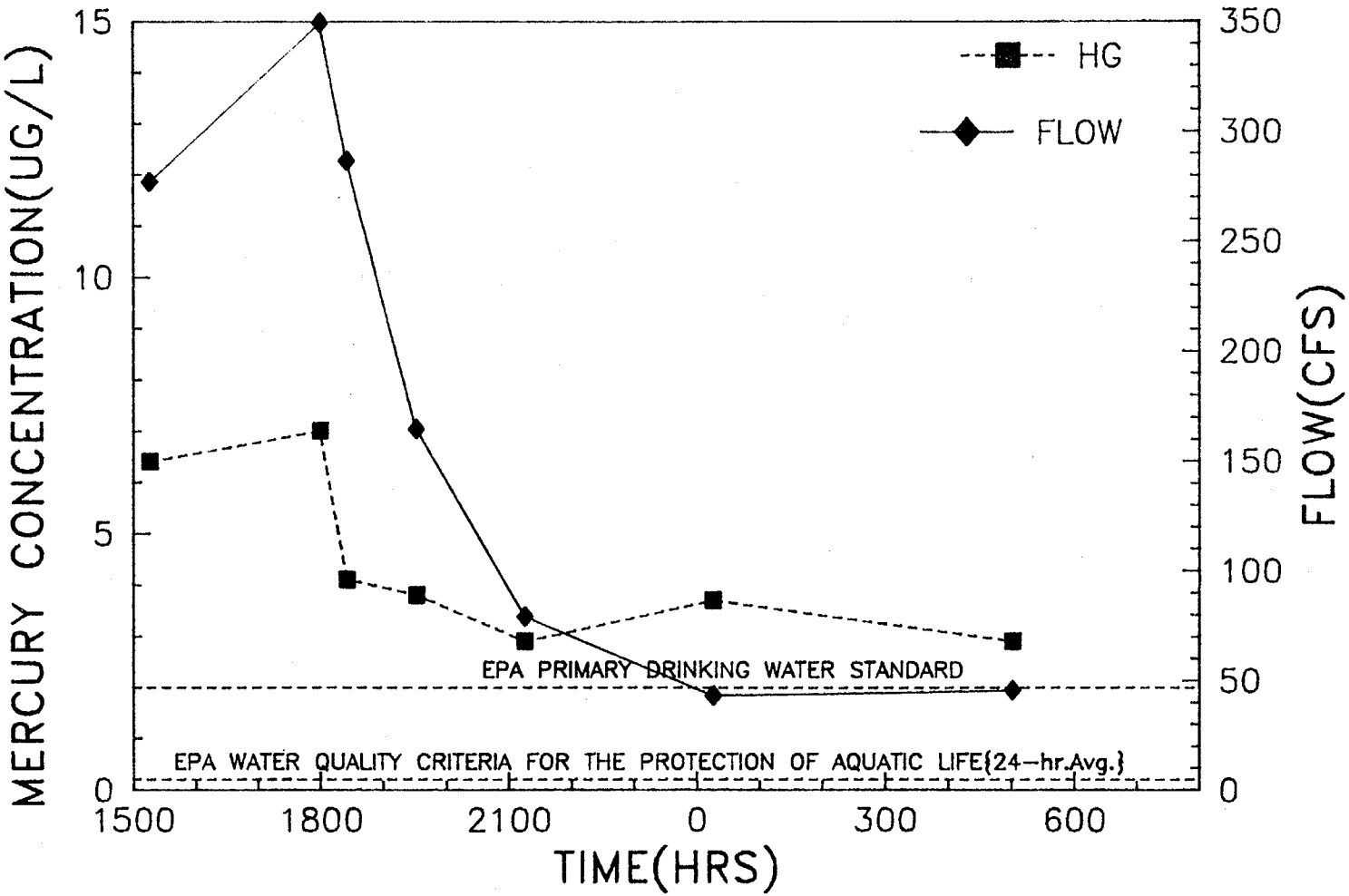
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/08/85

EFPCM 3.3

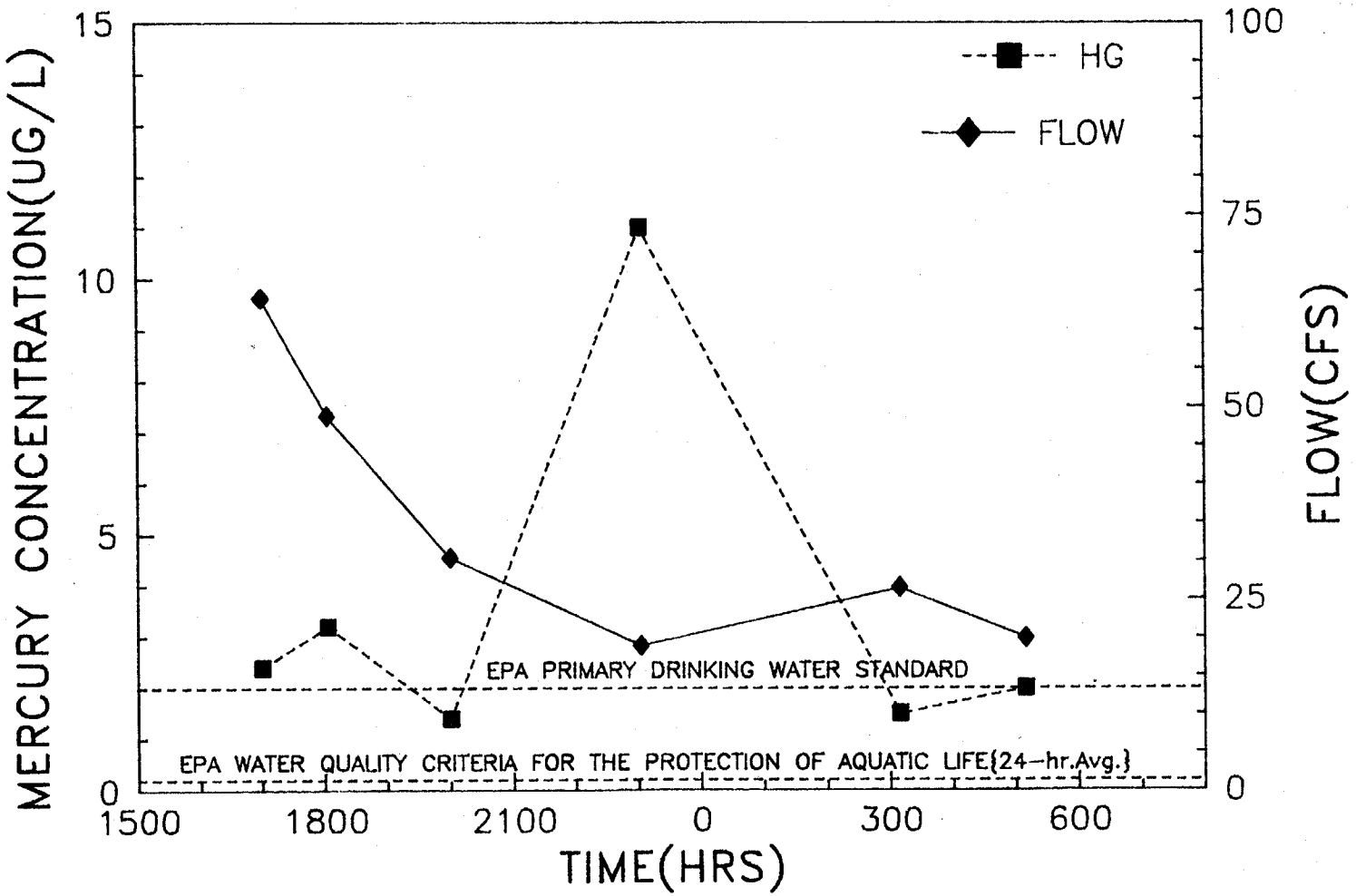
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/08/85

EFPCM 10.0

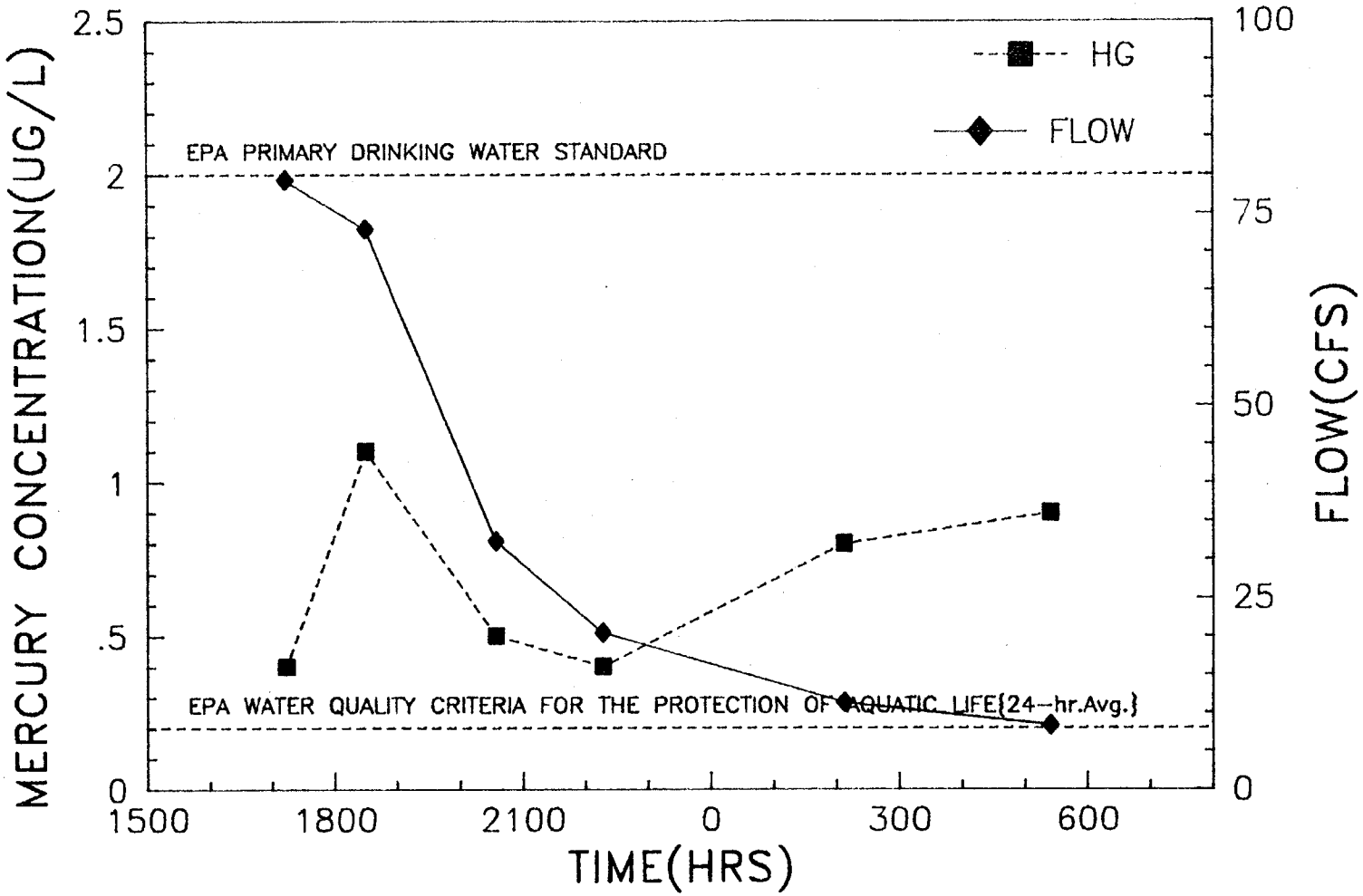
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/08/85

EFPCM 14.4

INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/08/85

BCM 0.55

TABLE 1

WATER AND BEDLOAD ANALYSES RESULTS - FIRST STORM

STORET RETRIEVAL DATE 85/04/10

476608
35 55 58.0 084 23 13.0 2
TRIBUTARY TO POPLAR CREEK 5.47
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 0.03
132TVAC 841103
0000 FEET DEPTH CSN-RSP 0749383-0695481

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	16	30		2D		5	4.27					
	17	35		3D		5	4.00		140			
	18	40		4D		5	4.09		340			
	19	40		40X		5						
	20	55		5D		5	3.60		590			
	21	55		6D		5	3.85		430			
	22	55		7D		5	4.05					
84/10/23	00	05		8D		5	4.05		360			
	01	05		9D		5	3.85					
	02	15		10D		5	3.65		190			
	03	25		11D		5	3.58					
	04	45		12C		5	3.69		62			
	06	15		13C		5	3.82					
84/10/22	16	30										
CP(B)-G						5			260		2.04	
84/10/23	06	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	16	30										
CP(B)-G										26.2	3.5	0.5
84/10/23	06	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	16	30										
CP(B)-G			0.1U									
84/10/23	06	15										

STORET RETRIEVAL DATE 85/04/10

476510
35 57 58.0 084 21 31.0 2
USGS GAGING STATION - BRIDGE 2.3 M NNE OF WHEAT
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 3.3
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735371-0695329

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDITY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	16 40			1D		5	3.55		390			
	17 20			15A		1	3.69	190.0	240	29		
	17 30			2D		5	3.71		440			
	17 35			16A		1						
	19 45			1B	10		3.89					
	19 54			26A		1	3.94	200.0	200	31		
	20 10			2B	30		3.92					
	20 25			27A		1						
	20 50			3B	60		3.97					
	21 25			4B	70		4.08					
	21 26			30A		1	4.05	200.0	200	28		
	21 33			3D		5	4.08		430			
	21 50			5B	90		4.11					
	19 45											
CP(B)-05											2.46	
84/10/22	21 50											
	21 55			31A		1						
	22 10			6B	10		4.08					
	22 30			7B	30		4.02					
	22 35		4082202R	1R	50		4.02					
	22 45			8B	60		3.95					
	22 57			34A		1	3.92	200.0	200	28		
	23 05			9B	70		3.91					
	22 10											
CP(B)-04											2.34	
84/10/22	23 05											
	23 30			35A		1						
84/10/23	00 54			39A		1	2.98	140.0	150	22		
	01 05			4D		5	2.90		150			
84/10/22	16 40											
CP(B)-6						5			348		1.59	
84/10/23	01 05											
	01 25			40A		1						
	04 10			50A		1						
	04 45			49A		1	2.29	85.0	81	15		

STORET RETRIEVAL DATE 85/04/10

476510
35 57 58.0 084 21 31.0 2
USGS GAGING STATION - BRIDGE 2.3 M NNE OF WHEAT
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 3.3
152TVAC 840601
0000 FEET DEPTH CSN-RSP 0735371-0695329

/TYPE/APPENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80209 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	17 35		0.3	5.8								
	20 25		0.2U	1.5								
	16 40											
CP(B)-05					4.1	4.6	11.8	59.7	79.0			
84/10/22	21 50											
	21 55		0.2	2.0								
	22 10											
CP(B)-04					4.2	5.1	7.6	20.6	36.8			
84/10/22	23 05											
	23 30		0.3	11.0								
	16 40											
CP(B)-6										39.8	10.7	0.9
84/10/23	01 05											
	01 25		0.2U	10.0								
	04 10		0.2U	4.7								

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	22 35			7	3	27	4	5	4			
	16 40											
CP(B)-6			0.1U									
84/10/23	01 05											

DATE FROM TO	TIME OF DAY	DEPTH FEET	21511 MPA-234 TOTAL ERROR	28301 I-131 TOTAL PC/L	28302 I-131 ERROR PC/L
84/10/22	22 35			14	3

STORET RETRIEVAL DATE 85/04/10

475509
35 58 56.0 084 13 38.0 2
ADJACENT TO OAK RIDGE COUNTRY CLUB
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 6.80
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735370-0695327

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 ESAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDITY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71921 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	17	45		10		5	3.95		370			
	18	45		20		5	4.25					
	19	45		30		5	4.35		320			
	20	45		40		5	4.18					
	21	45		50		5	3.40		150			
	22	45		60		5	2.50					
	23	45		70		5	1.95		110			
84/10/23	00	45		80		5	1.60					
	01	45		90		5	1.40					
	02	45		100		5	1.25		56			
	03	45		110		5	1.15					
	04	45		120		5	1.12					
	05	45		130		5	1.20		30			
84/10/22	17	45				5			149		1.79	
CP(B)-G												
84/10/23	05	45										

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	17	45										
CP(B)-G										16.9	2.3	0.1U
84/10/23	05	45										

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	17	45										
CP(B)-G			0.1U									
84/10/23	05	45										

STORET RETRIEVAL DATE 85/04/10

476508
35 59 55.0 084 18 00.6 1
BRIDGE AT WILTSHIRE
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 10.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735369-0695324

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00003 LAB IDENT. NUMBER	84069 SERIES CODE ALPHA	00002 SAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDITY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/CM	00010 WATER TEMP CENT
84/10/22	15	15		4A		1		95.0	130	18		
	15	20		5A		1						
	15	00		1B	20		3.78					
	15	20		2B	40		3.78					
	16	40		3B	50		4.00					
	17	00		4B	70		4.08					
	17	10		1D		5	4.10		300			
	17	15		5B	90		4.14					
	15	00										
CP(B)-05											2.24	
84/10/22	17	15										
	17	25		23A		1		250.0	250	32		
	17	35		6B	20		4.18					
	17	45		24A		1						
	17	50		7B	40		4.18					
	18	05	4092210R	1B	50		4.20					
	18	09		25A		1		220.0	210	31		
	18	10		2D	50	5	4.08		130			
	18	11		8B	50		4.04					
	18	25		9B	70		4.04					
	17	35										
CP(B)-04											2.18	
84/10/22	18	25										
	18	30		26A		1						
	19	15		28A		1		200.0	170	26		
	19	40		30		5	3.08		110			
	19	41		29A		1						
	20	50		32A		1		180.0	130	20		
	21	10		33A		1						
	21	25		4D		5	1.75		89			
84/10/23	00	15		41A		1						
	00	40		42A		1		80.0	70	14		
	01	00		5D		5	1.10		40			
84/10/22	17	10										
CP(B)-6						5			114		1.90	

35 [illegible] 55.0 084 18 00.6 1
BRIDGE AT WILTSHIRE
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 10.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735369-0695324

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/23	04 55			53A		1						
	05 20			54A		1		50.0	43	11		

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	15 20		0.7	6.4								
	16 00											
CP(B)-05					31.9	36.0	49.6	75.2	100.0			
84/10/22	17 15											
	17 45		0.2	7.0								
	17 35											
CP(B)-04					33.9	36.3	62.8	92.8	100.0			
84/10/22	18 25											
	18 30		0.2	4.1								
	19 41		0.2U	3.8								
	21 10		0.2U	2.9								
84/10/23	00 15		0.2	3.7								
84/10/22	17 10											
CP(B)-G										5.8	2.2	0.9
84/10/23	01 00											
	04 55		0.2U	2.9								

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	18 05			7	3	16	3					268
	17 10											
CP(B)-G			0.5									
84/10/23	01 00											

DATE FROM TO	TIME OF DAY	DEPTH FEET	21511 MPA-234 TOTAL ERROR	28301 I-131 TOTAL PC/L	28302 I-131 ERROR PC/L
84/10/22	18 05		138		

STORET RETRIEVAL DATE 85/04/10

476507
35 59 49.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AGENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 %SAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	17	00		1D		3	1.03	130.0	120	18		
	17	20	4082228R	1R	50		1.00					
	18	05		2D		3	0.89	100.0	78	14		
	20	00		3D		3	0.50	55.0	42	10		
	21	00		4D		3	0.50					
	22	00		5D		3	0.45					
	23	04		6D		3	0.40	45.0	59	11		
84/10/23	00	05		7D		3	0.38					
	01	10		8D		3	0.48					
	02	13		9D		3	0.58					
	03	15		10D		3	0.55	17.0	21	7		
	04	15		11D		3	0.46					
	05	15		12D		3	0.42	13.0	16	10		
84/10/22	17	00										
CP(B)-G						3			53		1.55	
84/10/23	05	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	17	00	0.2U	2.4								
	18	05	0.2U	3.2								
	20	00	0.6U	1.4								
	23	04	0.2	11.0								
84/10/23	03	15	0.2U	1.5								
	05	15	0.3	2.0								
84/10/22	17	00										
CP(B)-G										5.3	1.1	0.1U
84/10/23	05	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	17	20		7	3	17	3					
	17	00										
CP(B)-G			0.1U									
84/10/23	05	15										

/TYPA/AGENT/STREAM

35 59 45.0 084 18 03.0 2
TRIBUTARY TO EAST FORK POPLAR CREEK 9.66
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
MILL BRANCH 0.20
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735373-0695333

DATE FROM TO	TIME OF DAY	DEPTH FEET	00009 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLCC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	17	15		10		3	1.55		30			
	18	15		20		3	1.50		24			
	19	15		30		3	1.46					
	20	15		40		3	1.40		20			
	21	15		50		3	1.40					
	22	15		60		3	1.38		9			
	23	15		70		3	1.36					
84/10/23	00	15		80		3	1.35					
	01	15		90		3	1.33					
	02	15		100		3	1.32		5			
	03	15		110		3	1.32					
	04	15		120		3	1.30					
	05	15		130		3	1.30		3			
	06	15		140		3	1.30					
84/10/22	17	15										
CP(B)-G						3			8		1.54	
84/10/23	06	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	17	15										
CP(B)-G										1.5	0.4	0.1U
84/10/23	06	15										

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	17	15										
CP(B)-G			0.1U									
84/10/23	06	15										

STORET RETRIEVAL DATE 85/04/10

475515
35 56 41.4 084 22 01.2 1
UPSTREAM FROM THE INFLUENCE OF EFPC BACKWATER
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 0.55
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735375-0695338

/TYPA/AGENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71921 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/10/22	15 00			1C		5			38			
	16 55			10A		1		160.0	200	29		
	17 00			2D		5	1.90		230			
	17 20			13A		1						
	17 25		4082194R	1R	50		1.90					
	18 20			15A		1		550.0	550	60		
	18 50			17A		1						
	20 30			24A		1		550.0	460	56		
	20 55			25A		1						
	22 05			28A		1		200.0	270	32		
	22 20			3D		5	1.10		240			
	15 00											
CP(B)-G						5			133		1.36	
84/10/22	22 20											
	22 25			29A		1						
84/10/23	01 50			38A		1		140.0	80	12		
	02 15			39A		1						
	05 15			47A		1		90.0	46	9		
	05 40			48A		1						

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/10/22	17 20		0.2U	0.4								
	18 50		0.2	1.1								
	20 55		0.2U	0.5								
	15 00											
CP(B)-G										9.7	2.7	0.4
84/10/22	22 20											
	22 25		0.2U	0.4								
84/10/23	02 15		0.2U	0.8								
	05 40		0.7	0.9								

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/10/22	17 25			4	3	36	5	6	4			

APPENDIX III

INSTREAM CONTAMINANT STUDY - TASK 1

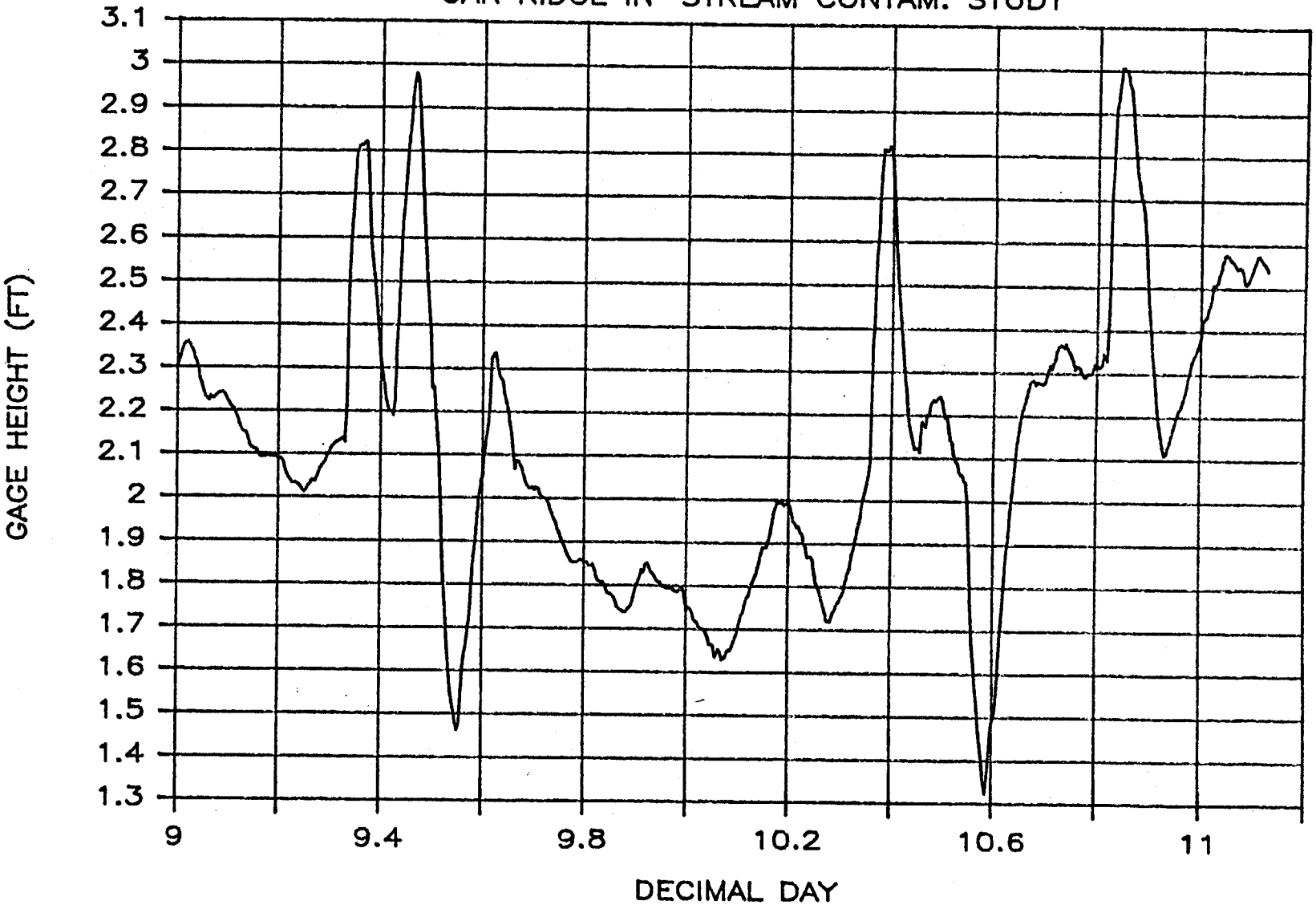
STORMFLOW SURVEY RESULTS - SECOND STORM

FIGURE 1

STREAMFLOW RESULTS - SECOND STORM

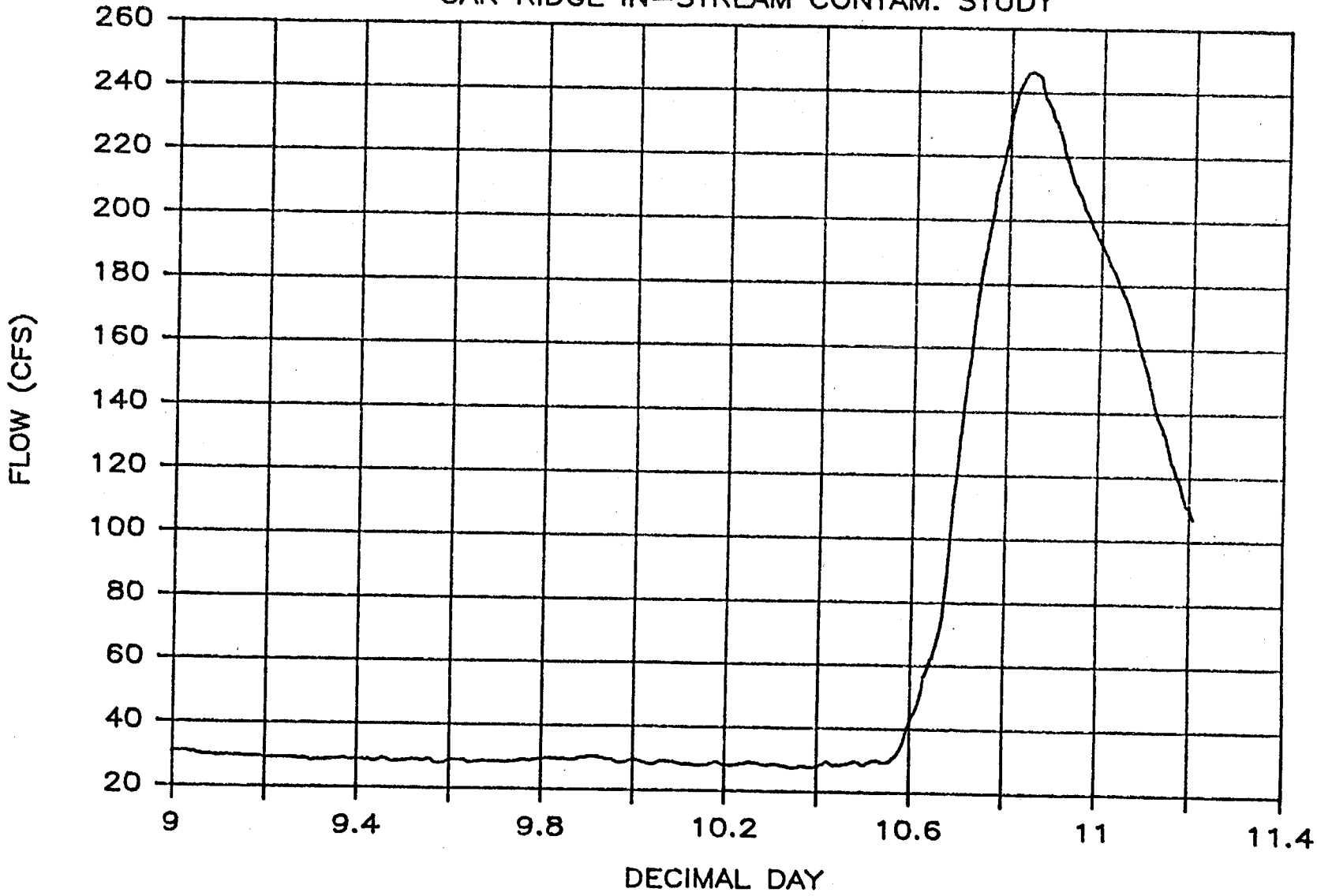
E. FK. POPLAR CR. MI. 0.03 – NOV. 1984

OAK RIDGE IN–STREAM CONTAM. STUDY



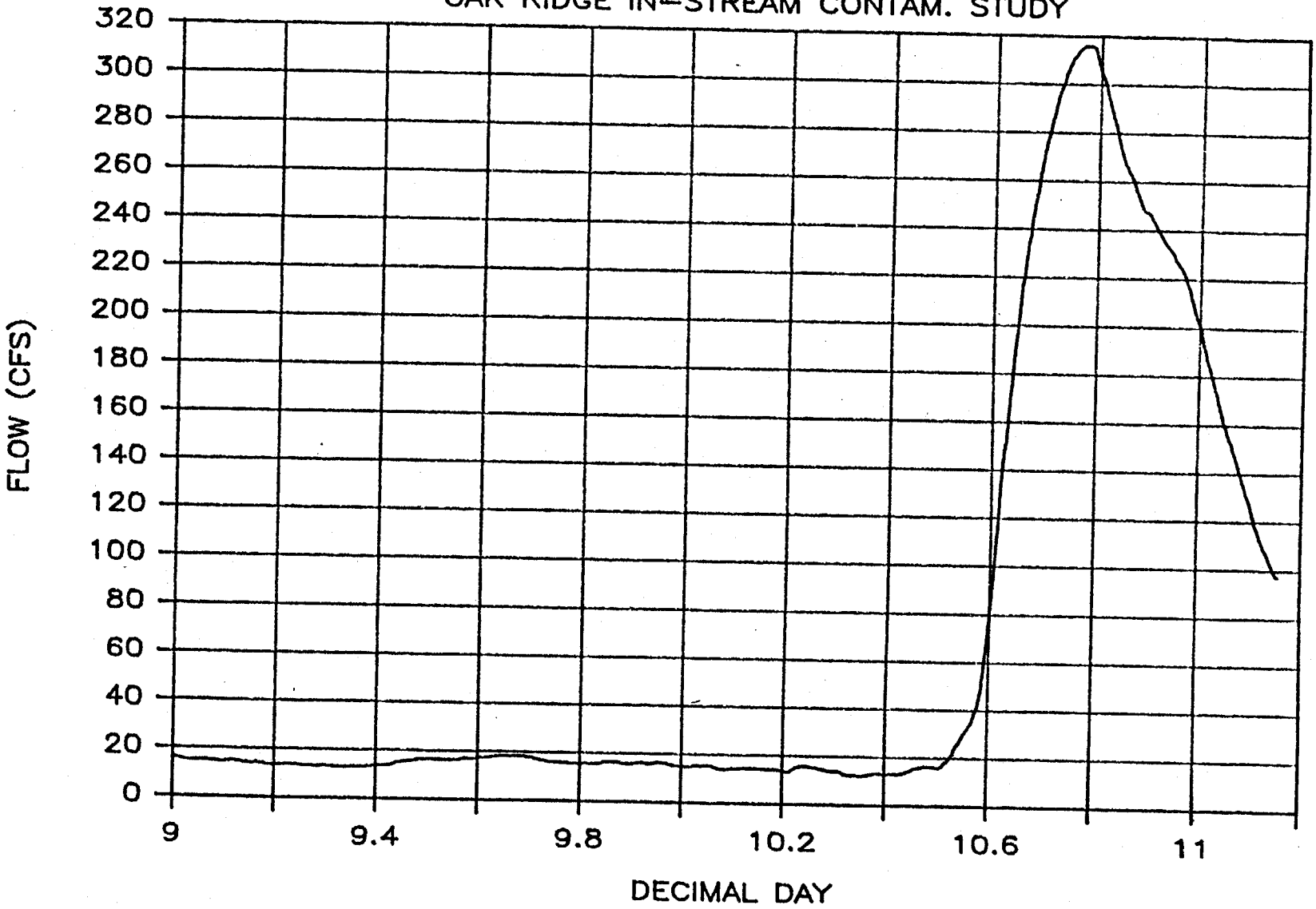
E. FK. POPLAR CR. MI. 3.3 – NOV. 1984

OAK RIDGE IN–STREAM CONTAM. STUDY



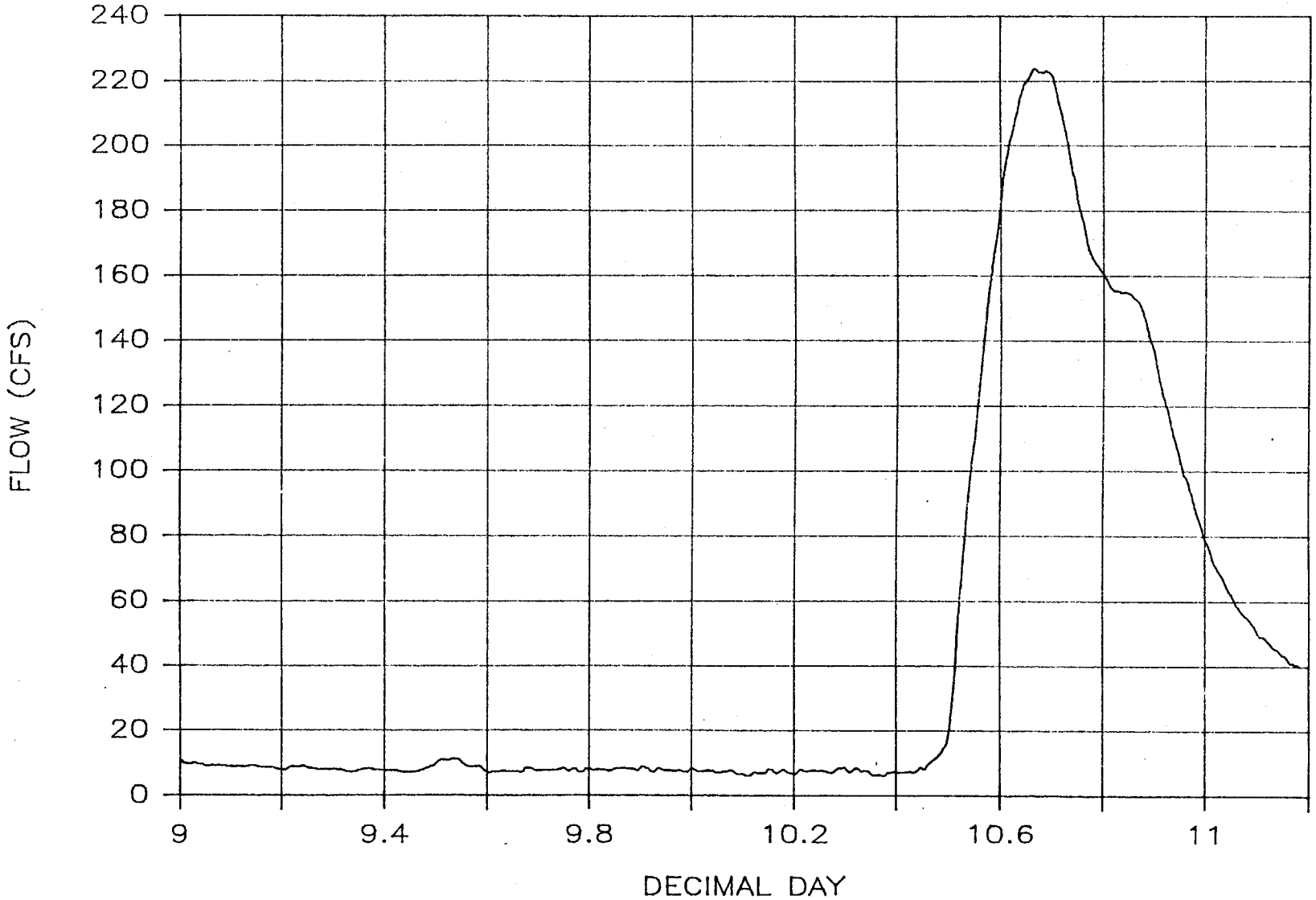
E. FK. POPLAR CR. MI. 6.89 – NOV. 1984

OAK RIDGE IN–STREAM CONTAM. STUDY



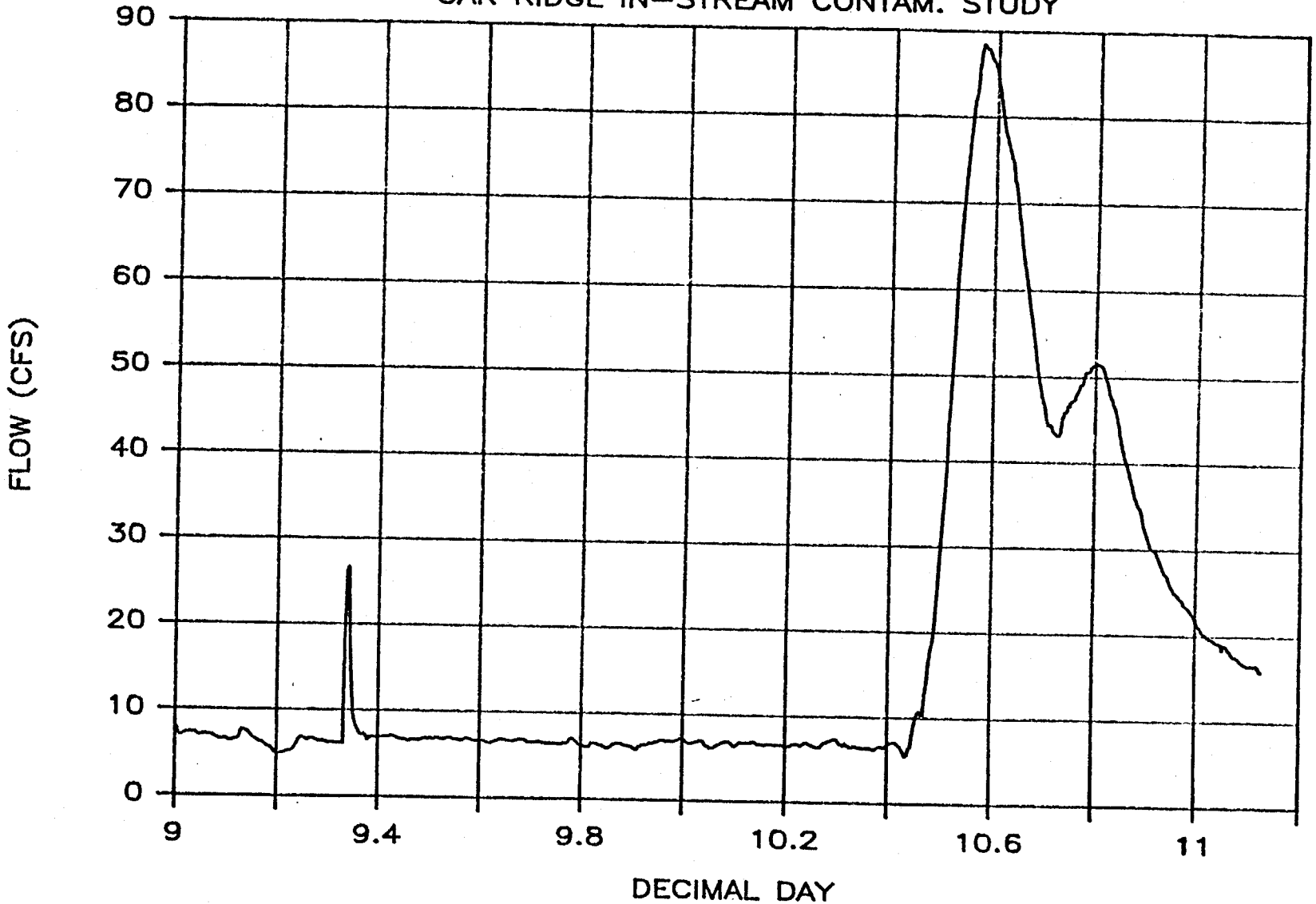
E. FK. POPLAR CR. MI. 10.0 — NOV. 1984

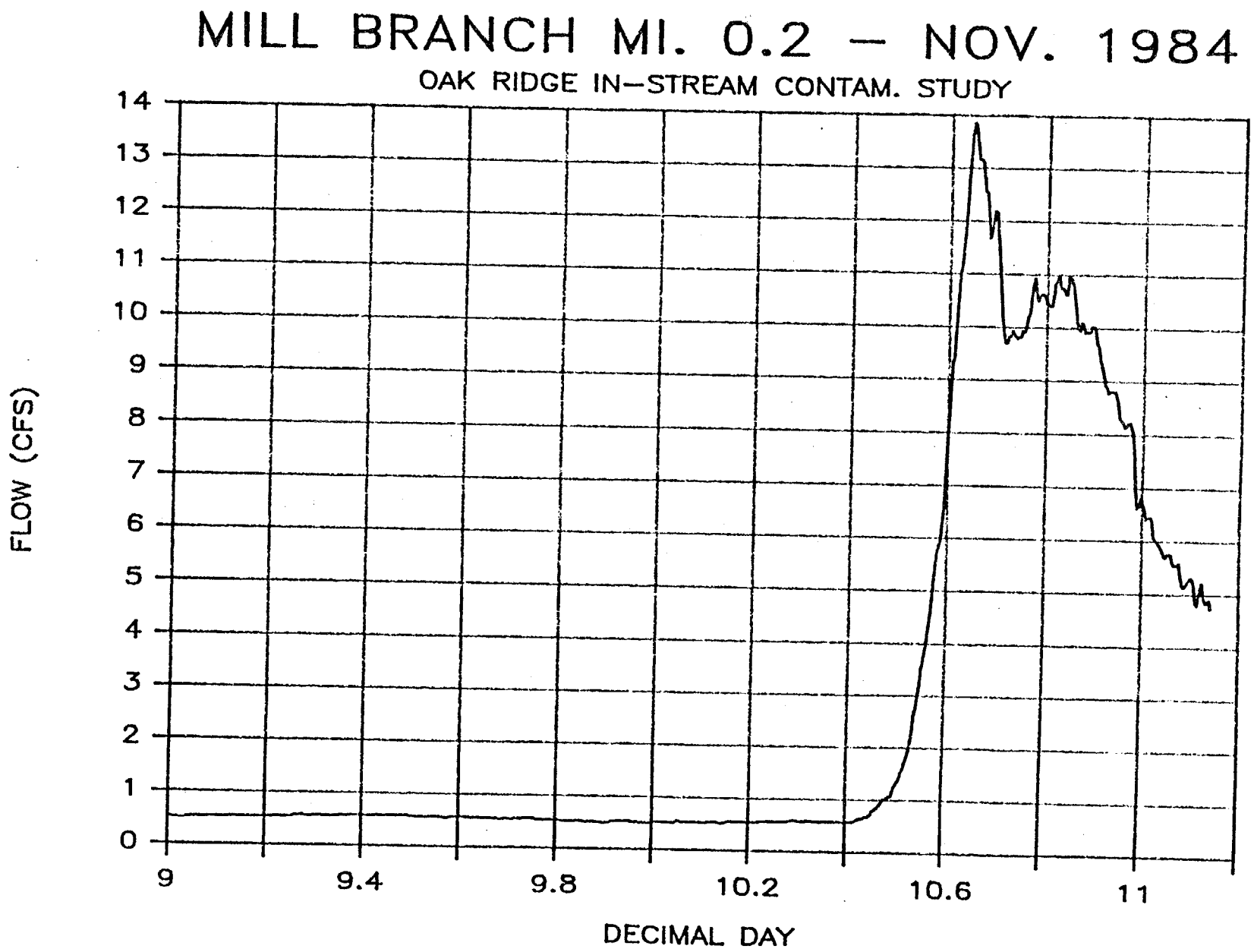
OAK RIDGE IN-STREAM CONTAM. STUDY



E. FK. POPLAR CR. MI. 14.4 — NOV. 1984

OAK RIDGE IN-STREAM CONTAM. STUDY




MILL BRANCH MI. 0.2 — NOV. 1984
OAK RIDGE IN-STREAM CONTAM. STUDY
FLOW (CFS)
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
9
9.4
9.8
10.2
10.6
11
DECIMAL DAY

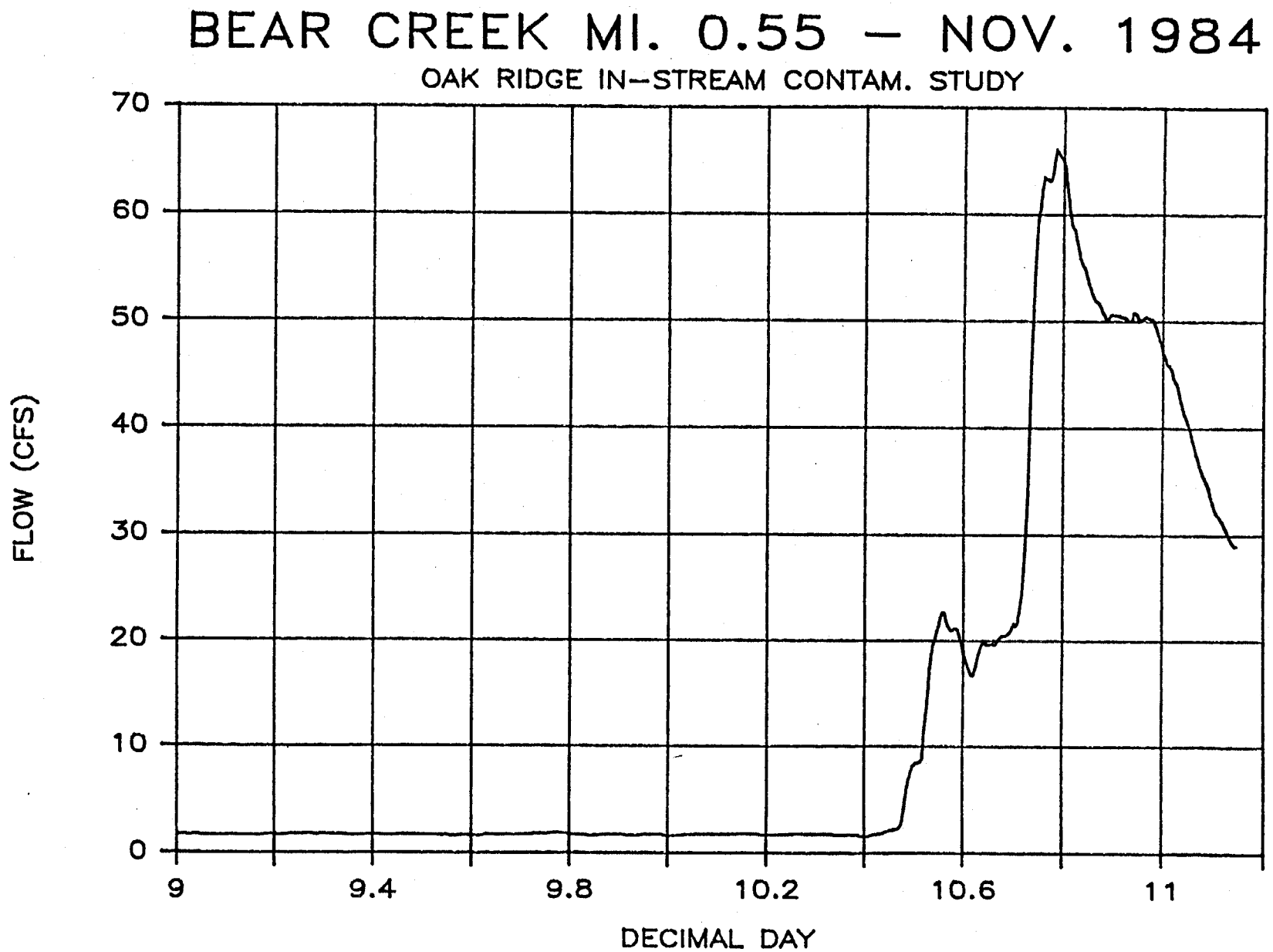
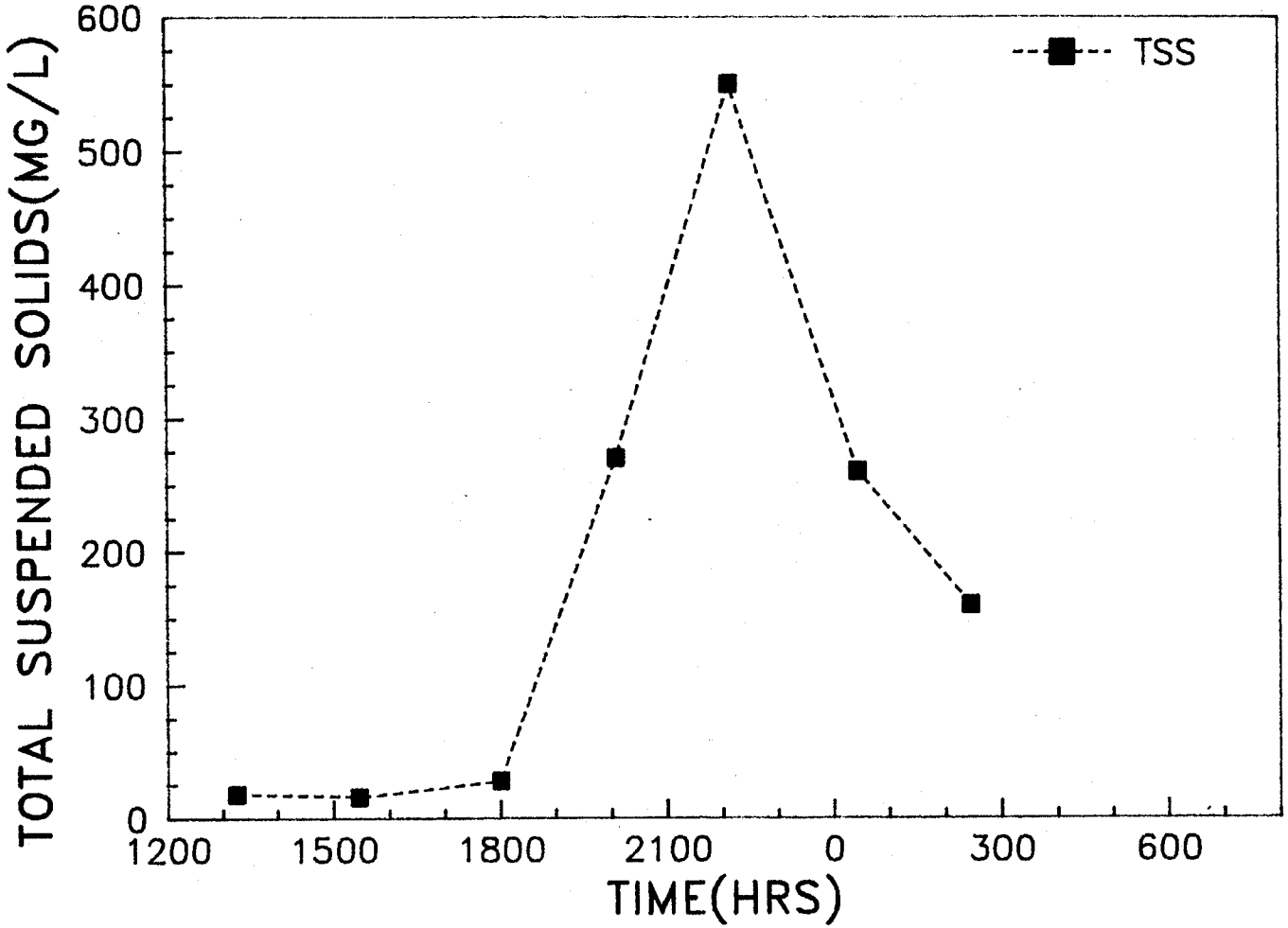

BEAR CREEK MI. 0.55 – NOV. 1984
OAK RIDGE IN–STREAM CONTAM. STUDY
FLOW (CFS)
70
60
50
40
30
20
10
0
9
9.4
9.8
10.2
10.6
11
DECIMAL DAY

FIGURE 2

TOTAL SUSPENDED SOLIDS AND STREAMFLOW
VERSUS TIME FOR DURATION OF SECOND STORM EVENT
(NOVEMBER 10-11, 1984)

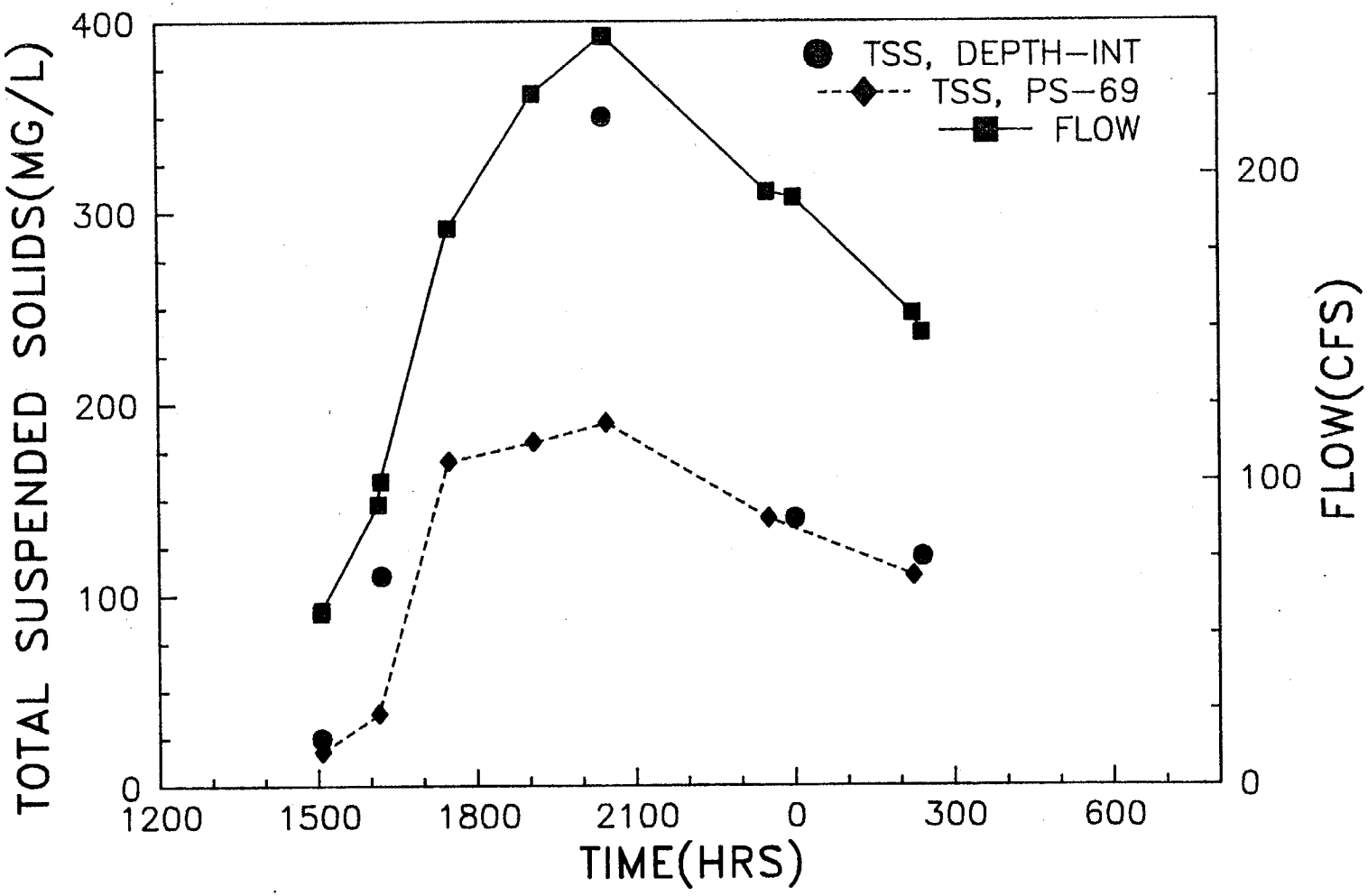
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/14/85

EFPCM 0.03

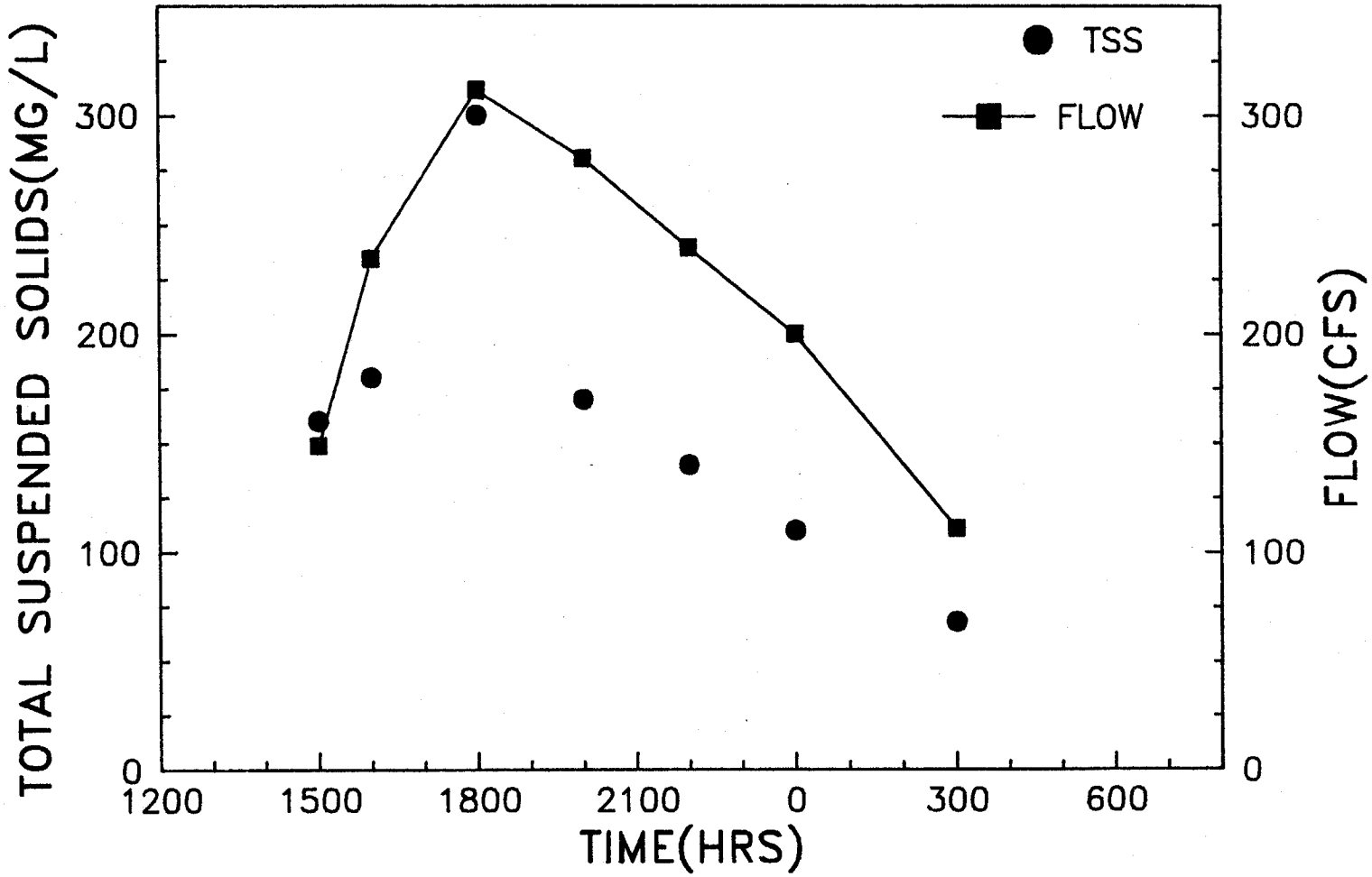
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/18/85

EFPCM 3.3

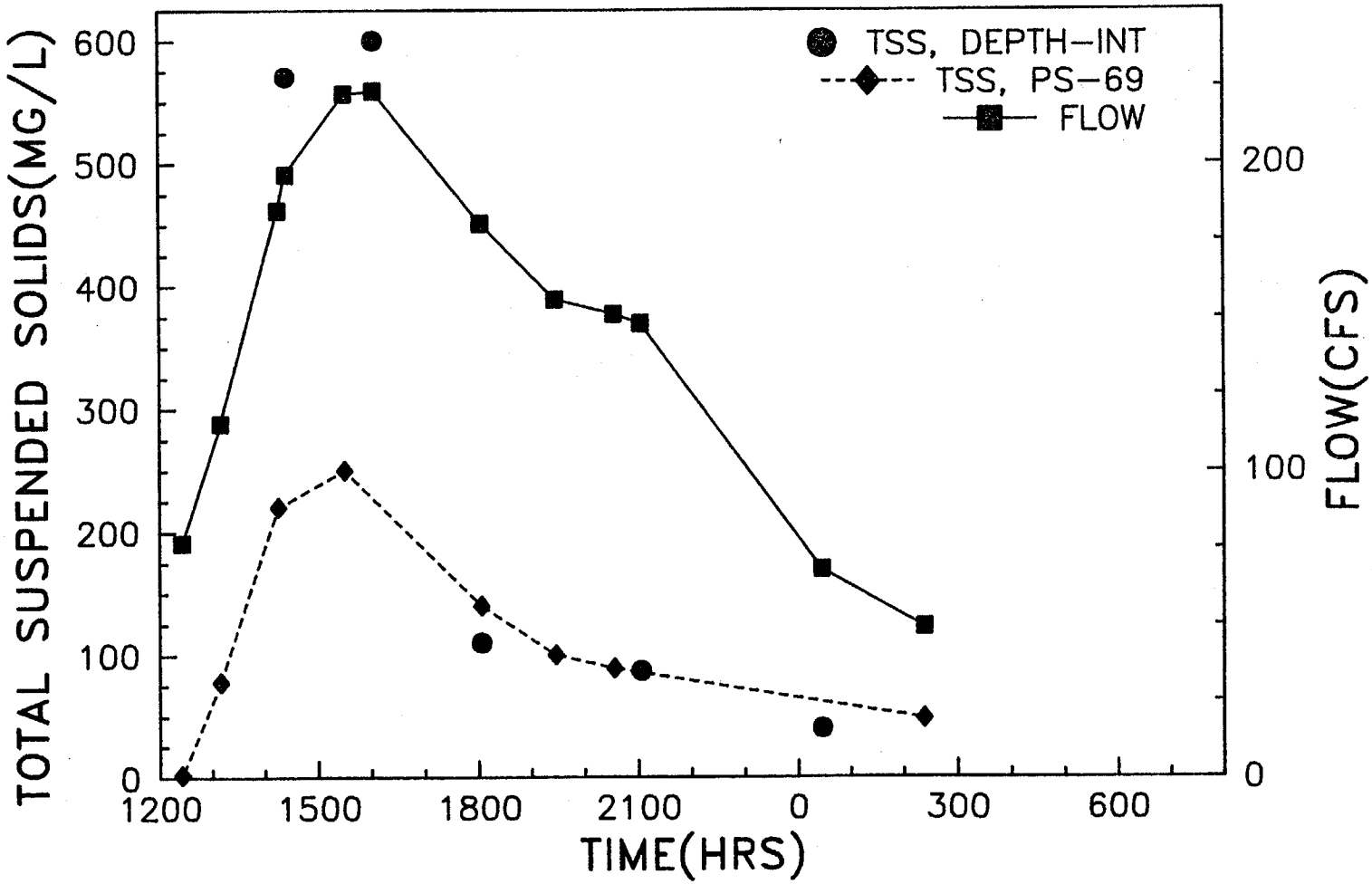
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/19/85

EFPCM 6.8

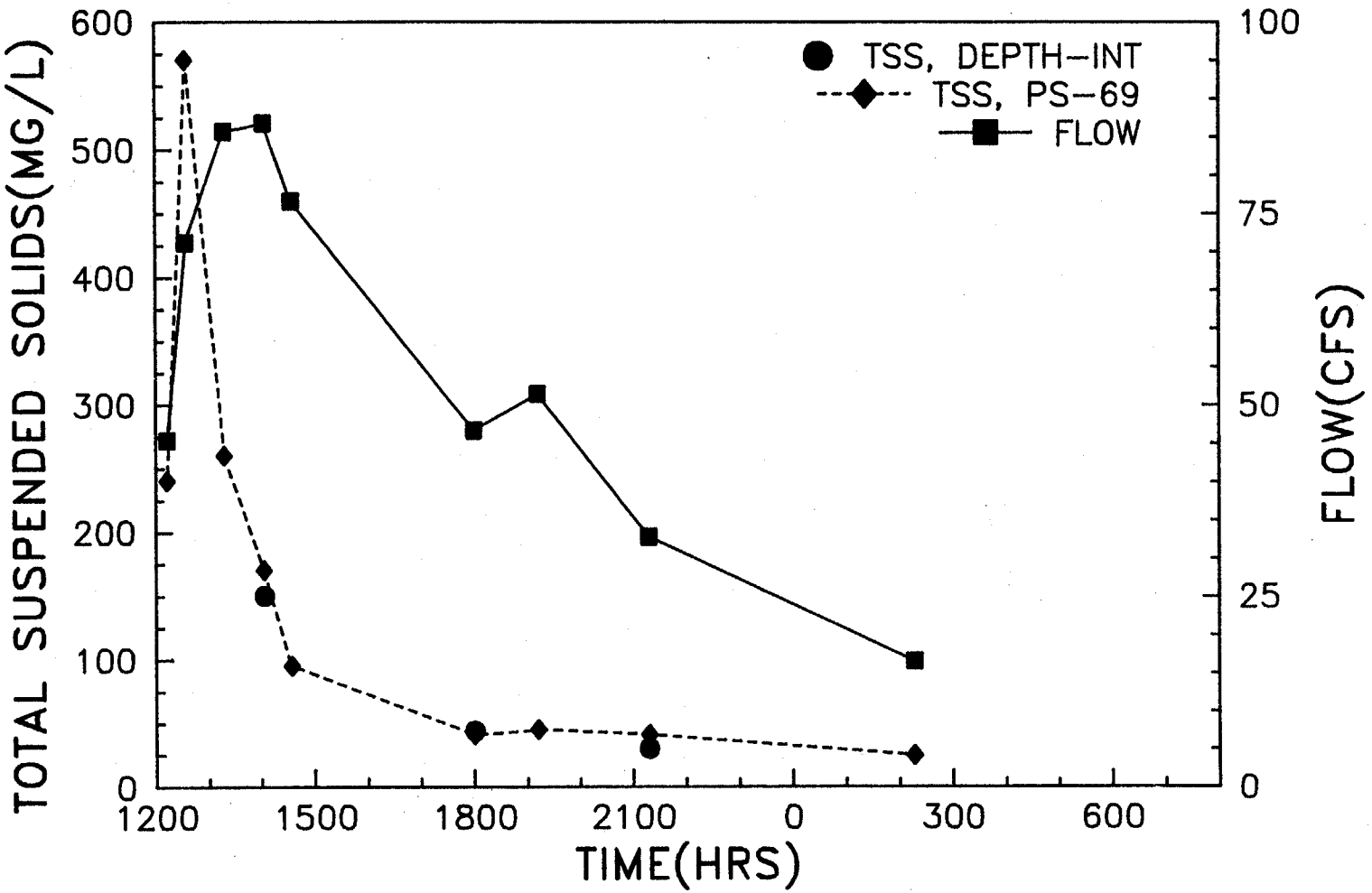
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/19/85

EFPCM 10.0

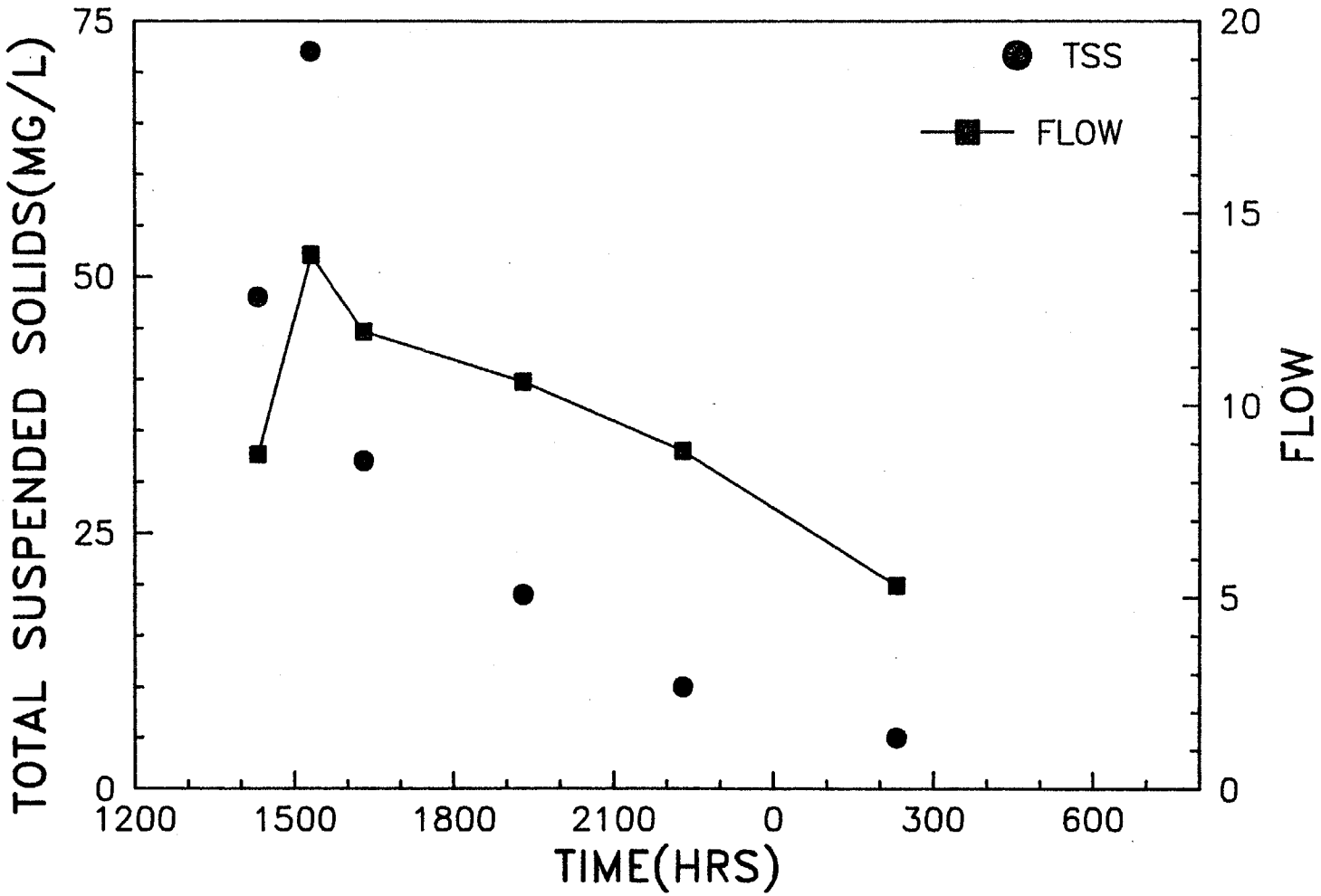
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/18/85

EFPCM 14.4

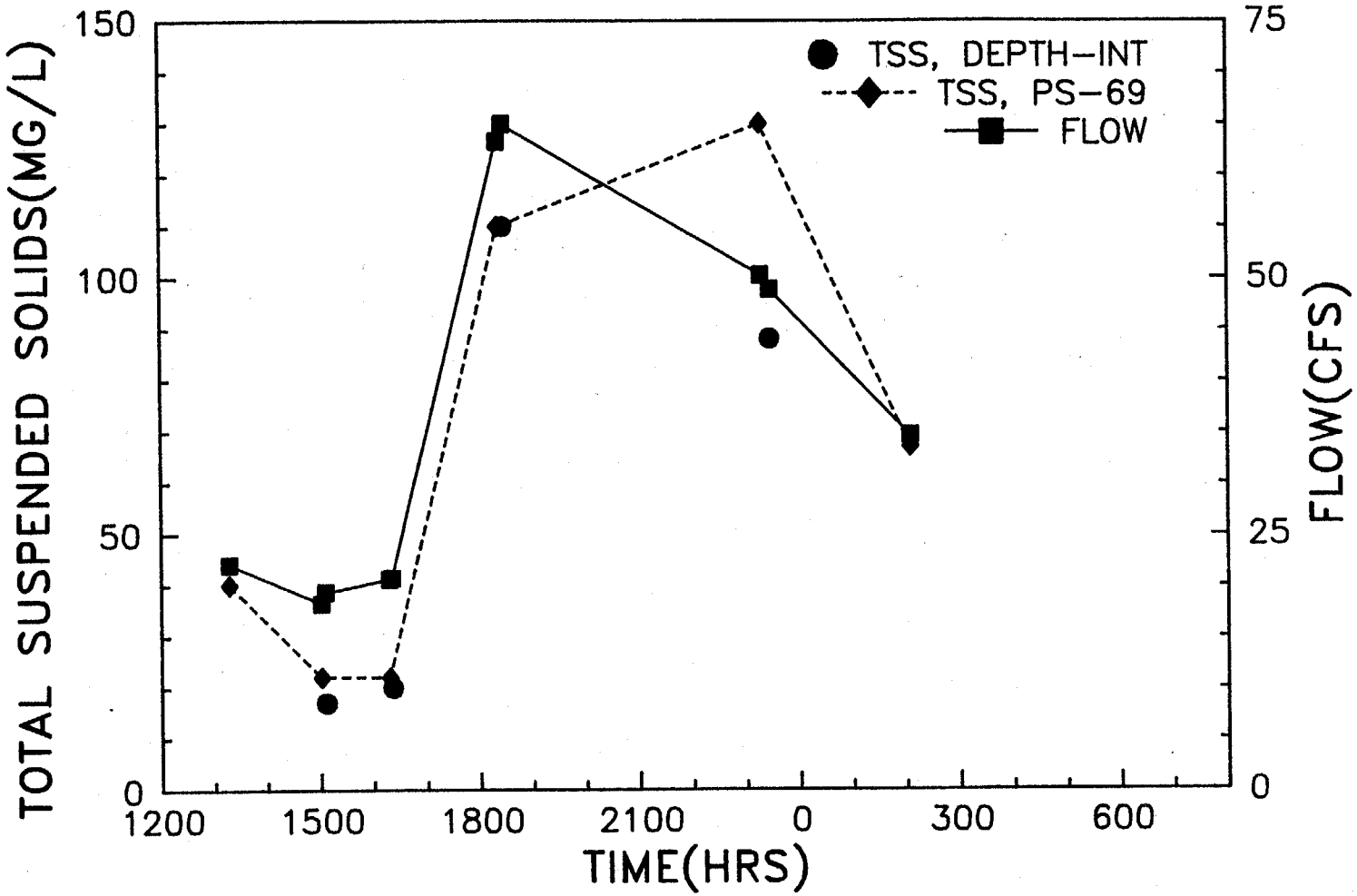
INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/18/85

MILL BR. 0.2

INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



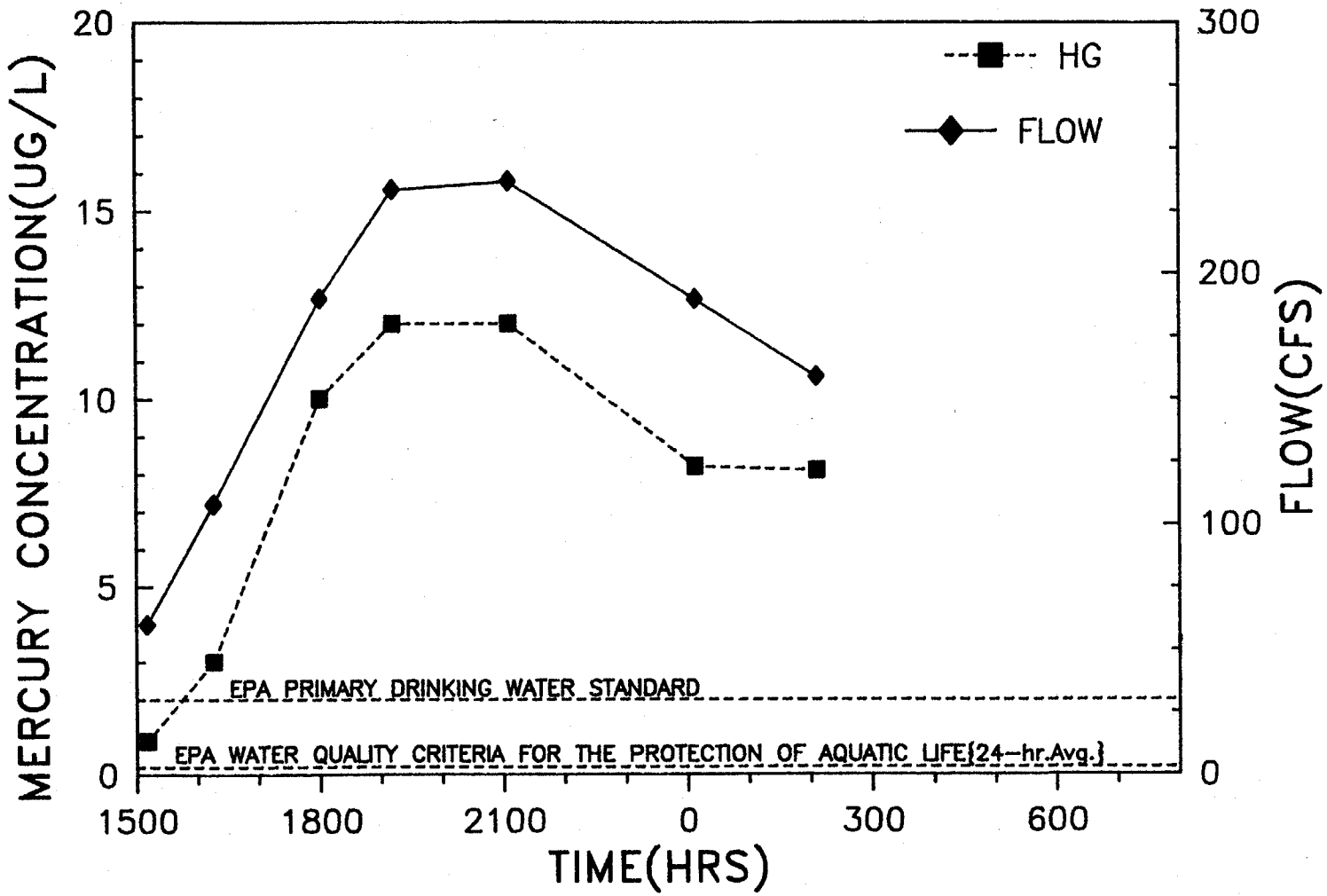
WSDB: 3/18/85

BCM 0.55

FIGURE 3

MERCURY AND STREAMFLOW VERSUS TIME
FOR DURATION OF SECOND STORM EVENT
(NOVEMBER 10-11, 1984)

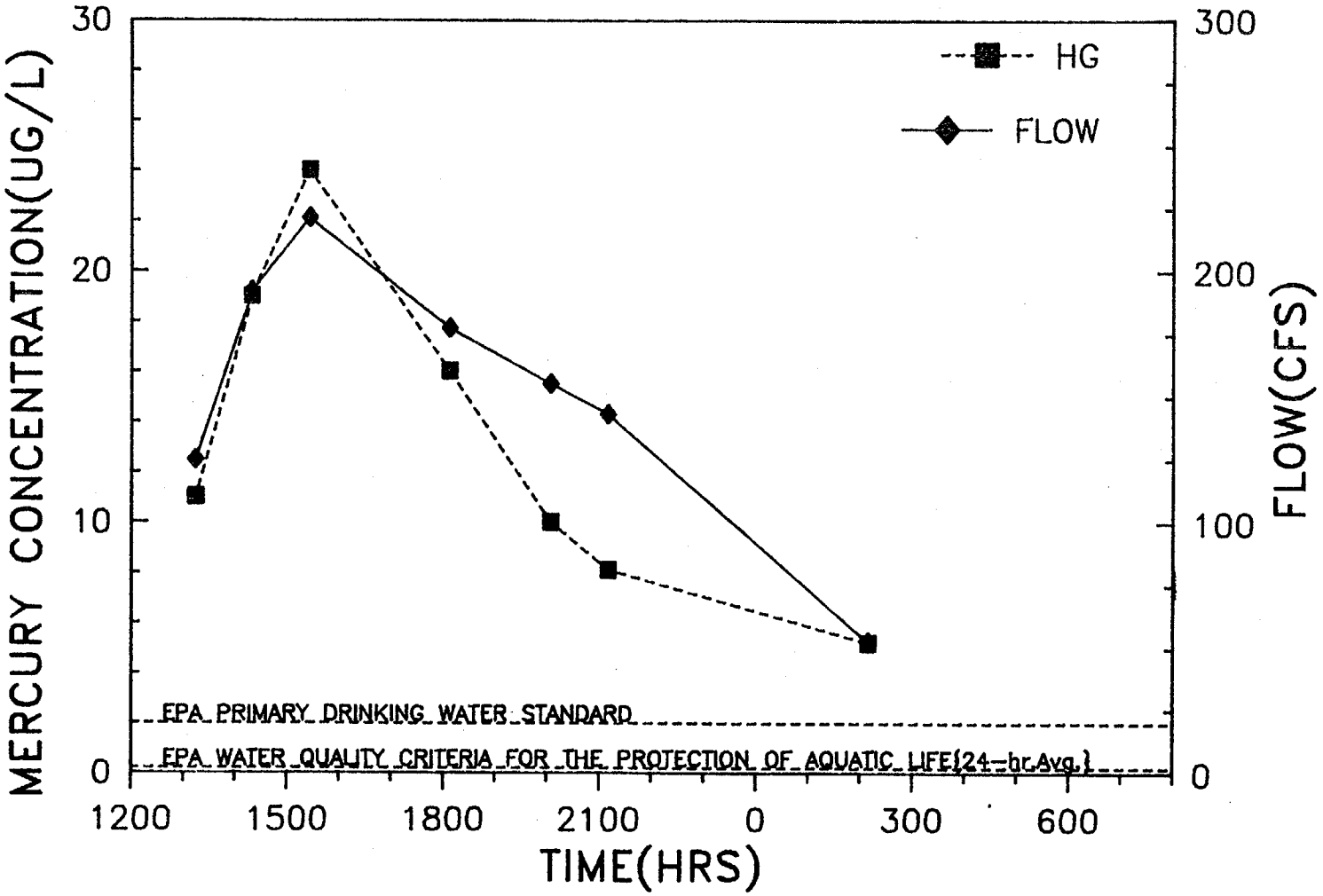
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/14/85

EFPCM 3.3

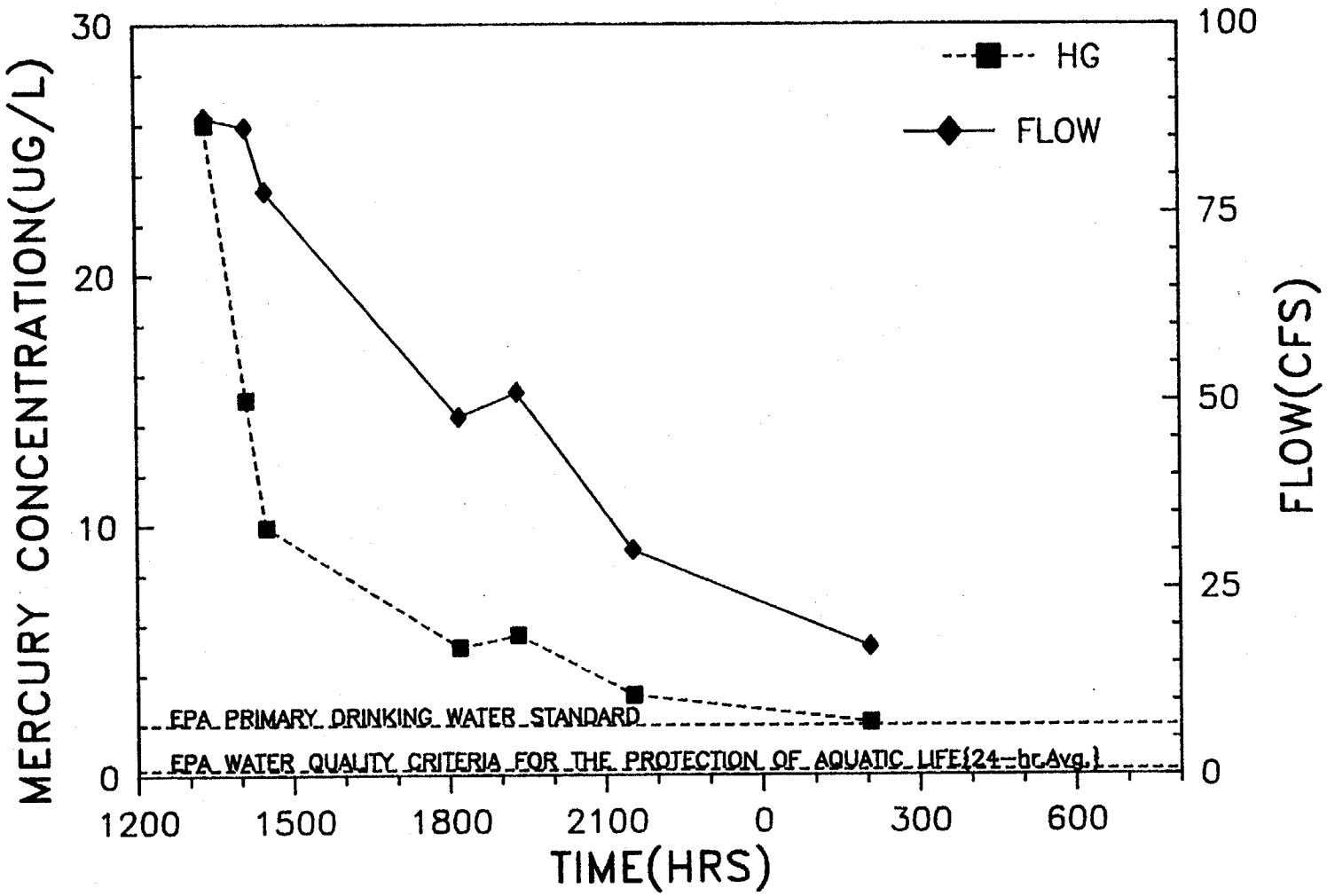
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/14/85

EFPCM 10.0

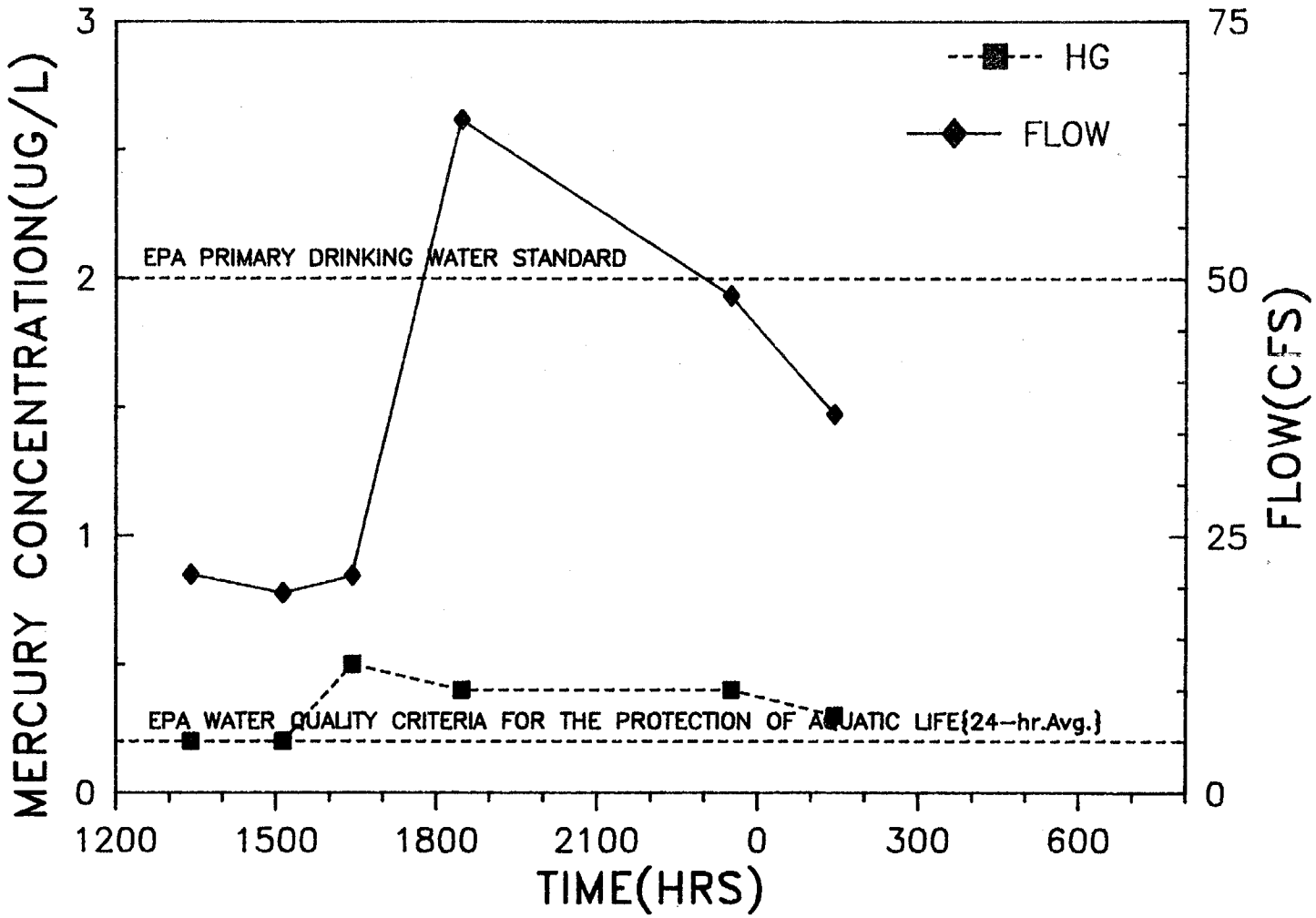
INSTREAM CONTAMINANT STUDY—TASK 1
STORM FLOW SURVEY



WSDB: 3/14/85

EFPCM 14.4

INSTREAM CONTAMINANT STUDY–TASK 1
STORM FLOW SURVEY



WSDB: 3/14/85

BCM 0.55

TABLE 1

WATER AND BEDLOAD ANALYSES RESULTS - SECOND STORM

STORET RETRIEVAL DATE 85/04/10

476608
35 56 58.0 084 23 13.0 2
TRIBUTARY TO POPLAR CREEK 5.47
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 0.03
132TVAC 841103
0000 FEET DEPTH CSN-RSP 0749383-0695491

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	13 25			14D		5	1.80		18			
	14 45			15D		5	1.65					
	15 45			16D		5	2.27		16			
	17 10			17D		5	2.30					
	18 00			18D		5	2.30		28			
	19 10			19D		5	2.30					
	20 10			20D		5	2.95		270			
	21 05			21D		5	2.75					
	22 15			22D		5	2.12		550			
	23 15			23D		5	2.30					
84/11/11	00 45			24D		5	2.51		260			
	01 35			25D		5	2.55					
	02 45			26D		5	2.56		160			
84/11/10	13 25											
CP(B)-G						5			190		2.07	
84/11/11	02 45											

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	13 25											
CP(B)-G										31.1	10.8	1.1
84/11/11	02 45											

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	13 25											
CP(B)-G			0.1U									
84/11/11	02 45											

USGS GAGING STATION - BRIDGE 2.3 M NNE OF WHEAT
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 3.3
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735371-0695329

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	02	40							120			
	15	05		5D		5	2.21		25			
	15	07		5A		1		10.0	18	4		
	15	18		6A		1						
	16	15		11A		1		26.0	38	7		
	16	20		6D		5	2.58		110			
	16	27		12A		1						
	17	48		19A		1		120.0	170	24		
	18	00		20A		1						
	19	08		26A		1		150.0	180	28		
	19	19		27A		1						
	20	00		11B	10		3.75					
	20	20		12B	30		3.75					
	20	40	4089769R	2R	50		3.76					
	20	41		7D		5	3.76		350			
	20	45		13B	60		3.76					
	20	46		33A		1		180.0	190	33		
	21	04		14B	70		3.70					
	21	09		34A		1						
	21	30		15B	90		3.66					
	20	00										
CP(B)-05											2.45	
84/11/10	21	30										
	21	50		16B	10		3.62					
	22	05		17B	30		3.57					
	22	25		18B	60		3.53					
	22	45		19B	70		3.49					
	23	00		20B	90		3.45					
	21	50										
CP(B)-05											1.34	
84/11/10	23	00										
	23	50		41A		1		140.0	140	26		
	24	00		8D		5	3.35		140			
84/11/11	00	13		42A		1						
	02	09		46A		1						
	02	23		47A		1		110.0	110	24		

STORET RETRIEVAL DATE 85/04/10

476510
35 57 58.0 084 21 31.0 2
USGS GAGING STATION - BRIDGE 2.3 M NNE OF WHEAT
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 3.3
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735371-0695329

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 %SAMPLCC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/12	02 40			9D		5	3.00		120			
84/11/10	15 05											
CP(B)-6						5			150		1.14	
84/11/12	02 40											

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	15 18		0.2U	0.9								
	16 27		0.2	3.0								
	18 00		0.9	10.0								
	19 19		0.2	12.0								
	21 09		0.2U	12.0								
	20 00											
CP(B)-05					7.6	9.4	17.5	25.7	83.5			
84/11/10	21 30											
	21 50											
CP(B)-05					13.8	16.4	42.5	85.4	100.0			
84/11/10	23 00											
84/11/11	00 13		0.2U	8.2								
	02 09		0.2U	8.1								
84/11/10	15 05											
CP(B)-6										41.0	8.3	0.1U
84/11/12	02 40											

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	20 40			5	3	23	4	8	5	6	4	
	15 05											
CP(B)-6			0.1U									
84/11/12	02 40											

35 58 56.0 084 19 38.0 2
ADJACENT TO OAK RIDGE COUNTRY CLUB
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 6.80
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735370-0695327

/TYPA/APBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	14	20		1F			1.50	54.0	120	18		
	15	00		14D		5	2.10		160			
	15	15		2F			2.50	110.0	200	26		
	16	00		15D		5	2.85		180			
	17	00		16D		5	3.25					
	18	00		3F			3.50	200.0	400	80		
	18	01		17D		5	3.46		300			
	19	00		18D		5	3.46					
	20	00		19D		5	3.25		170			
	21	00		20D		5	3.05					
	22	00		21D		5	2.95		140			
	23	00		22D		5	2.75					
	24	00		23D		5	2.60		110			
84/11/11	01	00		24D		5	2.30					
	02	00		25D		5	2.05					
	03	00		26D		5	1.75		68			
84/11/10	15	00										
CP(B)-G						5			170		1.59	
84/11/11	03	00										

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	15	00										
CP(B)-G										22.7	8.7	1.1
84/11/11	03	00										

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	15	00										
CP(B)-G			0.1U									
84/11/11	03	00										

STORET RETRIEVAL DATE 85/04/10

476528
35 59 55.0 084 18 00.6 1
BRIDGE AT WILTSHIRE
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 10.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735369-0695324

/TYPA/APPNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	12 43			1A		1		3.4	2	2		
	13 17			7A		1		56.0	78	11		
	13 24			8A		1						
	14 25			19A		1		190.0	220	26		
	14 32			20A		1						
	14 40			6D		5	2.90		570			
	15 44			32A		1						
	15 45			11B	20		3.05					
	15 49			33A		1		200.0	250	29		
	15 50		4089751R	2R	50		3.05					
	16 00			12B	40		3.08					
	16 05			7D		5	3.08		600			
	16 20			13B	50		3.08					
	16 35			14B	70		3.08					
	17 05			15B	90		3.00					
	15 45											
CP(B)-05											2.27	
84/11/10	17 05											
	17 20			16B	20		2.92					
	17 35			17B	40		2.88					
	17 50			18B	50		2.76					
	18 04			19B	70		2.70					
	18 05			8D		5	2.70		110			
	18 06			54A		1		140.0	140	22		
	18 12			55A		1						
	18 20			20B	90		2.64					
	17 35											
CP(B)-04											1.73	
84/11/10	18 20											
	19 45			63A		1		120.0	100	16		
	20 07			64A		1						
	20 55			67A		1		110.0	89	15		
	21 05			9D		5	2.34		87			
	21 17			68A		1						
84/11/11	00 45			10C		5	1.48		40			
84/11/10	14 40											
CP(B)-6						5			210		1.36	

35 59 55.0 084 18 00.6 1
BRIDGE AT WILTSHIRE
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 10.0
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735369-0695324

/TYPA/AGENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00009 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 PSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/11	02 15			81A		1						
	02 37			82A		1		26.0	48	8		

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	13 24		0.2U	11.0								
	14 32		0.2U	19.0								
	15 44		0.2U	24.0								
	15 45											
CP(B)-05					0.5	1.4	3.2	16.5	80.0			
84/11/10	17 05											
	18 12		0.2U	16.0								
	17 35											
CP(B)-04					21.2	27.0	50.8	79.3	89.6			
84/11/10	18 20											
	20 07		0.2	10.0								
	21 17		0.2U	8.1								
	14 40											
CP(B)-G										26.1	10.5	1.1
84/11/11	00 45											
	02 15		0.2	5.2								

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	15 50			9	3	24	4	6	4			
	14 40											
CP(B)-G			0.1U									
84/11/11	00 45											

STORET RETRIEVAL DATE 85/04/10

476507
35 59 43.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AGENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 %SAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	12 22			1A		1		160.0	240	44		
	12 57			7A		1		320.0	570	94		
	13 30			13A		1		100.0	260	48		
	13 35			14A		1						
	14 05			13C		3	1.38		150			
	14 06			20A		1		140.0	170	31		
	14 12			21A		1						
	14 20		4089744R	2R	50		1.38					
	14 50			27A		1						
	14 57			28A		1		90.0	95	22		
	16 00			32A		1		81.0	80	17		
	18 00			14C		3	0.84		44			
	18 01			46A		1		53.0	41	10		
	18 20			48A		1						
	19 20			55A		1		51.0	45	12		
	19 32			56A		1						
	21 30			15C		3	0.64		30			16.0
	14 05											
CP(B)-G						3			69		1.24	
84/11/10	21 30											
	21 31			66A		1		47.0	41	8		
	21 54			67A		1						
84/11/11	02 04			78A		1						
	02 27			79A		1		24.0	25	6		

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	13 35		0.2U	26.0								
	14 12		0.2	15.0								
	14 50		0.2U	9.9								
	18 20		0.4U	5.1								
	19 32		0.2U	5.5								
	14 05											
CP(B)-G										5.0	1.7	0.1U
84/11/10	21 30											
	21 54		0.2U	3.2								
[illegible]	[illegible]		[illegible]	[illegible]								

476507
35 59 49.3 084 14 27.3 1
BELOW NEW HOPE POND DIVERSION POINT
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
EAST FORK POPLAR CREEK 14.36
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735368-0695321

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	14 20			15	4	37	5					
	14 05											
CP(B)-G			0.1U									
84/11/10	21 30											

STORET RETRIEVAL DATE 85/04/10

476512
35 59 45.0 084 18 03.0 2
TRIBUTARY TO EAST FORK POPLAR CREEK 9.66
47001 TENNESSEE ANDERSON
CLINCH RIVER BASIN 040102
MILL BRANCH 0.20
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735373-0695333

/TYPA/AMENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	12 00			1F			1.25	14.0	10	5		
	14 30			15D		3	1.60		48			
	15 30			16D		3	1.72		72			
	16 30			17D		3	1.68		32			
	17 30			18D		3	1.65					
	18 30			19D		3	1.67					
	19 30			20D		3	1.68		19			
	20 30			21D		3	1.64					
	21 30			22D		3	1.62					
	22 30			23D		3	1.60		10			
	23 30			24D		3	1.57					
84/11/11	00 30			25D		3	1.54					
	01 30			26D		3	1.50					
	02 30			27D		3	1.48		5			
84/11/10	14 30											
CP(B)-6						3			18		0.79	
84/11/11	02 30											

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	14 30											
CP(B)-6										1.6	0.2	0.1U
84/11/11	02 30											

DATE FROM TO	TIME OF DAY	DEPTH FEET	80326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	14 30											
CP(B)-6			0.1U									
84/11/11	02 30											

STORET RETRIEVAL DATE 85/04/10

476515
35 56 49.4 084 22 01.2 1
UPSTREAM FROM THE INFLUENCE OF EFPC BACKWATER
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 0.55
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735375-0695338

/TYPA/APENT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00008 LAB IDENT. NUMBER	84068 SERIES CODE ALPHA	00002 HSAMPLOC % FROM RT BANK	00063 NO. OF SAMPLING POINTS	00065 STREAM STAGE FEET	82079 TURBIDTY LAB NTU	00530 RESIDUE TOT NFLT MG/L	00535 RESIDUE VOL NFLT MG/L	71821 SPECIFIC GRAVITY SEDGM/GM	00010 WATER TEMP CENT
84/11/10	13 29			4A		1		40.0	40	7		
	13 40			5A		1						
	15 02			12A		1		26.0	22	5		
	15 10			4D		5	1.05		17			
	15 12			13A		1						
	15 30		4089777R	2R	50		1.05					
	16 30			20A		1		24.0	22	5		
	16 35			5D		5	1.09		20			
	16 42			21A		1						
	16 45			6D		5	1.70		110			
	18 35			31A		1		90.0	110	15		
	18 47			32A		1						
	21 00		4089785R	3R	50		1.58					
	23 28			49A		1		120.0	130	17		
	23 45			7D		5	1.56		88			
	15 10											
CP(B)-G						5			50		1.04	
84/11/10	23 45											
	23 50			50A		1						
84/11/11	01 43			55A		1						
	02 08			56A		1		100.0	67	9		

DATE FROM TO	TIME OF DAY	DEPTH FEET	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	80203 TOT SED SIEVE %<.062MM	80204 TOT SED SIEVE %<.125MM	80206 TOT SED SIEVE %<.500MM	80208 TOT SED SIEVE %<2.00MM	80327 TOT SED SIEVE % LT6.35MM	80325 SUS PART > 63U MG/L	80322 SUS PART >125U MG/L	80328 SUS PART GT500UM MG/L
84/11/10	13 40		0.2U	0.2								
	15 12		0.2U	0.2								
	16 42		0.2U	0.5								
	18 47		0.2U	0.4U								
	15 10											
CP(B)-G										7.4	2.2	0.2
84/11/10	23 45											
	23 50		0.2U	0.4								
84/11/11	01 43		0.2U	0.3								

STORET RETRIEVAL DATE 85/04/10

476515
35 56 49.4 084 22 01.2 1
UPSTREAM FROM THE INFLUENCE OF EFPC BACKWATER
47145 TENNESSEE ROANE
CLINCH RIVER BASIN 040102
BEAR CREEK 0.55
132TVAC 840601
0000 FEET DEPTH CSN-RSP 0735375-0695338

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00326 SUS PART >2000 UM MG/L	01501 ALPHA TOTAL PC/L	01502 ALPHA-T ERROR PC/L	03501 BETA TOTAL PC/L	03502 BETA-T ERROR PC/L	22383 BI-214 TOTAL PCI/L	22384 BI-214 TOTAL ERROR	17519 PB-214 TOTAL PCI/L	17520 PB-214 TOTAL ERROR	21510 MPA-234 TOTAL PCI/L
84/11/10	15 30			5	2	16	3					
	21 00			15	4	55	7					
	15 10											
CP(B)-G			0.1U									
84/11/10	23 45											

APPENDIX IV

INSTREAM CONTAMINANT - TASK 1

QUALITY CONTROL

FIGURE 1

Sample Collection, Shipping and Receiving

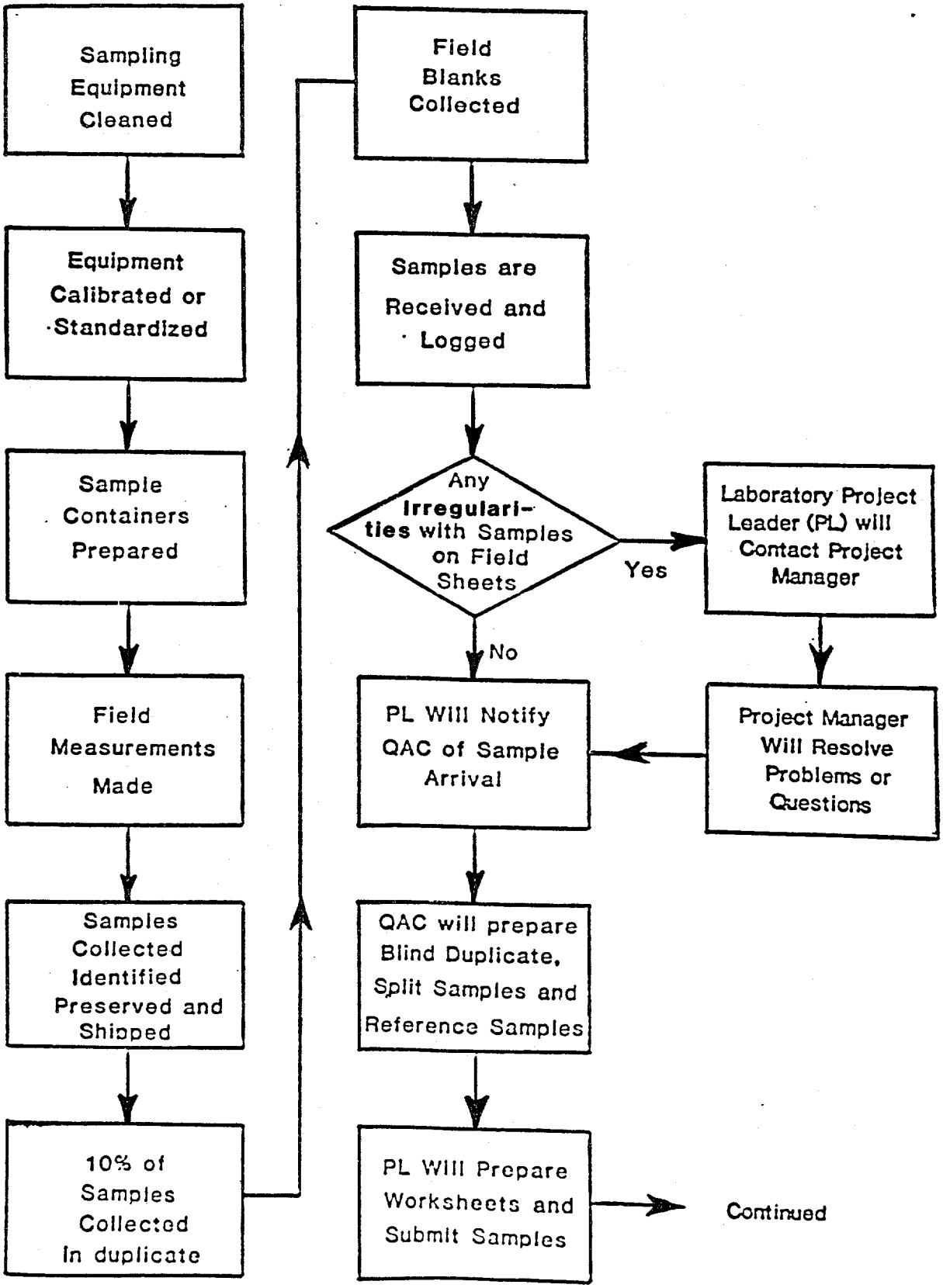
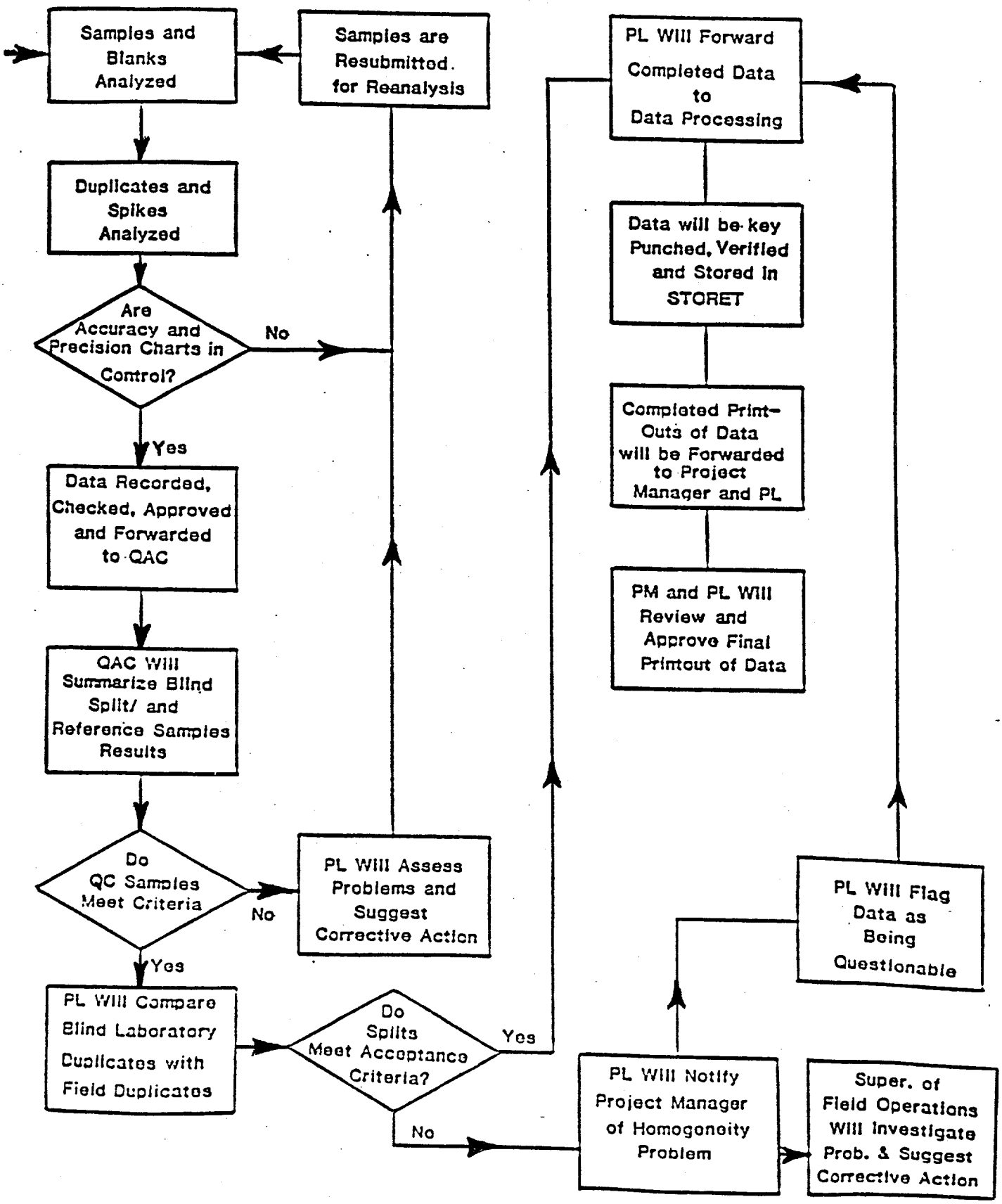


FIGURE 2
Laboratory Analysis and Data Reporting



APPENDIX IV

LABORATORY ANALYSIS PROCEDURES

1.0 Analytical Methodology

1.1 Routine Parameters

1.1.1 Applicable Documents

1.1.1.1 Methods for Chemical Analysis of Water and Wastes, Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio, 1979.

1.1.1.2 Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA 600/4-82-057, Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, July 1982.

1.1.1.3 Methods for Determination of Inorganic Substances in Water and Fluvial Sediments, Book 5. Chapter A1, U.S. Geological Survey, Washington, DC, 1979.

1.1.1.4 "Standard Methods for the Examination of Water and Waste Water," APHA, AWWA, WPCF, American Public Health Association, Washington, D.C., 1971.

1.1.1.5 "Handbook of Radiochemical Analytical Methods," F. B. Johns, Editor, EPA 680/4-75-001, February 1975.

1.1.1.6 "Gross Alpha and Gross Beta Activity Determination," Procedure Number G-01, Laboratory Services, Tennessee Valley Authority, Muscle Shoals, Alabama, July 1984.

1.1.1.7 "Tritium Activity Determination in Urine, Atmospheric Moisture and Environmental Aqueous Samples," Procedure Number T-01, Laboratory Services, Tennessee Valley Authority, Muscle Shoals, Alabama, July 1984.

1.1.1.8 "Gamma Analysis of Environmental Samples," Procedure Number G-03, Laboratory Services, Tennessee Valley Authority, Muscle Shoals, Alabama, November 1980.

1.1.1.9 "Germanium Spectroscopy System Operating Procedure," Procedure Number OP-05, Laboratory Services, Tennessee Valley Authority, Muscle Shoals, Alabama, June 1984.

1.1.2 Summary of Methods

Parameter	Applicable Documents	Type of Analysis	Detection Limit
Residue, Nonfilterable	1.1.1.1 Method 160.2	Gravimetric	1 mg/L
Residue, Volatile	1.1.1.1 Method 160.4	Gravimetric	1 mg/L
Mercury, Total and Dissolved	1.1.1.1 Method 245.1	Manual Cold Vapor	0.2 µg/L
Turbidity	1.1.1.1 Method 180.1	Nephelometric	0.1 NTU
Hardness, Total	1.1.1.1 Method 130.2	EDTA Titrimetric	1 mg/L as $CaCO_3$
Total Kjelkdahl Nitrogen	1.1.1.1 Method 351.2	Colorimetric, Semi-Automated Block Digestor	0.02 mg/L
Total Phosphorous	1.1.1.1 Method 365.4	Colorimetric, Semi-Automated Block Digestor	0.01 mg/L
Nitrate plus Nitrite Nitrogen	1.1.1.1 Method 353.2	Colorimetric, Automated Cadmium/reduction	0.01 mg/L
Oil and Grease	1.1.1.1 Method 413.1	Colorimetric	5 mg/L
Cyanide, Total	1.1.1.1 Method 335.2	Colorimetric	20 µg/L
Phenol, total	1.1.1.1 Method 420.1	Colorimetric, Manual with distillation	2 µg/L
Extractable Organics	1.1.1.2 Method 625	GC/MS, Methylene Chloride Extraction	Various Detection Limits
Volatile Organics	1.1.1.2 Method 624	GC/MS, Purge and Trap	Various Detection Limits
Pesticides and PCB's	1.1.1.2 Method 608	GC/EC, Methylene Chloride Extraction	Various Detection Limits
Arsenic	1.1.1.1 Method 206.2	AA - Furnace	1 µg/L
Antimony	1.1.1.1 Method 204.2	AA - Furnace	1 µg/L
Chromium	1.1.1.1 Method 218.2	AA - Furnace	1 µg/L
Copper	1.1.1.1 Method 200.7	ICP	5 µg/L
Zinc	1.1.1.1 Method 200.7	ICP	5 µg/L

Parameter	Applicable Documents	Type of Analysis	Detection Limit
Beryllium	1.1.1.1 Method 200.7	ICP	1 µg/L
Aluminum	1.1.1.1 Method 200.7	ICP	1 µg/L
Thallium	1.1.1.1 Method 200.7	ICP	50 µg/L
Nickel	1.1.1.1 Method 249.2	AA - Furnace	1 µg/L
Cadmium	1.1.1.1 Method 213.2	AA - Furnace	0.1 µg/L
Lead	1.1.1.1 Method 239.2	AA - Furnace	1 µg/L
Selenium	1.1.1.1 Method 270.2	AA - Furnace	1 µg/L
Silver	1.1.1.1 Method 272.2	AA - Furnace	10 µg/L
Lithium	1.1.1.3 Method I-3425-78	AA - Direct	10 µg/L
Gross Alpha	1.1.1.4; 1.1.1.6	Alpha Counting	2.0 pCi/L
Gross Beta	1.1.1.4; 1.1.1.6	Beta Counting	2.4 pCi/L
Tritium	1.1.1.5; 1.1.1.7	Liquid Scintillation Counting	330 pCi/L
Gamma-Emitting Radionuclides	1.1.1.8; 1.1.1.9	Gamma Spectral Analysis of Ge(Li) Spectra	5-10 pCi/L

1.2 Nonroutine Parameters

1.2.1 Particle Size

1.2.1.1 Applicable Documents

Guy, H. P., "Laboratory Theory and Methods for Sediment Analysis," Book 5, Chapter C1, in Techniques of Water-Resources Investigations of the United States Geological Survey, U.S. Government Printing Office, Washington, DC, 1969.

1.2.1.2 Summary of Method

The particle size of the suspended material was determined gravimetrically. A homogenious alquiot was filtered through the following sieves: 2.0 mm, 0.5 mm, 0.125 mm, and 0.062 mm. Each sieve was rinsed into a preweighed 100 mm x 50 mm pyrex dish and dried overnight in a 105° oven and reweighed. The results were calculated in mg/L greater than each fraction.

1.2.1.3 Sample Size

2 liters

1.2.1.4 Minimum Detectable Amount

0.1 mg/L

1.2.2 Specific Gravity on Suspended Particulates

1.2.2.1 Applicable Documents

No reference, private communications May 1984.

1.2.2.2 Summary of Method

The specific gravity of the suspended particulates was calculated from the densities on both a filtered and unfiltered storm water sample. These densities were determined by the DOE laboratory through the use of a liquid-density balance. The specific gravity was calculated using the following equation:

$$\text{Suspended Particulates} = \frac{\text{weight of equal volume of suspended particulate}}{\text{weight of equal volume of water displaced}}$$

$$= \frac{W_{SP}(\text{mg/L}) \times 10^{-3}\ (\text{g/mg})}{(D_{UF} - D_F)\ (\text{g/cm}^3) \times 1000\ \text{cm}^3/\text{L}}$$

Where
W_{SP} = suspended solids on storm water
D_{UF} = Density of unfiltered storm water
D_F = Density of filtered storm water

1.2.2.3 Minimum Detectable Amount

Not applicable

APPENDIX IV - TABLES 1 to 5

QUALITY CONTROL RESULTS

TABLE 1

SUMMARY OF UNKNOWN REFERENCE SAMPLES
SUBMITTED WITH BASEFLOW WATER SAMPLES

Parameter	Lab Value (µg/L)	True Value (µg/L)	% Recovery
Carbon Tetrachloride	25; 26	26.6	96
Chlorobenzene	43; 40	40.4	103
Chlorodibromomethane	32; 33	29.6	110
1,2 Dichloroethane	29; 28	25.0	114
1,1-Dichloroethylene	21; 22	20.8	103
1,2-Dichloropropane	33; 32	40.0	81
Methylene Chloride	44; 22	40.0	82
1,1,2,2-Tetrachloroethane	59; 60	50.6	118
Trans-1,2-dichloroethylene	59; 60	55.2	108
Trichloroethylene	52; 52	49.6	105
Al	720	730	99
As	220	235	94
Cd	38.6	39	99
Cr	250	261	96
Cu	330	339	97
Li	580	550	105
Hg	8.3	8.7	95
Ni	212	207	102
Se	56	50	112
Ag	1.1	1.2	92
Zn	420	418	100
Sb	9	8.2	110
Be	230	235	98
Tl	<50	25.2	-
Oil and Grease	22	20	110
Bis(2 chloroethyl ether)	272	253	108
Benzo(a)anthracene	133	315	42
3,4-Benzofluoranthene	320	246	130
Benzo(k)fluoranthene	320	246	130
Bis(2-chloroethyoxy)methane	281	255	110

TABLE 1 CONTINUED

Parameter	Lab Value (μg/L)	True Value (μg/L)	% Recovery
2-chloro-naphthalene	424	251	169
1,2-Dichlorobenzene	237	250	95
1,3-Dichlorobenzene	122	148	82
Diethylphthalate	198	254	78
Di-n-Butylphthalate	288	252	114
2,4-Dinitrotoluene	200	277	72
2,6-Dinitrotoluene	184	229	80
Di-n-Octylphthalate	66	230	29
Hexachlorobenzene	214	350	61
Hexachlorobutadiene	121	157	77
Isophorone	151	149	101
N-nitrosopdimethylamine	419	352	119
phenanthrene	195	202	97
pyrene	89	298	30
1,2,4 Trichlorobenzene	217	256	85
2-chlorophenol	30	30	100
2,4-Dichlorophenol	38	50	76
2,4-Dimethylphenol	24	30	80
4,6-Dinitro-o-cresol	<50	250	0
2-Nitrophenol	38	50	76
p-chloro-m-cresol	50	75	67
pentachlorophenol	<10	75	0
phenol	<10	100	0
2,4,6-Trichlorophenol	8	25	32

TABLE 2

RESULTS OF BLIND LABORATORY AND FIELD DUPLICATE SAMPLES ON BASEFLOW WATER SAMPLES - NONRADIOLOGICAL ANALYSES

Parameter	Units	Field Duplicates			Laboratory Duplicates		
		Value #1	Value #2	% RSD	Value #1	Value #2	% RSD
Al	µg/L	210	200	4.3	205	210	2.1
As	µg/L	<1	<1	-	<1	<1	-
Cd	µg/L	<0.1	<0.1	-	<0.1	<0.1	-
Cr	µg/L	9	9	0.0	9	8	10
Cu	µg/L	<5	<5	-	<5	<5	-
Li	µg/L	<10	<10	-	<10	<10	-
Pb	µg/L	3	3	0.0	3	5	44
Total Hg	µg/L	<0.2	0.3	-	<0.2	0.3	-
Diss. Hg	µg/L	<0.2	<0.2	-	<0.2	<0.2	-
Ni	µg/L	4	5	20	5	10	59
Se	µg/L	<1	<1	-	<1	<1	-
Ag	µg/L	<0.2	<0.2	-	<0.2	<0.2	-
Zn	µg/L	24	30	20	27	16	46
Sb	µg/L	<1	<1	-	<1	<1	-
Be	µg/L	<1	<1	-	<1	<1	-
Tl	µg/L	<50	<50	-	<50	<50	-
Hardness	mg/L as $CaCo_3$	160	160	0.0	160	150	5.7
Turbidity	NTU	21	22	4.1	22	23	4.0
TSS	mg/L	18	17	5.1	18	18	0.0
TVSS	mg/L	3	3	0.0	3	3	0.0
Oil & Grease	mg/L	5	5	-	NA	NA	-
Vol. Org.	µg/L	----------No Compounds Detected----------					
Base Neutrals	µg/L	----------No Compounds Detected----------					
Acid Extract.	µg/L	----------No Compounds Detected----------					
Pest. & PCBs	µg/L	----------No Compounds Detected----------					
TKN	mg/L	0.42	0.47	10	0.47	0.54	12
NH_3-N	mg/L	0.13	0.12	7.1	0.12	0.12	0.0
NO_3+NO_2-N	mg/L	0.83	0.83	0.0	0.83	0.83	0.0
TP	mg/L	0.20	0.17	14	0.17	0.17	0.0
T. Cn	µg/L	Not Collected			<20	<20	-
Total Phenol	µg/L	Not Collected			4	2	59

TABLE 3

RESULTS OF BLIND FIELD DUPLICATE SAMPLES
ON BASEFLOW WATER - RADIOLOGICAL ANALYSES

Parameters	Units	Field Duplicates[1]	
		Value #1	Value #2
Gross Alpha	pCi/L	10.8 ± 3.6	10.2 ± 3.5
Gross Beta	pCi/L	690 ± 70	690 ± 70
Tritium	pCi/L	544,000 ± 53,000	540,000 ± 53,000
Cs-137	pCi/L	68 ± 7	57 ± 5
Co-60	pCi/L	19 ± 2	18 ± 4

[1]Error terms represent 95 percent confidence limits.

TABLE 4

RESULTS OF SPLIT SAMPLE DATA WITH EPA, REGION IV
FOR SAMPLES COLLECTED ON BASEFLOW WATER - NONRADIOLOGICAL ANALYSES

Parameter	Units	LAB: EPA	LAB: TVA	% Relative Error
Al	µg/L	<100	210	-
As	µg/L	<40	<1	-
Cd	µg/L	<10	<0.1	-
Cr	µg/L	11	9	20
Cu	µg/L	<10	<5	-
Li	µg/L	NA	<10	-
Pb	µg/L	<30	4	-
Hg	µg/L	<0.2	<0.2	-
Ni	µg/L	<20	8	-
Se	µg/L	<40	<1	-
Ag	µg/L	<10	<0.2	-
Zn	µg/L	14	21	-40
Sb	µg/L	<40	<1	-
Be	µg/L	<10	<1	-
Tl	µg/L	NA	<50	-
Total Hardness	mg/L as $CaCo_3$	140	150	-6.9
Turbidity	NTU	17	22	-
TSS	mg/L	22	18	-26
TVSS	mg/L	5.2	3	54
Oil & Grease	mg/L	<5	<5	-
TKN	mg/L	0.45	0.50	-11
NH_3-N	mg/L	0.15	0.12	22
NO_3+NO_2-N	mg/L	0.90	0.83	8.1
Total Phosphorus	mg/L	0.12	0.17	-34
Total Cn	µg/L	<2	<20	-
Total Phenols	µg/L	<20	3	-
Organic Priority Pollutants	µg/L	All compounds less than detectable limit.		

TABLE 5

RESULTS OF SPLIT SAMPLE DATA WITH EPA EASTERN ENVIRONMENTAL RADIATION FACILITY FOR SAMPLES COLLECTED ON BASEFLOW WATER - RADIOLOGICAL ANALYSES

Parameter	Units	EPA LAB: EERF	TVA LAB: WARL
Tritium	pCi/L	569,000 ± 2,000	544,000 ± 53,000
		700 ± 200	500 ± 110
Gross Alpha	pCi/L	10 ± 4	10.8 ± 3.6
		79 ± 15	31 ± 16
Gross Beta	pCi/L	520 ± 30	690 ± 70
		330 ± 20	330 ± 40
Gamma Spectral Analysis			
Cs-137	pCi/L	41 ± 4	68 ± 7
Co-60	pCi/L	20 ± 4	19 ± 2