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Illinois Power Company - Baldwin Power Plant Ash-Pond Effluent Boron Mixing with the Kaskaskia River

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Prepared for the
Illinois Power Company
Decatur, Illinois

October 1995

Illinois State Water Survey
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Champaign, Illinois

A Division of the Illinois Department of Natural Resources

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EXECUTIVE SUMMARY

The Illinois Pollution Control Board (IPCB) has set a water quality standard of 1.0 milligrams per liter (mg/L) for total boron for general use surface water conditions. Illinois Power Company (IPC), in cooperation with the Illinois Environmental Protection Agency (IEPA), has gathered information and data for use in petitioning the IPCB for an adjusted boron (B) standard for the Kaskaskia River waters downstream of the IPC Baldwin coal-fired generating plant. Coal burning at a power plant produces both fly-ash and bottom-ash. Fly-ash consists of fine, solid particles of noncombustible ash, which are carried out of a bed of solid fuel by a draft. The fly-ash is then filtered from the draft system and carried by water to a pond where the solids are removed by settling. Bottom-ash consists of heavier solid particles, which are sluiced to a separate ash-pond cell for settling. Both fly-ash and bottom-ash pond discharges are combined prior to entering a final clarification cell. The combined supernatant water is normally allowed to discharge to the Kaskaskia River at river mile 18.8, located in a reach of the river that has been deepened and straightened to accommodate commercial navigation. River flow is controlled somewhat by releases from the Carlyle Reservoir dam at river mile 94.2.

Ash-pond effluent is inherently high in dissolved minerals and elements, including boron. IPC officials feel that the general use water quality standard of 1.0 mg/L of total boron may be too restrictive, especially during extremely low-flow conditions for the Kaskaskia River below the ash-pond discharge at Baldwin. Strict imposition of this standard by regulatory officials could create undue hardship on the operation of the Baldwin generating facility to the extent that a shutdown could occur.

The basic problem is that, during low-flow periods in the Kaskaskia River in the area of the ash-pond discharge, the 1.0 mg/L B standard is frequently exceeded, although effluent B concentrations appear to have been significantly reduced over the past 15 years. Based on the results of routine monitoring, the probability of an effluent B concentration exceeding 10.0 mg/L appears small. However, during 7-day, 10-year low flows ($Q_{7,10}$), a peak effluent flow rate having a B concentration of only about 3.42 mg/L would produce a 1.0 mg/L B concentration in the river based on 100 percent mixing.

Mathematical modeling of mixing zones and dispersion was used in conjunction with risk-assessment analyses to evaluate the frequency and magnitude of potential violations of the existing general use boron standard. Modeling/risk-assessment algorithms were developed and supported, and the outputs were verified, by generating a wealth of field data over a wide range of flows and weather conditions. The study was designed to produce an extensive database for use in mitigating any need that could arise requiring a change in the existing standard.

The fact that the river below the ash-pond outfall is used as a potable water supply by several communities greatly influenced field sampling techniques and scope and the approach used in designing the modeling/risk-assessment algorithms. Sparta withdraws part of its domestic water supply 2,200 feet downstream, and from there 2,300 feet up a cutoff meander from the outfall. Baldwin and Red Bud have shallow, gravel-packed wells along the river bank 3,000 feet downstream, while Evansville withdraws its public water supply at river mile 12.2.

The primary objective of this study was to generate effluent flow-rate and B concentration data and Kaskaskia River flow-rate and B concentration data so that IPC environmental management officials could evaluate the effects of Baldwin ash-pond discharges on boron levels in the river. From this, a management plan or strategy was to be developed considering the distinct possibility that the present boron stream standard of 1.0 mg/L may be too restrictive. If the standard was found to be too restrictive, the intent was for IPC to petition

the IPCB for regulatory relief from the present standard in this reach of the Kaskaskia River. The results of this study provide the basis around which an adjusted standard can be developed.

The study involved two basic elements or work tasks. The first involved generating hydraulic/hydrologic and water quality data to evaluate the conformity of the Baldwin ash-pond effluent mixing with the Kaskaskia River to the mixing, mixing-zone, and zone of initial dilution (ZID) specifications outlined in IPCB Rules and Regulations, paragraphs b)-8), b)-12), and e) of Section 302.102. Data for making mixing-zone and ZID evaluations and analyses were generated in two ways: (1) conducting, over a seven-month period, routine (basically biweekly) data collections using specific conductance (SC) as a tracer to define mixing; and (2) conducting three intensive, mixing-zone analyses using a conventional fluorescent dye-tracer injected into the effluent stream.

The data generated from the tracer studies provided input into the development, calibration, and verification of the computerized, mathematical, mixing-zone model CORMIX. The model was envisioned for use in predicting B concentrations outside the mixing zones and ZID as defined by the IPCB Rules and Regulations. A reliable model, if successfully developed, was to be used to predict dispersion and mixing during very low flows — particularly during 7-day, 10-year low-flow ($Q_{7,10}$) conditions —a perceivable concept that is not often realized during field work.

Mixing characteristics were also evaluated by developing isoplethic percentages on an areal and cross-sectional basis above and below the ash-pond outfall using both residual dye and SC values as tracers. These isoplethic constructions permitted examining conditions for which the 25 percent cross-sectional area or volume (paragraph b)-8)) or the 26-acre (paragraph b)-12)) mixing-zone limitations set forth in the IPCB Rules and Regulations are exceeded or violated. The isoplethic construction concept was also used to examine the ZID provisions of the Rules and Regulations.

The other major work task or element of the study involved generating a large amount of water quality data over a wide range of hydraulic/hydrologic conditions that could be used in assessing the probability of boron exceeding certain levels downstream. Risk assessment is basically statistical (deterministic) modeling as opposed to the mathematical modeling exemplified by CORMTX. Specific conductance and temperature readings were recorded hourly using DataSonde II remote monitors from early May 1994 to early January 1995 at four river locations and in the outfall.

Boron samples were collected from the effluent during the biweekly sampling and during the mixing-zone (dye-tracer) studies to develop a mathematical relationship between effluent B concentrations and effluent SC levels. This permitted the conversion of the continuously monitored SC values to "continuously monitored" B values. From this "generated" data, a cumulative probability distribution of discharge B concentrations was developed. Similar probability distributions were developed for river flow and effluent discharge rates. These three probability distributions were used in a simulation technique known as Monte Carlo sampling. In Monte Carlo sampling simulations, a large set of samples is randomly drawn from cumulative probability functions and used to evaluate the output of a deterministic model — which in this study happens to be the completely mixed downstream B concentrations. Consequently, the frequency of occurrence (probability) of specific B concentrations could be predicted using this methodology for river locations such as the oxbow inlet to the Sparta water intake, the intake location of the Evansville water treatment plant, and at the lock and dam near the mouth.

Seventeen effluent grab samples were collected for boron analyses over the course of the study. The minimum, average, and maximum values were 3.71, 5.53, and 7.88 mg/L, respectively. The maximum B value reported by IEPA as a result of its grab sampling program initiated in 1987 is 10.0 mg/L for a sample collected on October 7, 1987. The highest value reported by IPC for its 24-hour composite sampling initiated on November 18, 1993, is 6.9 mg/L.

Mixing-zone data were generated on 11 dates, starting on May 24, 1994, and ending on November 29, 1994. River flows ranged from a high of 6,070 cubic feet per second (cfs) in May to a low of 120 cfs on November 2, 1994. Dye-injection mixing studies were conducted on August 25 (423 cfs), September 28 (411 cfs), and November 2 (120 cfs). The river flow of 120 cfs on November 2 was both numerically and theoretically equivalent to $Q_{7,10}$; five days prior to that, the flow dropped from 126 cfs to 120 cfs and remained at this level for seven straight days. This provided an ideal field setting for evaluating the effects of ash-pond mixing with the river under regulatory-specified $Q_{7,10}$ conditions.

In addition to the 17 ash-pond discharge boron analyses, another 171 boron analyses were run on various other samples, including 135 from river locations both up- and downstream of the outfall, 9 from the Sparta water intake, and 27 for quality assurance/quality control (QA/QC) procedures. As part of the QA/QC procedures duplicate analyses were run on 14 samples. The average B value for one set of duplicates was 2.00 mg/L, while for the other set it was 2.06 mg/L; the standard deviation was extremely small. The minimum, average, and maximum B concentrations at the Sparta intake were 0.10, 0.49, and 0.63 mg/L, respectively. On November 2, 1994, when the river was in the midst of experiencing $Q_{7,10}$, a completely mixed B value of 0.54 mg/L was measured in the river approximately two miles below the ash-pond discharge. The results of two samples collected at the Evansville water intake were 0.61 mg/L (376 cfs) and 0.47 mg/L (120 cfs).

Table 7 lists 130 sampling results from random sampling locations in the river other than in the near-field and far-field mixing-zone areas. Relatively high B concentrations were recorded upstream of the outfall. On August 25, 1994, a value of 1.82 mg/L was recorded at the surface 72 feet from the east bank and 600 feet upstream. Although this was a relatively high B value, the encompassing plume, defined by a 1.0 mg/L stream B value for a discharge B concentration of 9.9 mg/L, was only 7.3 percent of the cross-sectional area. On September 29, B values of 1.53 and 1.49 mg/L were recorded at different times 700 feet upstream of the outfall. Insufficient data prevented constructing cross-sectional plume configurations for the conditions that prevailed when these samples were collected. However, their encompassing plumes were probably less than 25 percent of the cross-sectional area. Both samples were collected 61 feet from the east bank in line with the upstream flow to the pumping station intake. The B concentrations of two samples collected at the IPC water pumping station intake, approximately 1,300 feet upstream of the outfall, were 0.51 and 1.07 mg/L. These results indicate that boron migrates upstream during low flows in what is actually a narrow plume that tends to "hug" the east bank and funnels into the pumping station intake.

Based on a rigorous analysis of mixing and dispersion using the CORMIX model over a wide range of river and effluent flows, the conclusion was reached that the effluent plume cannot be adequately modeled mathematically. Frequently, the CORMIX model correctly predicted general plume behavior, but it failed to produce clear, definitive results especially during critical low-flow conditions. Errors within the software program often surfaced, limiting the information that could be derived for some specific simulations.

The model was particularly vulnerable to producing inexact and/or erroneous results for river flows less than 500 cfs. At these low river flows, when river velocities were extremely low relative to effluent velocities, the model output signaled that the discharge plume contacted the opposite bank in the immediate area of the outfall transect. Field tracer studies, using SC and dye, verified that the model correctly predicted this behavior; however, these predictions rendered the model incapable of performing additional analyses.

Three additional factors limited the adaptability of CORMEX to this situation: (1) the model cannot correctly predict the behavior of negatively buoyant plumes; (2) changes in diurnal buoyancy limit the utility of a steady state model; and (3) upstream movement of plumes cannot be incorporated into the analyses. The model is designed to handle only neutrally buoyant plumes. In contrast, the ash-pond effluent and river temperatures often differ significantly. Diurnal changes in the effluent temperature can be dramatic, causing reversals in buoyancy in a matter of a few hours.

Upstream movement of the plume is common during intermediate to low-flow river conditions. This movement is caused or exacerbated by positively buoyant plumes, by withdrawal of river water 1,300 feet upstream of the outfall at the Lake Baldwin pumping station, and by the fact that in this reach of the river the flow is in counteralignment with prevailing southwest winds.

The final management scheme was developed using data generated from isoplethic depictions of percent effluent residuals in river cross sections in concert with risk analysis. Isopleths represent lines on areal views or cross sections, connecting points at which a given variable has a specified constant value. For this study, the given variables are percent effluent residuals at points in the river.

Detailed isopleths were developed for the field data generated during the dye-tracer study conducted on November 2, 1994. Depictions were developed for cross sections 310 feet upstream of the outfall, at the outfall, and at locations 300, 600, 1,000, and 2,000 feet downstream. The results, summarized below, clearly demonstrate a significant upstream movement of the plume.

Distance from Outfall (feet)	*Plume Residual (%)*
-310	38
0	99+
+300	79
+600	75
+1,000	66
+2,000	50

The 50 percent residual 2,000 feet downstream plus the 38 percent residual upstream total slightly less than 100 percent. However, the most reliable estimate is the 50 percent downstream value. Consequently, the assumption can be made that, at low flows, with an upstream wind direction and active pumping at the Lake Baldwin pumping station, at least 50 percent of the plume will probably move upstream. A constant shift in the residual percentages occurs within + 500 feet of the outfall due to extenuating factors such as wind variability, temperature changes, boat and barge traffic, and the variability in effluent flow rates.

Downstream movement percentages could be computed for the 11 dates during which field data were generated. The variability in flow alone was shown to account for approximately 93 percent of the variability in the downstream movement of boron in the plume. Consequently, the following regression equation was developed for use in predicting downstream plume residual fractions (F) under a wide range of river flow conditions (Q): $F = Q/(124 + 0.9938Q)$. Consequently, for an effluent flow rate of 29 cfs, with a B concentration of 9.9 mg/L, the equation predicts the occurrence of a completely mixed downstream B concentration of approximately 1.23 mg/L. A high degree of probability exists that completely mixed downstream B concentrations will infrequently exceed this value when the effluent B concentration is 9.9 mg/L or less and the river flows exceed 120 cfs. On November 2, 1994, the actual effluent flow rate was 29 cfs, and it contained 5.63 mg/L of boron. The completely mixed B value two miles downstream was measured at only 0.54 mg/L, whereas the equation predicted it to be 0.70 mg/L.

Risk analyses were performed to evaluate the possibilities of exceeding both the existing boron stream standard of 1.0 mg/L and a proposed standard of 1.23 mg/L at the entrance to the Sparta water intake oxbow and at the Evansville water intake. Evaluations were made for two conditions. One considered a 100 percent movement of the plume downstream under all flow conditions, whereas the other evaluation was performed by fractionalizing the downstream movement of the plume relative to flow as per the equation presented in the preceding paragraph.

Evaluations were made for hydrologic conditions representing the 1-day annual flow ($Q_{1,A}$) and for five low-flow durations including that for 7 days (Q_7); $Q_{7,2}$; $Q_{7,10}$; $Q_{7,25}$; and $Q_{7,50}$. The results are summarized for Kaskaskia River locations at the mouth of the Sparta water intake meander (river mile 18.4) and at Evansville (river mile 12.2).

Hydrologic Conditions at Two Kaskaskia River Locations

	Probability of exceedance (%)							
	Total downstream plume movement for standard of:				*Fractional downstream plume movement for standard of:*			
Flow	*1.00 mg/L*		*1.23 mg/L*		*1.00 mg/L*		*1.23 mg/L*	
Statistic	*EM18.4*	*RM12.2*	*RM18.4*	*RM12.2*	*KM 18.4*	*RM12.2*	*RM18.4*	*RM12.2*
$Q_{1,A}$	8.2	7.4	5.4	5.1	0.30	0.26	<0.01	<0.01
Q_7	60.5	26.6	39.1	13.3	3.61	0.31	0.03	<0.01
$Q_{7,2}$	37.0	7.3	4.5	<0.01	<0.01	<0.01	<0.01	<0.01
$Q_{7,10}$	99.1	88.6	99.3	53.8	5.89	0.41	<01	<0.01
$Q_{7,25}$	99.6	93.3	96.5	67.7	8.95	0.88	0.10	<0.01
$Q_{7,50}$	99.8	95.3	97.8	74.6	11.43	1.45	0.24	<0.01

With the nonfractionalizing of the plume, the results for Q_{1A} indicate that the existing stream standard of 1.0 mg/L will be exceeded approximately 30 days (0.082 x 365) a year at the entrance to the Sparta water intake oxbow meander; at Evansville it will be exceeded approximately 27 days a year. Raising the standard to 1.23 mg/L will reduce the frequency of violations at the mouth of the meander and Evansville to 20 days and 19 days, respectively. These values are very conservative in that the results of this study showed that during low flows, fractionalization of the plume is almost guaranteed to occur. Consequently, when fractionalization of the plume occurs in proportion to flow, the existing standard of 1.0 mg/L will probably be exceeded fewer than two days a year. A standard of 1.23 mg/L will probably be exceeded only once every 25 years.

TABLE OF CONTENTS

ILLINOIS POWER COMPANY-BALDWIN POWER PLANT
ASH-POND EFFLUENT BORON MIXING WITH THE KASKASKIA RIVER

by Thomas A. Butts, Robert S. Larson, and
Dana B. Shackleford

INTRODUCTION

A water quality standard of 1.0 milligrams per liter (mg/L) total boron (B) has been set by the Illinois Pollution Control Board (IPCB) for general use conditions within the state (State of Illinois, 1993). Illinois Power Company (IPC), in cooperation with the Illinois Environmental Protection Agency (IEPA), has gathered information and data for use in petitioning the IPCB for relief from the present 1.0 mg/L boron standard for Kaskaskia River waters downstream of discharge from the IPC Baldwin coal-fired generating plant. Coal burning at power plants produces fly-ash and bottom-ash. Fly-ash consists of fine, solid particles of noncombustible ash, which are carried out of a bed of solid fuel by a draft. The fly-ash is then filtered from the draft system and carried by water to a pond where the solids are removed by settling. Bottom-ash consists of heavier solid particles, which are sluiced to a separate ash-pond cell for settling. Both fly-ash and bottom-ash pond discharges are combined at the Baldwin plant prior to entering a final clarification cell. The combined supernatant water is then allowed to discharge to the Kaskaskia River.

Ash-pond effluent is inherently high in dissolved minerals and elements, including boron. IPC officials feel that the general use water quality standard of 1.0 mg/L total boron may be too restrictive, especially during extremely low-flow conditions for the Kaskaskia River downstream of the ash-pond discharge at Baldwin. Strict imposition of this standard by regulatory officials could create undue hardship on the operation of the Baldwin generating facility to the extent that a shutdown could occur.

Problem

Officials of the IPC are faced with the problem of providing the IPCB with information delineating and defining the extent and magnitude of potential boron standard violations in the Kaskaskia River and of developing a management plan to eliminate or minimize the frequency of possible stream standard violations. The IEPA began collecting grab samples from the Baldwin ash-pond effluent for boron analyses during August 1987 and continued to do so periodically through December 1993. Also, during the 1980s and the early 1990s, IPC collected 24-hour composite samples periodically for special projects. Beginning in October 1993, IPC initiated monthly 24-hour composite sampling for boron as required by the Baldwin Power Plant's current National Pollution Discharge Elimination System (NPDES) permit. Results from the IEPA grab sampling program and from the last four years of the IPC's NPDES 24-hour composite monitoring program are presented in table 1. The highest ash-pond effluent B concentration ever recorded is 13.0 mg/L for a sample collected on April 23, 1980, during water quality assessments associated with a priority pollutant sampling and analysis program.

The basic problem is that, during low-flow periods in the Kaskaskia River in the area of the ash-pond discharge, the 1.0 mg/L B standard is frequently exceeded, although effluent B concentrations appear to have been significantly reduced over the past 15 years. Based on the data in table 1, the probability of an effluent B concentration exceeding 10.0 mg/L appears small. However, during 7-day, 10-year low flows ($Q_{7,10}$), a peak effluent flow rate having a B concentration of only about 3.42 mg/L would produce a 1.0 mg/L B concentration in the river based on 100 percent mixing.

The magnitude of this problem could be mitigated in various ways. The most obvious, but the least practical, would be to either increase river flows, decrease effluent flows while maintaining *status quo* B concentrations, decrease B concentrations while maintaining *status quo* flow rates, or a combination of these three options. Flows in this area of the Kaskaskia River can be and are controlled by releases upstream at the Carlyle Reservoir dam and below, at the mouth, by a navigation lock and dam via U.S. Army Corps of Engineers management procedures. The possibility of the Corps increasing releases during dry weather is problematical in that the river system is operated to optimize navigational needs in concert with maintaining specific seasonal reservoir water levels.

The most realistic approach is to use mathematical modeling in conjunction with risk assessments to evaluate the frequency and magnitude of potential violations of the existing boron standard over a wide range of flow and weather conditions. For this study, such an approach was undertaken. Modeling/risk-assessment algorithms were developed and supported, and the outputs were verified, by generating a wealth of field data over a wide range of flows and weather conditions. The study was designed to produce an extensive database for use in mitigating any need that could arise requiring a change in the existing standard.

Study Area

The study area consists of a two-mile reach of the Kaskaskia River below the Baldwin generating plant ash-pond outfall as shown on Figure 1. The outfall discharges to the Kaskaskia River at river mile (RM) 18.8; the nearest U.S. Geological Survey (USGS) gaging station is located upstream at Venedy Station at RM 57.2. The Carlyle dam is at RM 94.2.

This reach of the Kaskaskia was rendered navigable to commercial barge traffic by building a lock and dam six-tenths of a mile above the river's confluence with the Mississippi River and by channelizing and straightening the natural meandering channel during the 1960s. The cutoff meanders have been left connected to the main navigation channel via openings usually located on the downstream end (figure 1). A cutoff meander opening exists at RM 18.4, approximately 2,200 feet downstream of the outfall, on the outfall side (left bank looking downstream, LBLDS). Water is withdrawn from this cutoff meander downstream of highway-154 for potable use by the community of Sparta (figure 1). This fact significantly influenced the sampling and monitoring procedures designed and employed to generate field data.

The study also included monitoring and data collection in the ash-pond discharge or outfall channel, which is shown on figure 1. Ash-pond effluent, as denoted by the dashed line on the figure, is routed to the river via a channel running parallel to and immediately below the railroad embankment. This effluent channel includes a diked-off upper segment of the lower portion of the cutoff meander, as shown by figures 1 and 2. The dike or diversion dam prevents direct routing of the ash-pond effluent into the Sparta domestic water intake (figure 1). Boron can still be indirectly drawn into the intake through a somewhat circuitous route by traveling 2,200 feet downstream in the main channel of the Kaskaskia and then back up the cutoff meander another 2,300 feet (figure 1).

This reach of the river receives heavy recreational boating use. Also, recreational and commercial fishing activities are prevalent in both main channel and cutoff meander areas. The cutoff meanders and backwaters are heavily used by waterfowl hunters during the fall. Commercial barge traffic is very light. At best, an average of one tow a day passes through the study reach.

Other notable features within or downstream of the study area that are relevant to this study are the presence of domestic water-supply wells along the east and west banks of the river approximately 3,000 feet downstream of the outfall (figure 1) and the Evansville domestic water-supply intake located approximately 6.5 miles downstream. Red Bud has two 65- to 67-foot-deep, 20-inch-diameter, gravel-packed wells equipped with 25-foot screens along the west bank. Baldwin has two gravel-packed wells along the east bank — one is a 65-foot-deep, 10-inch-diameter well while the other is a 60-foot-deep, 8-inch-diameter well — both of which are equipped with 10-foot screens. Dlinois State Water Survey (ISWS) ground-water experts feel that little or no river water is drawn through these wells (Ellis Sanderson, phone conversation, May 25, 1995).

Objectives and Deliverables

The primary or overall objective of this study was to generate effluent flow-rate and B concentration data and Kaskaskia River flow-rate and B concentration data so that IPC environmental management officials could evaluate the effects of the Baldwin ash-pond discharges on boron levels in the river. From this, a management plan or strategy was to be developed considering the distinct possibility that the present boron stream standard of 1.0 mg/L may be too restrictive. If the standard was found to be too restrictive, the intent was for IPC to petition the IPCB for relief from the present standard in this reach of the Kaskaskia River. The results of this study would provide the basis around which this regulatory relaxation of the standard could be developed.

IPCB water quality Rules and Regulations (State of Illinois, 1993) permit stream standard violations within prescribed areas of streams defined as mixing zones and zones of initial dilution (ZIDs). Rules and Regulations paragraphs b)-8), b)-12), and e) of Section 302.102 (Allowed Mixing, Mixing Zones, and ZIDs) are most pertinent to this study and are noted below.

> "b)-8) The area and volume in which mixing occurs, alone or in combination with other areas and volumes of mixing, must not contain more than 25% of the cross-sectional area or volume of flow of a stream except for those streams where the dilution ratio is less than 3:1. Mixing is not allowed in receiving waters which have a zero minimum seven day low flow which occurs once in ten years."
>
> "b)-12)The area and volume in which mixing occurs must be as small as is practicable under the limitations prescribed in this subsection, and in no circumstances may the mixing encompass a surface area larger than 26 acres."
>
> "e) . . . a person may apply to the Agency to include as a condition in an NPDES permit a ZED as a component portion of a mixing zone. Such ZID shall, at a minimum, be limited to waters within which effluent dispersion is immediate and rapid. For the purposes of this subsection, "immediate" dispersion means an effluent's merging with receiving waters without delay in time after its discharge and within close proximity of the end of the discharge pipe, so as to minimize the length of exposure time of aquatic life to undiluted effluent, and "rapid" dispersion means an effluent's merging with receiving waters so as to minimize the length of exposure time of aquatic life to undiluted effluent . . ."

Essentially this study was designed to evaluate the conformity of the Baldwin ash-pond effluent mixing with the above specifications. Data for making mixing-zone and ZID evaluations and analyses were generated in two ways. One involved conducting, over a nine- or ten-month period, routine (basically biweekly) data collections using specific conductance (SC) as a tracer to define mixing. The other approach involved conducting three intensive mixing-zone analyses using a conventional fluorescent dye tracer injected into the effluent stream.

Since the SC of ash-pond effluents is much higher than the ambient SC of surface waters in Illinois, and SC is easily and relatively inexpensive to measure, this parameter appeared to be a good, quick, and inexpensive means of defining mixing over a wide range of flow and weather conditions. Consequently, this concept was used to generate the bulk of the mixing-zone data derived as a result of this study. The three conventional dye-injection tracer runs were made to provide reliable data in the event the SC-tracer approach proved to be unreliable.

The data generated from the SC and dye-tracer studies provided input into the development, calibration, and verification of a computerized, mathematical, mixing-zone model. The model was envisioned for use in predicting B concentrations outside the mixing zone and ZID as defined by the IPCB Rules and Regulations (State of Illinois, 1993). A reliable model, if successfully developed, would be used to predict dispersion and mixing during very low flows — particularly during 7-day, 10-year low flow ($Q_{7,10}$) conditions — a perceivable concept that is not often realized during field work.

An alternative approach to modeling as a means of assessing mixing and evaluating the need to adjust the boron water quality standard is risk assessment. In the event modeling did not provide definitive answers, a continuous monitoring program was designed and employed to provide a wealth of data that could be conveniently used in assessing the risk of excessive boron levels throughout the river downstream of the outfall.

Boron samples were collected from the effluent during the biweekly sampling and during the dye mixing-zone studies to develop a mathematical relationship between effluent B concentrations and effluent SC levels. This would permit the conversion of the continuously monitored SC values to "continuously monitored" B values. This in turn would provide the data and information needed to perform risk-assessment analyses over a wide range of effluent and river flows and weather conditions. These analyses would involve computing the probability of occurrence of specific B concentrations at specific locations in the river such as at the oxbow inlet to the Sparta water intake, the intake location of the Evansville water treatment plant, and at the lock and dam near the mouth if needed.

Mixing characteristics were evaluated by developing isoplethic percentage "contours" on an areal and cross-sectional basis above and below the ash-pond outfall using both residual dye and SC values as tracers. These isoplethic constructions permitted examining conditions for which the 25 percent cross-sectional area or volume (paragraph b)-8) or the 26-acre (paragraph b)-12) mixing-zone limitations set forth in the IPCB Rules and Regulations are exceeded or violated. The isoplethic construction concept was also used to examine the ZID provisions of the Rules and Regulations.

Specific conductance readings were taken at various cross sections during the biweekly monitoring and sampling runs. Conditions on specific dates dictated the extent and locations of these measurements. Boron and total dissolved solids (TDS) samples were taken at selected locations in the cross section during the conduction of the SC cross-sectional measurements.

The report includes: 1) tabulations of water quality data generated via routine sampling and continuous monitoring; 2) updated, refined, and new hydrologic/hydraulic data and information related to river and effluent flows; and 3) results of tracer studies performed using dye and specific conductance to characterize mixing and to determine the applicability of the CORMIX model as a predictor of mixing zones in the study area. The outcome and results of these three items were used to develop a final product focusing on risk assessment and the need to adjust the stream boron standard in this area of the Kaskaskia River. Specific products generated in the overall evaluation and assessment are outlined as follows:

I. Water Quality Data
   A. Statistical summary tabulations including averages, minimums, maximums, and standard deviations for:
      1. Effluent B and TDS concentrations from ISWS grab sampling and IPC routine monthly composite sampling.
      2. SC and temperature values recorded at hourly intervals for river background and effluent stations. The statistics were computed on a daily basis and on a grand total basis.
      3. B values generated via regression equations relating boron to SC and effluent flow rates, contingent on the fact that the two independent variables appear to account for at least 80 percent of the observed variability in B, i.e., R = 0.894.
   B. Tabulations of B, SC, TDS, and temperature grab sampling data collected routinely and during the three dye-tracer studies, with site collections being identified by longitudinal, lateral, and vertical coordinates.
   C. Frequency distribution curves for:
      1. Effluent B concentrations generated using a regression equation developed relating B to effluent SC and effluent flow.
      2. Effluent and river temperature differentials to determine the percent of times positively, negatively, and neutrally buoyant plumes occur. Background river temperatures were carefully selected by screening and scrutinizing station 1 temperature data.
   D. Regression equations relating:
      1. Effluent B concentrations to effluent SC and flow.
      2. B to SC for all effluent and river B/SC data generated during routine sampling and dye-tracer studies.

II. Hydrologic/Hydraulic Data
   A. Flow duration curves for the Kaskaskia River at Baldwin and at the mouth estimated using the Illinois Stream Assessment Model (ILSAM) (Knapp, 1990).
   B. Monthly effluent discharge statistics.
   C. Monthly flow duration curves for the period July-November.

III. Tracer Studies
   A. Percentages of river cross-sectional areas that exceed the 1.0 mg/L B standard using SC and dye as tracers:
      1. For transects located at the outfall and for a few selected locations above and below the outfall.
      2. For specified effluent B concentrations of 13, 10, 9, and 7 mg/L or less until the 25 percent cross-sectional limitation is no longer evident.
   B. A plot representing the 25 percent or greater cross-sectional area curve using river flow as the independent variable and the effluent B concentration as the dependent variable for the outfall transect.
   C. Regression equations relating:
      1. SC to dye.
      2. Dye to boron.
      3. SC to boron.
   D. Isoplethic percentage contours defining a ZID for conditions approximating $Q_{7,10}$ conditions in the Kaskaskia River at the outfall cross section.

IV. Final Product
   A. CORMIX model results and a description of the limitations encountered in applying the CORMIX model to the Baldwin Plant ash-pond discharge.
   B. Risk assessments made relative to the probability of 1.0 and 1.23 mg/L of boron entering the Sparta and Evansville water intakes.

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Marty Hunt maintained the electronic monitoring equipment and prepared information for field use. He diligently performed tedious QA/QC procedures to insure accurate and precise results. Tests for boron, other metals, and TDS were performed by chemists in the Office of Analytical & Water Treatment Services in Champaign under the supervision of Loretta Skowron. The figures and artwork result from long hours spent by Tori Spangler manipulating Autodesk AutoCAD and Bentley Microstation programs to fulfill the special drafting needs of this study. Linda Dexter prepared part of the text and all of the tables. Special thanks are extended to Jim Slowikowski who volunteered his time and Hydrology Division equipment so that the initial dye run could be conducted successfully and on schedule.

METHODS AND PROCEDURES

The methods and procedures are presented under two categories: 1) water quality and 2) mixing-zone regions and plume types.

Water quality efforts included the establishment of a surveyed baseline and permanent monitoring stations for the continuous collection of conductivity and temperature data. Routine field trips were made to measure conductivity/temperature and to collect water quality samples for laboratory analyses. For comparative purposes, all conductivity measurements were recorded and reported as specific conductance, which is conductivity corrected to a standard temperature of 25°C. In addition, SC/temperature measurements and water quality sample collections were made in conjunction with the three dye-tracer studies.

For mathematical modeling purposes, mixing zones are divided into two regions referred to as the *near field* and *the far field* (figure 3). In each region, different hydrodynamic processes affect mixing. In the near field, mixing processes are controlled by the characteristics of the effluent discharge in relation to the receiving body, in particular, flux, velocity and buoyancy. The geometry of the outfall structure is also important in the near field. In the far field, passive diffusion due to ambient turbulence dominates the mixing process, and the characteristics of the effluent and outfall become less important. The near field and far field regions are defined by hydrodynamic processes, and are totally independent of any definition of a regulatory mixing zone. The regulatory mixing zone is a region of initial dilution where the concentration of the pollutant in question exceeds established ambient standards. Often, especially in river systems, the regulatory mixing zone may include both near field and far field regions.

While mixing zones can be categorized and described in many different ways, one of the most common and useful is by the buoyancy of the plume. A plume can be categorized as being neutrally, positively, or negatively buoyant. Buoyancy determines the location of the plume in the water column and dictates the extent of its vertical mixing. Temperature differentials between effluents and receiving water bodies usually dictate buoyancy conditions, but differences in water impurities may also contribute.

Neutrally buoyant plumes occur when the density of the outfall and the receiving stream are equal. A neutrally buoyant plume will eventually mix vertically throughout a water column.

A positively buoyant effluent results when the plume is less dense than the coolest portion of a stratified receiving stream. If the effluent density is less than the minimum density of a stratified receiving body, the resulting plume is considered to be strongly buoyant. A positively buoyant plume may not become completely mixed vertically, but may be confined as a surface layer. The depth of a surface layer is determined by the relative density differences as well as by factors that influence turbulent mixing. A positively buoyant plume will also be deflected less rapidly than a neutrally buoyant plume. Sometimes interactions with the near bank do not occur. When a positively buoyant plume is discharged into a receiving stream with low ambient velocities, the plume may exhibit a tendency to move upstream (Jones and Jirka, 1991).

A negatively buoyant plume occurs when the effluent is denser than the ambient environment, confining the plume to a layer of water along the bottom of the river bed. The factors that determine the thickness of the bottom layer also determine the thickness of the layer for a positively buoyant plume.

Field Procedures

Survey Baseline

Between March 16 and March 25, 1994, a reference baseline was surveyed along the left bank of the Kaskaskia River looking downstream (LBLDS) for referencing river sampling transects. The line was established 910 feet upstream and 10,000 feet downstream of the outfall (figure 1). Station 0+00 was located 19 feet downstream of the centerline of the discharge channel. Consequently, the outfall stationing is denoted as -0+19. Two-by-two wooden hubs were established at 50-foot intervals between stations -2+10 (upstream) and 5+00 (downstream). Between stations -2+10 and -9+10 and 5+00 and 100+00, hub placement was expanded to 100-foot intervals.

At each 50-foot and 100-foot station, 1-inch by 2-inch by 8-foot white sighting stakes were established as shown in figure 4. Many of these stakes had to be reestablished due to flooding that occurred in late April and early May. As much as 9 inches of silt covered some of the baseline hubs. The baseline was used to determine longitudinal transect locations along the river, while rangefinder sightings, in line with the sighting stakes, were used to determine transverse sampling distances.

Continuous Monitoring

Five permanent monitoring stations were established (figure 5) to continuously measure, on a hourly basis, conductivity and temperature using DataSonde II (DS) dataloggers. Station 1 was installed on May 18, 1994, whereas installation of stations 2 through 5 was delayed until May 23 because of high water and strong river velocities. Also, a beaver dam had to be removed from the effluent channel prior to installing station 2.

Hazard buoys fitted with photocell-activated, blinking lights were deployed to secure the DS monitors at stations 1, 3, 4, and 5, as shown in figures 6 and 7. After June 30, 1994, the monitors at station 2 were housed in floating wooden shrouds accessed by a submerged plank walkway extending 18 feet into the discharge channel. An initial attempt to use a submerged harness system accessed by wading failed because the loose flocculant sediments lining the channel bottom made access difficult, if not impossible.

Two monitors were deployed at each station. This duplicity was employed solely for backup purposes at station 2, while at the river stations it provided backup and flexibility in the vertical placement of the units. Originally, station 1 was intended solely for monitoring background water quality conditions above the outfall, while station 5 was intended to monitor relatively well-mixed conditions below the outfall. Consequently, at both of these stations, one DS unit was fixed on the bottom using chains as weights (figure 6), while the other DS was adjusted to monitor near-surface conditions. Uniform water quality conditions were presumed to persist at these two locations; however, this proved to be an invalid assumption during low-flow river conditions.

The surface monitors at stations 1 and 5 and both monitors at stations 3 and 4 could be adjusted to record at any water depth. These monitors were secured to a line equipped with counterweights and adjustable "stops" (figures 6 and 7). Depths could be changed by moving the stops along the counterweight line. Rigging both monitors at stations 3 and 4 on counterweight lines permitted flexibility in adjusting depths to meet changing conditions within the active, incomplete mixing-zone area below the outfall.

The ten DS monitors at the five stations were initially installed on May 24, 1994, and exchanged 15 times until all units were removed permanently on January 3, 1995. Exchanges were timed to ensure continuous data generation during the placement period at all stations. The units were downloaded and subjected to maintenance, calibration, and quality assurance/quality control (QA/QC) procedures in the laboratory within one or two days after removal from the river.

Periodic Monitoring and Sampling

Cross-sectional measurements of conductivity and temperature were usually made at selected locations within the study area during the time the DS units were exchanged, approximately every two weeks. These measurements were made using a Yellow Springs Instruments (YSI) Model 600 multiparameter water quality measuring instrument, fitted with conductivity and temperature probes. The probes were fitted to a weighted, 50-foot transmitting cable connected to a YSI 610-DM hand-held field display/memory microcomputer terminal. The microcomputer converted conductivity measurements to specific conductance. Field use of the setup was extended by fitting a 12-volt, DC adapter into the system.

Transverse distances on a transect were measured using a Leitz Model 8026-15 split image rangefinder, as shown in figure 4. Vertical locations on a transect were obtained using a depth-calibrated fishing downrigger, as shown in figure 8. The temperature/conductivity probe was taped to a ¾-inch hose line, which was hooked to the downrigger cable. This arrangement permitted water samples to be pumped from precise locations within the water column. Pumping was done using a 12-volt, DC-powered Pony Pump.

At the beginning of a daily transect monitoring run, the YSI 600/610-DM microcomputer/probe instrumentation was calibrated using a standard solution of 0.01 molar (M) KC1, which had been prepared in the laboratory earlier in the morning. The instrument was periodically checked with the standard in the field during use and at the culmination of a daily run. The instrumentation proved to be very stable and reliable, and recalibration was seldom required.

Boron and TDS samples were collected at six to eight selected points in the study area during each run. Samples were always collected from the discharge channel and from a number of points within the mixing zone; periodically samples were also collected from the Sparta water intake, the IPC pumping station intake, and the Evansville water intake. Boron and TDS samples were collected in separate sterilized plastic bottles. Strict QA/QC procedures were followed to minimize sample contamination and to insure that correct results were being achieved. Every tenth field sample was duplicated, and a traveling blank accompanied each field trip. All samples were iced in the field and transported to the laboratory within 24 hours of collection. The boron samples were treated with spectroscopy-grade nitric acid immediately upon receipt at the laboratory for preservation.

Dye-Tracer Studies

On three occasions, Rhodamine WT dye was injected into the discharge channel to study *in situ* mixing of the ash-pond effluent with the Kaskaskia River. The objective was to perform these studies during stable, low river flow conditions. Runs were made on August 25, September 28-29, and November 2, 1994. The flows during the first two runs were stable and moderately low, whereas during the third run the flow was very stable and very low.

Two methods of dye injection were tried at two injection sites. For the first run, dye was injected approximately 300 feet from the mouth of the discharge channel using a positive displacement pump powered by a 12-volt battery. A plank bridge was laid across the channel, and the pump, battery, and accompanying dye dilution tank were situated so that dye could be injected underwater in the center of the channel. Diluted dye was pumped from a 256-L plastic tank at a rate calculated to produce a dye concentration of 10 micrograms per liter (μg/L) at the mouth of the discharge channel.

The pump-injection method proved to be only moderately successful. Since the pump operated under a steadily reduced positive suction head and pumping efficiency appeared to become somewhat reduced as the battery voltage dropped, a slight but steady reduction in the injection rate was observed over the course of the run. Also, the injection point did not appear to be a sufficient distance upstream of the mouth to provide complete mixing before the dye-impregnated water reached the river.

During the second and third runs, the dye injection point was moved to the upstream end of the 30-inch steel pipe carrying the effluent under the railroad tracks (figures 1 and 2). At this location, dye injection was accomplished using a constant-feed, gravity system referred to as a mariotte vessel (Kilpatrick and Cobb, 1985). The system works by maintaining atmospheric pressure inside a sealed tank (via a specially designed air-intake tube) regardless of the liquid depth inside the tank. The mariotte vessel, a converted 40-gallon tank, and its injection location produced steady injection rates and complete dye mixing in the channel before reaching the river.

Dye injections were started 18 to 24 hours prior to river monitoring to allow well-mixed, steady-state conditions to be reached in the river. River dye concentrations were measured and recorded *in situ* using Turner Designs Model 10-005 fluorometers capable of detecting dye concentrations as low as 0.2 μg/L. The fluorometer intake line was attached to a downrigger as were attendant temperature and conductivity probes, as shown by figure 8.

Three two-man boat/fluorometer crews were used during the first run, whereas only two two-man crews were deployed during the second and third runs. Specific sampling/monitoring reaches were assigned to each crew as per the following schedule:

Run	*Crew*	*Assigned Subreach*
1	1	-9+10 to 1+10
	2	-0+19 to 20+00
	3	25+00 to 42+00
2,3	1	-9+10 to -1+10
	2	-0+19 to 100+00

Crews 1 and 3 used a YSI Model 59 dissolved oxygen (DO)/temperature meter to measure temperature in concert with fluorometer readings. Crew 2 used the YSI 600/610-DM conductivity/temperature instrument to measure both temperature and specific conductance in concert with fluorometer readings.

During the first run the crews collected 12 samples for boron and TDS analyses at random locations within their assigned sampling subreaches. Samples were collected using plastic, 4-liter Kemmerer water bottles. During runs 2 and 3, all 36 boron and TDS samples were collected by crew 2 from their fluorometer discharge hose. This permitted the crew to record SC values in concert with sampling. The samples were collected by crew 2 at random locations throughout the study reach. Taking the water samples from the fluorometer discharge hose in lieu of using the Kemmerer bottles provided a more exact matchup of water-sample and water-column locations with fluorescence, temperature, and SC measurement locations.

Laboratory Procedures

Work tasks performed in the laboratory and office settings included performing QA/QC procedures on the DataSonde monitors, calibrating the monitors and fluorometers for field use, and making physical and chemical water quality analyses on samples collected in the field.

QA/QC

All DataSonde QA/QC work was performed by Office of River Water Quality personnel at the Peoria Regional Laboratory. Prior to the initial deployment of each DS, basic mathematical statistical procedures were used to develop methodologies for accurately and precisely correcting the DS temperature readouts to National Institute of Standards Testing (NIST) referenced values. Two heating/cooling constant temperature water baths were used for finite control of water temperatures during calibration and QA/QC testing procedures. Each DS unit was evaluated using 110 separate temperature measurements between 14°C and 34°C. This generated 110 sets of NIST-referenced, thermometer/DS readings from which a linear regression equation was developed relating the NIST thermometer reading to that of the DS, i.e.:

$$T_c = a + b\ T_o \qquad (1)$$

where:

T_c	=	NIST thermometer reading in °C
T_o	=	DataSonde temperature reading in °C
a	=	T_c-axis (y-axis) intercept in °C
b	=	Slope of the regression line

The standard error of the estimate was derived using:

$$E = \sqrt{\frac{(T_{obs} - T_{comp})^2}{N - 1}} \qquad (2)$$

where:

E	=	Standard error of estimate in °C
T_{obs}	=	Observed NIST thermometer reading in °C
T_{comp}	=	Temperature computed (T_c) using observed T_o in conjunction with equation 1
N	=	Number of observations used to develop equation 1, i.e., 110 in this study

The regression coefficients (a and b) derived for each DS unit were used to correct the temperature readings. A 3E value was employed for ascertaining if a unit was within quality control limits after its retrieval from use in the field.

The DataSonde instruments retrieved from the field were returned to the lab for QA/QC testing. Two constant temperature baths were used for the QA/QC procedures and both were set at approximately 14°, 24°, and 34°C. The DS monitors were placed in each water bath and NIST-calibrated thermometer readings were taken in concert with "real-time" DS temperatures viewed from a computer monitor.

A DataSonde monitor was deemed "out of control" if the difference between the NIST reading and the monitor reading divided by 3E exceeded unity, i.e.,:

$$\frac{\text{NIST Reading - Monitor for meter) reading}}{3E} > 1 \qquad (3)$$

An *ex post facto* "out of control" situation was handled by recalibration, combining 110 sets of new data and the 110 old data sets to develop a new 220-set regression equation. This effectively averaged the instrument drift over the life of its deployment.

This rigorous procedure was employed to insure accurate and precise temperature (and therefore SC) values generated at the river monitoring stations. Assurance that the results were good and reliable was necessitated by the fact that the SC values were eventually going to be converted to boron values, via a regression equation relating B to SC, for use in the Monte Carlo/risk analysis evaluations.

Before deployment of the DataSonde units, conductivity probes were thoroughly cleaned, conditioned, and calibrated with fresh 0.01M KC1 standard solution (SC = 1.413 millisiemens per centimeter (mS/cm)). After retrieval of the DataSonde units, the conductivity probes were superficially cleaned and tested for possible calibration drift. Temperature corrections were applied to units that tested out of control, as indicated by equation 3. Even the most severe case of temperature drift resulted in a maximum change of only 0.005 mS/cm in SC. Therefore, corrections to field-generated SC values, based on temperature drift, were minimal.

TDS analyses were run at 104°C and 180°C using Standard Methods procedures (American Public Health Association (APHA), 1992). Boron was analyzed, along with 32 additional elements using inductively coupled plasma atomic emision spectrometry USEPA Method 200.7 (USEPA, 1991). The samples were digested prior to performing the elemental analyses to provide total boron (mg/L) as required under Section 302.208 Paragraph e) of IEPA Rules and Regulations (State of Illinois, 1993). Table 2 lists all parameters analyzed by the laboratory along with method detection limits (MDLs). These analyses were performed by the Office of Analytical & Water Treatment Services in Champaign.

Maintenance and calibration of the fluorometers were the responsibility of the Office of Surface Water Resources: Systems, Information, & GIS in Champaign. The Turner Designs fluorometers used in the dye-tracer studies were calibrated before and after each dye study using standard solutions of Rhodamine WT dye in concentrations of 0.0, 1.0, 10.0, and 25.0 ug/L.

Hydrologic Monitoring

A streamgage site was established on the outfall channel between the outlet of the tertiary ash pond and the outlet to the Kaskaskia River immediately upstream of the culvert that conveys the ash-pond effluent under the railroad tracks (figure 2). The gage consisted of a Stevens Type H water-level recorder, enclosed within a steel security shelter atop an 18-inch-diameter corrugated metal pipe stilling well. Detailed effluent-channel discharge measurements were performed at known stages. A stage-to-discharge curve was developed using this data.

Daily monitoring of the Kaskaskia River flow near the Baldwin Power Station is not practical for two reasons. First, to do so would be expensive; and second, the depth of river in the vicinity of the Baldwin Power Station (14 to 20 feet) produces flow velocities, during low to medium flows, that are below the detectable limits of most velocity meters. Field checks were made to verify the theoretical low-flow velocities using a Price current meter. The results indicated that any attempts to directly measure flows would produce unreliable results. Preliminary data from the nearest USGS gaging station, Venedy Station (05594100), were used to generate estimated river flows at RM 19.1, just upstream of the Baldwin Power Station intake pumps. Each daily average flow value at Venedy Station was converted to a flow duration value with the corresponding flow at the Baldwin Power Station being assigned the same flow duration. Annual flow duration tables for both sites were obtained using the ILSAM model (developed by Knapp (1990)). This method produces the best, most reliable results during steady or low-flow conditions. High and/or unsteady flows, such as would occur after a storm, produce less reliable results.

Mixing-Zone Models

An incorrect or inappropriate selection of a mixing-zone model will lead to erroneous conclusions that can be financially and ecologically expensive and disastrous. The USEPA currently endorses two models for use in mixing-zone compliance determinations. These models are PLUMES (Baumgartner et al., 1993) and the Cornell Mixing Zone Expert System (CORMIX) (Jirka and Hinton, 1992; Doneker and Jirka, 1991).

A 1993 USEPA report, *Dilution Models for Effluent Discharges* (Baumgartner et al., 1993), provides guidance for the selection of appropriate mixing-zone models for a variety of situations. The section on surface discharges contains a single sentence: "CORMTX is recommended for modeling surface discharges." The PLUMES model is not recommended for use with surface discharges or in situations where interaction between the plume and a vertical boundary (e.g., a river bank) is possible. It was originally designed to evaluate the mixing characteristics of buoyant effluents discharged deep into marine environments and thus is unsuitable for analyzing the mixing zone of the Baldwin Plant ash-pond discharge.

CORMTX was developed for the USEPA by Professor Gerhard Jirka and associates at Cornell University. It was designed for the express purpose of analyzing mixing zones resulting from discharges to shallow and confined water bodies, conditions which render the PLUMES model inoperable. CORMTX, unlike most mixing-zone models, is not restricted to the analysis of near-field processes (figure 3). However, while the model is currently unable to predict mixing-zone configurations resulting from negatively buoyant effluents discharged from surface outfalls, it does include three submodels designed to evaluate submerged single port, submerged multiple port, and surface discharge outfalls.

In comparison to other available mixing-zone models, CORMTX is unique in that it merges two distinctly different computer technologies into one system. It uses hydrodynamic simulation subsystems for the quantitative analysis of mixing zones for various situations. It also includes an expert system capable of providing qualitative information. The expert system can analyze the simulation results and suggest alternative designs to improve dilution results.

CORMTX requires a variety of physical and chemical data for both outfall and river conditions.

Required parameters for the outfall and effluent are:

- •Outfall geometry
- •Effluent temperature or density
- •Effluent velocity or discharge
- •Boron concentrations

Required parameters for the receiving water include:

- •Cross-sectional geometry at and downstream of the outfall
- •Detailed depths near the outfall

- •Stream velocity or flow rate
- •Water temperature or density

Prior to the establishment of the continuous monitoring stations and the initiation of the transect temperature/SC measurements, preliminary mixing-zone analyses were conducted using CORMEX. Physical inputs to the model were generated from field data. The data included longitudinal river distances based on the surveyed baseline (figure 1), river cross-sectional widths and depths, and the discharge channel width and depth. River depth measurements were made at eight cross sections in a reach extending 10,000 feet downstream of the outfall (figure 1). The average depth was computed for each cross section. Weighted average depths and widths were then computed for the whole reach with greater weight being given to the cross sections nearest the outfall as recommended in the CORMEX user guide (Jones and Jirka, 1991).

The CORMEX model requires that the weighted-averaged cross section of the receiving stream be represented as a "bounded" equivalent rectangular channel (figure 9) or as an "unbounded" or undefined area represented by an average depth only. Initial model runs were conducted using a 300-foot-wide, 16-foot-deep "bounded" channel. Later runs were made under "unbounded" conditions so that the mixing zone was not influenced by the far-side bank.

Channel roughness and stream velocities are required inputs to the model. Channel roughness can be represented by either a Manning *n*-value or a Darcy-Weisbach friction factor. For this study, a Manning *n*-value of 0.025 was used. The model requires uniform streamflow velocities. Consequently, the continuity equation:

$$V = Q/A \tag{4}$$

where:

V	=	Velocity in feet per second (fps)
Q	=	Flow in cubic feet per second (cfs)
A	=	Cross-sectional area in square feet (ft^2)

was used to compute velocities for various flows passing through a hypothetical rectangular channel having an area of 4,800 ft^3 (300 feet x 16 feet).

The model permits the outfall to be represented as either a rectangular channel or as a partially submerged circular pipe. Its configuration or geometric orientation with the receiving stream also must be specified. The ash-pond discharge channel approximates a 20-foot-wide rectangle discharging approximately perpendicular to and flush with the streambank.

Upstream of the mouth, the average depth of the discharge channel was determined, by field measurements, to be approximately 3 feet. However, at the mouth, rip-rap placement has reduced the average depth to a value between 0.8 and 1.3 feet. Therefore, for modeling purposes the outfall was represented as a 20-foot-wide, 1-foot-deep rectangle. Consequently, outfall velocities were computed using an area of 20 ft^2 in equation 4.

At the time the mixing zone was evaluated using CORMEX, historical data relative to effluent discharge rates and B concentrations were limited. Discharge rates ranged from 15 to 30 cfs, while B concentrations were usually less than 7 mg/L and ranged from 1 to 12 mg/L. Insufficient data were available to develop a highly correlated mathematical relationship between discharge flow rates and B concentrations. Therefore, generalized predictions were developed using a B concentration of unity (i.e., B = 1.0 mg/L). As a result, B concentrations in the predicted mixing zone represented decimal fractions of a given effluent concentration.

Risk Analysis

Point source pollutants are commonly regulated using a deterministic model for an assumed "design" condition having a specified probability of occurrence. A simplistic dilution and/or mass balance equation, used in conjunction with a 7-day, 10-year low-flow ($Q_{7,10}$) condition, is an example of this approach. Mathematically, such a model is written as:

$$C_d = \frac{Q_u C_u + Q_e C_e}{Q_u + Q_e} \quad (5)$$

where:

Q_u	=	Flow upstream of the effluent in cfs
C_u	=	Upstream-flow pollutant concentration in mg/L
Q_e	=	Effluent flow in cfs
C_e	=	Effluent pollutant concentration in mg/L
C_d	=	Completely mixed pollutant concentration downstream of effluent in mg/L

Although each parameter may exhibit or possess some variability, equation 5 is normally analyzed by recognizing only the variability of Q_u in terms of its probability of occurrence. C_u, C_e, and Q_e are often assigned, assumed, or measured critical or maximum/minimum values. The results and usefulness of the results derived from deterministic models, such as equation 5, are limited because only one of the variables is selected on the basis of its probability of occurrence (frequency distribution curve) while other singular and all joint probabilities are ignored.

Including other singular and all possible joint probabilities in a modeling effort enhances the predictive qualities of a model and allows risk assessments to be made. The development of frequency distribution curves for such variables as Q_u, Q_e, and C_e permits the use of a simulation technique known as Monte Carlo sampling to increase the usefulness of equation 5 or similar deterministic models.

To effect Monte Carlo sampling processes, cumulative probability distributions have to be developed for some or all of the model variables. Furthermore, if joint probability functions appear necessary to enhance output results, codependency between two or more variables may have to be considered and specified. In Monte Carlo sampling, a large set of samples is randomly drawn from each of the frequency distribution curves for use in computing finite outputs from the model. The finite outputs that result from running the model with the randomly generated parametric inputs are then used to generate a frequency distribution curve from which risk assessments can be made.

For this study, 5,000 iterations were run for the six river flow conditions presented in table 3. These flow scenarios cover a wide range of potential hydraulic/hydrologic conditions and produce outputs that maximize the Monte Carlo simulation effort. Only two of the six flow specifications represent random hydraulic/hydrologic conditions, whereas the other four represent fixed conditions. Note, however, that Q_e and C_e are randomized for all scenarios.

The flow statistics and flow distributions were generated using the ILSAM hydraulic/hydrologic model (Knapp, 1990), which can be used to develop flow statistics at any point along a river for existing conditions. It can also adjust flow statistics to reflect the effect of water inputs and withdrawals such as those that occur in the vicinity of the Baldwin Power Plant via pumping withdrawals and ash-pond discharges. Flow statistics were developed at two locations. The first was immediately upstream of the ash-pond discharge channel at the power plant pumping station where the assumption was made that water is withdrawn using two of the three available pumps. The second location was at Evansville, approximately 6.6 miles below the Baldwin ash-pond discharge, where the effects of the Baldwin station withdrawal and discharge are dampened.

A flow distribution curve of the ash-pond channel discharge rate was developed using continuously recorded data generated at the streamgage shown on figure 2 for the low-flow period beginning on August 1, 1994, and ending on October 31, 1994. A probability distribution curve of effluent B concentrations was developed by using SC to predict B concentrations during the low-flow period. A predictive equation was developed, using statistical regression procedures, to convert SC readings to B concentrations. The continuously recorded SC values at station 2 (figures 1 and 5) were then used to generate "continuously recorded" B concentrations from which a frequency distribution curve was developed. The ash-pond flows (Q_e) and B concentrations (C_e) were randomly sampled from the respective cumulative probability distributions, as noted in table 3.

The upstream (or background) B concentration (C_u) was set at a constant value of 0.0352 mg/L — a value mutually deemed by IPC and IEPA as being appropriate. The appropriateness of this value was checked *ex post facto* by examining the historical boron values published in the USGS *Water Resources Data* publications (U.S. Geological Survey, 1981-1991) for water quality data collected at Venedy Station.

Data Reduction

Most of the statistical analyses were done on an IBM Model 70 PC fitted with a math coprocessor using the proprietary program *Number Cruncher Statistical System (NCSS) - Version 5.3,* developed by Dr. Jerry L. Hintze of Kaysville, Utah. Predictive equations, curve fittings, and parameter correlations were developed or calculated using statistical regression techniques. Correlation coefficients and/or regression equations were developed relating: (1) Kaskaskia River flow rates and USGS-reported B concentrations at Venedy Station, (2) ash-pond effluent SC and B concentrations, (3) river dye concentrations and SC, (4) river dye and B concentrations, (5) river SC and B concentrations, and (6) percent of effluent moving downstream and river flow rates. Computerized curve fittings were used to develop data to graphically depict the combinations of river flows and effluent B concentrations that will result in B concentrations of 1.0 mg/L, or greater, and occupy at least 25 percent of the cross-sectional area at stations -4+10, -0+19, 1+00, and 20+00. These endeavors were performed to fulfill specific work tasks and objectives presented in the *Objectives and Deliverables* section of this report.

Development of the "percent-of-effluent-moving-downstream" versus "river-flow-rate" graphic presentations required the generation of isoplethic lines on cross sections at stations -4+10, -0+19, 1+00, and 20+00. Also, isoplethic plots were developed to demonstrate areal mixing above and below the outfall. Isopleths are lines on maps, cross sections, or areal views, connecting points at which a given variable has a specified constant value. For this study, residual effluent B concentrations, in terms of percentages, were the specified constant values. Residual percentage isopleths were constructed for a number of cross sections above and below the outfall for all the biweekly SC-measurement runs and for the three dye-tracer runs. Areal isopleths were constructed for the November 2, 1994, dye run. The computational procedures used to compute isoplethic plotting points are demonstrated by the walk-through example below.

Given

1. Background SC at RM 19.2 (0.4 miles above the ash-pond discharge) = 410 mS/cm
2. Ash-pond effluent SC = 980 mS/cm
3. Cross-sectional SC values
   a. Station 10+00 (see figure 1); Distance LBLDS = 100 feet

(1) At depth of 1 foot, SC = 560 mS/cm
(2) At depth of 4 feet, SC = 505 mS/cm

b. Stations 12+00; Distance LBLDS = 100 feet, at depth of 1 foot, SC = 480 mS/cm

Net SC Computations

1. Net Ash-pond SC (APSC) = 980 - 410 = 570 mS/cm
2. Net cross-sectional SC (CSSC)
   @ 10+00, 100 feet, 1 foot = 560 - 410 = 150 mS/cm
   @ 10+00, 100 feet, 4 feet = 505 - 410 = 95 mS/cm
   @ 12+00, 100 feet, 1 foot = 480 - 410 = 70 mS/cm

Residual Percentages

@ 10+00, 100 feet, 1 foot = CSSC/APSC = (150/570)(100) = 26.3%
@ 10+00, 100 feet, 4 feet = (95/570)(100) = 16.7%
@ 12+00, 100 feet, 1 foot = (70/570)(100) = 12.3%

Isoplethic Line Coordinate Computation

1. Find depth of the 20% isopleth at 10+00

$$1 - \left[\frac{26.3 - 20.0}{26.3 - 16.7}(1\text{-}3)\right] = 2.31 \text{ feet}$$

2. Find station location of 1-foot depth for 15% isopleth between stations 10+00 and 12+00

$$10{+}00 + \left[\frac{16.7 - 15.0}{16.7 - 12.3}(1200\text{-}1000)\right] = 10{+}77$$

Linear interpolation was used in placing the isoplethic percentage points based on the SC reading, as shown above. Similar procedures were used to compute residual percentages using the dye-tracer readings, TDS concentrations, and B concentrations.

RESULTS

The results will be presented in the order that data were derived from: (1) water quality sampling and monitoring, including data generated from both routine or biweekly water quality sampling and DataSonde continuous monitoring, (2) hydrologic monitoring, (3) CORMIX computer modeling analyses, (4) dye-injection mixing and dispersion runs, and (5) risk-assessment analyses.

A total of 19 trips were made to the study area to collect water quality and/or mixing-zone data between May 23, 1994, and January 4, 1995. The purposes and work tasks associated with each trip are summarized in table 4. Specific conductance measurements were made on 12 dates exclusive of the three dye-injection, mixing-zone/dispersion events. The second dye-injection event required two days to complete while only one day was required for events 1 and 3. Specific conductance measurements were made in the area of the river immediately below the outfall in concert with taking residual dye readings with a fluorometer for all four dye-injection dates.

Water Quality

Table 1 lists the historical IEPA boron grab-sampling results, along with boron results generated from IPC's ongoing, 24-hour composite sampling program. IPC started routine monthly 24-hour composite sampling on October 27, 1993. During 1992, IPC collected only four composites on the dates presented in table 1.

Specific conductance and temperature readings, for the A-DataSonde units at all stations and for the B-units at stations 2, 3, and 4, were recorded at constant water depths throughout the study period as dictated by the riggings illustrated by figures 6 and 7. The A-depth for stations 1, 3, 4, and 5 was 1.4 feet, while the A- and B-depths at station 2 were both 1.1 feet, since the units were contained in identical floats. B-units for stations 3 and 4 were set at 3.5 feet and 3.8 feet, respectively; the variable depths for stations 1 and 5 are given in table 4. As indicated in table 4, the water depth varied by about 5 feet during the study period.

The hourly SC and temperature readings were reduced to statistical summaries, which are presented in Appendix A. The summaries include the daily and overall means, standard deviations, and the minimum and maximum values. The individual SC readings, used to calculate the SC statistical summaries in Appendix A, were also used to generate mathematical relationships correlating boron to SC for use in the risk-assessment analyses. The hourly SC and temperature results are on a computer disk and are available upon request. The disk includes approximately 5,448 individual SC and temperature readings taken over 226 days at each station.

Comparisons were made between hourly temperatures at station 1A/1B and at station 2 to estimate the frequency of occurrence of negatively and positively buoyant plumes throughout the study period. All recorded hourly values, however, could not be used in the analyses. Those values, at either stations 1A or 1B, that appeared to be influenced by upstream plume movement had to be eliminated from the analyses. For the hourly evaluated buoyancy analysis, indirect allowances were made for plume interferences by selecting the lesser of the station 1A or 1B hourly values for comparison with hourly values recorded at station 2. Station 1 values that were within ±1.0°C of the discharge temperature were considered to represent neutrally buoyant conditions. Station 1 temperatures that exceeded discharge values by more than 1.0°C were deemed to represent negative buoyancy, whereas station 1 values that were more than 1.0°C cooler were deemed to represent positive buoyancy.

Insight into the frequency and magnitude of plume interference with background data can be gained by examining the daily average SC values listed in Appendix A. During the course of a day, the standard deviations for SC were usually less than 0.010 mS/cm and often as low as 0.002 or 0.003 mS/cm, as can be noted by the first eight to ten entries in Appendix A for stations 1A and 1B. At station 1A, the first major evidence of significant plume movement upstream occurred on June 2, 1994, when the SC standard deviation rose to 0.028 mS/cm from the previous daily value of 0.003 mS/cm. A 0.018 mS/cm SC standard deviation was used as the "breakpoint" at which significant upstream plume interference was considered to have taken place. Using this value to gauge upstream interference, plume interference occurred 18.6 percent of the time near the surface, but only 5.8 percent of the time at the bottom over the 226-day study period.

Over the course of the study, 188 samples were collected and analyzed for boron and TDS. The results have been tabulated by ash-pond discharge effluent (table 5), Sparta intake (table 6), river channel (table 7), other locations (table 8), and QA/QC (table 9).

An in-depth analysis was conducted to ascertain representative background levels of boron in the Kaskaskia River above the Baldwin ash-pond discharge. Between April 3, 1980, and September 24, 1991, the USGS reported 93 total and dissolved boron results for samples collected at its water quality monitoring and flow gaging station at Venedy Station (figure 1). Precise results were not achieved in making the analyses because on January 5, 1984, the minimum boron detection limit was raised to 0.05 mg/L, whereas prior to that, dissolved boron values as low as 0.017 mg/L were reported.

Regression analyses were performed to determine if either total or dissolved B concentrations were correlated to river flow rates. These analyses indicated that neither dissolved nor total fractions were found to be significantly correlated to river flow. Only 2.7 percent of the variability in total boron could be ascribed to the variability in flow. Consequently, the average B value best represents background conditions under any and all flow conditions.

The best estimate of the average river background total B concentration is 0.048 mg/L. This value was derived in somewhat of an indirect manner. Of the 93 reported values, 47 were recorded with a MDL of less than 0.05 mg/L, whereas 46 were detected with concentrations of 0.03 to 0.09 mg/L. The average of the 46 values was 0.0553 mg/L. The average of 16 values that were less than 0.05 mg/L was 0.0417 mg/L. The 0.048 mg/L average value represents a weighted average of the 0.0553 and 0.0417 mg/L values, i.e., (47/93)(0.0417) + (46/93)(0.0553).

Hydrology

Daily average flow discharges for the period May 23, 1994, to January 3, 1995, are given in table 10 for the ash-pond return flows and in table 11 for the Kaskaskia River upstream of the IPC Baldwin Power Plant intake pump. The maximum daily ash-pond discharge of 40 cfs occurred on November 15, 1994, and the minimum of 25 cfs on October 17, 1994; the monthly average discharge ranged from 27.3 cfs in May to 34.5 cfs in September. Equipment malfunction prevented the generation of ash-pond flow data on 18 days.

CORMTX Modeling

A total of 23 scenarios were simulated for six river flows ranging from 82 to 1,000 cfs and for effluent flows ranging from 2 to 30 cfs (table 12). Each scenario represents a unique combination of effluent and receiving stream discharge rates. Table 12 also lists the flow duration (the percent of time that a given flow is exceeded) for each Kaskaskia River discharge. The flow durations were computed using the ILSAM model (Knapp, 1990).

Originally, the plan was to model four effluent discharges — 15, 20, 25, and 30 cfs — values that are inclusive within the range of historical flow data. However, the scenarios pairing these effluent discharges with low Kaskaskia River flows resulted in situations that could not be modeled. These situations occurred at flows less than 500 cfs when the flow velocities were extremely low relative to the effluent velocity. For these cases, the model produced the warning message, *Near field limitation in bounded channel,* meaning that the plume was not sufficiently deflected by the low receiving stream velocity to prevent the near-field plume from contacting the opposite river bank. In such cases, force-fitted results were obtained by modeling the receiving stream as an unbounded water course rather than a bounded one. Results could thus be obtained for the portion of the near-field zone before the plume contacts the far bank. Also, in extreme cases, when ambient velocities in the river were very low, the model warned or predicted that complete lateral and vertical mixing would occur near the outfall. In such cases, realistic results could only be obtained by using effluent discharge rates that were less than the minimum recorded value.

Presentation of Results

The CORMTX model does not explicitly predict the boundary of a specified regulatory mixing zone, i.e., the area in which the pollutant concentration is permitted to exceed the stream standard. For this study, the model is incapable of definitively outlining either surficial or cross-sectional areas bounded by a 1.0 mg/L isoplethic line. Consequently, model outputs or predictions need to be verified. This is often done by using plume maps empirically constructed with data generated from field studies using fluorescent dye tracers. Plume maps show the distribution of effluent concentrations in the receiving stream. However, these "maps" are of limited use when a large number or wide range of situations need to be modeled. The cost and the time involved in conducting field studies to verify all situations would be prohibitive.

An alternate approach is to develop tables and graphs outlining and depicting carefully selected characteristics of model outputs, which can be compared for a large number of scenarios and over a wide range of conditions. These characteristics should include general measures of mixing performance, such as generating distances to complete vertical mixing (figure 9), developing outputs of recirculation zones caused by plume interaction with shorelines, and computing distances to regulatory specifications as exemplified by figures 9b, c, and d.

The primary outputs generated by the CORMIX model are pollutant concentrations along the centerline, the width, and the depth of the plume. The model assumes that the pollutant is normally distributed laterally (full Gaussian curve) and vertically (half Gaussian curve) along a plume in a cross section, as shown in figure 9. The lateral edges of the plume at the surface are arbitrarily defined by the model as points at which the concentrations are 46 percent of the centerline concentration (C_c, figure 9). By definition, complete vertical mixing occurs when the arbitrarily defined plume edge of 0.46 C_c intersects with the bottom of the equivalent rectangular cross section, as shown in figure 9.

Preliminary model results indicated that the regulation limiting the mixing zone to no more than 26 surface acres is less restrictive than the regulation limiting the cross-sectional area of the mixing zone to no more than 25 percent of the receiving stream cross section. This conclusion applies only to neutrally buoyant conditions for which CORMIX analyses are restricted. Possibly, the surface area limit may be more restrictive for buoyant plumes that are confined vertically, conditions CORMIX cannot handle. Consequently, the analyses using CORMIX modeling were restricted to comparing neutrally buoyant plume configurations to the 25-percent cross-sectional area limitations.

The CORMIX model cannot predict B concentrations at the Sparta domestic water intake or at any point within the meander on which the intake is located (figure 1). Sparta pumps water from the meander to supplement its principal domestic water supply taken from a reservoir. Of special concern is the possibility that boron in excess of the regulatory limit of 1.0 mg/L could enter the Sparta water supply. CORMIX was used to predict B concentrations at the mouth of the cutoff meander (RM 18.4) located 2,200 feet downstream of the ash-pond outfall to assess the potential of excess boron entering the meander.

The results of each model run were characterized and evaluated using a set of six criteria. Numerical outputs were derived relative to the:

- Distance downstream to the point of vertical mixing (figure 9).
- Distance downstream to the point at which the plume occupies 25 percent of the receiving stream cross section.
- Percent residual of effluent boron at the lateral plume edge, where the plume occupies 25 percent of the receiving stream cross section.
- Maximum ash-pond B concentration that can be discharged without violating the 25-percent cross-sectional area regulation; this represents the reciprocal of the plume-edge concentration.
- Percent residual of effluent boron at the mouth of the Sparta water intake cutoff meander.
- Maximum ash-pond B concentration that can be discharged without exceeding a concentration of 1.0 mg/L at the mouth of the cutoff meander; this represents the reciprocal of the centerline concentration.

For brevity, each scenario is identified by the pairing of river flows at RM 19.1 and ash-pond flows, as given in table 12. Scenario 500/20, for example, refers to a simulation in which the Kaskaskia River and effluent flows are 500 and 20 cfs, respectively. Nine of the 23 scenarios represented in the receiving stream were modeled as an unbounded water body, as noted in table 12.

General Mixing Characteristics

The model outputs for all 23 scenarios indicated that plume interaction was occurring with the near bank, producing undesirable recirculation zones. Such undesirable recirculation commonly occurs around surface discharges. Interaction between the plume and bank prevents lateral dispersion from occurring along the edge of the plume.

The distances to vertical mixing are presented in table 13. Increasing the effluent discharge rate or decreasing the river flow increased the distance to vertical mixing as exemplified by the plots for discharge flow rates of 15 and 25 cfs, shown on figure 10. The distances did not vary greatly considering the extreme ranges of flows and extreme ratios of river flow to effluent discharges (12.5 to 70.0) that were modeled. The shortest distance, 421 feet, occurred for a river flow of 350 cfs and an effluent flow of 5 cfs; the longest distance, 1,267 feet, occurred for a river flow of 350 cfs and an effluent flow of 20 cfs.

Regulatory Mixing-Zone Considerations

The distances to which the plume occupied 25 percent of the cross-sectional area varied greatly, ranging from 417 to 6,601 feet downstream of the outfall (table 13). Generally, greater distances resulted when the plume was strongly deflected by either increasing the river flow or by decreasing the effluent flow, as exemplified by the plots for discharge flow rates of 15 and 25 cfs shown on figure 10.

The maximum effluent concentrations that can be discharged without exceeding mixing-zone regulations vary greatly over the range of conditions modeled. When river flows exceed 500 cfs and discharge rates are 25 cfs or less, CORMIX indicates that B concentrations of 11.0 mg/L or greater can be discharged. However, for river flows of 250 cfs or less, the modeling results indicate that the effluent discharge rates must be maintained at rates significantly lower than the historical average of 25 cfs to avoid exceeding regulatory limits. Effluent residual percentages at the edge of the regulatory 25-percent cross-sectional area ranged from a low of 2.3 percent for 1,000/15 conditions to 16.4 percent for 125/10 conditions (table 13).

A family of curves was plotted, showing the relationships between ash-pond discharge flows, the minimum effluent B concentration that would cause B levels to exceed 1.0 mg/L in 25 percent of a cross-sectional area, and river flows (figure 11). These curves were, in turn, used to develop a family of plots that can be used to determine the maximum effluent discharge rate (for a combination of river flows and effluent B concentrations) necessary to prevent the containment of 1.0 mg/L or greater B levels in 25 percent of the river cross-sectional area. This family of curves is presented as figure 12.

Boron at the Cutoff Meander Mouth

Table 14 presents minimum effluent B concentrations that will produce 1.0 mg/L of boron at the mouth of the Sparta water intake cutoff meander as predicted by CORMIX for the 23 modeling scenarios. Seven of the scenarios, as shown in table 14, produced indeterminate results because, under these specific combinations of river and effluent flows, the plume interacted with the far bank upstream of the meander. For the remaining 16 modeling scenarios, the 25-percent cross-sectional area regulatory requirement occurred downstream of the meander. Imposing a boron limit of 1.0 mg/L in the meander mouth would be more restrictive than the present mixing-zone regulations.

Mixing Zone and ZED

Three dye-injection runs were conducted to define ash-pond mixing with the river, while on other dates, sufficient SC data were collected to develop additional mixing-zone and ZID isoplethic profiles on either an areal or transect basis. The dye-injection/mixing dates are presented in table 4; the SC-mixing dates are: 6/08/94, 6/30/94, 7/07/94, 8/10/94, 9/14/94, 9/28/94 (in concert with dye), 10/06/94, 10/20/94, 11/02/94 (in concert with dye), and 11/29/94. A limited number of SC measurements were collected during the first dye run on 8/25/94, but not enough data were generated for constructing isoplethic profiles.

The results of the three dye runs are presented in Appendix B, which is subdivided into Appendices B1 (8/25/94), B2 (9/28/94), and B3 (11/02/94). Included in the tabulations are the absolute dye reading in µg/L, percent dye residuals, and temperature readings at x-, y-, and z-coordinate locations. At selected coordinates, SC measurements were taken and boron samples were collected. The absolute and residual percentages for both these parameters are presented when appropriate. The exact locations of the boron results given in Appendix B can be quickly determined by referencing the dye-injection dates to the corresponding dates presented in tables 5, 6, and 7.

A perusal of the data in Appendix B will show that the success of run 1 was marginal at best. Certain problems often inherent in a start-up or initial run of this kind materialized, and the overall results are somewhat limited in scope and use. Problems developed with the dye-injection system, the conductivity meter batteries died, and boron sample collection depths were inexact because a Kemmerer water botde was used for collections. These weaknesses affected the comparability of the percent residuals of the dye, SC, and boron.

Major changes were made in the field methodology prior to starting run 2. The dye injection point was moved from its position near the effluent channel mouth to the entrance of the 30-inch culvert (figures 1 and 2); a constant-feed, gravity system replaced an electric pump used in run 1; a 12-volt battery was used to power the conductivity meter; and water quality samples were collected from the fluorometer discharge line, insuring compatibility of coordinate values. These sundry improvements in operational procedures produced much better data, contributed to greater efficiency, and allowed more extensive data to be collected by two crews in place of the three crews that were used during run 1. A close examination of the data in Appendix B2 shows that the dye, SC, and B percentages agreed significantly better during runs 2 and 3 (particularly 3) than they did during run 1.

Ideal conditions prevailed during run 3 on November 2, 1994. An almost idealized $Q_{7,10}$ river flow occurred (table 11), equipment worked to perfection, and operating experience acquired during runs 1 and 2 produced excellent mixing and dispersion results. Note from Appendix B3 the good agreements between the parametric residual percentages.

Table 15 summarizes the statistical relationships that were developed between SC, B, and dye concentrations for the three runs. The r^2 value, the coefficient of variation, explains the fraction (or percentage) of the variability of the dependent variable (y), which can be explained by the variability in the independent variable x. For example, during run 3, 97.68 percent of the variability in boron can be explained by the variability in the dye. This contrasts somewhat with the results of run 1, for which only 79.76 percent of the variability in the boron can be explained by the variability in the dye. This is reflected in the poorer sampling method used during the first run.

For overall conditions (1+2+3), SC appears to be an excellent predictor of boron; i.e, 92.94 percent of the variability in boron can be accounted for by the variability in SC, as shown by the results in table 15. This provided the opportunity to make eight dispersion and mixing-zone analyses in addition to the three made possible by the dye-injection runs. These 11 sets of data for widely varying river flow conditions provided enough information to develop plots showing what effluent B concentrations will effect exceedance of the 25 percent-area limitation for any river flow.

The development of these predictive plots, using the 11 sets of available data, was a four-step process, which was performed for data collected at stations -4+10, -0+19 (outfall), 1+00, and 20+00. The first step involved calculating percent effluent residuals at SC and/or dye measurement points within a cross section, as shown by the legend in Appendix C. The second step involved calculating areas enclosed by B values equal to or greater than 1.0 mg/L by fitting a 1.0 mg/L isopleth to the effluent-residual percentage point for four to ten effluent B concentrations ranging from 3.0 to 13.0 mg/L (Appendix C legend).

The third step involved constructing *River Flaw* versus *Percent of Cross Section Exceeding 1.0.mg/L Boron* curves for each of the four transects, as shown by figures 13 though 16. The fourth step involved plotting *River Flow* versus *Effluent Boron Concentration* curves (figure 17) using data points taken along the 25-percent exceedance line from figures 13 through 16. Figure 17 permits estimates to be made as to what effluent B concentrations will yield at least 1.0 mg/L of boron in 25 percent of the cross-sectional areas at stations -4+10, -0+19, 1+00, and 20+00. Figure 17 represents an empirically derived family of curves, which is analogous to the family of curves developed using CORMTX (figure 12).

The cross-sectional plots at the outfall (Appendix C2) also serve to illustrate two extremes in buoyant conditions. The plume on 8/10/94 was markedly positively buoyant, whereas the plumes on 10/06/94 and 11/02/94 were markedly negatively buoyant. Note from Appendix C4 that the negative plume of 11/02/94 becomes virtually completely mixed by the time it reaches 20+00, a relatively short distance downstream of the outfall. While CORMTX could not quantify this, the model did essentially predict almost instant, complete mixing, under similar flow conditions, by virtue of its output showing that the plume would interact with the far bank above the cutoff meander at station 22+00 (table 14).

Cross-sectional and areal isoplethic profiles were developed to empirically analyze the mixing-zone characteristics of ash-pond discharge flows. Of particular interest were the conditions that existed during the November 2, 1994, dye-tracer study, when river-flow conditions approximated $Q_{7,10}$. Figures 18 though 23 represent effluent-residual, percentage isopleths at stations -3+10, -0+19, 3+00, 6+00, 10+00, and 20+00. Figure 24 shows a detailed areal view of the surface isopleths of effluent-residual percentages in the immediate area of the outfall; figure 25 shows surface conditions that extended more than a mile downstream.

The plume was negatively buoyant on November 2 and was moving strongly upstream, as can be noted from the effluent-residual percentages occurring at -3+10 (figure 18). Near the bottom, residuals of almost 28 percent existed, whereas at distances of 300 to 400 feet upstream, the maximum values at the surface were less than eight percent (figure 24). A percentage slightly greater than 7.5 was measured at the surface at -4+10, which accounts for the 7.5-percent isopleth extension to that location, as shown areally on figures 24 and 25. Either sampling verticals were not spaced sufficiently close to pick up values in excess of seven percent at -3+10 or higher values were beginning to surface at around -4+10. In either case, surface continuity of the 7.5 percent isopleth was extended across -3+10.

Weighted-average, cross-sectional B concentrations were developed for each of the transects using an effluent B concentration of 9.9 mg/L. The results, presented in table 16, indicate that the plume does not appear to be "hanging up" along the near shore during $Q_{7,10}$ flow conditions as was predicted by CORMTX. Note from table 16 that the weighted average B concentration, in the 11.7 percent of the cross-sectional area closest to the outfall, was 5.31 mg/L, but drops to only 3.46 mg/L in 46.1 percent of the cross-sectional area. The plume clearly interacts with the far bank, as predicted by CORMTX and shown by figure 19. These results, however, quantify the degree of interaction, something CORMTX is incapable of doing.

The appropriateness of these methods and procedures and the excellent quality of the data can be demonstrated by using equation 5 to compare the measured and theoretical, completely mixed B concentration that would be expected given an effluent B value of 9.9 mg/L during the November 2 river and effluent conditions. Conditions are: Q_e = 29 cfs (table 10), Q_u = 120 cfs (table 11), IPC pumping rate 30 cfs, and C_u = 0.048 mg/L (U.S. Geological Survey, 1980-1991).

Therefore:

$$C_d = \frac{(9.9)(29) + (120-30)(0.048)}{(120-30)+29} = 2.45 \text{ mg/L}$$

Theoretically, the weighted-average concentration of any conservative constituent in the effluent should equal the completely mixed value at the outfall transect. Note the excellent agreement of the outfall (-0+19) value of 2.42 mg/L (table 16) with the above value.

Ancillary information relative to complete mixing under varying effluent B concentrations and flow rates, and varying river flows with a C_u = 0.2 mg/L were provided by Illinois Power Company and are presented in Appendix D.

If the entire plume moves downstream, the weighted-average value should equal the theoretical, completely mixed B value. However, since a significant portion of the plume, at times, moves upstream in the Kaskaskia River due to a combination of low flows, wind direction, wind speed, IPC pumping station rates, and temperature differentials, downstream values will often be less than the theoretical, completely mixed concentrations. This phenomenon is clearly exemplified by the data presented in table 16. Note the progressive reduction in 100-percent area, weighted-average concentrations at each downstream transect. At 20+00, nearly completely mixed conditions exist (figure 23), but the 100-percent area value of 1.23 mg/L represents only about 50 percent of the theoretical outfall-transect value.

The average total cross-sectional area residuals at the other downstream stations of 3+00, 6+00, and 10+00 represent 79, 74, and 66 percent, respectively, of the theoretical, completely mixed value of 2.45 mg/L. The upstream value of 0.93 mg/L represents 38 percent of the well-mixed plume. The upstream movement plus the downstream movement of the dye should theoretically total 100 percent if no dye is lost by absorption and/or adsorption. The well-mixed 50 percent at 20+00 plus the less-than-well-mixed 38 percent at -3+10 total 88 percent, a figure remarkably close to 100 percent considering the dynamic changes that can occur in the mixing zone 300 or 400 feet up- or downstream within a few hours. This dynamism is clearly illustrated by the results presented in table 17 for SC measurements made at stations 1+00 and -4+10. A buoyant plume started moving upstream, as evidenced by the change in the residual percentage at the surface from 7.6 to 43.1. Downstream, the shifting of a greater share of the plume upstream is reflected in about a four percent reduction in the percent residuals from top to bottom.

Also, measured B residuals can be used to substantiate the applicability and reliability of conducting well-controlled mixing-zone studies, as was done during this project using either SC or fluorescent dye as tracers. On August 11 the effluent B concentration was 6.19 mg/L; the theoretical well-mixed river value was 0.495 mg/L. For well-mixed conditions at station 80+00, as substantiated using SC measurements, a water sample collected in this transect contained a B concentration of 0.49 mg/L (table 7). During the September 29, 1994, dye run, the effluent B concentration was 5.12 mg/L; the theoretical well-mixed river value was 0.479 mg/L. For well-mixed conditions at station 100+00, as substantiated by SC readings, a water sample collected in this transect contained a B concentration of 0.48 mg/L (table 7).

The fractional upstream/downstream movement of the plume relative to flow was investigated to determine if flow variability could be used to predict plume movement with some high degree of reliability. Eleven dates provided usable data (table 18) to make this evaluation.

Statistical curve-fitting techniques outlined by Dr. Jerry L. Hintze in his *Number Cruncher Statistical System (NCSS) - Version 5.03* s were used to develop the model best suited to describing the fractional plume movement. The development of a reliable predictive model would be important for several reasons, one of which would be for use in combination with risk analysis to significantly modify downstream levels of boron with changes in flow.

The model that was finally selected to represent fractionalization of the plume into up- and downstream movements was:

$$1/F = m(1/Q_u) + b \qquad (6)$$

where:

F	=	Fractional downstream movement of plume
Q_u	=	River flow in cfs
m, b	=	Regression constants

After m and b were determined the equation took the final form:

$$F = Q_u/(124 + 0.9938\ Q) \qquad (7)$$

The correlation coefficient (*r*) relating the 11 values of F to Q_u in table 18 was 0.875, which indicates that 77.6 percent (r_2) of the variation in F can be explained by the variation in Q_u in reference to equations 6 and 7. Other models produced somewhat higher correlations but were not as theoretically correct as the model selected. The reciprocal function equation more closely follows dilution theory, whereas other simplified models do not.

Examination of equation 7 shows that unity (F=l) is not reached until Q_u equals 20,000 cfs. It is basically a curvilinear line that appropriately inflects asymtopically towards unity in the area of 800 to 1,000 cfs, as shown by figure 26. At 6,070 cfs — the highest flow encountered during the field studies — equation 7 predicts that 98.6 percent of the plume will move downstream. A log-log formulation had an r = 0.963, but at 6,070 cfs the log-log model resulted in an F value greater than unity, which is theoretically impossible and practically unacceptable.

Risk Assessment and Analysis

Risk assessments were conducted for two conditions: conditions in which 100 percent of the plume was permitted to move downstream under all river flows and conditions in which the downstream movement of the plume was proportioned according to equation 7. For the second scenario, F was set equal to unity for flows greater than 6,000 cfs.

The flow inputs to the risk-assessment and Monte Carlo algorithms are presented in tables 19 and 20. Table 19 shows the selected flows and recurrence frequencies that were used to construct flow duration curves at Baldwin (RM 19.1) and Evansville (RM 12.2). Table 20 gives numerical results for the modeling scenario presented in table 3.

Probability distributions for ash-pond flow discharge and specific conductance were developed for only the low-flow months of August, September, and October, partially because of insufficient data during the other months and partially because these are, historically, the low-flow months that exhibit the highest B concentrations in the river. The probabilities of occurrence of ash-pond flows during this three-month period are presented in table 21.

The B and SC results presented in table 5 for August, September, and October were statistically analyzed to develop a functional relationship between effluent B and SC that could be used to predict effluent B concentrations using SC. The predictive equation that resulted is:

$$B = 24.38(SC) - 17.83 \tag{8}$$

where:

B	=	Effluent boron concentration in mg/L
SC	=	Effluent specific conductance in mS/cm

The correlation coefficient *(r)* for the data used to derive the equation was 0.992, which means that 98.4 percent (r^2) of the variability can be attributed to the variability in SC. This equation was used to generate effluent B concentrations for use in risk analysis/ Monte Carlo simulations computation. Frequency distribution curves were developed for the six flow scenarios listed in table 3 for total and partial plume movement downstream. For a river location at Baldwin at the mouth of the Sparta water intake meander (RM 18.4), the curves for total and partial plume movement are shown on figures 27 and 28, respectively. The respective curves for Evansville (RM 12.2) are shown on figures 29 and 30.

Numerical statistical results of the risk analyses are presented in table 22. Table 22a summarizes predicted conditions when 100 percent of the plume is programmed to move downstream; table 22b summarizes predicted conditions when the downstream plume movement is fractionalized in relationship to flow using equation 7. Included in the table are results categorized according to $C_d \geq$ 1.00 mg/L and $C_d \geq$ 1.23 mg/L. The 1.23 mg/L value is the best estimate of what the well-mixed B concentration would be for a 9.9 mg/L effluent B value during $Q_{7,10}$ river flow conditions (table 16).

Results in table 22a indicate that for daily mean flow conditions ($Q_{1,A}$), the 1.00 and 1.23 mg/L river boron levels would be exceeded 8.2 and 5.4 percent of the time, respectively, at Baldwin (RM 18.4) and 7.4 and 5.1 percent of the time, respectively, at Evansville (RM 12.2), assuming that 100 percent of the plume moves downstream. However, these percentages are, in reality, reduced significantly, since downstream plume movement has been shown to be fractionalized in direct proportion to decreases in river flows below 6,000 cfs. Note from table 22b that for $Q_{1,A}$ conditions, the probabilities for 1.00 and 1.23 mg/L are only 0.30 and less than 0.01 percent, respectively, at Baldwin, and 0.26 and less than 0.01 percent, respectively, at Evansville.

The percentage values for $Q_{1,A}$ translate into 30 and 27 days per year in which a $C_d \geq$ 1.0 mg/L is exceeded at Baldwin (RM 18.4) and Evansville (RM 12.2), respectively, for total downstream plume movement. When proper allowances are given to fractionalizing downstream plume movement, the indication is that the existing 1.0 mg/L standard will be exceeded fewer than two days a year at either Baldwin or Evansville.

Plume Buoyancy

Plume buoyancy results, analyzed on the basis of the relationship between effluent and river temperature differentials, indicate that over the course of a year, positive, negative, and neutral plumes occur 45.2, 17.2, and 37.6 percent of the time, respectively. Figure 31 presents the recurrence frequency of various hourly durations of the three categories of buoyancy.

The prevalence of both positive and neutral plumes is significant in terms of general frequency rates and duration rates, since these conditions are more apt to create upstream movement of boron. The combined positive and neutral recurrence frequency is 62.4 percent. This means that the plume is extremely vulnerable to upstream movement by prevailing southwest winds during almost two out of every three days of the year, since the warm effluent water will be at or near the surface as it discharges to the river.

A cursory examination of figure 31 could lead to the conclusion that neutrally buoyant conditions may prevail over positively buoyant conditions. However, in the overall time scheme, positive buoyancy predominates. For example, positively buoyant conditions persisted for more than 96 hours on six different occasions (figure 31). The average duration for these six periods was 230 hours; the maximum duration was 451 hours.

DISCUSSION

This study has produced a wealth of information that has advanced the understanding and knowledge of the mechanics of effluent plume mixing in a medium-sized navigable waterway. Study goals were accomplished via a combination of intensive and extended field work and data gathering and complex computer modeling. Conceptual modeling, empirical modeling, and risk-assessment/Monte Carlo simulations were used to generate data and formulate concepts that can be used in developing a logical and rational ash-pond boron discharge management plan.

The raw data generated and used in the analysis are presented in the extensive appendixes included in this report. Some specifics on rationales and concepts related to field sampling and data application strategies and methodologies will be discussed. A number of independent approaches were taken to assess the impact of Baldwin ash-pond boron discharges and effluent mixing on water quality. And although these approaches met with varying degrees of success, all provided some degree of input in the final analysis.

Water Quality

Seventeen ash-pond effluent samples were collected at the mouth of the discharge channel. The average of these values was 5.53 mg/L, ranging from a low of 3.71 mg/L to a high of 7.88 mg/L (table 5). The grab sample average of 5.53 mg/L is somewhat greater than the 4.51 mg/L average of the 20 IPC, 24-hour composite samples listed in table 1. Noteworthy, however, is the fact that all project grab samples and IPC composite samples contained B concentrations significantly less than 9.9 mg/L, the level around which management strategies were developed. Based on this direct evidence, along with indirect evidence correlating SC to B concentrations, the possibility appears remote that routine boron discharges in excess of 9.9 mg/L will occur. Such an occurrence could only be effected through a radical change in the *modus operandi* of the Baldwin Power Plant as a whole and the ash-pond waste handling system in particular. The project sampling results are verified by results obtained using IEPA-approved QA/QC procedures performed in an IEPA-certified laboratory.

The average effluent SC was 0.963 mS/cm, a value 212 percent higher than the average Kaskaskia River background level of 0.455 mS/cm (table 5). This very significant difference supports the contention that SC can be used with a great degree of confidence for tracing ash-pond effluent mixing in the river. Only three background TDS values from the river are available for comparison with the effluent values. These three values average 232 mg/L. Consequently, the effluent TDS appears to be approximately three times greater than the river TDS. Therefore, both SC and TDS should be highly correlated with boron in the mixing and ZID areas of the river. Tracer and mixing-zone studies can be conducted more cheaply, easily, and probably more accurately using SC in place of fluorescent dye tracers when the difference between waste effluent and receiving water SC readings is approximately 50 percent or greater. Ambient cold-weather river SC values could differ significantly from ambient warm-weather values. As an example, the daily average river background value on November 8, 1994, was only 0.334 mS/cm, whereas on August 25, 1994, a value of 0.659 mS/cm was recorded. Summer SC values tended to be higher than winter values.

Nine samples were collected at the Sparta water intake. The average B concentration was 0.49 mg/L with values ranging from 0.10 mg/L to 0.63 mg/L (table 6). Stagnant water conditions persist in the upper end of the cutoff meander, and biological and physical factors appear to temper and dampen the positive relationship between B and SC in such a setting. Note from table 6 that the average SC of the samples was only slightly greater than the prevailing river values. On several dates, such as October 20, 1994, the sample SC value was significantly greater than the river value. Since the time of travel up the meander is very long, instantaneous comparisons between river and upper meander SC values cannot be made. Therefore, because of these and other factors, SC variability at the Sparta water intake probably does not reflect similar variability in boron.

Table 7 lists 130 results from random sampling locations in the river other than in the near-field and far-field mixing zones. Note that relatively high B concentrations were recorded significant distances upstream of the outfall. On August 25, 1994, a value of 1.82 mg/L was recorded at the surface, 72 feet from the east bank at station -6+10 (figure 32). Although this was a relatively high B value, the encompassing plume, defined by a 1.0 mg/L stream B value for a discharge B concentration of 9.9 mg/L, was only 7.3 percent of the cross-sectional area. On September 29, B values of 1.53 and 1.49 mg/L were recorded at different times 700 feet upstream of the outfall. Insufficient data prevented constructing cross-sectional plume configurations for conditions that prevailed when these samples were collected. However, the encompassing plumes were probably less than 25 percent of the cross-sectional area. Both samples were collected 61 feet from the east bank in line with the upstream flow to the pumping station intake. The B concentrations of two samples collected at the IPC water pumping station intake, located approximately 1,300 feet upstream of the outfall, were 0.51 and 1.07 mg/L. These results indicate that boron migrates upstream during low flows in a narrow plume that tends to "hug" the east bank and funnels into the pumping station intake.

Downstream, values above 1.0 mg/L were frequently recorded between 3,200 feet and 4,200 feet below the outfall. The highest value recorded at the farthest station downstream (100+00) was 0.54 mg/L on November 2, 1994. However, the two samples collected at Evansville, 6.6 miles downstream, were 0.47 mg/L and 0.61 mg/L (table 8). The 0.47 mg/L result was for a sample collected on November 2, 1994, when the river flow approximated $Q_{7,10}$ conditions.

The results of the QA/QC program indicate a lack of sample contamination, as evidenced by the traveling blank results presented in table 9a. In one case, a blank produced a B value slightly above the MDL. Over the sampling period, 14 duplicate analyses were made, and the results indicate that good, reliable laboratory procedures were followed throughout the study. The duplicate averages for TDS and boron were almost identical, as noted in table 9b.

Mixing and ZID

The mixing-zone characteristics, developed for the various mixes of flow and B concentrations encountered over the study period, provide good insight into which factors influence mixing in the outfall area of the river. At low flows, with moderate to strong south to southwest winds, a significant portion of the effluent moves upstream, as clearly demonstrated by figures 18, 24, and 26. The winds, along with low stream velocities and water-intake pumping at Baldwin Lake, approximately 1,000 feet upstream, combine to draw the plume upstream. During low flows, the channel cross section in the outfall is so deep and wide (see transect plots in Appendix C2) that Price current meters cannot readily detect downstream water movements.

A good example of an extremely buoyant plume is demonstrated by the isoplethic cross-sectional profiles presented in Appendix C2 for August 10, 1994. The antithesis to the August 10 condition is the pronounced negative plume observed at the outfall on October 6, 1994 (Appendix C2). Mixing in this reach of the river fits no definable pattern amenable to modeling. Mixing appears to occur almost equally in both upstream and downstream directions during very low flows, as demonstrated by figure 26. Given that stream geometry, hydrology, and hydraulics are not apt to change, that winds will continue to blow from the south/southwest, that buoyant and neutral plumes predominate, and that upstream lake pumping will need to be continued, upstream movement of the plume will almost certainly continue to persist and exhibit the patterns defined in this report.

The definitive nature of this plume, which splits in upstream and downstream segments at low to medium flows, leads to the recommendation for a 1.23 mg/L boron stream standard on the basis of the data presented in table 16 for station 20+00.

At the time of the November 2, 1994, mixing-zone dye-tracer study, river conditions approximated $Q_{7,10}$ or 120 cfs. Complete mixing at station 20+00 (November 2, 1994, Appendix C4) would have produced a completely mixed B value of 2.45 mg/L for an effluent B value of 9.9 mg/L. This represents 24.74 percent of a B discharge concentration of 9.9 mg/L. However, the weighted average dye percentage based on the isoplethic areas shown on figure 23 is only 12.42. A major portion of the remaining 12.32 (24.74 - 12.42) percent appears to be moving upstream due to dispersion and mixing. At station -3+10, the weighted-average percentage is 9.14 (figures 18 and 24). Consequently, the combined data at stations 20+00 and -3+10 (12.42 + 9.14) account for 21.56 percent of the 24.74 percent. This indicates that at extremely low flows a stream standard of 1.23 mg/L boron will seldom be exceeded even if the discharge B value is 9.9 mg/L since the flow will probably be split with part going upstream and part downstream.

A boron sample was collected at 20+00 on November 2, 1994. Its value was 1.20 mg/L (table 7) or <u>21.3</u> percent of that recorded for the 5.34 mg/L effluent value (table 5). "Sample SC minus the background SC" values for the effluent and river samples were 0.469 and 0.098 mS/cm, respectively, yielding a residual SC percentage of <u>20.9</u>. This value agrees very well with the residual boron percentage, a fact that serves to identify the accuracy of the data and the appropriateness of the methods and procedures used to generate the data.

Tracer Studies

Two types of tracers were used to characterize Baldwin ash-pond effluent mixing with the Kaskaskia River. Rhodamine WT fluorescent dye was injected on three occasions, while specific conductance, a naturally occurring water quality parameter, was used as a tracer during biweekly field studies. During the planning and developmental phases of the project, effluent SC levels were suspected of being significantly greater than ambient river SC levels, thereby providing a "built-in" natural tracer. This suspicion proved to be true, and the dye-tracer runs basically served to justify the use of SC as a tracer to define mixing and dispersion.

During the November 2, 1994, dye run, when river conditions approximated $Q_{7,10}$, extremely good correlations were observed between dye and SC, dye and boron, and SC and boron results, as shown by the statistical data summarized in table 15. Because SC proved to be an excellent tracer, a more extensive usable database was generated. This, in turn, provided greater insight into identifying and defining the mechanisms that control and characterize ash-pond mixing and dispersion in this particular reach of the Kaskaskia River. For example, without the additional data generated using SC as a tracer, the stochastic model relating the fractional downstream movement of the plume to river flow, as shown by figure 26, could not have been developed. This empirical model provided information for use in developing realistic risk-assessment analyses.

CORMIX

Generally, the CORMIX mixing model is not applicable for describing and defining mixing for the extreme and unusual hydraulic and hydrologic conditions that occur during low flows in this reach of the Kaskaskia River. At best, the river can be described as a medium-sized river, and it has been straightened and channelized to accommodate commercial barge traffic, producing almost lake-like conditions during summer low flows. The model is not adequately designed to model mixing and dispersion under such conditions. However, CORMIX modeling outputs did provide some realistic and usable information. Some of the basic results derived using CORMIX either verified or supported some of the empirically derived conclusions that were arrived at via stochastic modeling, risk-assessment analyses/Monte Carlo simulations, and isoplethic constructions.

The CORMTX model almost always correctly predicted general plume behavior, but it often failed to quantify conditions within the plume. For example, because of the combination of extremely low river velocities that persist during low-flow conditions and the relatively high effluent velocities, the model predicted that the plume would "shoot" across the channel and intersect with the far bank. The prediction of this far-bank interaction prevented the model from performing additional computations and analyses, thereby effectively rendering the model useless in quantifying and defining dispersion and mixing in these instances.

The applicability of CORMIX was also extenuated by several additional factors, such as plume buoyancy conditions, wind direction, and movement of river water due to upstream water withdrawal via pumping. The model cannot predict upstream plume movement. Also, the model operates only for neutrally buoyant plume conditions. Temperature data, generated hourly in and upstream of the outfall, were used to develop the frequency of occurrence of neutrally, positively, and negatively buoyant plumes. The results indicate that, at best, neutrally buoyant plumes can be expected to occur only about 38 percent of the time. This means that the model is rendered unusable for predicting mixing approximately 62 percent of the time, due just to this one fact. Furthermore, the neutrally buoyant plumes, for which modeling can be done, would tend to be pushed upstream by the south/southwest winds that prevail in the area.

Risk Analysis/Monte Carlo Simulations

Risk analyses and Monte Carlo simulations proved to be the best procedure for generating information to develop a management plan for regulating boron releases from the ash-pond discharge. Stochastic, statistical models were developed from field measurements and sampling for input into the risk-assessment analyses. The analyses took into account upstream plume movement, as predicted by the curve presented as figure 26.

From the analyses, the conclusion was reached that the existing river boron standard of 1.0 mg/L would probably not be exceeded more than two days a year at either the mouth of the cutoff meander at Baldwin from which Sparta withdraws its water or at Evansville, approximately 6.6 miles downstream. A standard of 1.23 mg/L would probably not be exceeded more than once every 25 years at a point immediately downstream of Baldwin or at Evansville.

CONCLUSIONS

Following are the conclusions reached as a result of field work, data reduction, and statistical modeling work tasks performed as part of this project and study.

1. <u>Boron concentrations in the Baldwin power station ash-pond discharge to the Kaskaskia River appear to persist at levels below 10.0 mg/L</u>. The average of 17 grab samples collected between May 24, 1994, and January 4, 1995, was 5.53 mg/L; values ranged from a low of 3.71

mg/L to a high of 7.88 mg/L. The average of 24 24-hour composite samples collected by IPC since March 11, 1992, was only 4.46 mg/L.

2. The present IPCB requirement that boron concentrations cannot exceed 1.0 mg/L in 25 percent or more of a cross-sectional area cannot be met during 7-day. 10-year low-flow $(Q_{7,10})$ conditions in spite of the fact that relatively low levels of boron are now being discharged. The natural mixing and dispersion power of the river has been severely reduced due to the straightening and deepening of the river to accommodate commercial barge traffic. At low flows, the river velocities are so low, compared to the effluent discharge velocity, that the discharge plume is quickly projected across the entire transect at the outfall. The plume often contains boron levels in excess of 1.0 mg/L occupying more than 25 percent of the cross section.

3. The plume moves upstream during intermediate to low-flow conditions. This movement becomes perceptible when river flows fall to about 700 or 800 cfs and becomes extremely pronounced around 400 cfs. Isoplethic cross-sectional plots developed from field data generated during mixing-zone studies indicate that approximately 50 percent of the plume moves upstream at a $Q_{7,10}$ flow of 120 cfs. This movement develops when wind and upstream pumping forces exceed the dynamic velocity of the river.

4. The division of the plume into up- and downstream fractions during low flows reduces downstream boron concentrations significantly. An effluent boron concentration of 9.9 mg/L discharged during $Q_{7,10}$ flow conditions would probably result in a well-mixed boron concentration of only 1.23 mg/L at a distance approximately 2,000 feet below the outfall.

5. The probability of boron concentrations in excess of 1.0 mg/L entering either the Sparta or Evansville domestic water supply is small. Risk analyses performed in concert with Monte Carlo simulations indicate that, when consideration is given to the upstream movement of the plume as predicted by figure 26, the present standard of 1.0 mg/L will be exceeded fewer than two days a year at Baldwin at the Sparta water intake meander (RM 18.4). A standard of 1.23 mg/L would be exceeded only once every 25 years below the outfall. These risk assessment results are substantiated by sundry field results, among which is the fact that a boron level of only 0.47 mg/L was detected in a water sample collected at the Evansville water intake (RM 12.2) during $Q_{7,10}$ flow conditions. The maximum boron value recorded at the Sparta water intake during the study was 0.63 mg/L.

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TABLES

Table 1. IEPA and IPC Ash-pond Boron Monitoring Results

IEPA grab sampling				*IPC 24-hour composites*			
Date	*Boron (mg/L)*	*Date*	*Boron (mg/L)*	*Date*	*Boron (mg/L)*	*Date*	*Boron (mg/L)*
8/12/87	9.20	3/24/92	5.60	3/11/92	5.1	6/02/94	2.4
10/07/87	10.00	5/20/92	6.80	5/13/92	6.9	7/06/94	5.4
12/08/88	5.40	7/09/92	8.60	9/09/92	6.1	8/03/94	6.1
9/20/89	5.34	8/26/92	7.60	11/18/92	5.5	9/07/94	6.9
10/24/89	7.02	10/07/92	8.60	10/27/93	3.5	10/05/94	6.5
12/06/89	5.88	12/22/92	5.10	11/03/93	3.6	11/16/94	4.0
2/15/90	5.81	4/07/93	3.50	12/08/93	3.0	12/07/94	4.6
3/27/90	3.06	6/02/93	5.60	1/05/94	4.1	1/04/95	5.8
8/16/90	4.62	12/08/93	2.30	2/02/94	1.9	2/1/95	5.2
10/17/90	4.37	3/08/94	3.00	3/02/94	3.3	3/1/95	5.6
10/31/90	5.20	6/15/94	5.50	4/06/94	2.4	4/15/95	4.9
1/16/91	4.60	8/25/94	8.60	5/04/94	4.2		
4/03/91	6.11	10/17/94	6.20				
8/15/91	1.60	1/26/95	3.30				
10/31/91	6.30	3/14/95	6.48				
12/18/91	4.70						

Table 2. Parameters Analyzed and Method Detection Limits (MDLs)

Parameter	*MDL(mg/L)*	*Parameter*	*MDL(mg/L)*
Aluminum (Al)	0.008	Mercury (Hg)	0.010
Antimony (Sb)	0.110	Molybdenum (Mo)	0.009
Arsenic (As)	0.042	Nickel (Ni)	0.006
Barium (Ba)	0.001	Phosphorus (P)	0.080
Beryllium (Be)	0.002	Potassium (K)	0.640
Bismuth (Bi)	0.004	Selenium (Se)	0.050
Boron (B)	0.050	Silicon (Si)	0.030
Cadmium (Cd)	0.004	Silver (Ag)	0.002
Calcium (Ca)	0.060	Sodium (Na)	0.033
Chromium (Cr)	0.003	Strontium (Sr)	0.001
Cobalt (Co)	0.005	Sulfur (S)	0.060
Copper (Cu)	0.002	Thallium (Tl)	0.080
Lead(Pb)	0.016	Tin(Sn)	0.022
Lithium (Li)	0.003	Titanium (Ti)	0.001
Iron (Fe)	0.230	Vanadium (V)	0.060
Magnesium (Mg)	0.032	Zinc (Zn)	0.004
Manganese (Mn)	0.001	Total Dissolved Solids (TDS) (@ 104° and 180°C)	3.000

Table 3. Flow Scenario Modeled and Nature of Each Variable

Scenario	*Flow statistic representing Ou*	*Random (R) or Fixed (F)* *Ou*	*Oe*	*Ce*
1	$Q_{1,A}$	R	R	R
2	Q_7	R	R	R
3	$Q_{7,2}$	F	R	R
4	$Q_{7,10}$	F	R	R
5	$Q_{7,25}$	F	R	R
6	$Q_{7,50}$	F	R	R

Table 4. Routine Boron Sampling, Specific Conductance (SC) Test, and DataSonde (DS) Exchange Dates

		Purpose of trip			*DS exchange @ stations*					*B depth (ft) @ station*	
		Boron	*SC*	*DS*	*1*	*2*	*3*	*4*	*5*		
Trip	*Date*	*sample*	*test*	*exchange*	*AB*	*AB*	*AB*	*AB*	*AB*	*1*	*5*
1	5/23/94			X	XX	XX	XX			13	13
	5/24/94	X	X	X				XX	XX		
2	6/07/94			X	XX	XX	XX	XX	XX	10	10
	6/08/94	X	X								
3	6/29/94			X		XX				10	11
	6/30/94	X	X	X	XX		XX	XX	XX		
4	7/07/94	X	X								
5	7/13/94			X	X	X	XX	XX	XX	10	10
6	7/26/94			X	XX	XX	XX	XX	XX	10	10
7	8/09/94			X	XX	XX	XX	XX	XX	10	10
	8/10/94		X								
	8/11/94	X	X								
8	8/25/94	X	X		Dye Injection/Mixing-Zone Trip					9	10
9	9/01/94			X	XX	XX	XX	XX	XX	9	10
	9/02/94	X	X								
10	9/13/94			X	XX	XX	XX	XX	XX	9	10
	9/14/94		X								
	9/15/94	X	X								
11	9/22/94			X	XX	XX	XX	XX	XX	7	7
12	9/28/94		X		Dye Injection/Mixing-Zone Trip					8	9
	9/29/94	X	X		Dye Injection/Mixing-Zone Trip						
13	10/06/94	X	X	X	XX	XX	XX	XX	XX	9	10
14	10/19/94	X		X	XX	XX	XX	XX	XX	10	11
	10/20/94	X	X								
15	10/26/94			X	XX	XX	XX	XX	XX	10	11
16	11/02/94	X	X		Dye Injection/Mixing-Zone Trip					10	11
17	11/08/94			X		XX				11	12
	11/09/94			X	XX		XX	XX	XX		
18	11/28/94			X	XX	XX	XX	XX	XX	12	13
	11/29/94	X	X								
19	1/03/95	X								11	12
	1/04/95	X									

Table 5. Water Quality Results for Ash-pond Discharge

	SC (mS/cm)		*TDS at 104°C*	*Boron*
Date	*Background*	*Sample*	*(mg/L)*	*(mg/L)*
5/24/94	0.370	1.058	819	7.30
6/08/94	0.379	0.834	676	4.79
6/30/94	0.316	0.944	693	5.76
7/07/94	0.358	0.935	714	5.81
8/11/94	0.525	0.877	657	6.19
8/25/94	0.582	1.096	843	7.71
9/02/94	0.555	1.028	797	7.88
9/15/94	0.545	0.969	685	5.45
9/29/94	0.569	0.937	677	5.00
9/29/94	0.569	0.949	680	5.24
10/06/94	0.517	1.037	771	5.48
10/20/94	0.499	0.898	656	4.41
11/02/94	0.514	0.983	712	5.63
11/29/94	0.409	0.866	582	3.71
11/29/94	0.409	0.914	583	3.71
1/03/95	0.459	1.022	767	4.97
1/04/95	0.459	1.029	779	4.95
Average	0.455	0.963	711	5.53

Table 6. Water Quality Results at Sparta Water Intake

	SC (mS/cm)		*TDS at l04°C*	*Depth*	*Boron*
Date	*Background*	*Sample*	*(mg/L)*	*(ft)*	*(mg/L)*
6/08/94	0.379	0.387	268	0	0.10
9/02/94	0.555	0.538	343	0	0.62
9/15/94	0.545	0.580	356	13	0.61
9/29/94	0.569	0.564	345	0	0.58
10/06/94	0.517	0.567	351	4	0.63
10/20/94	0.499	0.560	345	0	0.52
11/02/94	0.514	0.566	353	0	0.61
11/02/94	0.514	0.540	335	8	0.45
11/29/94	0.409	0.452	299	0	0.31
Average	0.500	0.528	333	-	0.49

Table 7. Water Quality Results in River Channel (SC values in parentheses are calculated using TDS)

Date	*Station*	*Distance LBLDS(ft)**	*Depth (ft)*	*SC (mS/cm) Background*	*SC (mS/cm) Sample*	*TDS @ 104° (mg/L)*	*Boron (mg/L)*
5/24/94	-4+10	50	0	0.370	0.370	237	<0.05
	1+00	59	0	0.370	0.445	299	0.84
	20+00	60	0	0.370	0.373	249	0.19
	80+00	68	0	0.370	0.379	241	0.10
6/08/94	80+00	64	10	0.379	0.387	268	0.10
	20+00	60	8	0.379	0.387	266	0.29
	1+00	59	14	0.379	0.385	261	0.14
	-4+10	50	10	0.379	0.379	248	<0.05
6/30/94	80+00	64	0	0.316	0.331	217	0.10
	20+00	60	0	0.316	0.351	220	0.19
	1+00	62	6	0.316	0.318	211	<0.05
	-4+10	50	0	0.316	0.316	199	<0.05
7/07/94	-4+10	58	0	0.358	0.358	246	<0.05
	1+00	62	0	0.358	0.554	483	3.07
	20+00	62	0	0.358	0.420	288	0.73
	80+00	68	0	0.358	0.361	255	0.10
8/11/94	80+00	69	4	0.525	0.526	328	0.49
	20+00	72	6	0.525	0.558	355	0.81
	1+00	55	0	0.525	0.691	479	3.03
	-4+10	46	0	0.525	0.512	324	0.35
8/25/94	RM19.2	150	8	0.582	(0.592)	371	0.10
(Dye)	-6+10	72	0	0.582	(0.698)	461	1.82
	-4+10	58	3	0.582	(0.886)	618	4.15
	-2+10	50	3	0.582	(0.895)	626	4.74
	-2+10	90	0	0.582	(0.820)	562	2.97
	-1+10	60	0	0.582	(0.768)	518	2.28
	-1+10	85	2	0.582	(0.669)	439	1.29
	10+00	115	20	0.582	0.698	450	1.32
	10+00	135	18	0.582	0.658	476	0.26
	10+00	176	14	0.582	0.587	368	0.28
	10+00	223	4	0.582	0.618	400	0.73
	8+00	76	18	0.582	0.669	438	1.40
	8+00	129	20	0.582	(0.665)	436	1.29
	8+00	190	10	0.582	(0.580)	368	0.14
	8+00	158	0	0.582	(0.625)	398	0.83
	-0+19	64	0	0.582	(0.788)	554	3.71
	-0+19	80	18	0.582	(0.592)	366	0.26
	-0+19	113	0	0.582	(0.702)	473	1.87
	-0+19	152	20	0.582	(0.594)	366	0.20
	-0+19	162	0	0.482	(0.647)	421	1.13
	42+00	157	12	0.582	(0.656)	428	1.21
	32+00	200	10	0.582	(0.645)	420	0.88
	32+00	97	12	0.582	(0.644)	419	1.04
	29+00	147	12	0.582	(0.641)	414	0.91
	1+00	42	5 .	0.582	(0.818)	583	3.91
	1+00	72	8	0.582	(0.861)	624	4.77
	1+00	133	4	0.582	(0.648)	421	1.09
	1+00	220	0	0.582	(0.633)	405	1.03
	1+00	262	0	0.582	(0.643)	416	0.96

Table 7. Continued.

Date	Station	Distance LBLDS (ft)*	Depth (ft)	SC (mS/cm) Background	Sample	TDS @ 104° (mg/L)	Boron (mg/L)
9/02/94	-4+10	58	0	0.555	0.553	353	0.41
	0+50	212	19	0.555	0.661	426	1.70
	20+00	350	14	0.555	0.562	353	0.50
	32+00	218	0	0.555	0.561	351	0.47
9/15/94	-0+19	216	0	0.545	0.573	345	0.46
	1+00	58	13	0.545	0.747	484	2.51
	1+00	178	5	0.545	0.675	386	1.07
	-4+10	58	0	0.545	0.698	447	2.15
	1+00	58	14	0.545	0.612	387	1.09
9/29/94	RM19.2	152	0	0.569	0.569	343	0.09
(Dye)	-3+50	172	20	0.569	0.670	438	1.77
	-3+50	172	2	0.569	0.570	393	0.27
	-7+10	61	20	0.569	0.668	429	1.53
	15+00	111	16	0.569	0.655	435	1.27
	100+00	260	0	0.569	0.580	352	0.48
	73+00	133	17	0.569	0.575	349	0.47
	54+00	345	13	0.569	0.573	351	0.41
	42+00	180	0	0.569	0.604	364	0.66
	30+00	224	12	0.569	0.612	375	0.83
	20+00	74	6	0.569	0.595	370	0.62
	20+00	131	6	0.569	0.595	368	0.63
	20+00	197	6	0.569	0.586	356	0.54
	20+00	290	6	0.569	0.594	363	0.60
	20+00	425	6	0.569	0.590	366	0.55
	10+00	165	20	0.569	0.658	421	1.41
	3+00	128	0	0.569	0.598	365	0.50
	3+00	128	8	0.569	0.612	368	0.67
	3+00	128	13	0.569	0.695	456	1.88
	3+00	160	0	0.569	0.581	355	0.35
	3+00	160	11	0.569	0.597	374	0.56
	3+00	160	16	0.569	0.683	450	1.57
	3+00	244	0	0.569	0.581	355	0.33
	3+00	244	5	0.569	0.730	483	2.18
	1+00	91	5	0.569	0.772	520	2.84
	1+00	150	6	0.569	0.748	469	2.13
	1+00	150	10	0.569	0.569	338	0.14
	1+00	240	4	0.569	0.605	365	1.04
	-3+50	172	20	0.569	0.664	424	0.51
	-3+50	172	2	0.569	0.628	380	0.95
	-7+10	61	20	0.569	0.668	424	1.49
10/06/94	-0+19	53	5	0.517	0.713	510	3.16
	-0+19	210	20	0.517	0.632	406	1.27
	20+00	224	14	0.517	0.628	405	1.32
	35+00	220	8	0.517	0.579	363	0.69
	80+00	187	15	0.517	0.580	361	0.68
	-4+10	208	19	0.517	0.619	382	1.03
10/20/94	-5+10	145	18	0.499	0.541	339	0.58
	20+00	65	4	0.499	0.552	344	0.56
	80+00	190	18	0.499	0.563	348	0.56

Table 7. Concluded.

Date	Station	Distance LBLDS (ft)*	Depth (ft)	SC (mS/cm) Background	Sample	TDS @ 104° (mg/L)	Boron (mg/L)
11/02/94	-0+19	210	19	0.514	0.687	454	1.98
(Dye)	-0+19	150	21	0.514	0.698	463	2.09
	-0+19	150	15	0.514	0.603	388	1.13
	-0+19	265	13	0.514	0.616	399	1.22
	-3+10	103	21	0.514	0.655	389	1.68
	-3+10	103	13	0.514	0.587	373	0.96
	-5+10	160	20	0.514	0.595	377	1.03
	-5+10	160	5	0.514	0.554	342	0.56
	-8+10	159	20	0.514	0.581	367	0.86
	-10+10	190	18	0.514	0.557	335	0.54
	1+50	135	19	0.514	0.665	458	1.86
	1+50	135	12	0.514	0.605	383	1.13
	3+00	178	20	0.514	0.645	413	1.50
	3+00	285	20	0.514	0.661	425	1.78
	3+00	285	5	0.514	0.609	386	1.16
	6+00	175	22	0.514	0.655	427	1.63
	8+00	168	0	0.514	0.597	371	1.03
	10+00	168	21	0.514	0.649	411	1.64
	10+00	168	15	0.514	0.603	372	1.16
	15+00	225	17	0.514	0.639	407	1.58
	15+00	225	8	0.514	0.590	358	0.97
	20+00	226	14	0.514	0.612	394	1.20
	30+00	185	14	0.514	0.575	365	0.80
	40+00	185	14	0.514	0.572	362	0.74
	48+70	225	12	0.514	0.575	363	0.77
	60+00	210	11	0.514	0.560	351	0.61
	80+00	86	11	0.514	0.560	353	0.59
	80+00	198	17	0.514	0.560	353	0.62
	100+00	205	13	0.514	0.556	351	0.54
	100+00	420	7	0.514	0.554	347	0.54
	-0+19	150	15	0.514	0.603	388	1.04
	15+00	225	8	0.514	0.590	379	0.98

*Note: LBLDS = Left bank looking downstream.

Table 8. Water Quality Results for Specialized Sampling Locations

Date	Location	Depth (ft)	SC (mS/cm) Background	Sample	TDS @ 104°C (mg/L)	Boron (mg/L)
8/25/94	IPC Water Intake	0	0.582	0.605	375	0.51
9/15/94	IPC Water Intake	2	0.545	0.621	379	1.07
10/19/94	Evansville Water Intake	0	0.517	0.568	351	0.61
11/02/94	Evansville Water Intake	0	0.514	0.547	338	0.47
9/29/94	Oxbow Inlet to Sparta	0	0.569	0.565	348	0.56

Table 9. Quality Assurance/Quality Control (QA/QC)
Water Quality Sampling Results

a. Traveling Blanks

	TDS (mg/L)		*Boron*	*32 Other*
Date	*@ 104°C*	*@ 180°C*	*(mg/L)*	*Metals*
5/24/94	<3	<3	<0.05	<MDL
6/30/94	15	-	<0.05	<MDL
7/07/94	22	27	<0.05	<MDL
8/11/94	<3	<3	<0.05	<MDL
8/25/94	4	<3	<0.05	4 Detected
8/25/94	<3	<3	<0.05	3 Detected
9/02/94	<3	<3	<0.05	<MDL
9/15/94	7	<3	0.13	<MDL
9/15/94	5	<3	<0.05	7 Detected
9/29/94	<3	<3	<0.05	<MDL
10/06/94	<3	<3	<0.05	<MDL
10/20/94	5	-	<0.05	<MDL
11/02/94	5	5	<0.05	3 Detected

b. Duplicate Analyses for Samples 1 and 2

				TDS (mg/L)					
		Distance	*Depth*	*@ 104°C*		*(a). 180°C*		*Boron (mg/L)*	
Date	*Station*	*LBLDS (ft)**	*(ft)*	*1*	*2*	*1*	*2*	*1*	*2*
5/24/94	-0+19	0	0	817	820	801	797	7.12	7.47
6/08/94	20+00	60	8	273	262	259	247	0.28	0.29
6/30/94	-0+19	0	0	687	699	661	667	5.75	5.76
7/07/94	1+00	62	0	519	447	496	425	3.10	3.03
8/11/94	20+00	72	6	349	360	318	339	0.79	0.83
8/25/94	1+00	133	4	397	445	385	427	0.97	1.20
8/25/94	8+25	158	0	401	394	384	377	0.81	0.85
9/02/94	32+00	218	0	352	349	334	342	0.46	0.47
9/15/94	1+00	178	5	391	382	377	370	1.01	1.13
9/29/94	-0+19	0	0	678	675	645	641	4.88	5.11
9/29/94	54+00	345	13	351	351	337	319	0.42	0.40
9/29/94	3+00	160	11	376	372	343	343	0.57	0.54
10/06/94	-0+19	210	20	409	403	392	388	1.31	1.23
10/20/94	20+00	65	4	343	344	334	335	0.55	0.57
			Average	453	450	433	430	2.00	2.06

* Note: LBLDS = Left bank looking downstream.

Table 10. Baldwin Plant Ash-pond Return Flows, May 23, 1994 -January 3, 1995

	May		*June*		*July*		*Aug.*		*Sept.*		*Oct.*		*Nov.*		*Dec.*		*Jan.*	
Day	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*	*cfs*	*med*
1			28	17.8	31	19.8	NA	NA	34	22.1	27	17.5	27	17.3	39	25.3	32	21.0
2			26	16.9	30	19.7	NA	NA	31	20.3	29	18.9	29	18.7	37	24.2	30	19.5
3			27	17.8	33	21.1	33	21.3	31	20.2	27	17.5	27	17.4	38	24.4	29	18.9
4			27	17.3	34	21.7	34	22.3	32	20.6	26	16.7	28	17.8	34	22.2		
5			26	16.7	34	22.0	34	21.8	29	19.0	25	16.2	35	22.8	35	22.9		
6			26	16.9	35	22.5	34	21.7	34	21.7	25	16.2	36	23.2	36	23.2		
7			26	17.1	34	21.8	35	22.4	32	20.5	28	17.8	32	20.8	39	25.5		
8			27	17.5	30	19.7	32	21.0	33	21.6	26	17.1	30	19.7	38	24.7		
9			30	19.3	30	19.5	34	22.1	34	21.7	30	19.4	32	20.9	37	23.9		
10			29	18.9	31	20.1	34	22.1	36	23.5	33	21.1	39	25.4	39	25.1		
11			28	17.8	33	21.3	33	21.3	NA	NA	31	20.0	39	25.1	37	24.1		
12			26	17.1	34	22.3	31	20.3	NA	NA	29	18.6	35	22.4	38	24.9		
13			28	18.0	35	22.8	31	20.2	37	24.0	29	19.0	37	24.2	40	26.1		
14			28	17.8	34	21.8	32	20.9	35	22.9	28	18.4	39	25.0	40	26.0		
15			27	17.3	31	20.2	31	20.0	35	22.5	27	17.6	40	25.9	34	22.2		
16			29	18.8	30	19.4	33	21.4	34	22.2	28	18.4	38	24.8	35	22.4		
17			28	18.0	29	18.9	34	21.9	36	23.4	25	16.2	37	23.8	32	20.6		
IS			28	18.2	NA	NA	35	22.9	35	22.9	26	17.1	35	22.4	30	19.6		
19			27	17.5	NA	NA	34	21.9	35	22.6	29	18.5	37	23.7	34	21.9		
20			29	18.9	NA	NA	34	22.2	33	21.3	30	19.6	36	23.3	39	25.4		
21			29	18.8	NA	NA	35	22.4	35	22.9	27	17.6	40	26.1	35	22.4		
22			31	20.2	NA	NA	33	21.2	36	23.1	28	18.2	37	24.2	31	19.8		
23	27	17.3	32	20.6	NA	NA	31	20.2	37	24.0	29	18.6	38	24.4	33	21.3		
24	28	17.8	32	20.4	NA	NA	32	20.4	38	24.9	27	17.6	37	24.1	35	22.4		
25	27	17.7	32	20.4	NA	NA	32	20.9	37	23.9	27	17.3	36	23.2	32	20.4		
26	27	17.7	32	20.6	NA	NA	31	20.2	36	23.1	27	17.5	39	25.5	29	18.9		
27	29	18.7	32	20.7	NA	NA	33	21.1	36	23.5	28	17.9	40	25.9	28	18.0		
28	27	17.6	29	18.7	30	19.5	34	22.2	35	22.7	26	16.9	39	25.2	32	20.5		
29	28	18.2	27	17.4	32	20.9	35	22.6	35	22.5	26	16.8	NA	NA	33	21.3		
30	26	16.6	28	18.2	NA	NA	35	22.8	32	21.0	26	16.7	NA	NA	35	22.9		
31	27	17.3			NA	NA	36	23.0			27	17.5			29	18.9		
Min	26	16.6	26	16.7	29	18.9	31	20.0	29	19.0	25	16.2	27	17.3	28	18.0	29	18.9
Max	29	18.7	32	20.7	35	22.8	36	23.0	38	24.9	33	21.1	40	26.1	40	26.1	32	21.0

NA = Data not available.

Table 11. Kaskaskia River Estimated Flows (cfs) Upstream of the IPC Baldwin Power Plant Pumping Station, RM19.1,, May 1, 1994 - January 3, 1995.

Day	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Jan.*
1	39,740	3,098	4,626	591	403	401	120	1,329	2,308
2	43,101	2,979	4,532	547	407	415	120	1,909	1,964
3	41,639	2,979	4,626	570	401	407	120	NA	1,633
4	33,312	2,949	4,873	525	393	397	122	NA	
5	28,420	3,335	4,522	500	401	391	497	NA	
6	24,478	3,678	4,352	528	407	391	1,578	NA	
7	21,862	3,803	4,106	489	405	378	1,578	NA	
8	21,085	4,071	3,920	491	399	368	1,605	1,534	
9	19,566	4,314	3,895	482	391	399	987	1,840	
10	19,256	4,720	3,703	463	383	401	661	NA	
11	18,239	4,626	3,552	453	383	403	694	NA	
12	17,856	4,465	3,246	440	376	395	1,047	3,678	
13	18,239	4,324	2,979	436	374	405	850	3,987	
14	17,280	4,248	2,800	439	372	425	631	4,295	
15	16,295	4,314	2,680	484	360	430	518	4,692	
16	15,502	4,494	2,467	501	347	489	471	4,981	
17	14,712	4,607	2,307	471	347	360	433	5,195	
18	13,937	4,692	2,295	438	347	362	430	5,410	
19	12,643	4,598	2,295	426	347	376	433	NA	
20	11,622	4,560	2,100	438	347	366	385	5,548	
21	10,678	4,541	2,009	439	341	276	609	5,149	
22	9,374	4,390	1,996	436	337	207	1,506	4,739	
23	7,471	4,154	1,826	435	343	239	2,654	4,484	
24	6,070	4,418	1,702	426	352	232	1,757	4,248	
25	5,318	4,673	1,785	423	368	202	964	4,154	
26	4,827	4,579	1,546	411	401	155	758	4,106	
27	4,513	5,872	1,374	411	429	134	819	3,962	
28	4,248	6,004	1,244	401	411	126	915	NA	
29	3,987	5,502	1,023	405	409	120	1,073	3,453	
30	3,753	4,889	884	413	399	120	1,381	2,947	
31	3.483		788	415		120		2.645	
Min	3,483	2,976	788	401	337	120	120	1,329	1,633
Max	43,101	6,004	4,873	591	411	489	2,654	5,548	2,308

NA = Data not available.

Table 12. CORMIX Modeling Flow Scenarios for the Kaskaskia River Upstream of the IPC Baldwin Power Plant Pumping Station (RM19.1) and the Ash-pond Effluent (RM18.8)

Scenario	*Flow (cfs)*		*Conditions*		*River/low*
identification	*River*	*Effluent*	*Bounded*	*Unbounded*	*Duration (%)*
1,000/30	1000	30	x		66
1,000/25	"	25	x		"
1,000/20	"	20	x		"
1,000/15	"	15	x		"
500/25	500	25		x	77
500/20	"	20	x		"
500/15	"	15	x		"
500/10	"	10	x		"
350/20	350	20		x	82
350/15	"	15	x		"
350/10	"	10	x		"
350/05	"	5	x		"
250/12	250	12		x	86
250/10	"	10		x	"
250/07	"	7	x		"
250/05	"	5	x		"
125/10	125	10		x	88
125/07	"	7		x	"
125/05	"	5		x	"
125/03	"	3	x		"
82/06	82	6		x	99+
82/04	"	4		x	99+
82/02	"	2	x		99+

Table 13. CORMIX-Predicted Distances to Complete Vertical Mixing and Transects Where B Concentrations ≥ 1.0 mg/L Occupy 25 Percent of the Cross-sectional Area

	Distance (ft) to				
Scenario identification	*Complete vertical mixing*	*25% Cross-sectional area occupancy*	*Scenario from figure 9*	*Minimum effluent B (mg/L) to cause 25% areal occupancy*	*Percent effluent residual @ 25% areal occupancy*
1,000/30	912	5,830	b	18.1	5.52
1,000/25	867	6,011	"	21.1	4.74
1,000/20	810	6,414	"	27.2	3.68
1,000/15	505	6,601	"	43.4	2.30
500/25	1,234	2,154	"	10.8	9.29
500/20	1,134	3,592	"	14.0	7.14
500/15	1,007	4,921	"	21.8	4.58
500/10	912	5,837	"	38.2	2.62
350/20	1,267	1,715	"	6.1	16.10
350/15	1,121	2,210	"	12.0	8.33
350/10	957	4,709	"	21.8	4.50
350/05	421	5,238	"	41.2	2.42
250/12	984	862	c	9.1	10.21
250/10	961	2,314	b	12.0	8.33
250/07	650	5,823	b	18.1	5.53
250/05	551	6,407	b	27.1	3.68
125/10	1,020	672	c	6.1	16.40
125/07	1,013	951	c	10.4	9.61
125/05	1,007	1,007	d	16.0	6.25
125/03	894	4,046	b	24.3	4.12
82/06	1,177	417	c	7.2	13.85
82/04	990	830	c	11.3	8.85
82/02	584	6,257	b	21.3	4.70

Table 14. CORMIX-Predicted Effluent B values Yielding B values ≤ 1.0 mg/L at the Mouth of the Sparta Water Intake Cutoff Meander

Scenario identification	*Minimum effluent B(mg/L) causing B=1.0 mg/L @ meander*	*Percent of effluent B concentration causing B=1.0 mg/L @ meander*	*Scenario identification*	*Minimum effluent B(mg/L) causing B=1.0 mg/L @ meander*	*Percent of effluent B concentration causing B=1.0 mg/L @ meander*
1,000/30	6.90	14.5	250/12	*	*
1,000/25	5.52	18.1	250/10	*	*
1,000/20	4.63	21.6	250/07	7.04	14.2
1,000/15	3.80	26.3	250/05	5.01	19.9
500/25	10.51	9.5	125/10	*	*
500/20	8.56	11.7	125/07	*	*
500/15	7.08	14.1	125/05	*	*
500/10	4.65	21.5	125/03	5.00	20.0
350/20	11.47	8.7	82/06	*	*
350/15	8.43	11.9	82/04	*	*
350/10	5.35	18.7	82/02	4.25	23.5
350/05	3.64	275			

* Indicates that plume interacts with far bank upstream of meander.

Table 15. Linear (y = mx + b) Statistical Relationships and Correlations Developed between Boron, Dye, and Specific Conductance For Dye-Injcction Events

Variable X	*Variable y*	*Event*	*Number of data points*	*Correlation coefficient (r)*	*Coefficient ofvariation (r^2)*	*m*	*b*	*Standard error of estimate*
Dye	SC	1	40	0.9582	0.9181	1.112	0.056	0.006
		2	445	0.9621	0.9256	1.122	-0.009	0.032
		3	281	0.9823	0.9650	0.871	0.100	0.020
		1+2+3	766	0.9033	0.8159	0.989	0.368	0.049
Dye	Boron	1	4	0.8931	0.7976	0.791	0.037	0.095
		2	28	0.9293	0.8637	0.928	0.048	0.070
		3	25	0.9883	0.9768	0.967	0.099	0.012
		1+2+3	57	0.9126	0.8329	0.914	0.072	0.059
SC	Boron	1	4	0.9612	0.9239	0.743	0.028	0.028
		2	28	0.9742	0.9491	0.890	0.043	0.043
		3	25	0.9247	0.8552	0.749	0.062	0.031
		1+2+3	57	0.9641	0.9294	0.867	0.040	0.038

Table 16. Cross-sectional Area Percentages and Boron Concentrations

Transect	*Isopleth (% effluent)*	*% of area*	*Average B concentration (mg/L) in % of area*	*Σ % of area*	*Average B concentration (mg/L) in ∑% of area*
-3+10	25.0-28.0	4.4	2.61	4.4	2.61
	22.5-25.0	6.3	2.35	10.7	2.46
	20.0-22.5	2.6	2.10	13.3	2.39
	17.5-20.0	3.0	1.86	16.3	2.29
	15.0-17.5	2.7	1.61	19.0	2.19
	12.5-15.0	2.9	1.36	21.9	2.08
	10.0-12.5	8.8	1.11	30.7	1.81
	7.5-10.0	13.0	0.87	43.7	1.53
	5.0-7.5	26.1	0.62	69.8	1.19
	2.5-5.0	23.6	0.37	93.4	0.98
	0.0-2.5	6.6	0.24	100.0	0.93
-0+19	95-100	0.3	9.65	0.3	9.65
	85-95	0.5	8.91	0.8	9.19
	75-85	0.8	7.92	1.6	8.55
	65-75	1.4	6.93	3.0	7.80
	55-65	1.3	5.94	4.3	7.23
	45-55	1.7	4.95	6.0	6.29
	35-45	5.7	3.96	11.7	5.31
	30-35	16.6	3.22	28.3	4.08
	25-30	8.4	2.72	36.7	3.70
	20-25	9.4	2.28	46.1	3.46
	15-20	42.7	1.73	88.8	2.63
	0-15	11.2	0.74	100.0	2.42
3+00	25.0-29.0	9.0	2.67	9.0	2.67
	22.5-25.0	9.6	2.35	18.6	2.51
	20.0-22.5	21.2	2.10	39.8	2.29
	17.5-20.0	23.7	1.86	63.5	2.13
	15.0-17.5	31.9	1.61	95.4	1.96
	12.5-15.0	4.6	1.37	100.0	1.93
6+00	28.0-30.0	3.7	2.86	3.7	2.86
	26.0-28.0	5.1	2.67	8.8	2.75
	24.0-26.0	4.4	2.48	13.2	2.66
	22.0-24.0	4.0	2.28	17.2	2.57
	20.0-22.0	3.5	2.08	20.7	2.49
	18.0-20.0	5.2	1.88	25.9	2.36
	17.0-18.0	16.4	1.73	42.3	2.12
	16.0-17.0	42.4	1.63	84.7	1.88
	15.0-16.0	13.8	1.54	98.5	1.83
	14.0-15.0	1.0	1.44	99.5	1.82
	13.0-14.0	0.4	1.34	99.9	1.82
	12.0-13.0	0.1	1.26	100.0	1.82

Table 16. Concluded.

Transect	Isopleth (% effluent)	% of area	Average B concentration (mg/L) in % of area	∑ % of area	Average B concentration (mg/L) in Z % of area
10+00	24.0-25.0	0.6	2.43	0.6	2.43
	22.0-24.0	2.9	2.28	3.5	2.30
	20.0-22.0	5.0	2.08	8.5	2.17
	19.0-20.0	4.1	1.93	12.6	2.09
	18.0-19.0	5.3	1.83	17.9	2.02
	17.0-18.0	8.7	1.73	26.6	1.92
	16.0-17.0	12.2	1.63	38.8	1.83
	15.0-16.0	21.2	1.54	60.0	1.73
	14.0-15.0	35.4	1.44	95.4	1.62
	13.0-14.0	4.5	1.34	99.9	1.61
	12.0-13.0	0.1	1.28	100.0	1.61
20+00	13.5-14.0	2.4	1.35	2.4	1.35
	13.0-13.5	13.9	1.31	16.3	1.32
	12.5-13.0	31.7	1.26	48.0	1.28
	12.0-12.5	33.0	1.21	81.0	1.25
	11.5-12.0	10.9	1.16	91.9	1.24
	11.0-11.5	6.4	1.11	98.3	1.23
	10.0-11.0	1.7	1.07	100.0	1.23

Note: Effluent B = 9.9 mg/L; Q-River = 120 cfs; Q-effluent = 29 cfs.

Table 17. Comparison of Effluent Residual Percentages at Two Stations at Two Different Times on October 15, 1994

Station	Distance (ft)	Depth (ft)	Military Time	SC (mS/cm)	Residual* SC (mS/cm)	Residual* Percentage
-4+10	42	0	9:55	579	32	7.6
		0	11:15	729	182	43.1
		10	9:55	575	28	6.6
		10	11:15	592	45	10.7
1+00	51	0	9:30	644	97	23.0
		0	12:05	629	82	19.4
		14	9:30	747	200	19.4
		14	12:05	612	65	15.4

* Note: River background SC = 547 mS/cm; Effluent background SC = 969 mS/cm.

Table 18. River Flow at Baldwin Upstream of IPC Pumping Station (RM19.1) and Fractional Downstream Movement of Plume Data Sets

Station	Date	River Flow, Ou (cfs)	Boron concentration (ms/L) Theoretical completely mixed	Weighted average using isopleths	Fraction, F, moving downstream
80+00	5/24/94	6,070	0.093	0.095	1.022
	6/08/94	4,071	0.114	0.117	1.028
	6/30/94	4,889	0.105	0.145	1.376
	7/07/94	4,106	0.129	0.148	1.146
	8/11/94	453	0.766	0.480	0.626
	9/28/94	411	0.889	0.677	0.762
42+00)	8/25/94	423	0.800	0.477	0.596
20+00	11/02/94	120	2.421	1.230	0.508
	11/29/94	1,073	0.406	0.316	0.778
8+00	8/10/94	463	0.776	0.545	0.702
5+00	9/14/94	372	0.988	0.627	0.635

Table 19. Kaskaskia River Annual Flow Durations at Baldwin Upstream of IPC Pumping Station (RM19.1) and at Evansville (RM12.2)

Flow duration (%)	Flow (cfs) RM19.1	RM12.2	Flow duration (%)	Flow (cfs) RM19.1	RM12.2
99	78	85	40	3,586	4,707
98	84	92	25	6,037	6,951
95	109	117	15	9,339	10,582
90	162	174	10	11,792	13,020
85	258	310	5	17,458	20,070
75	521	643	2	22,396	23,807
60	1,379	1,707	1	26,196	26,719
50	2,297	2,788			

Table 20. Kaskaskia River 7-day, Low Flows at Baldwin Upstream of IPC Pumping Station (RM19.1) and at Evansville (RM12.2)

Designation	Return Period (yrs)	Flow (cfs) Baldwin	Evansville
$Q_{7,2}$	2	199	238
$Q_{7,10}$	10	120	150
$Q_{7,25}$	25	107	141
$Q_{7,50}$	50	102	136

Table 21. Baldwin Ash-pond Flow Distribution, August 1 through October 31, 1994

Flow		*Cumulative*	*Flow*		*Cumulative*
cfs	*med*	*probability (%)*	*cfs*	*med*	*probability (%)*
25	16.4	2.3	33	27,7	58.0
26	17.1	6.8	34	22.3	69.3
27	17.7	13.6	35	23.0	81.8
28	18.4	21.6	36	23.6	92.0
29	19.0	28.4	37	24.3	96.6
30	19.7	31.8	38	24.9	98.9
31	20.3	36.4	39	25.6	99.9+
32	21.0	46.6			

Table 22. Statistical Summary of Risk Analyses at Kaskaskia River Locations at Baldwin at the mouth of the Sparta water intake meander (RM18.4) and at Evansville (RM12.2)

	Boron concentrations (me/L)						*Probability (%)*			
Flow	*Mean*		*Standard deviation*		*Maximum*		*Cd>1.00mg/L*		*Cd>1.23mg/L*	
Statistic	*18.4*	*12.2*	*18.4*	*12.2*	*18.4*	*12.2*	*18.4*	*12.2*	*18.4*	*12.2*
					a. Total Downstream Plume Movement					
$Q_{1,A}$	0.29	0.24	0.40	0.41	2.40	2.20	8.2	*1A*	5.4	5.1
Q_7	1.26	0.91	0.22	0.26	2.77	1.92	60.5	26.6	39.1	13.3
$Q_{7,2}$	0.95	0.80	0.16	0.13	1.46	1.22	37.0	7.3	4.5	<0.01
$Q_{7,10}$	1.63	1.25	0.27	0.21	2.47	1.91	99.1	88.6	93.3	53.8
$Q_{7,25}$	1.74	1.33	0.29	0.22	2.81	2.03	99.6	93.3	96.5	67.7
$Q_{7,50}$	1.84	1.38	0.30	0.23	2.77	2.11	99.8	95.3	97.8	74.6
					b. Partial Downstream Plume Movement					
$Q_{1,A}$	0.21	0.17	0.22	0.19	1.25	1.14	0.30	0.26	<0.01	<0.01
Q_7	0.67	0.57	0.16	0.12	1.27	1.09	3.61	0.31	0.03	<0.01
$Q_{7,2}$	0.59	0.53	0.10	0.09	0.94	0.84	<0.01	<0.01	<0.01	<0.01
$Q_{7,10}$	0.79	0.69	0.13	0.12	1.23	1.08	5.89	0.41	<0.01	<0.01
$Q_{7,25}$	0.81	0.71	0.14	0.12	1.27	1.12	8.95	0.88	0.10	<0.01
$Q_{7,50}$	0.83	0.72	0.14	0.12	1.29	1.14	11.43	1.45	0.24	<0.01

FIGURES

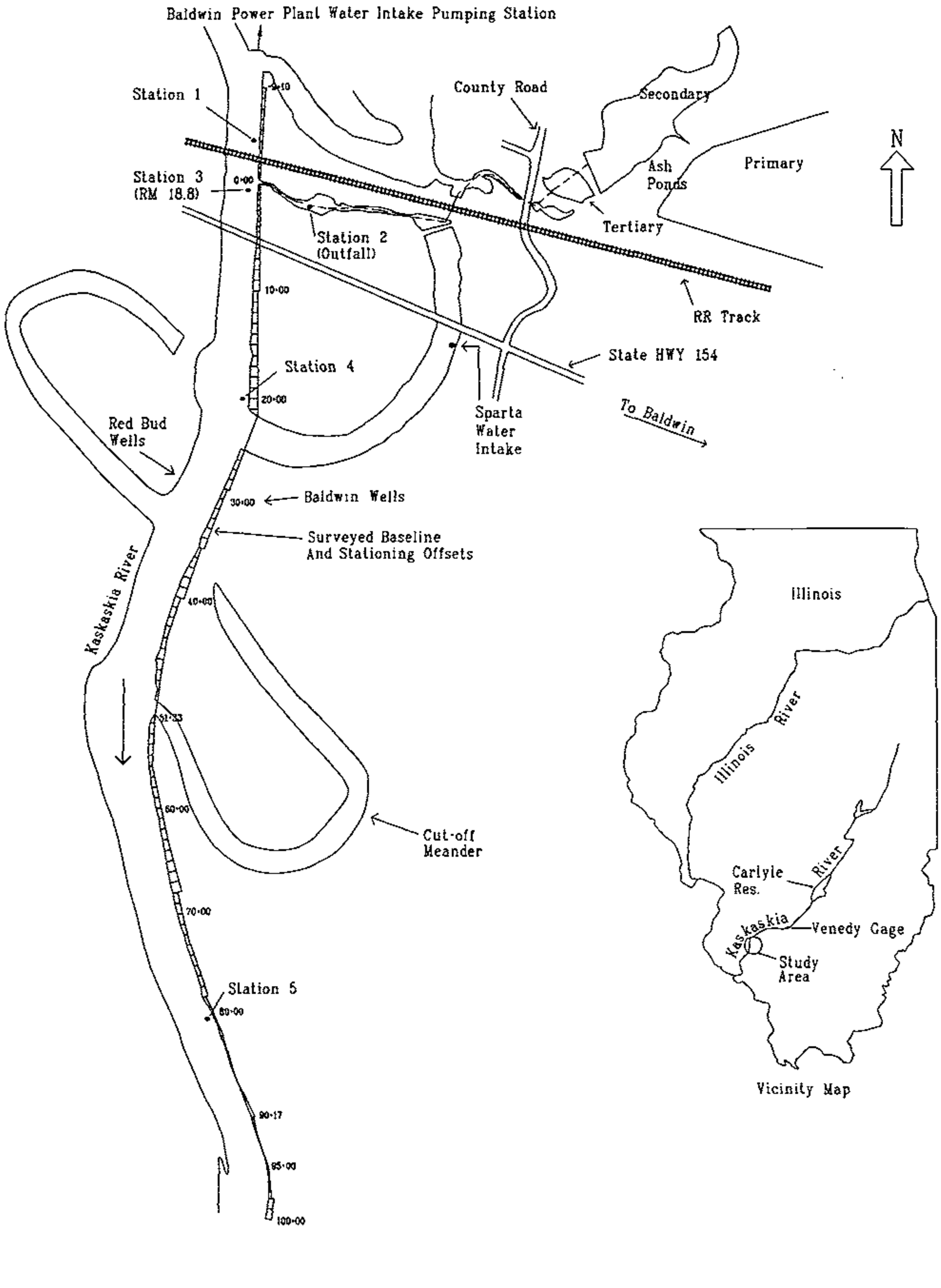


Figure 1. Map of Study Area and Vicinity

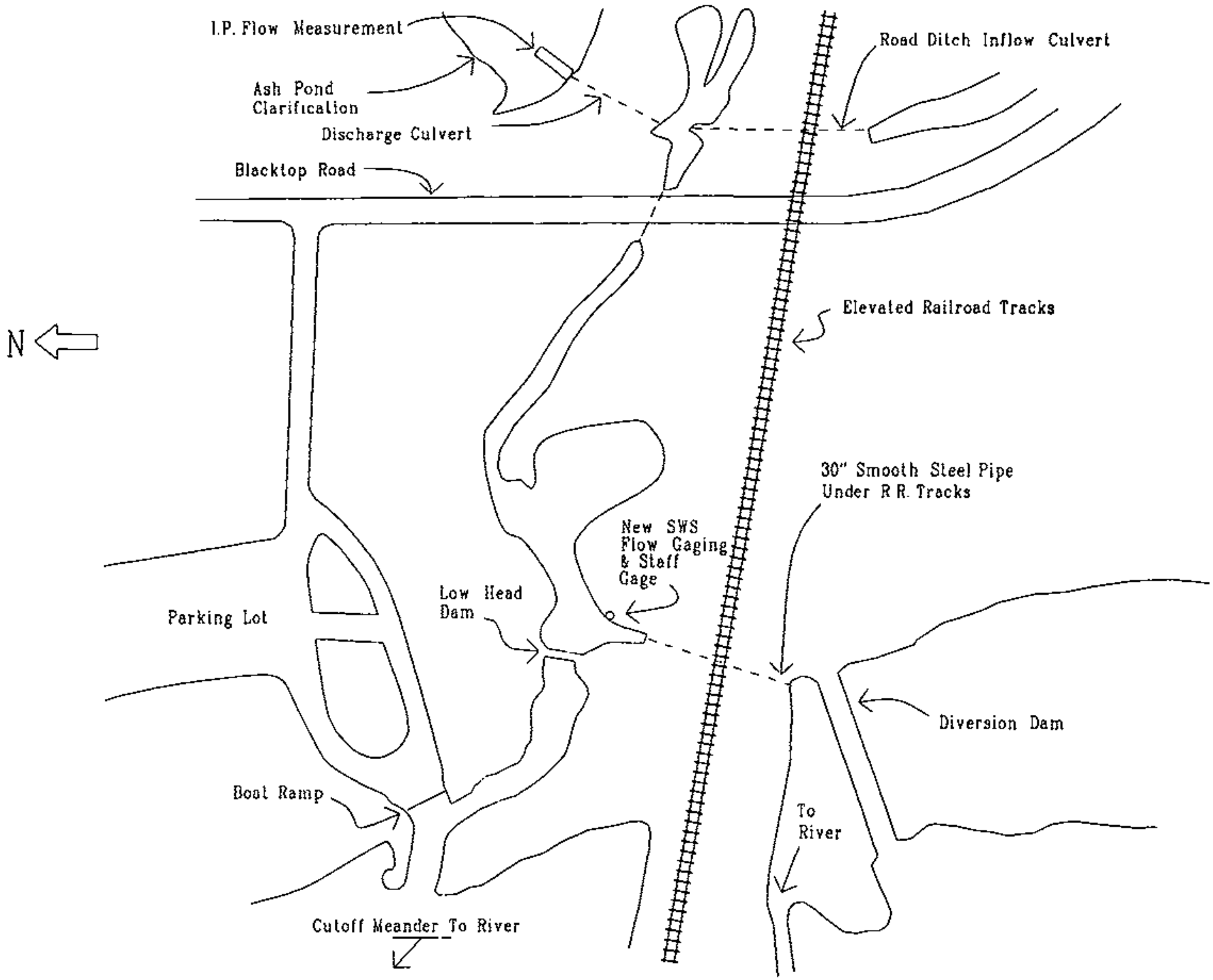


Figure 2. Areal View of Discharge Channel/Flow Measurement Station

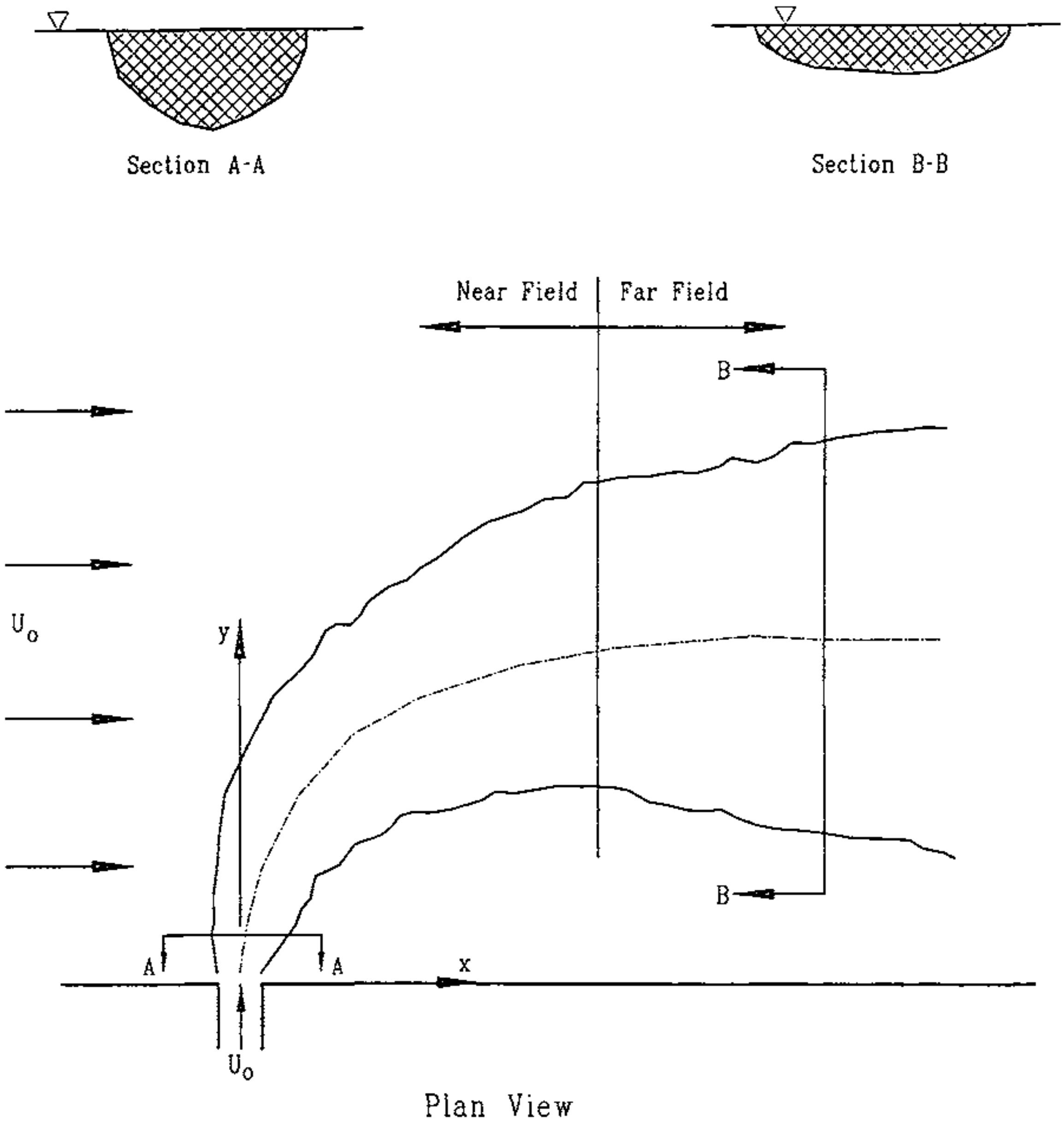


Figure 3. Near- and Far-Field Areas for a Typical Buoyant Surface Plume (A Neutrally Buoyant Plume Would be Thicker at Section B-B than at A-A)

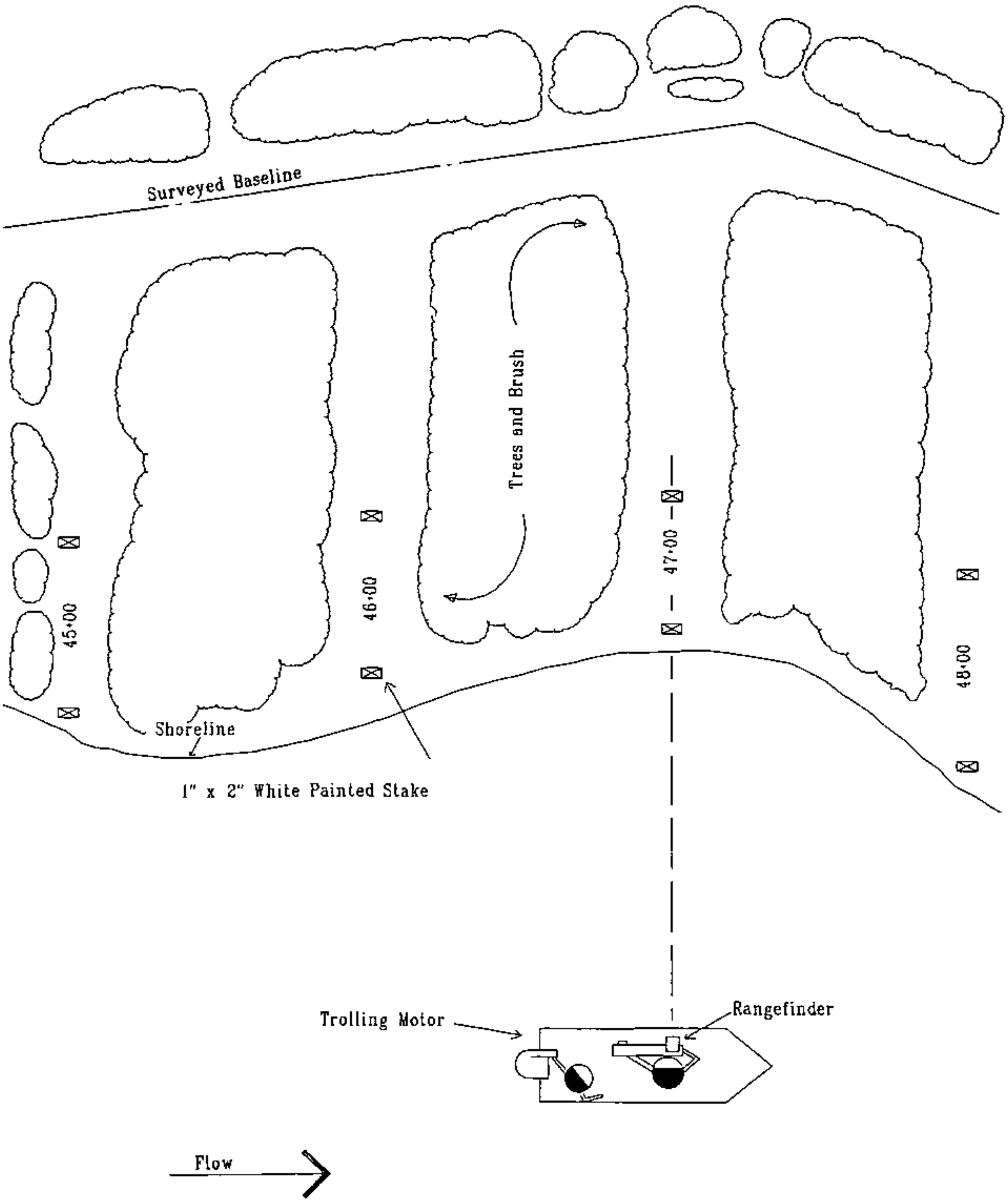


Figure 4. Schematic Outline Illustrating Sample Location Orientation

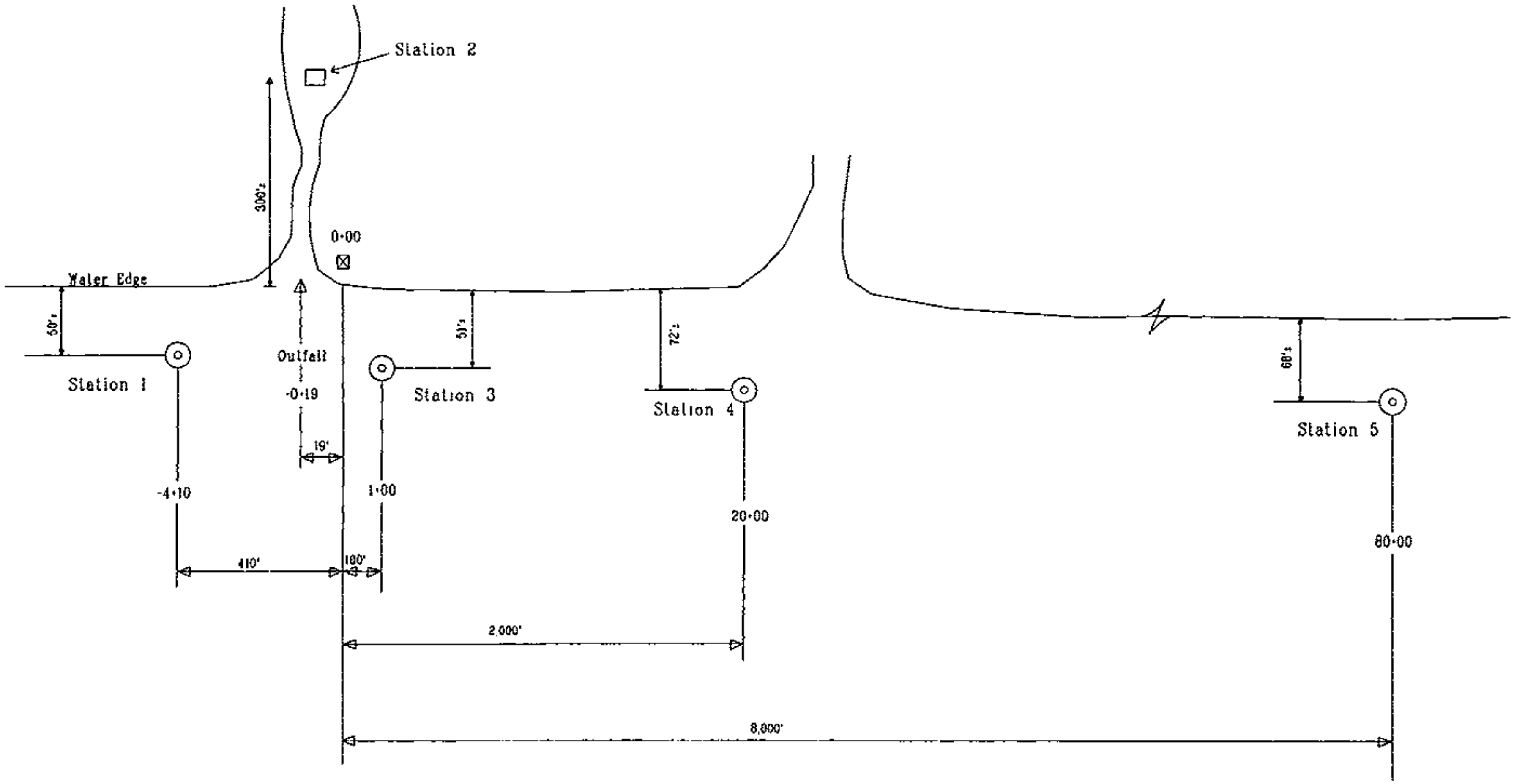


Figure 5. Location of Permanent Stations

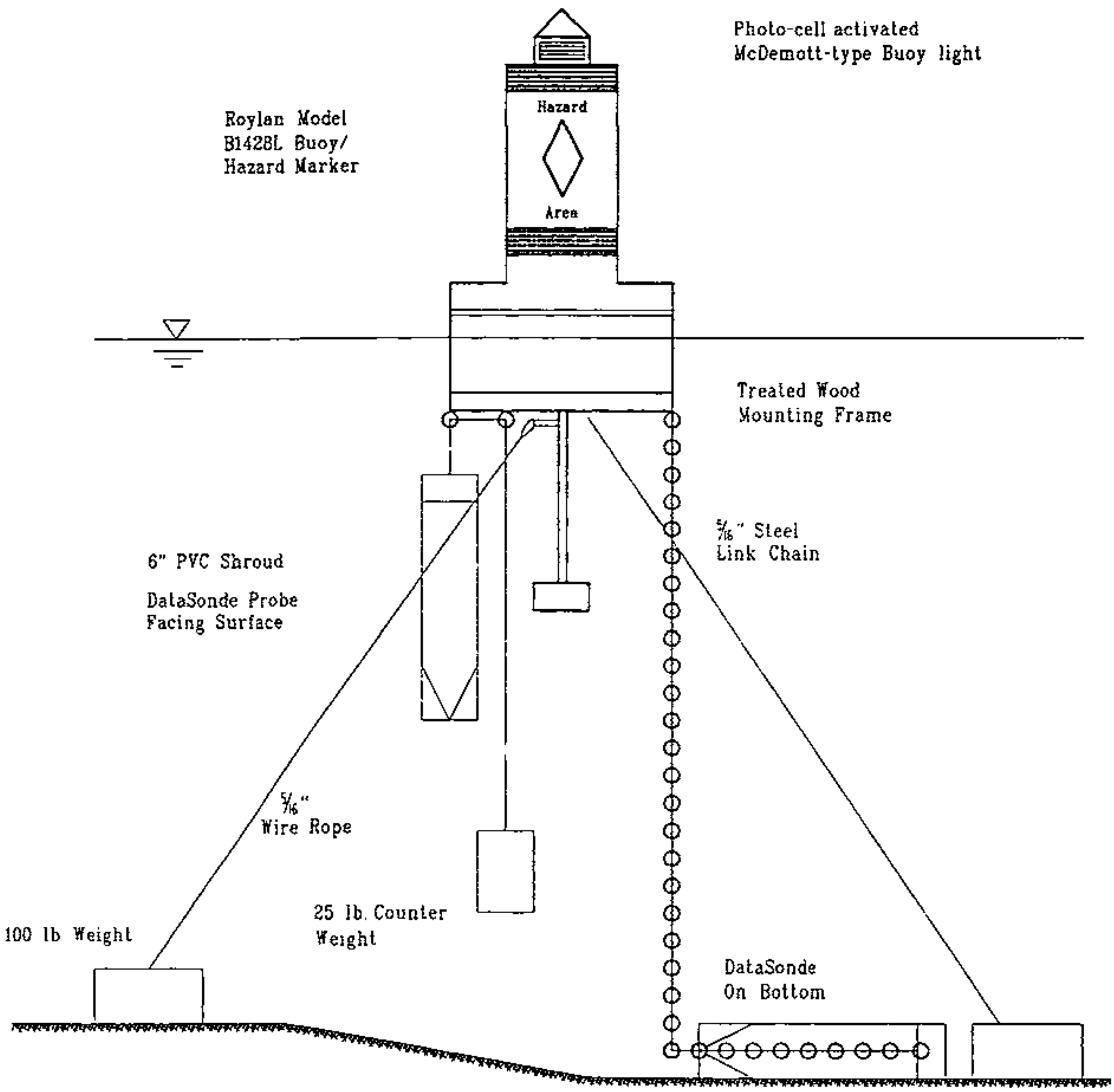


Figure 6. DataSonde Installation at Stations 1 and 5

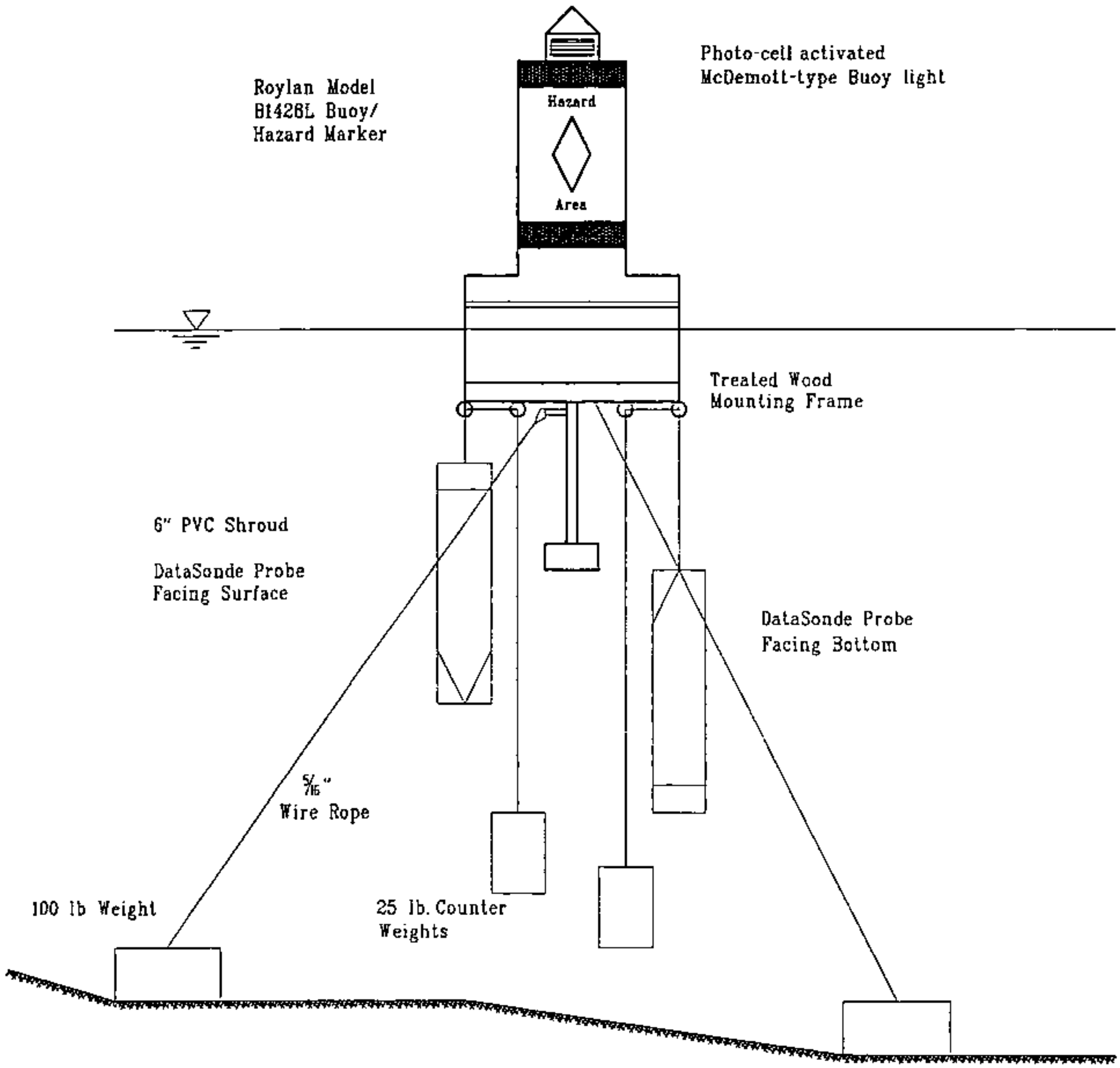


Figure 7. DataSonde Installation at Stations 3 and 4

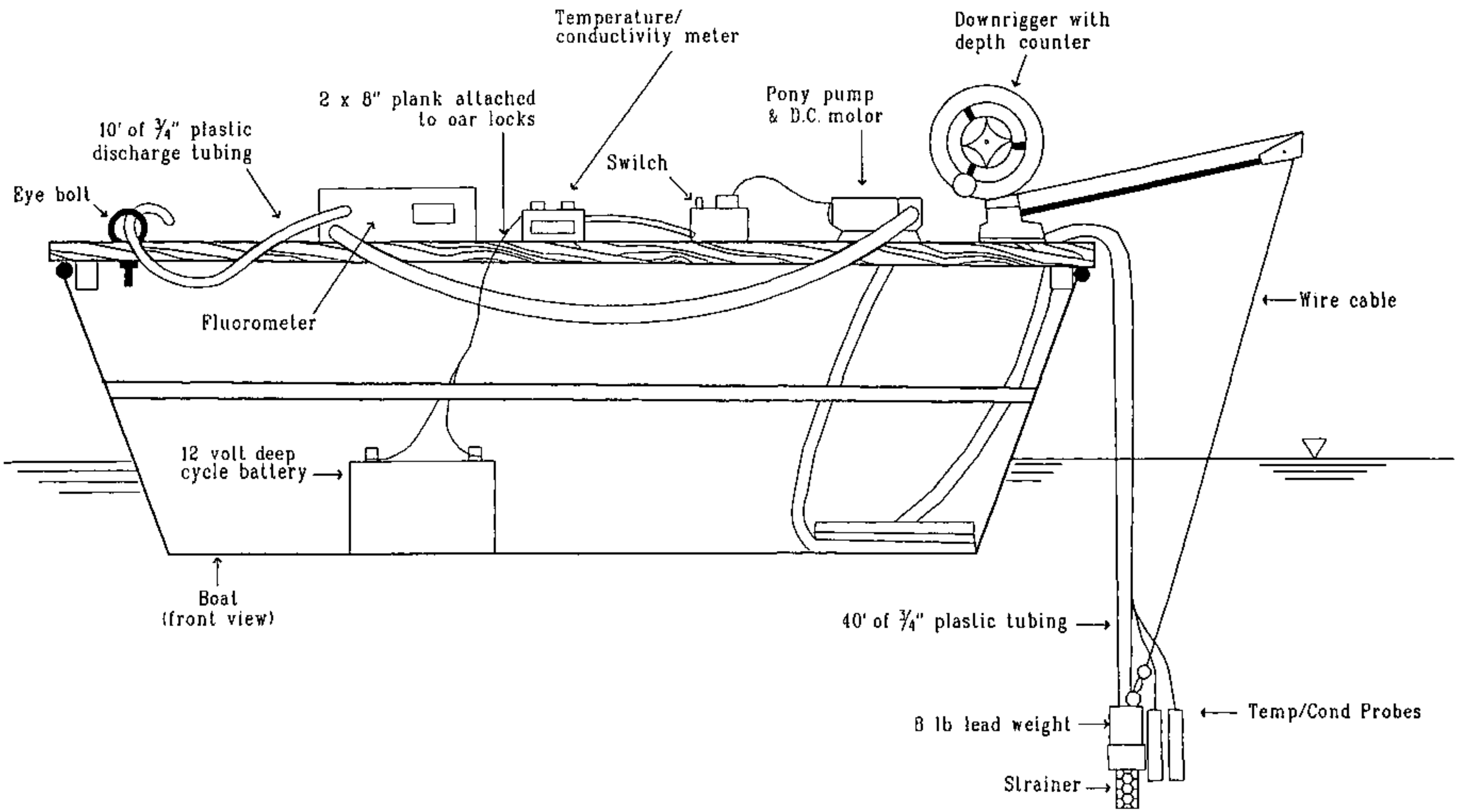


Figure 8. Schematic of Boat Equipped with Temperature/Conductivity and Dye Sampling Setup

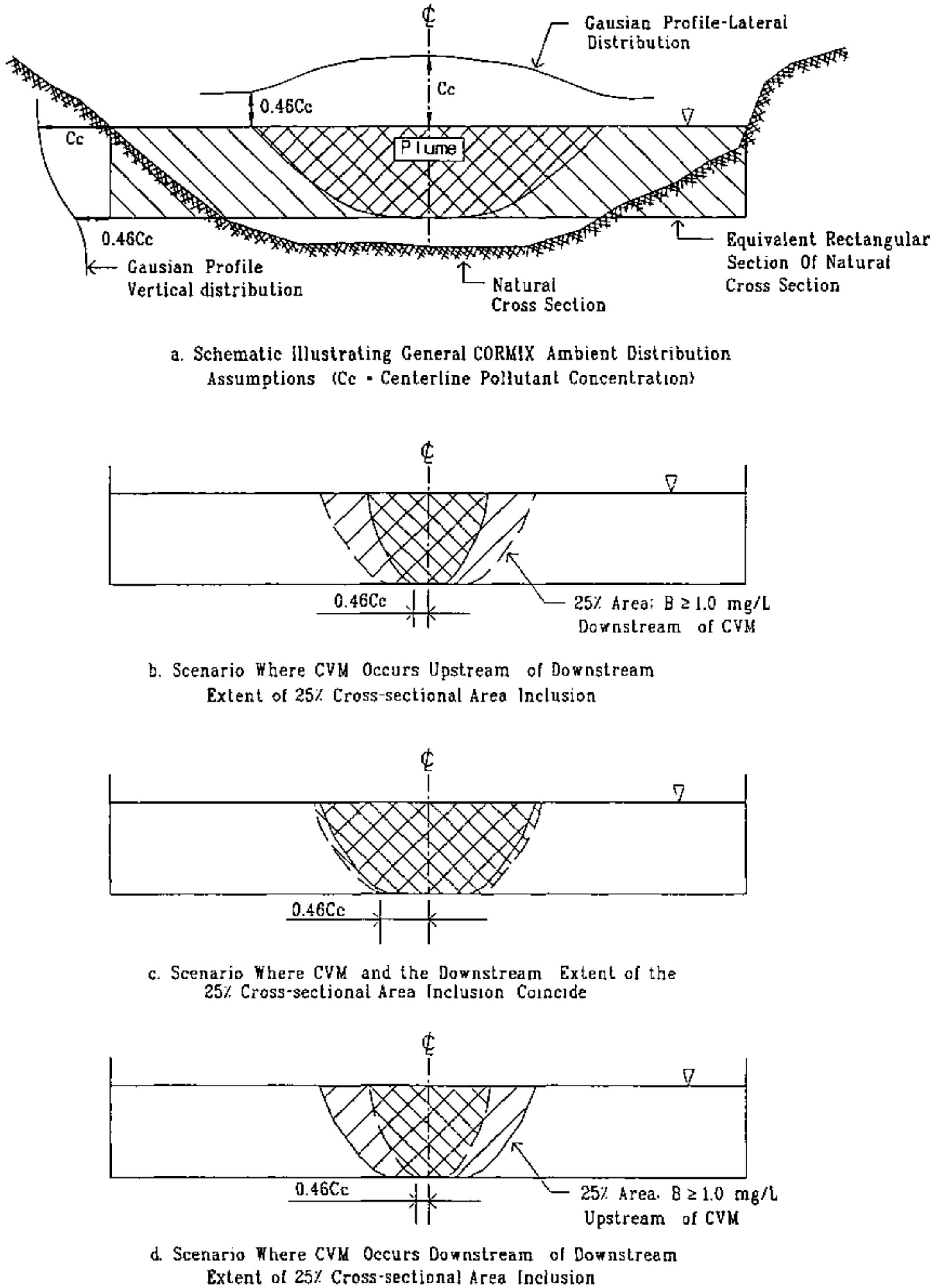


Figure 9. Schematics Illustrating (a) Generalized CORMIX Configuration and (b)-(d) Complete Vertical Mixing (CVM) and 25 Percent Cross-sectional Area Regulatory Requirement Relationships

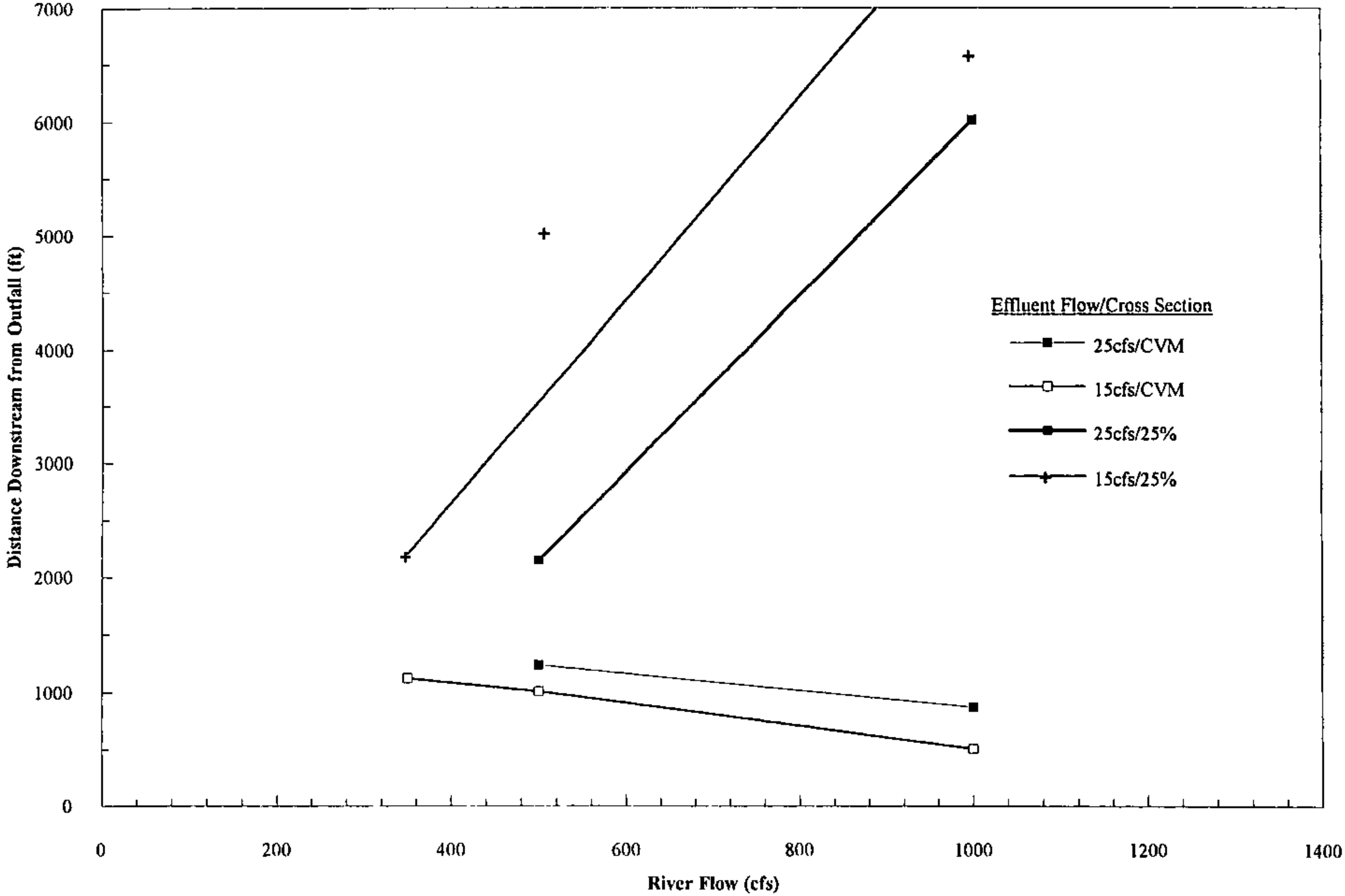


Figure 10. Distances Downstream to Complete Vertical Mixing (CVM) and the Point at which 25 Percent of the Cross Section Contains ≥ 1.0 mg/L Boron

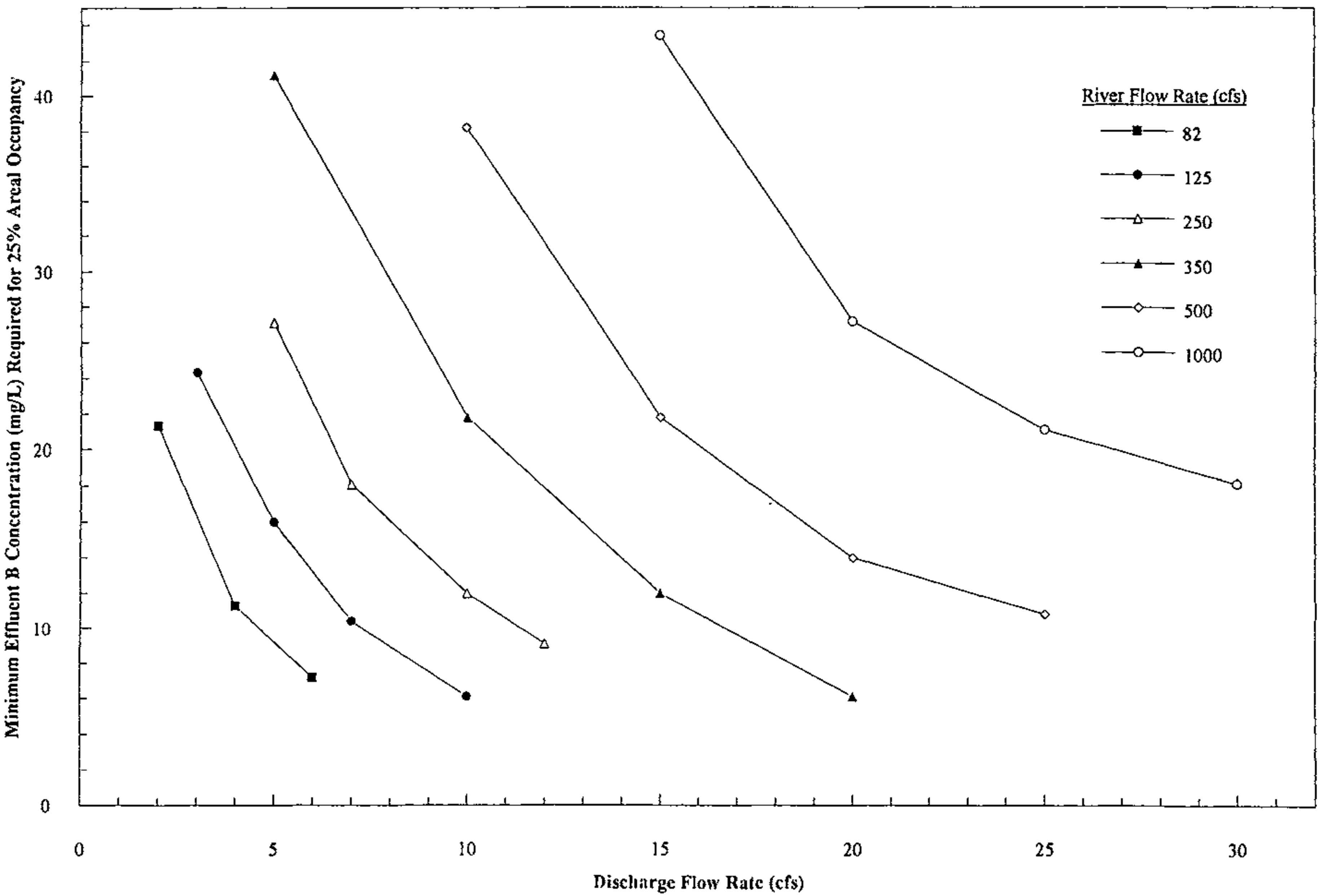


Figure 11. Minimum Effluent B Concentration Required To Produce 1.0 mg/L Boron in the River, as Determined by CORMTX Modeling

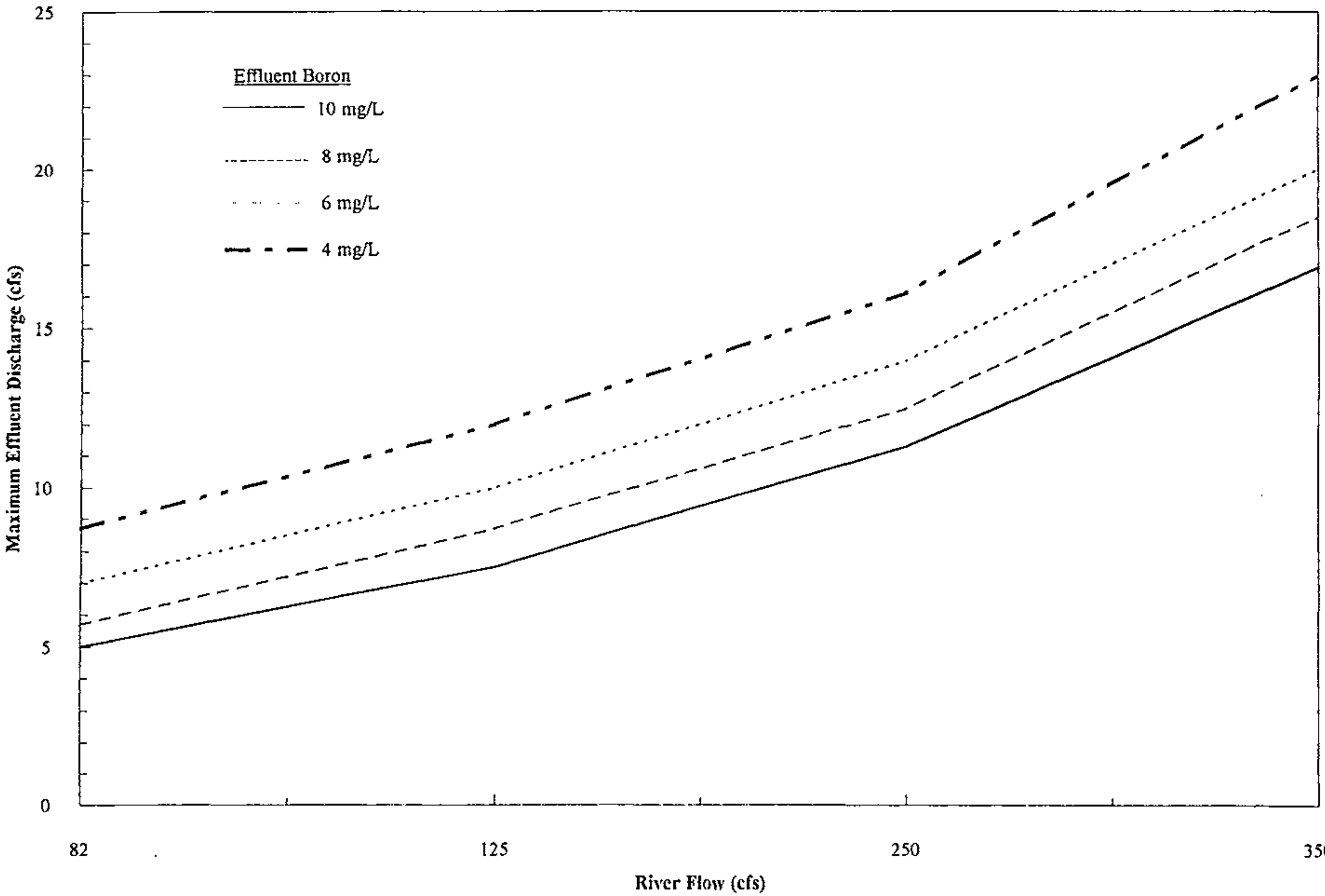


Figure 12. Effluent B Concentrations, in Combination with Effluent and River Flows, Required To Prevent Boron from Exceeding 1.0 mg/L in 25 Percent of the River Cross-sectional Area, as Determined by CORMIX Modeling

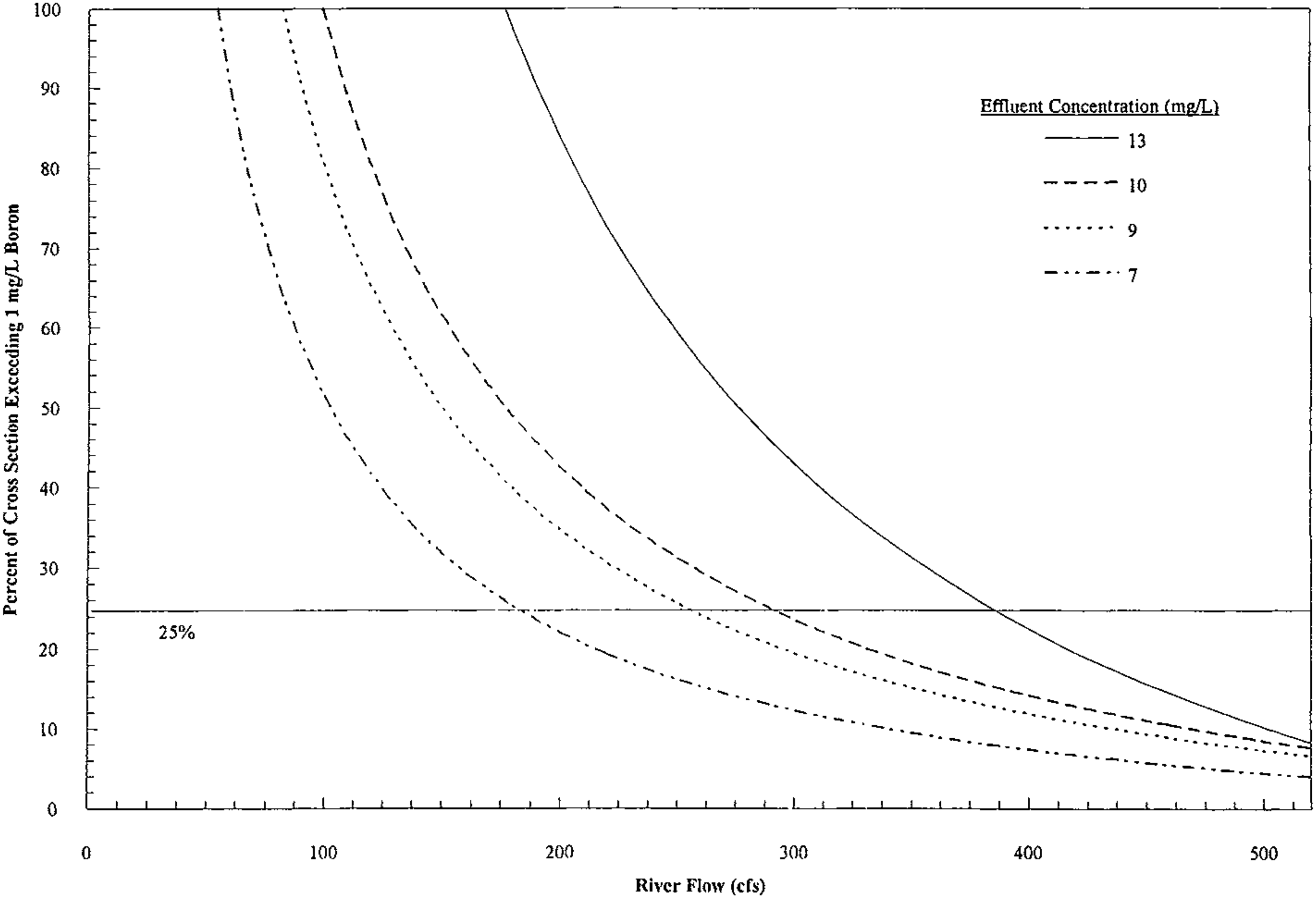


Figure 13. River Flow Versus Cross-sectional Area Exceeding 1.0 mg/L Boron for Various Effluent B Concentrations at Station -4+10

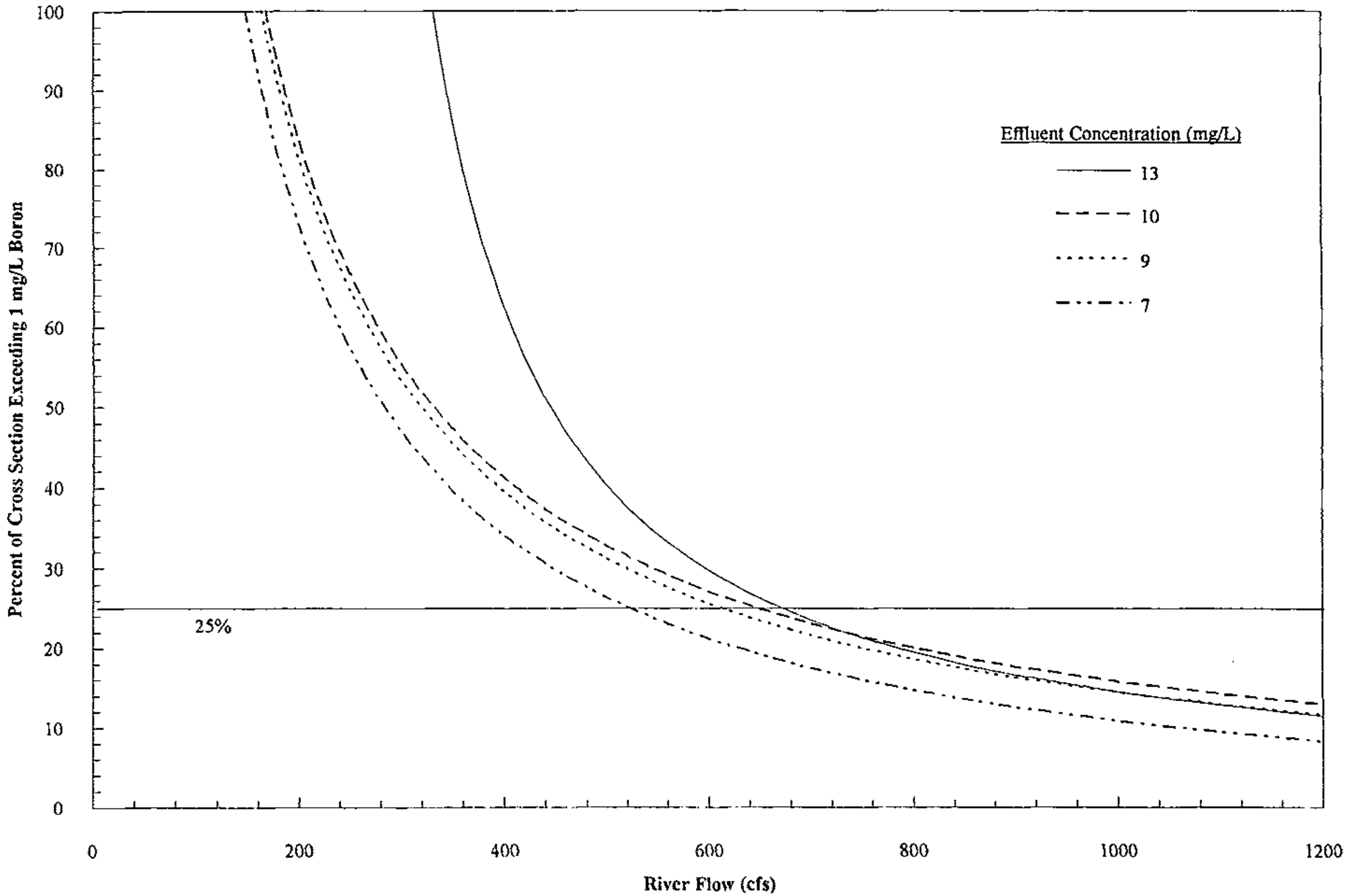


Figure 14. River Flow Versus Cross-sectional Area Exceeding 1.0 mg/L Boron for Various Effluent B Concentrations at Station -0+19 (Outfall)

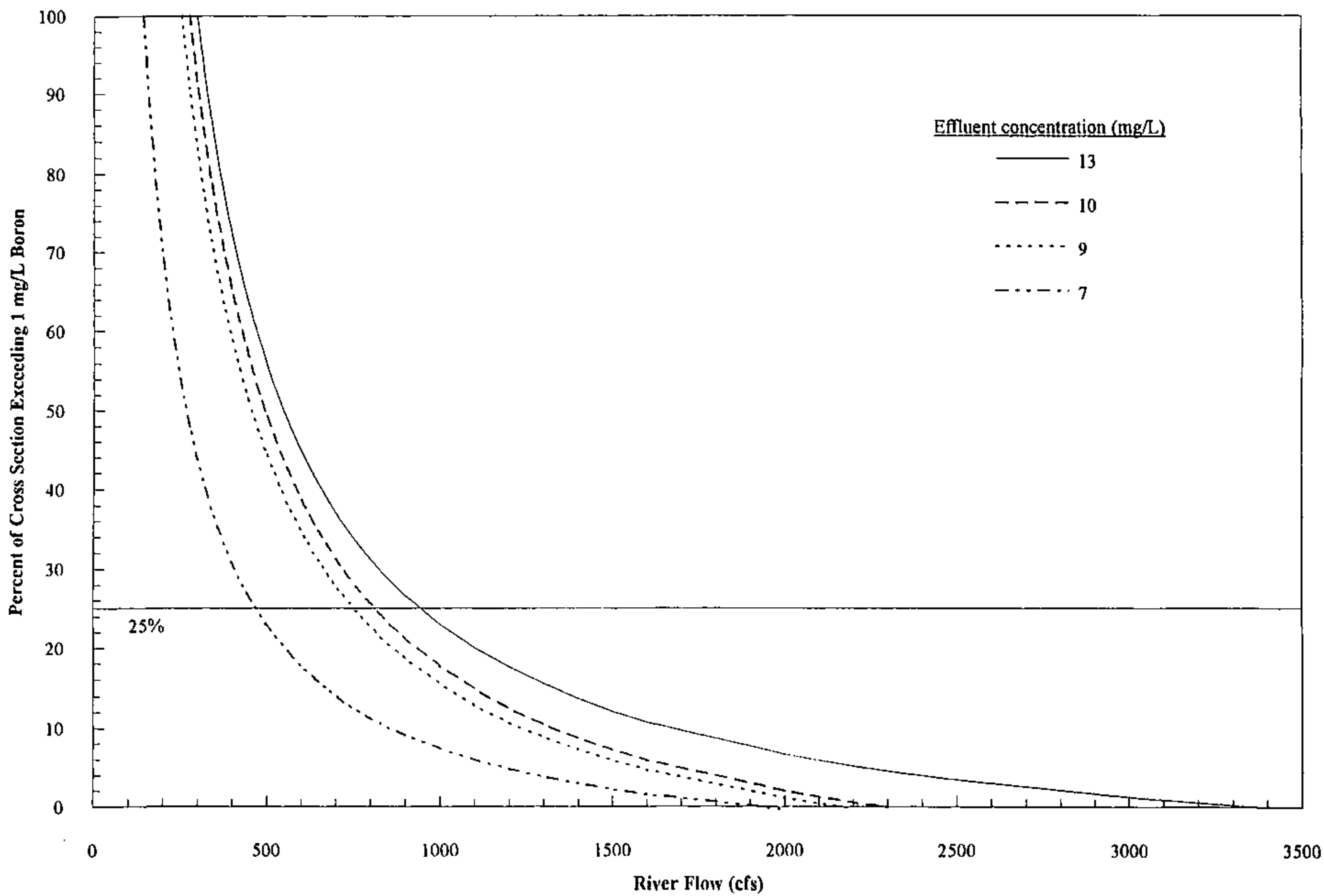


Figure 15. River Flow Versus Cross-sectional Area Exceeding 1.0 mg/L Boron for Various Effluent B Concentrations at Station 1+00

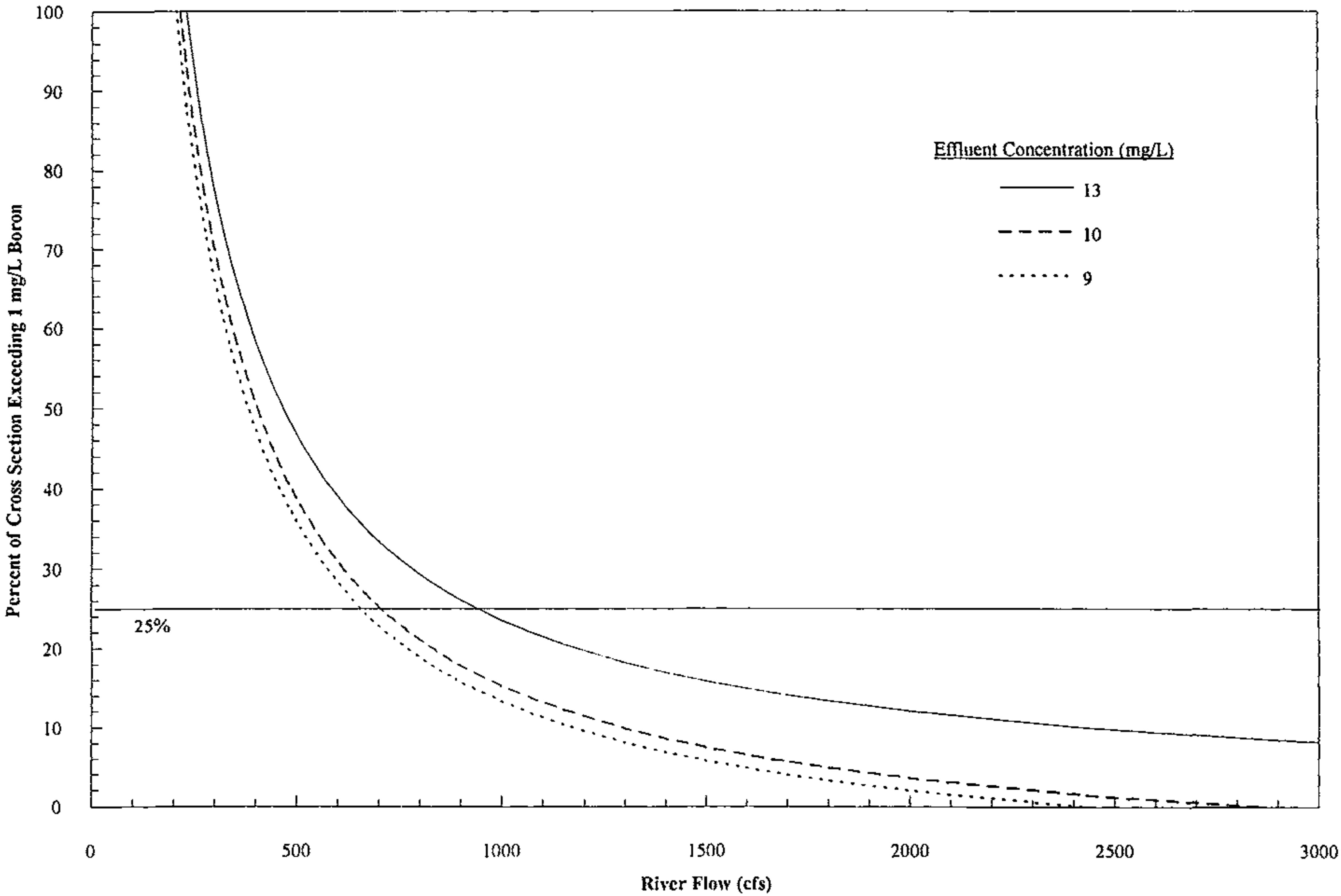


Figure 16. River Flow Versus Cross-sectional Area Exceeding 1.0 mg/L Boron for Various Effluent B Concentrations at Station 20+00

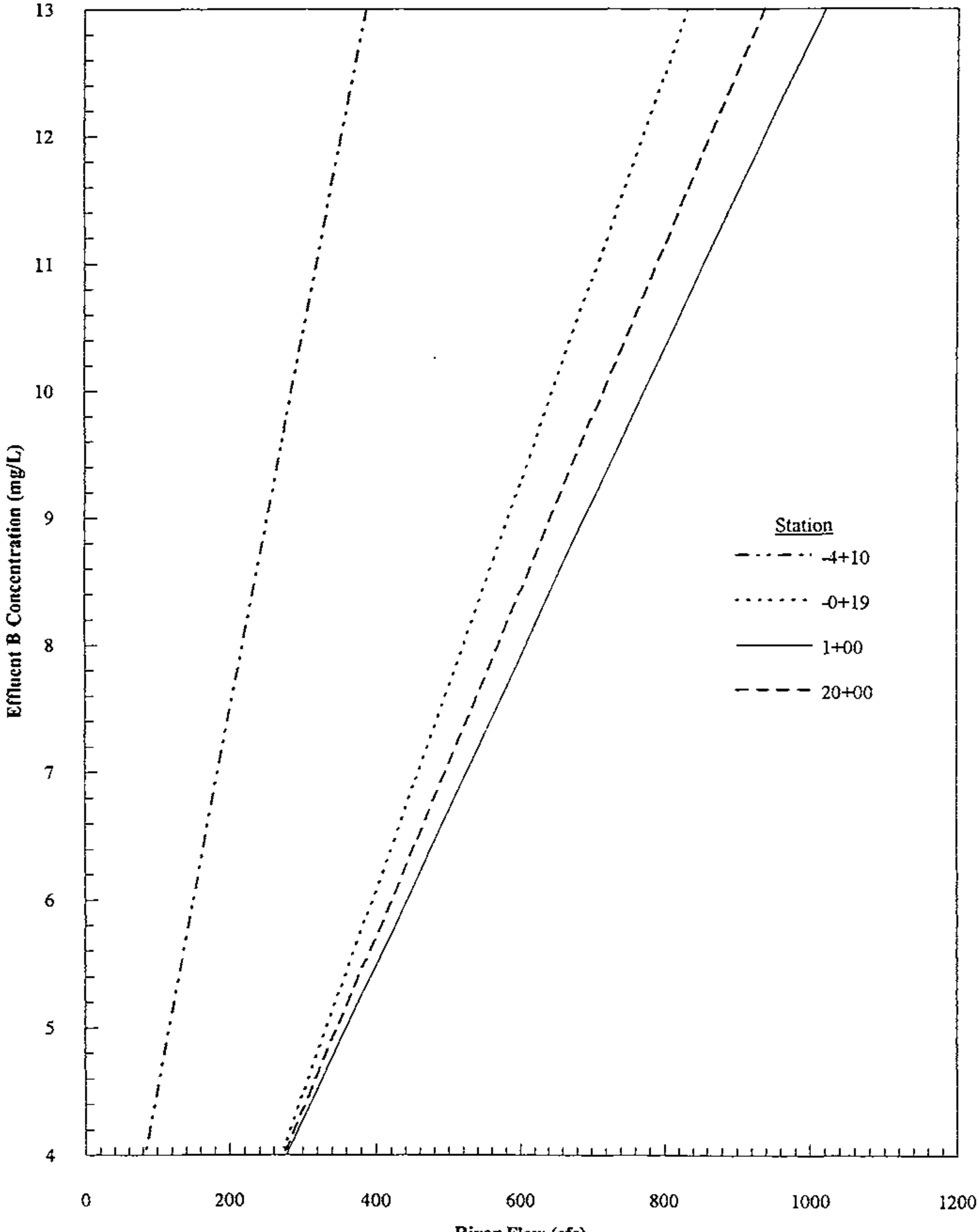


Figure 17. Effluent B Concentration and River Flow at Various Stations where 25 Percent of the Cross-sectional Area Exceeds 1.0 mg/L Boron

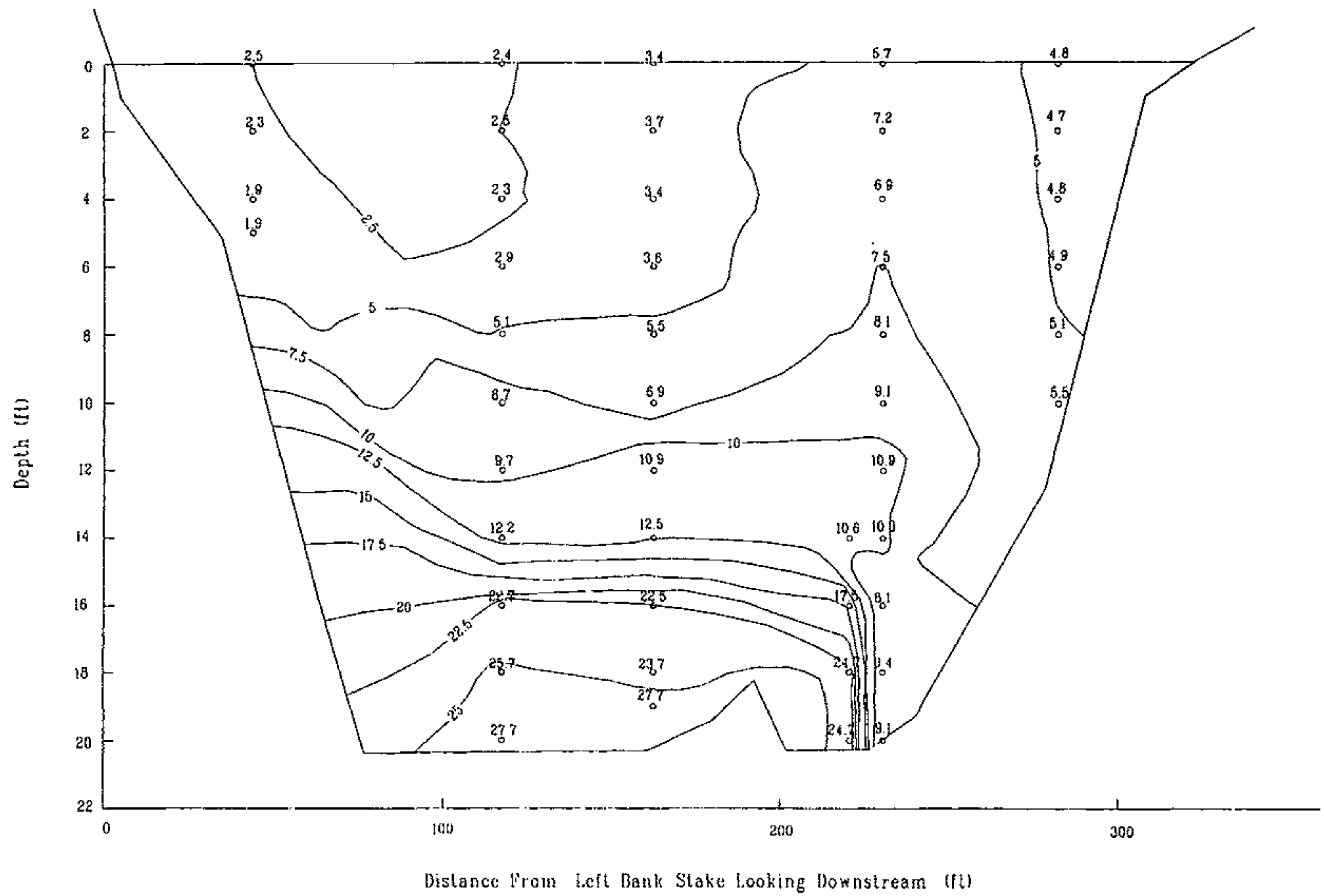


Figure 18. Cross-sectional Isopleth Percentages at Station -3+00, 11/02/94

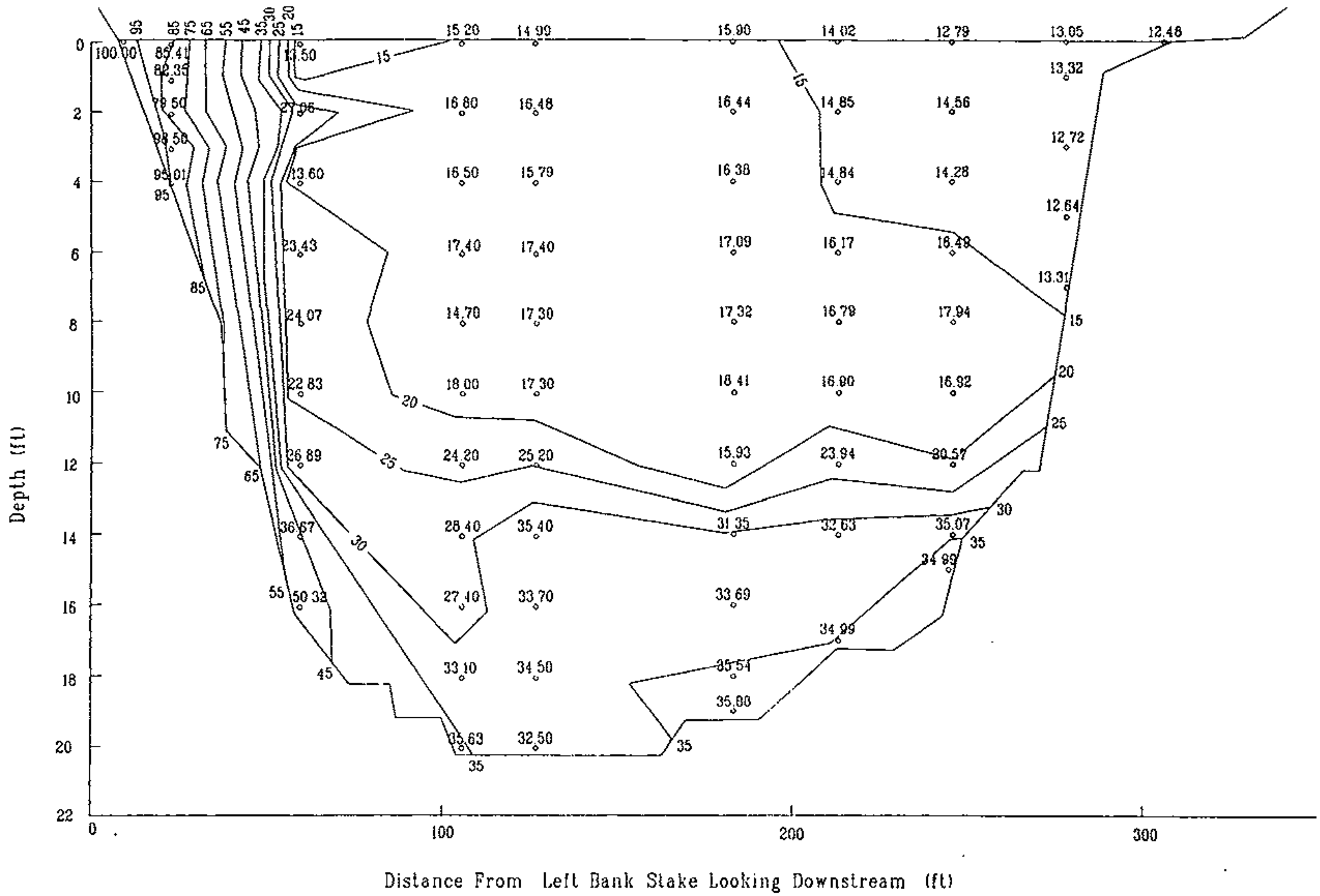


Figure 19. Cross-sectional Isoplcth Percentages at Station -0+19, 11/02/94

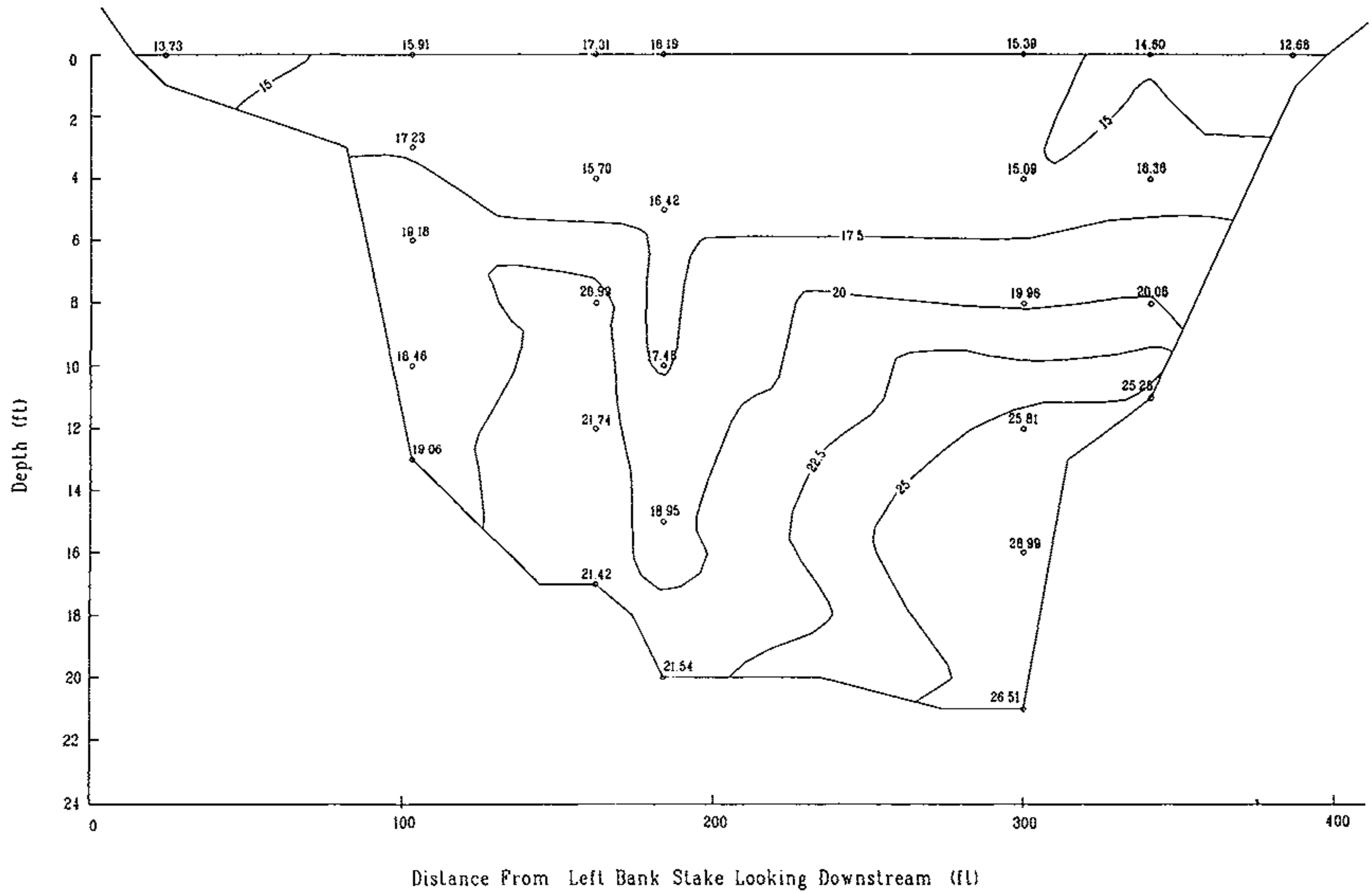


Figure 20. Cross-sectional Isoplcth Percentages at Station 3+00, 11/02/94

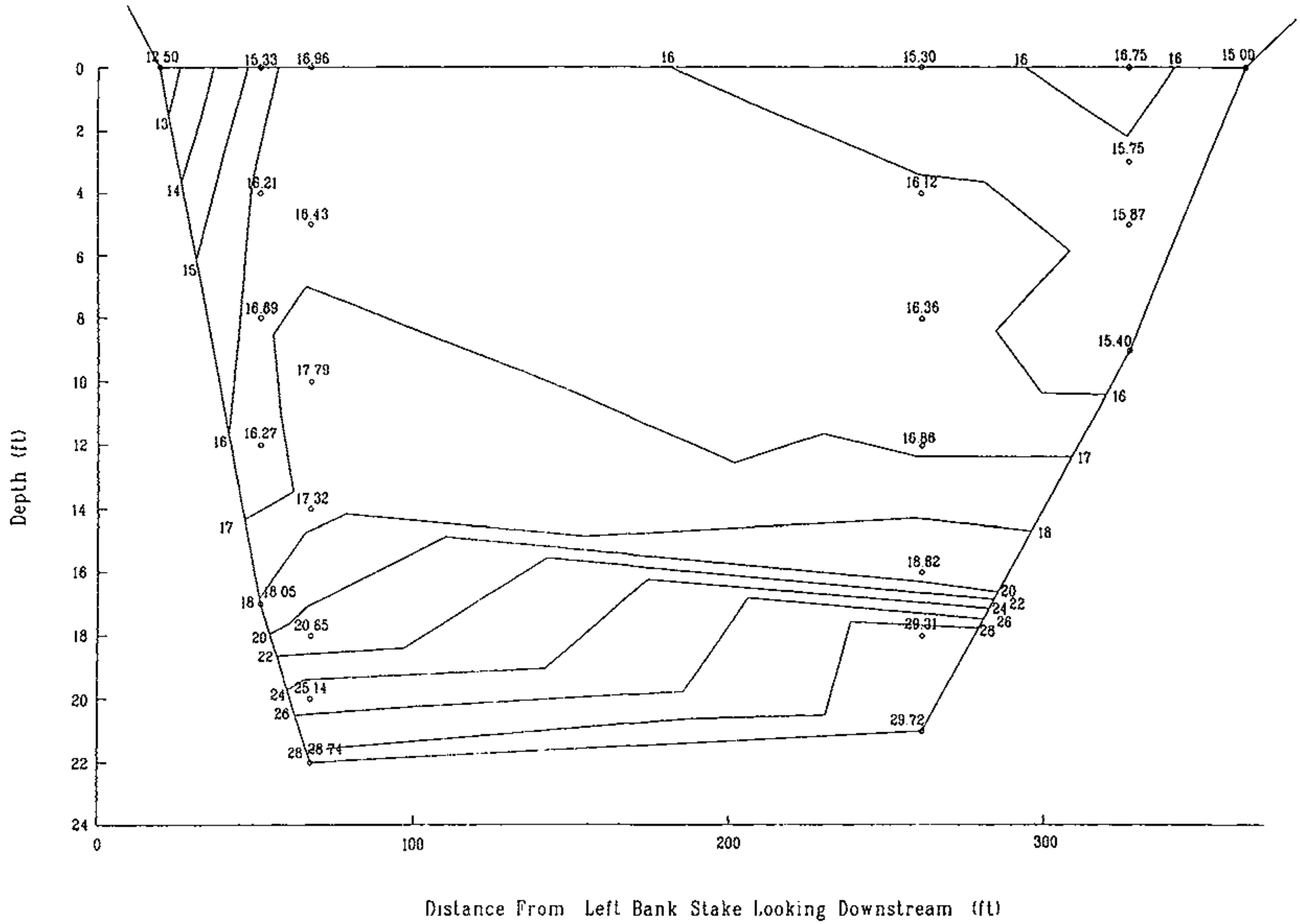


Figure 21. Cross-sectional Isopleth Percentages at Station 6+00, 11/02/94

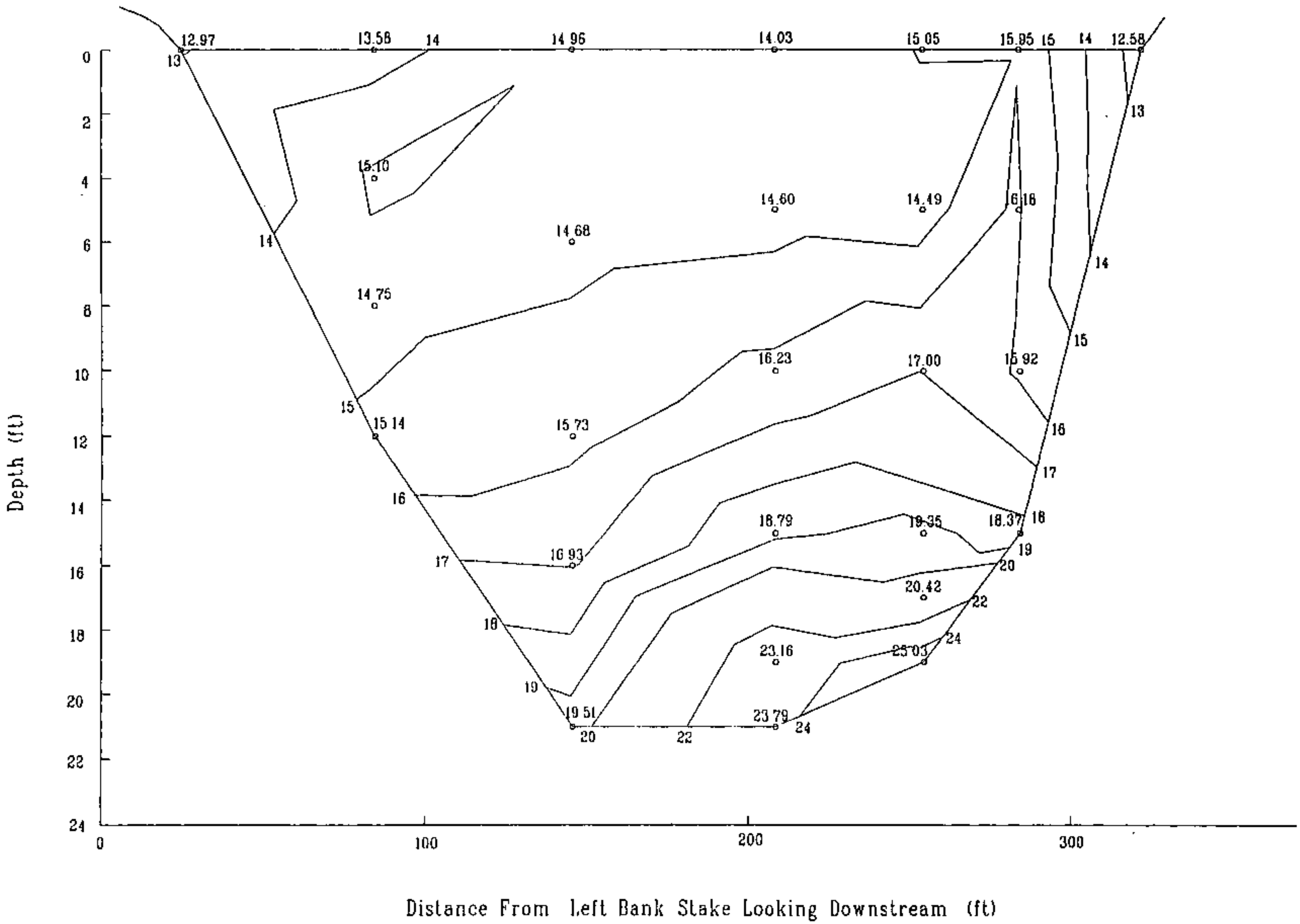


Figure 22. Cross-sectional Isopleth Percentages at Station 10+00, 11/02/94

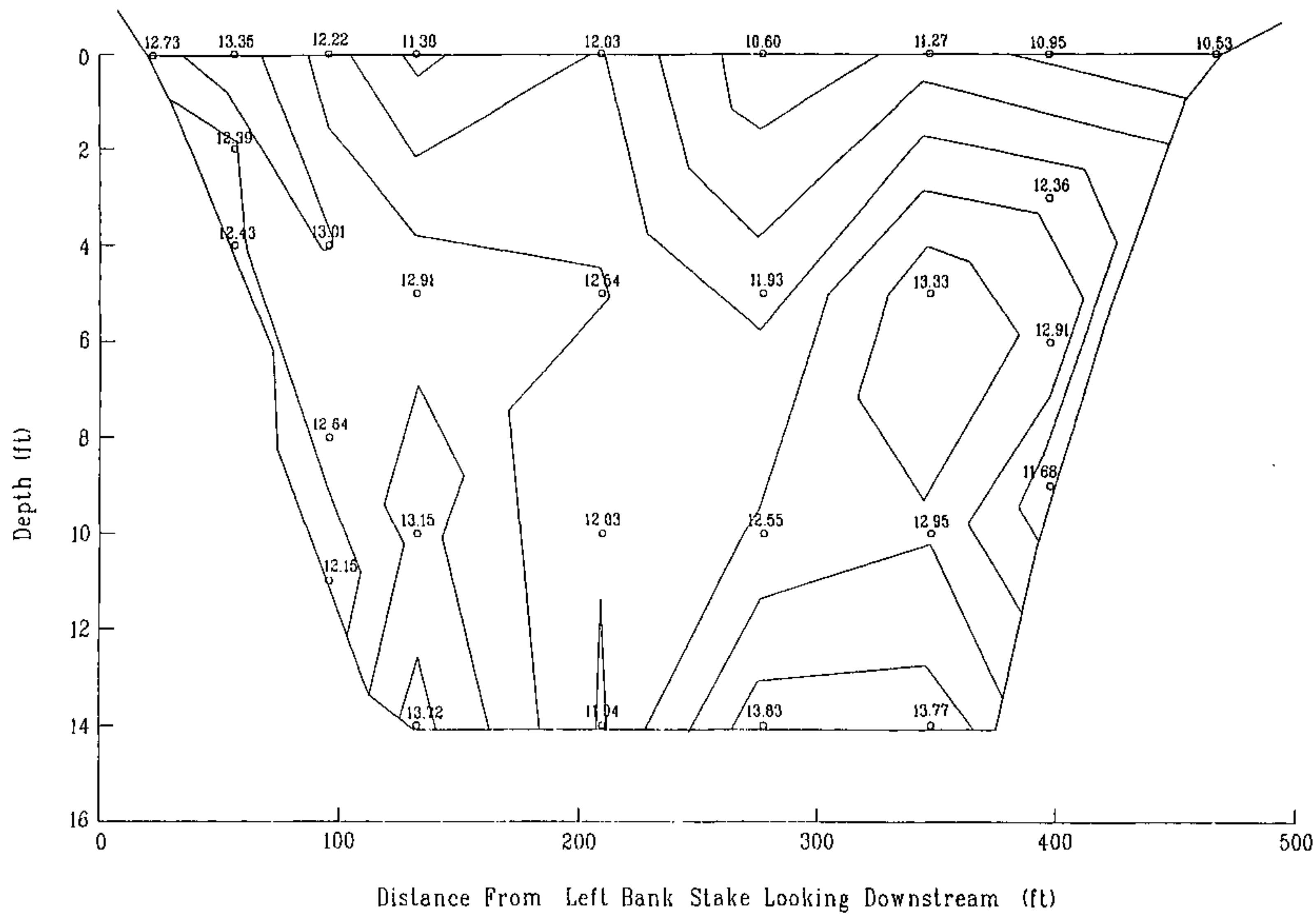


Figure 23. Cross-sectional Isopleth Percentages at Station 20+00, 11/02/94

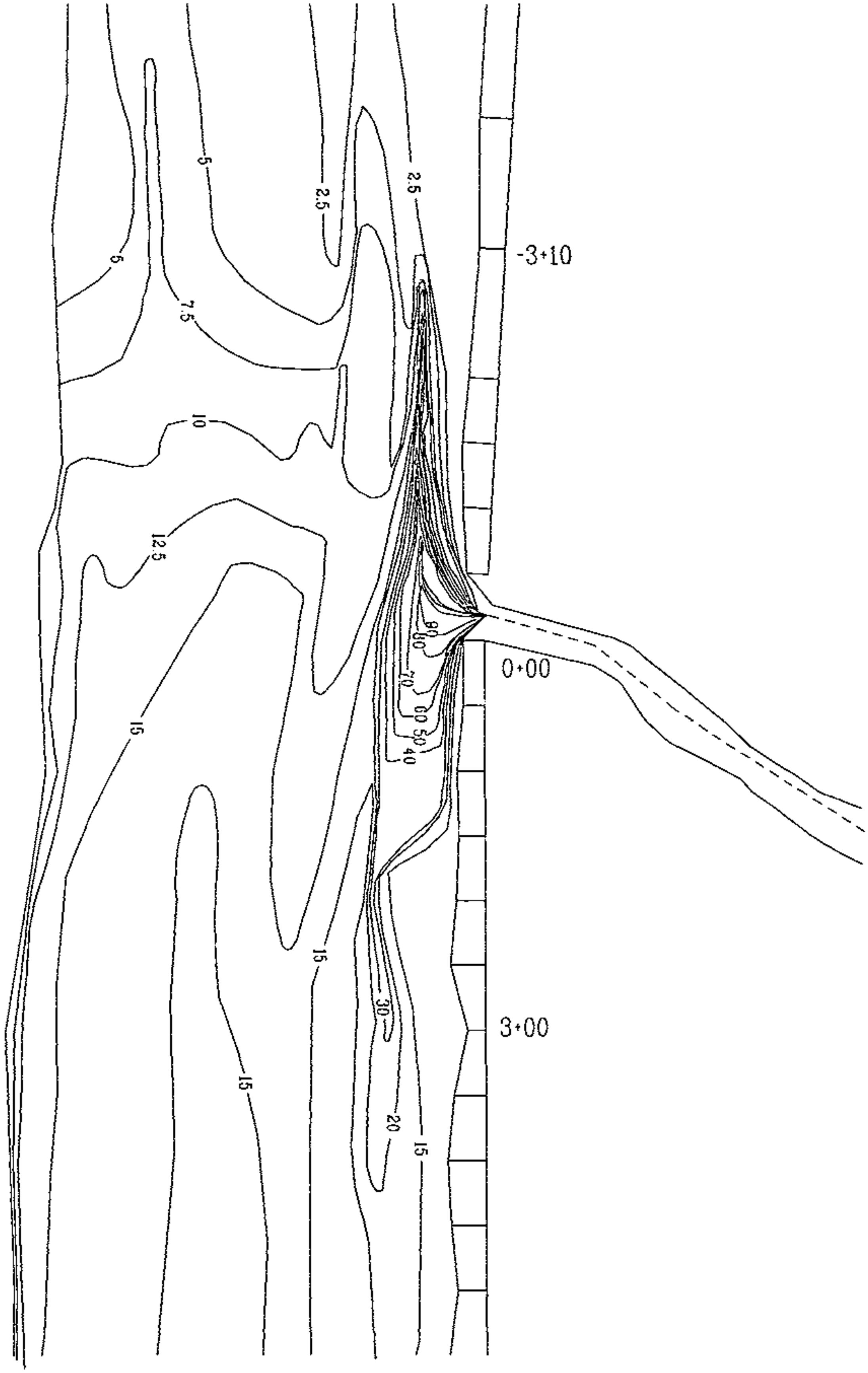


Figure 24. Detail of A real Isopleth Percentages at Outfall, 11/02/94

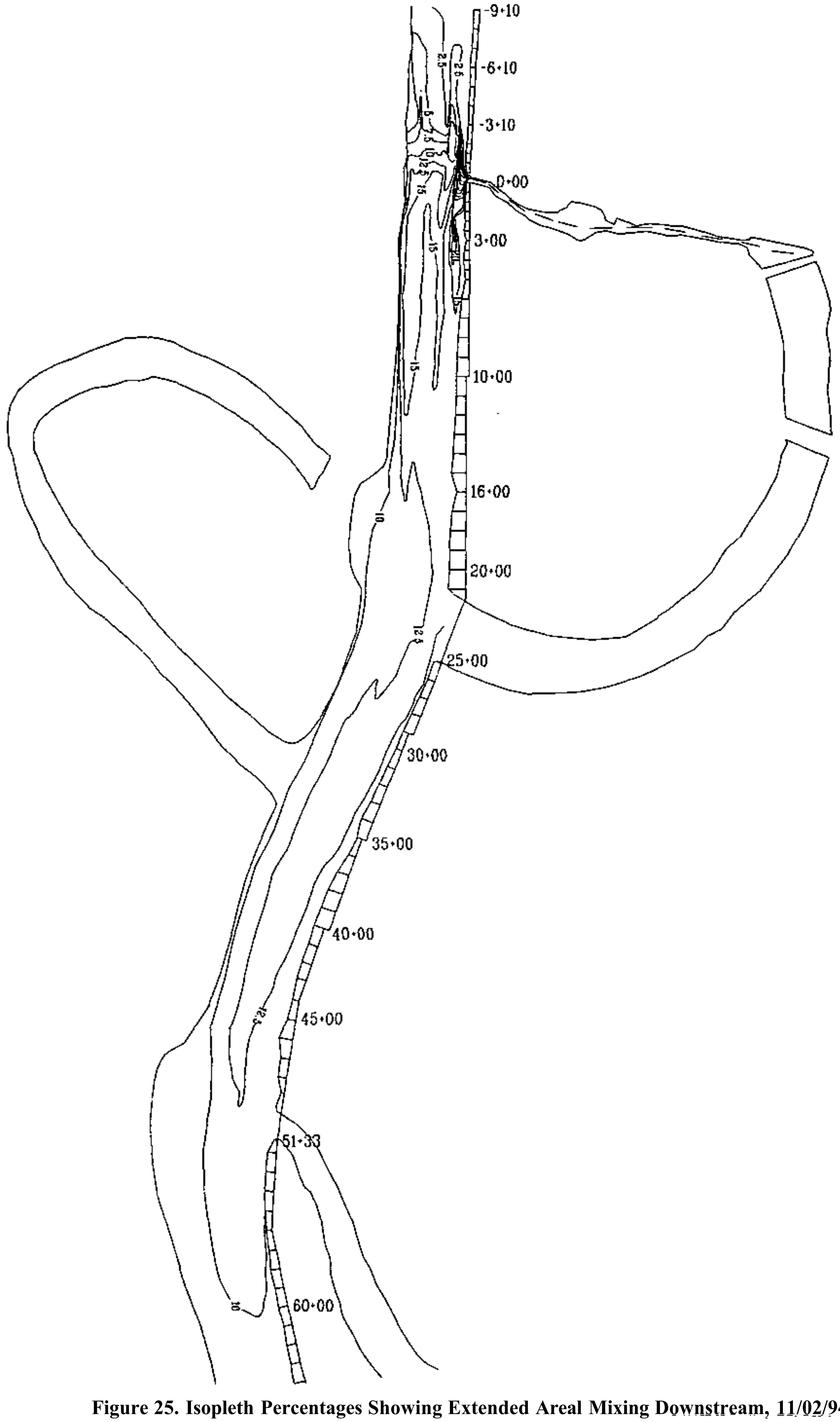


Figure 25. Isopleth Percentages Showing Extended Areal Mixing Downstream, 11/02/94

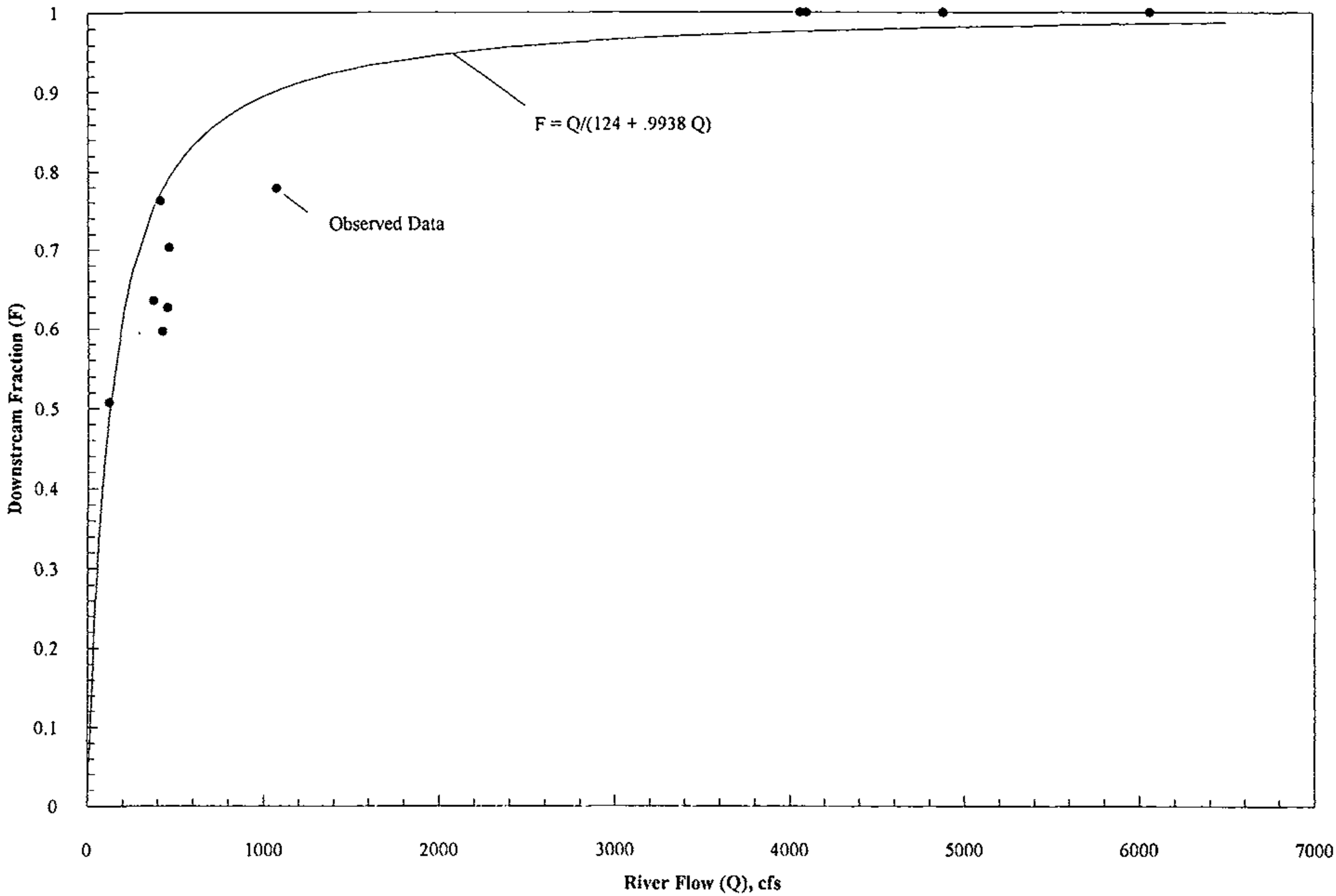


Figure 26. Fraction of Ash-pond Discharge Mixing in Downstream Direction

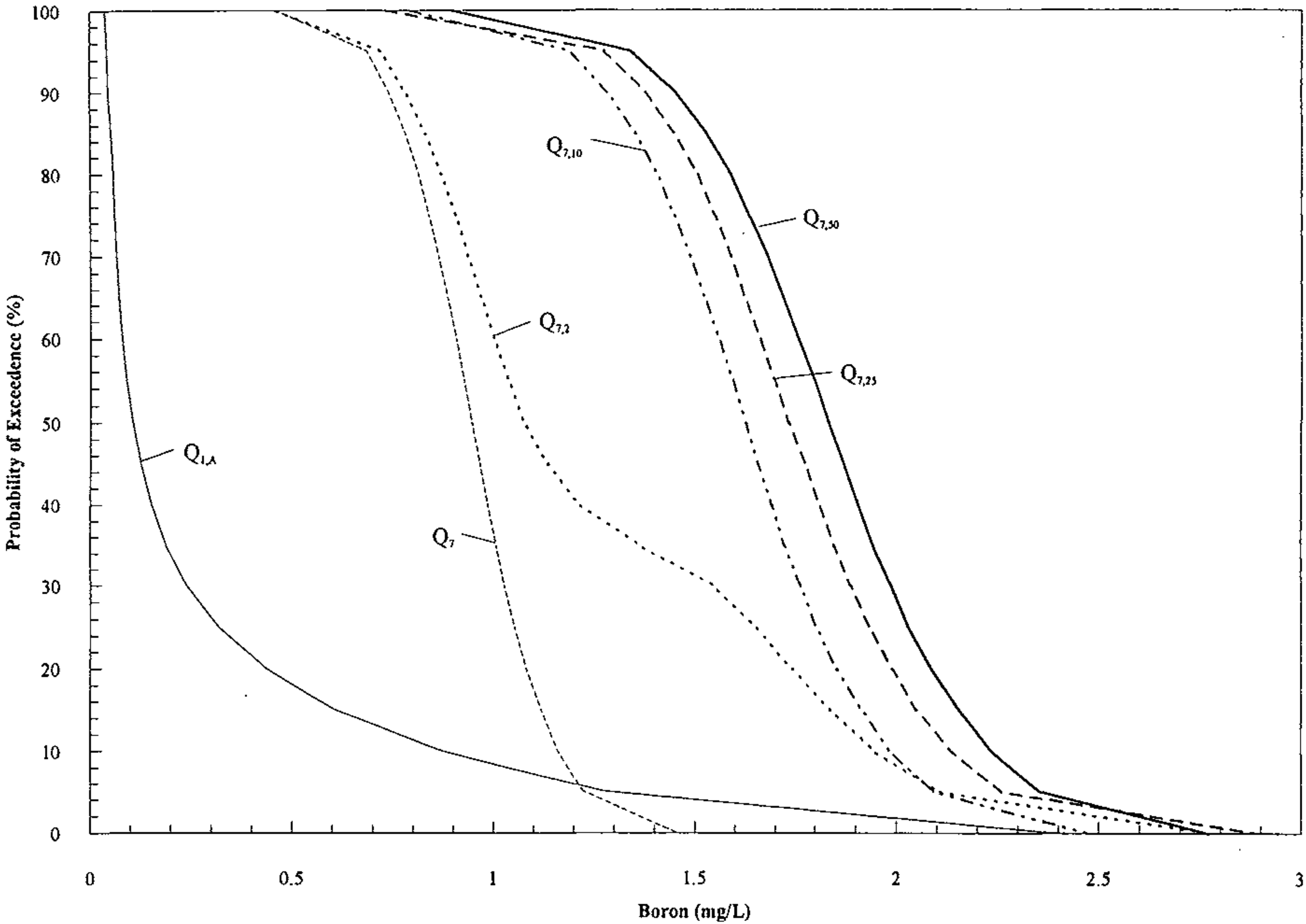


Figure 27. Boron Probability Distribution at Baldwin at Mouth of Sparta Water Intake Meander (RM 18.4) with Total Downstream Plume Movement

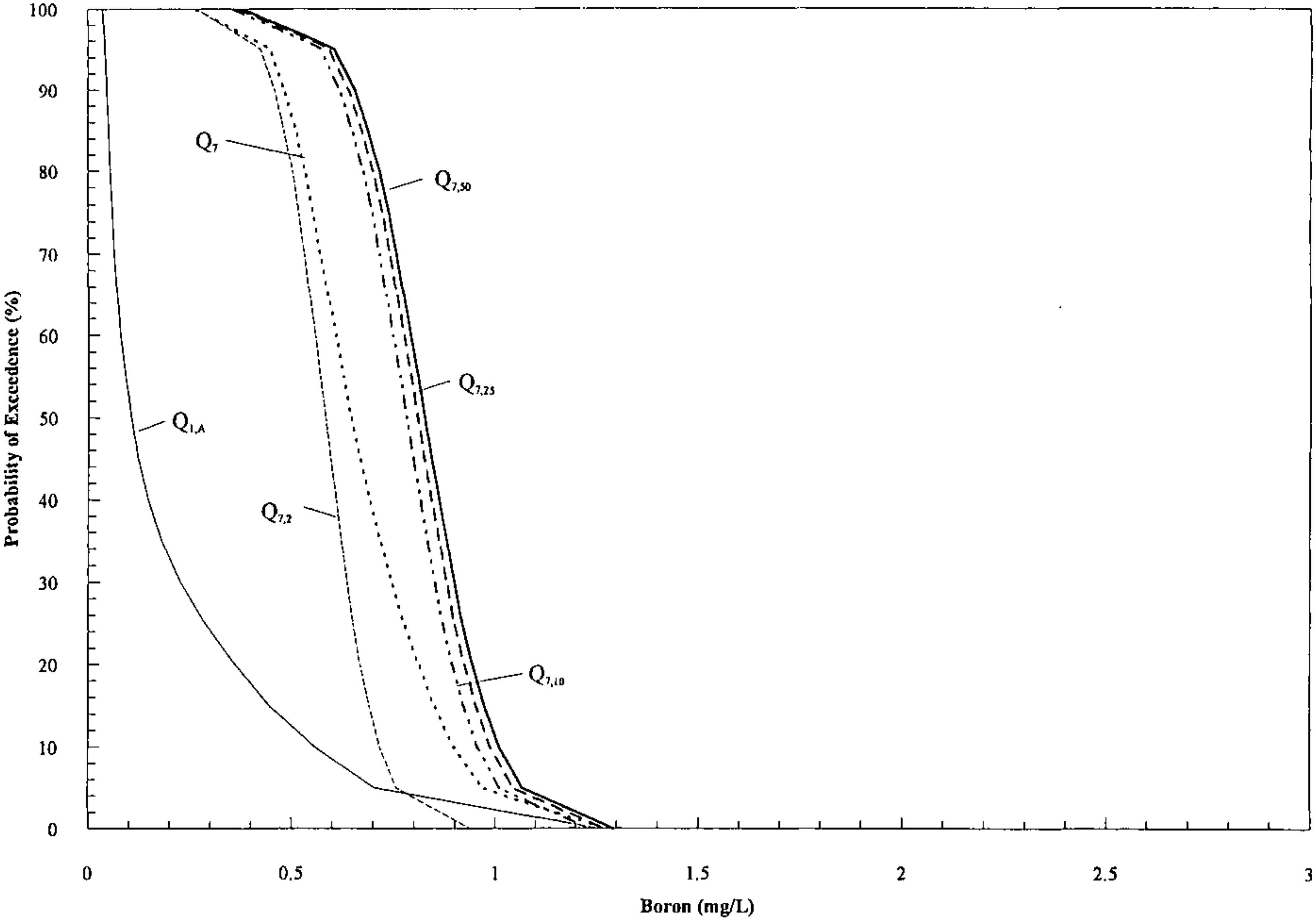


Figure 28. Boron Probability Distribution at Baldwin at Mouth of Sparta Water Intake Meander (RM 18.4) with Partial Downstream Plume Movement

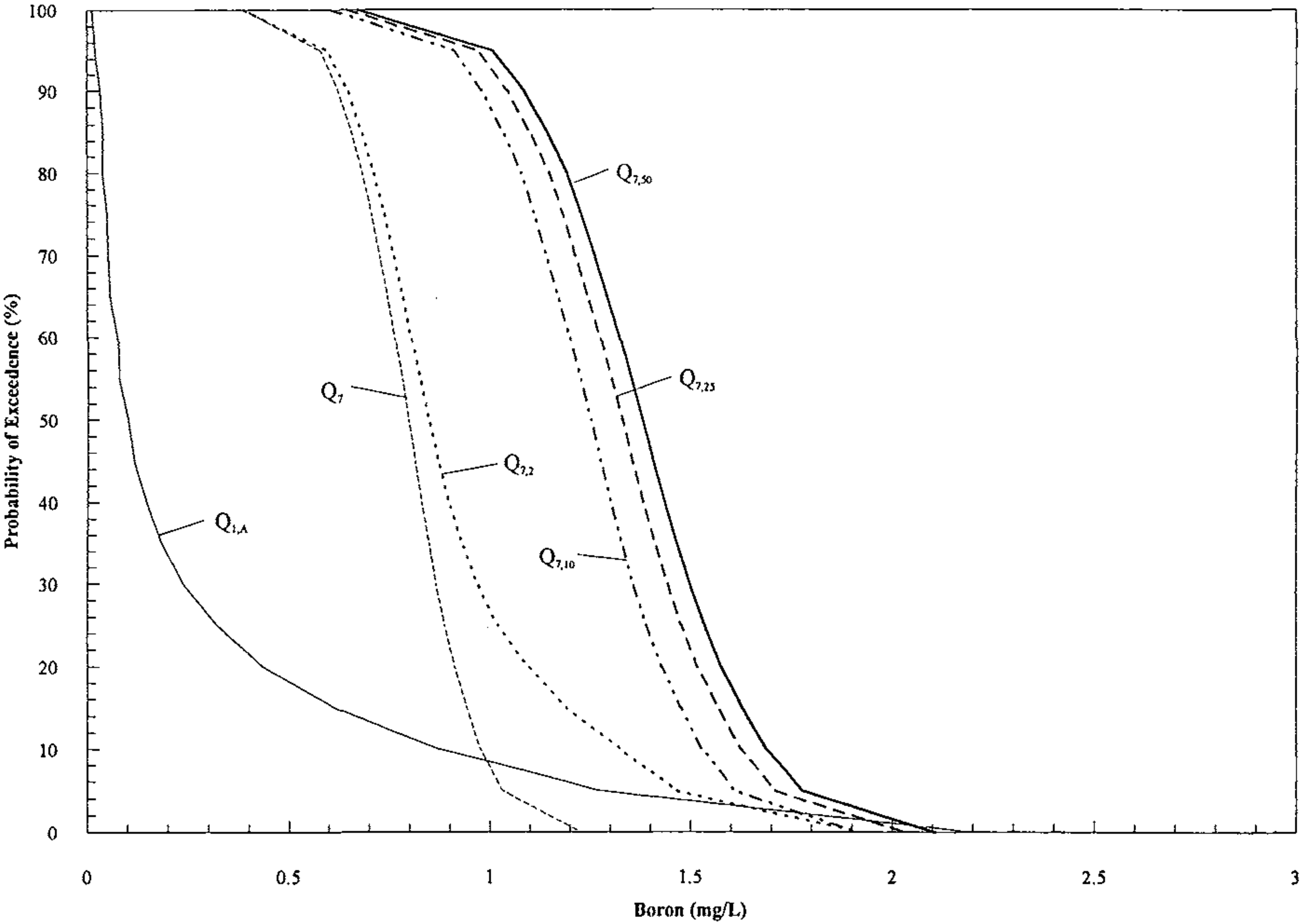


Figure 29. Boron Probability Distribution at Evansville (RM 12.2) with Total Downstream Plume Movement

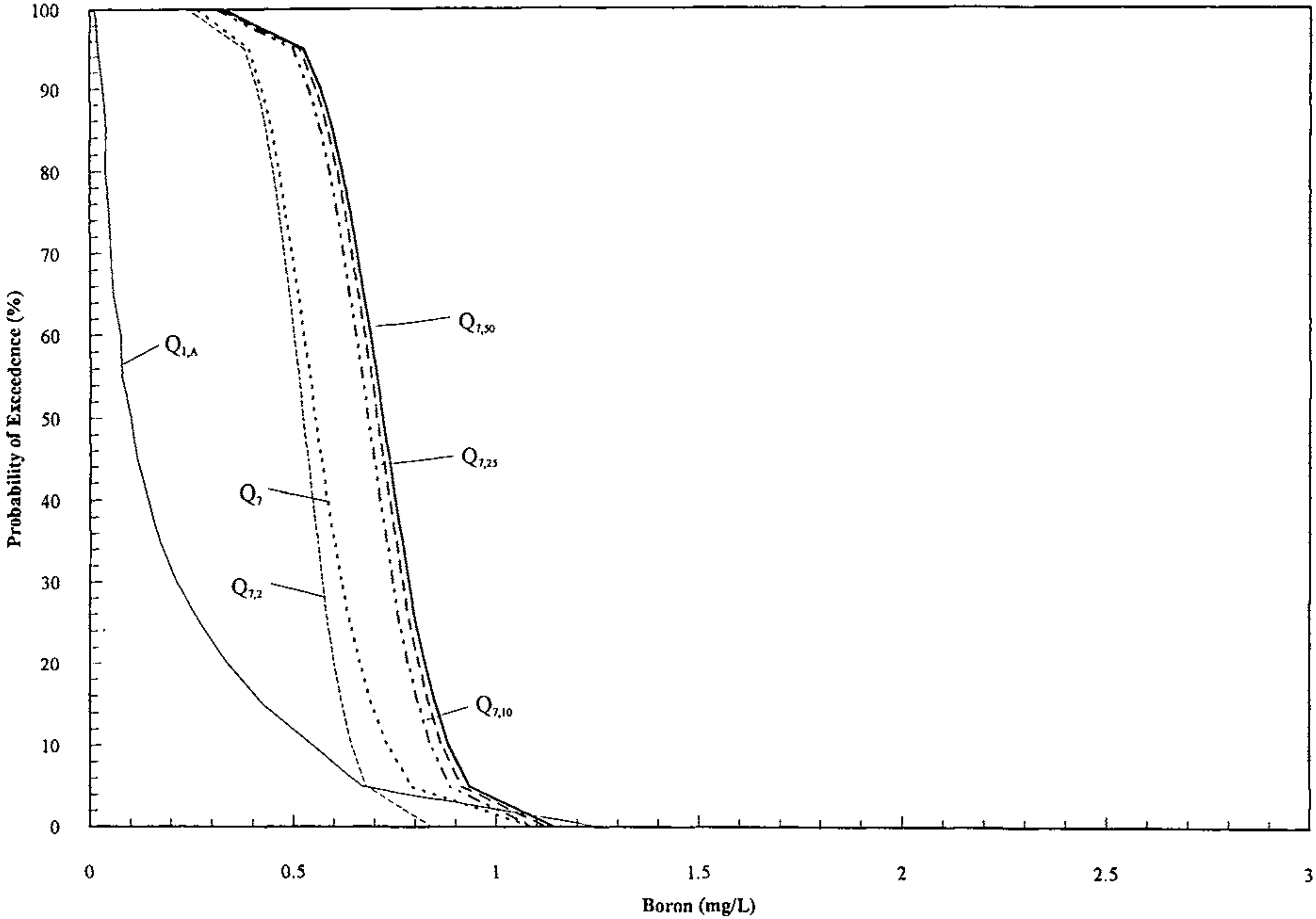


Figure 30. Boron Probability Distribution at Evansville (RM 12.2) with Partial Downstream Plume Movement

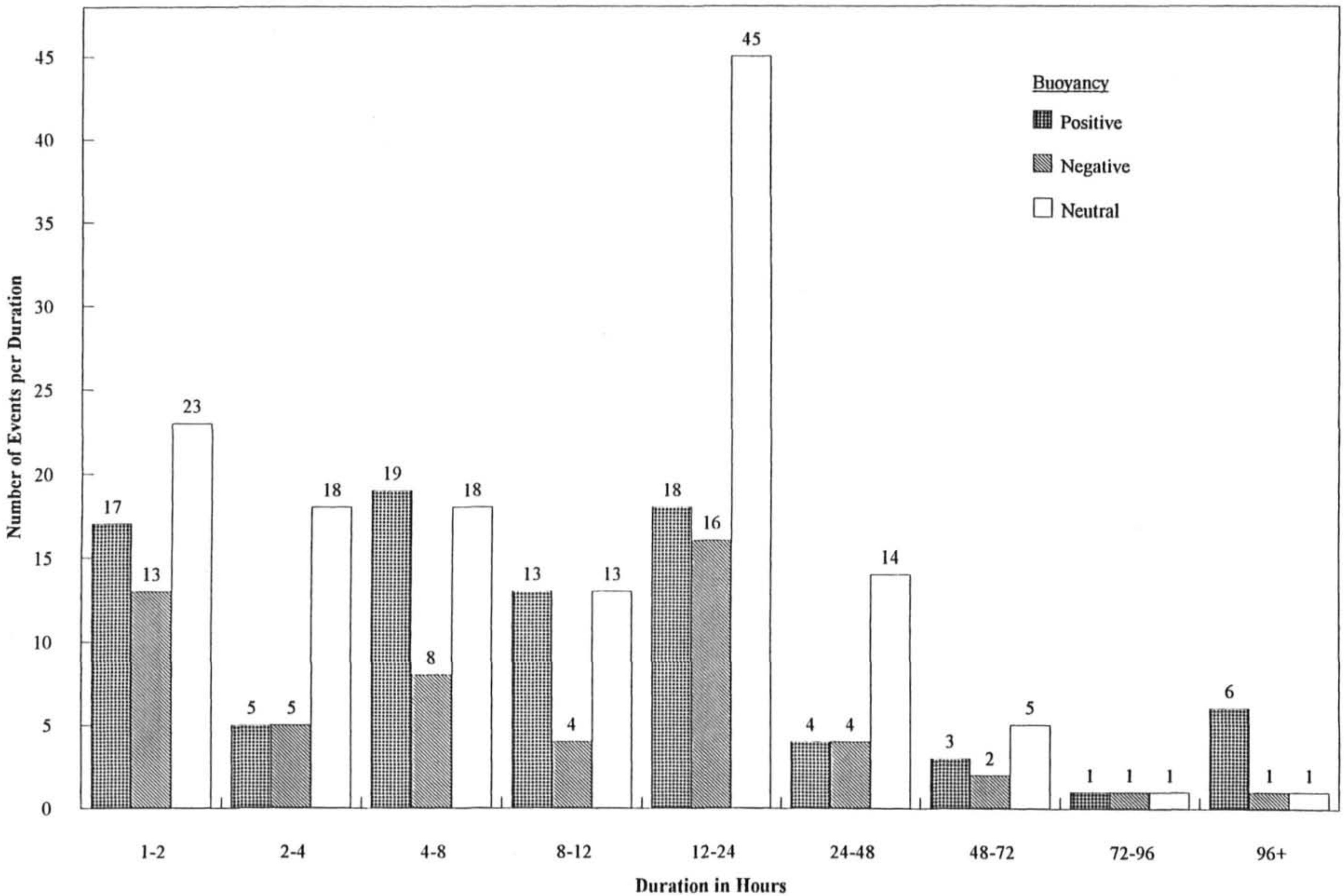


Figure 31. Numerical Frequency of Buoyancy Durations

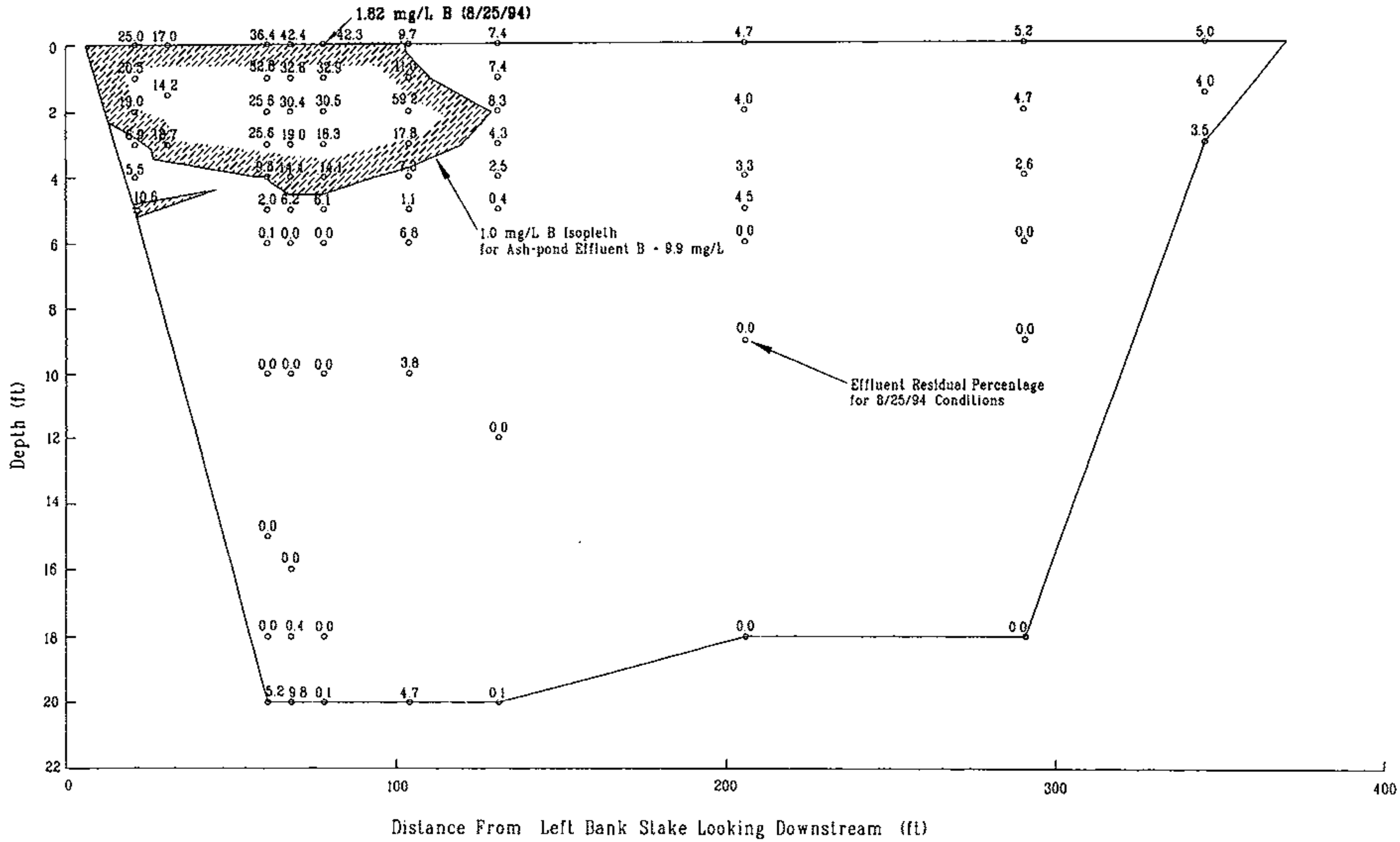


Figure 32. Cross Section Showing 1.0 mg/L Boron Isopleth at Station -6+10 (Ash-pond Effluent B=9.9 mg/L at 8/25/94 Conditions)

APPENDIXES

APPENDIX A

Total and daily statistical summaries of hourly specific conductance and temperature readings

Overall Statistics

Specific Conductance (mS/cm)

Station	*Mean*	*S.D.*	*Min*	*Max*	*Count*
1A	0.471	0.084	0.298	0.812	5402
1B	0.476	0.074	0.314	0.658	5402
2A	0.960	0.058	0.624	1.133	5400
2B	0.957	0.114	0.624	1.133	5092
3A	0.495	0.100	0.309	1.169	4844
3B	0.527	0.094	0.323	0.908	5399
4A	0.507	0.080	0.332	0.689	4109
4B	0.491	0.080	0.327	0.698	5045
5A	0.484	0.083	0.327	0.647	5380
5B	0.484	0.081	0.300	0.658	5093

Temperature (°C)

Station	*Mean*	*S.D.*	*Min*	*Max*	*Count*
1A	20.13	8.14	3.21	31.60	5402
1B	19.73	7.88	3.29	30.26	5402
2A	20.65	8.42	2.62	33.20	5400
2B	20.40	8.78	2.41	33.30	5312
3A	19.27	8.05	3.29	31.59	4845
3B	20.17	8.36	2.53	31.68	5399
4A	19.68	8.26	3.13	31.78	4109
4B	20.17	8.21	3.21	31.25	5045
5A	20.16	8.01	3.38	31.70	5380
5B	19.81	7.94	3.55	29.97	5039

Note: S.D. = standard deviation. Count = number of hourly measurements.
Specific conductance and temperature data collected by DataSondes

	Station 1A								Station 1B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
05/23/94	0.399	0.001	0.396	0.400	22.588	0.106	22.390	22.738	0.409	0.002	0.405	0.410	22.578	0.092	22.390	22.651
05/24/94	0.404	0.002	0.400	0.407	22.355	0.160	22.135	22.662	0.411	0.002	0.408	0.414	22.313	0.206	22.078	22.692
05/25/94	0.404	0.003	0.397	0.410	21.988	0.119	21.762	22.164	0.408	0.002	0.405	0.411	21.864	0.134	21.643	22.101
05/26/94	0.408	0.005	0.399	0.419	21.607	0.221	21.089	21.862	0.405	0.002	0.403	0.409	21.433	0.233	20.861	21.716
05/27/94	0.418	0.005	0.409	0.424	20.654	0.260	20.172	21.001	0.408	0.002	0.404	0.412	20.458	0.170	20.138	20.823
05/28/94	0.420	0.005	0.411	0.427	20.636	0.639	19.844	21.473	0.408	0.002	0.405	0.412	20.378	0.523	19.769	21.139
05/29/94	0.415	0.003	0.409	0.420	21.287	0.627	20.487	22.078	0.415	0.002	0.411	0.418	20.955	0.566	20.267	21.807
05/30/94	0.421	0.007	0.411	0.434	21.857	0.393	21.388	22.399	0.421	0.004	0.417	0.429	21.485	0.422	20.987	22.189
05/31/94	0.438	0.009	0.427	0.452	22.607	0.388	22.121	23.206	0.431	0.004	0.427	0.439	22.189	0.301	21.863	22.866
06/01/94	0.450	0.003	0.445	0.460	23.302	0.790	22.517	25.323	0.438	0.001	0.437	0.440	22.531	0.218	22.207	22.867
06/02/94	0.467	0.028	0.452	0.561	22.923	0.337	22.474	23.364	0.441	0.007	0.438	0.474	22.714	0.333	22.253	23.205
06/03/94	0.493	0.018	0.475	0.555	21.888	0.207	21.613	22.356	0.463	0.014	0.443	0.492	21.530	0.275	21.221	22.131
06/04/94	0.462	0.012	0.450	0.485	21.882	0.535	21.156	22.819	0.445	0.002	0.442	0.449	21.252	0.372	20.790	21.912
06/05/94	0.460	0.009	0.452	0.482	22.811	0.504	22.204	23.525	0.438	0.002	0.434	0.442	22.265	0.469	21.828	23.130
06/06/94	0.457	0.003	0.452	0.462	24.183	0.418	23.567	24.849	0.432	0.002	0.429	0.438	23.759	0.392	23.092	24.477
06/07/94	0.445	0.010	0.424	0.456	25.304	0.472	24.697	26.229	0.429	0.002	0.425	0.432	24.872	0.420	24.451	25.679
06/08/94	0.414	0.004	0.409	0.422	25.339	0.148	25.000	25.597	0.421	0.002	0.418	0.424	25.116	0.292	24.833	25.597
06/09/94	0.407	0.009	0.396	0.423	23.551	0.338	23.002	24.189	0.415	0.008	0.409	0.431	23.774	0.411	23.254	24.830
06/10/94	0.416	0.020	0.388	0.448	22.583	0.115	22.449	22.872	0.423	0.013	0.403	0.438	22.648	0.164	22.450	23.133
06/11/94	0.418	0.010	0.404	0.446	23.149	0.750	22.193	24.050	0.419	0.002	0.416	0.424	23.116	0.683	22.364	24.051
06/12/94	0.422	0.022	0.386	0.463	24.339	0.701	23.445	25.262	0.433	0.022	0.393	0.455	24.171	0.512	23.577	24.805
06/13/94	0.398	0.009	0.386	0.414	25.217	0.768	24.118	26.265	0.396	0.006	0.389	0.405	25.119	0.481	24.670	25.886
06/14/94	0.406	0.004	0.395	0.413	26.101	0.605	25.290	27.357	0.406	0.005	0.397	0.412	25.870	0.430	25.383	26.599
06/15/94	0.408	0.003	0.402	0.413	26.460	0.631	25.623	27.521	0.404	0.002	0.401	0.407	26.126	0.410	25.626	26.853
06/16/94	0.405	0.005	0.392	0.415	26.634	0.657	25.866	27.983	0.400	0.002	0.396	0.403	26.369	0.341	25.959	26.926
06/17/94	0.391	0.004	0.382	0.398	26.714	0.509	26.118	27.596	0.390	0.004	0.382	0.397	26.588	0.289	26.162	27.049
06/18/94	0.382	0.003	0.378	0.391	26.965	0.411	26.400	27.498	0.381	0.001	0.378	0.384	26.885	0.261	26.535	27.163
06/19/94	0.398	0.009	0.384	0.411	28.075	0.746	27.153	29.010	0.388	0.006	0.378	0.396	27.740	0.589	27.039	28.515
06/20/94	0.391	0.008	0.378	0.404	29.071	0.491	28.376	29.973	0.382	0.002	0.378	0.385	28.666	0.456	28.081	29.308
06/21/94	0.396	0.003	0.386	0.400	29.584	0.499	28.958	30.345	0.379	0.002	0.376	0.383	29.284	0.544	28.664	30.100
06/22/94	0.392	0.002	0.389	0.395	29.911	0.348	29.410	30.388	0.374	0.003	0.372	0.380	29.669	0.412	29.126	30.264
06/23/94	0.393	0.002	0.390	0.398	29.754	0.208	29.488	30.250	0.375	0.002	0.371	0.378	29.601	0.213	29.289	29.962
06/24/94	0.389	0.010	0.376	0.424	28.737	0.284	28.210	29.447	0.373	0.002	0.370	0.380	28.470	0.338	27.968	29.245
06/25/94	0.390	0.019	0.349	0.432	27.909	0.476	27.273	28.625	0.384	0.012	0.372	0.410	27.753	0.277	27.375	28.213
06/26/94	0.341	0.020	0.315	0.396	25.110	1.039	23.845	27.062	0.347	0.012	0.334	0.369	25.304	1.021	24.024	27.161
06/27/94	0.316	0.012	0.298	0.337	24.446	0.594	23.635	25.070	0.322	0.006	0.314	0.337	24.323	0.409	23.773	24.738
06/28/94	0.341	0.012	0.319	0.355	25.273	0.211	25.015	25.653	0.342	0.006	0.332	0.351	25.029	0.333	24.693	25.532
06/29/94	0.314	0.008	0.301	0.325	25.397	0.267	25.058	25.685	0.323	0.008	0.315	0.343	25.156	0.440	24.687	25.695
06/30/94	0.315	0.004	0.308	0.322	26.212	0.460	25.642	26.819	0.321	0.005	0.314	0.328	26.080	0.397	25.612	26.610
07/01/94	0.334	0.006	0.323	0.342	27.048	0.451	26.541	27.996	0.346	0.008	0.332	0.357	26.637	0.215	26.440	27.030
07/02/94	0.347	0.003	0.341	0.351	27.304	0.329	26.833	27.712	0.364	0.005	0.355	0.369	26.943	0.331	26.570	27.370
07/03/94	0.363	0.033	0.327	0.443	27.245	0.142	27.050	27.544	0.386	0.030	0.357	0.461	26.660	0.143	26.530	27.030
07/04/94	0.344	0.012	0.325	0.360	27.512	0.297	27.061	27.980	0.377	0.009	0.364	0.392	26.839	0.251	26.530	27.160
07/05/94	0.328	0.004	0.321	0.336	28.164	0.445	27.610	28.799	0.368	0.003	0.363	0.373	27.304	0.334	26.950	27.790
07/06/94	0.345	0.003	0.338	0.351	28.968	0.530	28.294	29.823	0.383	0.002	0.376	0.387	27.965	0.375	27.500	28.510
07/07/94	0.350	0.002	0.346	0.354	29.206	0.307	28.836	29.850	0.389	0.002	0.386	0.394	28.106	0.152	27.920	28.380
07/08/94	0.355	0.002	0.353	0.359	28.966	0.338	28.584	29.706	0.394	0.001	0.392	0.397	27.753	0.184	27.500	28.090
07/09/94	0.377	0.015	0.360	0.411	28.705	0.305	28.145	29.171	0.415	0.012	0.398	0.433	27.433	0.300	26.950	27.920
07/10/94	0.359	0.010	0.345	0.373	28.623	0.339	28.069	29.107	0.401	0.007	0.388	0.410	27.078	0.334	26.530	27.500
07/11/94	0.358	0.007	0.347	0.367	28.979	0.547	28.277	29.921	0.396	0.007	0.387	0.406	27.104	0.397	26.530	27.790
07/12/94	0.355	0.007	0.346	0.366	29.131	0.504	28.247	30.192	0.396	0.007	0.387	0.408	27.047	0.436	26.530	27.710
07/13/94	0.376	0.007	0.366	0.389	29.103	0.544	27.923	29.753	0.411	0.004	0.402	0.416	27.537	0.239	27.240	27.960
07/14/94	0.383	0.004	0.375	0.389	29.049	1.019	28.005	31.603	0.415	0.001	0.413	0.417	28.100	0.160	27.920	28.470
07/15/94	0.384	0.002	0.380	0.388	29.089	0.470	28.569	30.476	0.414	0.002	0.409	0.416	28.563	0.189	28.380	29.020
07/16/94	0.393	0.005	0.385	0.404	29.355	0.393	28.974	30.329	0.421	0.004	0.416	0.427	28.852	0.072	28.680	29.060
07/17/94	0.387	0.012	0.375	0.406	28.988	0.261	28.648	29.622	0.422	0.007	0.412	0.429	28.545	0.117	28.340	28.720
07/18/94	0.381	0.005	0.371	0.394	29.425	0.924	28.572	31.404	0.417	0.003	0.413	0.424	28.434	0.098	28.300	28.600
07/19/94	0.392	0.003	0.386	0.397	29.062	0.694	28.245	30.659	0.427	0.001	0.425	0.430	28.287	0.221	28.000	28.760
07/20/94	0.389	0.005	0.378	0.396	29.341	0.789	28.597	31.221	0.427	0.001	0.425	0.429	28.429	0.146	28.300	28.760
07/21/94	0.392	0.005	0.385	0.401	29.260	0.394	28.822	29.927	0.425	0.002	0.420	0.428	28.610	0.090	28.510	28.720
07/22/94	0.397	0.003	0.390	0.402	29.076	0.426	28.624	30.067	0.428	0.001	0.427	0.430	28.450	0.125	28.220	28.640

	Station 1A								Station 1B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Dale	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
07/23/94	0.398	0.005	0.391	0.405	29.034	0.605	28.258	30.291	0.428	0.001	0.427	0.430	28305	0.250	27.960	28.760
07/24/94	0.405	0.004	0.397	0.409	28.785	0.357	28.311	29.585	0.429	0.001	0.427	0.430	28.206	0.167	27.960	28.600
07/25/94	0.407	0.003	0.402	0.412	28.799	0.379	28.284	29.678	0.428	0.001	0.426	0.430	28.175	0.150	27.960	28.430
07/26/94	0.407	0.002	0.403	0.412	28.406	0.294	27.946	29.020	0.425	0.005	0.416	0.430	27.973	0.190	27.686	28.342
07/27/94	0.409	0.004	0.402	0.417	27.454	0.251	26.909	27.909	0.423	0.004	0.418	0.431	27.192	0.253	26.757	27.730
07/28/94	0.408	0.003	0.401	0.413	27.278	0.625	26.637	28.474	0.422	0.004	0.417	0.428	26.690	0.248	26355	27.135
07/29/94	0.414	0.004	0.407	0.422	27.244	0.667	26.443	28.951	0.430	0.002	0.426	0.434	26.450	0.181	26.194	26.727
07/30/94	0.421	0.003	0.415	0.427	26.668	0.229	26.296	27.002	0.436	0.001	0.434	0.437	26.258	0.166	25.994	26.526
07/31/94	0.437	0.004	0.430	0.446	26.787	0.436	26.276	27.565	0.454	0.010	0.435	0.471	26.285	0.264	25.875	26.733
08/01/94	0.471	0.047	0.430	0.567	27.274	0.753	26.419	28.642	0.448	0.006	0.435	0.463	26.330	0.202	26.097	26.706
08/02/94	0.497	0.054	0.433	0.595	27.650	0.898	26.654	29.130	0.468	0.040	0.445	0.590	26.474	0.105	26354	26.792
08/03/94	0.557	0.053	0.494	0.687	28.327	0.786	27.227	29.701	0.488	0.029	0.453	0.547	26.949	0.497	26.462	27.983
08/04/94	0.457	0.011	0.442	0.484	28.421	0.606	27.627	29.876	0.486	0.022	0.468	0.563	27.572	0.258	27.207	28.019
08/05/94	0.479	0.014	0.461	0.511	27.734	0.348	27.265	28.381	0.489	0.009	0.472	0.511	27.268	0.226	26.918	27.747
08/06/94	0.489	0.010	0.475	0.507	27.435	0.425	26.778	28.364	0.500	0.010	0.488	0.517	26.764	0.239	26.414	27.116
08/07/94	0.497	0.006	0.488	0.510	27.463	0.512	26.799	28.262	0.501	0.008	0.491	0.516	26.774	0.277	26.385	27.245
08/08/94	0.549	0.067	0.495	0.721	28.132	0.868	27.071	29.638	0.519	0.013	0.505	0.552	26.922	0.263	26.643	27.466
08/09/94	0.534	0.047	0.482	0.610	28.569	0.739	27.602	29.860	0.573	0.019	0.540	0.600	27.179	0.165	26.776	27.454
08/10/94	0.546	0.047	0.496	0.623	28.070	0.562	27.287	29.436	0.554	0.020	0.530	0.590	27.214	0.198	26.931	27.662
08/11/94	0.544	0.036	0.514	0.625	28.283	0.532	27.613	29.472	0.546	0.015	0.527	0.578	27.493	0.268	27.127	28.049
08/12/94	0.575	0.063	0.526	0.741	28.214	0.549	27.529	29.298	0.542	0.008	0.532	0.557	27.648	0.200	27.359	28.071
08/13/94	0.596	0.074	0.527	0.746	28.461	0.528	27.825	29.424	0.556	0.012	0.539	0.573	28.039	0.343	27.638	28.562
08/14/94	0.549	0.009	0.532	0.571	28.026	0.222	27.599	28.410	0.560	0.011	0.548	0.580	27.880	0.239	27.520	28.388
08/15/94	0.544	0.010	0.530	0.567	27.659	0.472	27.057	28.786	0.576	0.020	0.560	0.620	27.003	0.196	26.749	27.440
08/16/94	0.565	0.018	0.539	0.594	27.377	0.394	26.884	28.272	0.605	0.015	0.581	0.630	26.728	0.144	26.558	26.961
08/17/94	0.567	0.007	0.548	0.584	27.417	0.559	26.750	28.518	0.589	0.010	0.574	0.606	26.653	0.149	26.463	26.892
08/18/94	0.583	0.009	0.568	0.596	27.717	0.752	26.826	29.325	0.598	0.010	0.583	0.613	26.634	0.091	26.486	26.793
08/19/94	0.617	0.057	0.569	0.737	27.424	0.224	27.122	27.801	0.614	0.009	0.604	0.632	26.824	0.198	26.603	27.181
08/20/94	0.580	0.008	0.567	0.594	26.943	0.169	26.735	27.327	0.595	0.007	0.583	0.617	26.570	0.173	26.364	26.926
08/21/94	0.566	0.006	0.557	0.580	26.733	0.310	26.224	27.323	0.579	0.005	0.572	0.587	26.223	0.154	25.930	26.423
08/22/94	0.571	0.010	0.558	0.595	27.175	0.806	26.260	29.009	0.596	0.010	0.582	0.613	25.952	0.132	25.851	26.299
08/23/94	0.590	0.036	0.545	0.658	26.689	0.337	26.216	27.405	0.624	0.013	0.604	0.657	25.974	0.151	25.802	26.305
08/24/94	0.649	0.048	0.599	0.741	26.788	0.559	26.252	28.031	0.626	0.014	0.610	0.651	25.994	0.170	25.743	26.284
08/25/94	0.659	0.067	0.604	0.812	27.027	0.658	26.208	28.487	0.625	0.006	0.607	0.633	26.130	0.224	25.892	26.647
08/26/94	0.610	0.039	0.575	0.712	27.021	0.364	26.544	27.773	0.598	0.009	0.581	0.613	26.293	0.124	26.087	26.496
08/27/94	0.607	0.061	0.541	0.731	27.295	0.557	26.621	28.189	0.583	0.011	0.568	0.609	26.522	0.353	26.147	27.071
08/28/94	0.604	0.058	0.549	0.744	27.590	0.534	26.917	28.566	0.586	0.011	0.565	0.612	26.848	0.340	26.388	27.392
08/29/94	0.558	0.009	0.548	0.574	27.026	0.195	26.660	27.464	0.576	0.006	0.567	0.588	26.525	0.257	26.230	27.098
08/30/94	0.577	0.012	0.557	0.598	26.596	0.259	26.229	27.248	0.583	0.018	0.566	0.622	25.939	0.122	25.797	26.189
08/31/94	0.554	0.010	0.536	0.571	26.281	0.176	26.062	26.734	0.576	0.014	0.555	0.594	25.702	0.091	25.562	25.910
09/01/94	0.553	0.007	0.543	0.567	25.321	0.357	24.749	25.972	0.555	0.010	0.539	0.578	24.975	0.284	24.534	25.562
09/02/94	0.563	0.005	0.554	0.571	25.053	0.569	24.248	26.057	0.579	0.023	0.548	0.625	24.043	0.155	23.845	24.453
09/03/94	0.569	0.008	0.557	0.579	24.855	0.532	24.154	25.843	0.576	0.022	0.547	0.618	23.890	0.134	23.703	24.220
09/04/94	0.580	0.007	0.569	0.589	24.241	0.235	23.901	24.740	0.583	0.009	0.569	0.610	23.615	0.144	23.420	23.810
09/05/94	0.569	0.007	0.558	0.578	24.313	0.308	23.937	24.737	0.567	0.011	0.543	0.580	23.581	0.079	23.402	23.734
09/06/94	0.568	0.009	0.558	0.589	24.667	0.552	24.014	25.793	0.575	0.007	0.563	0.596	23.882	0.328	23.512	24.355
09/07/94	0.563	0.010	0.542	0.578	25.410	1.279	24.061	27.860	0.565	0.013	0.539	0.584	23.712	0.148	23.580	24.089
09/08/94	0.609	0.027	0.570	0.666	25.057	0.765	24.098	26.757	0.579	0.011	0.555	0.595	23.690	0.105	23.560	23.987
09/09/94	0.581	0.028	0.552	0.633	25.150	0.774	24.134	26.503	0.541	0.012	0.533	0.573	23.722	0.103	23.577	23.907
09/10/94	0.577	0.020	0.557	0.620	25.195	0.708	24.261	26.280	0.539	0.011	0.527	0.559	23.957	0.317	23.677	24.941
09/11/94	0.559	0.013	0.541	0.593	25.352	0.595	24.428	26.196	0.534	0.012	0.523	0.561	24.203	0.341	23.746	24.841
09/12/94	0.606	0.041	0.545	0.679	25.658	0.701	24.714	27.083	0.534	0.014	0.523	0.559	24.241	0.140	24.024	24.571
09/13/94	0.634	0.047	0.584	0.732	25.678	0.490	25.011	26.570	0.556	0.019	0.523	0.573	24.732	0.392	24.223	25.383
09/14/94	0.621	0.052	0.569	0.759	25.690	0.600	24.987	27.049	0.566	0.005	0.557	0.579	25.107	0.222	24.838	25.538
09/15/94	0.615	0.032	0.566	0.690	25.584	0.302	25.034	26.083	0.595	0.024	0.554	0.642	25.446	0.194	25.127	25.740
09/16/94	0.606	0.047	0.560	0.710	25.366	0.183	25.082	25.673	0.577	0.026	0.553	0.630	25.363	0.133	25.188	25.596
09/17/94	0.551	0.018	0.532	0.578	25.198	0.249	24.839	25.682	0.546	0.014	0.528	0.590	25.176	0.130	24.967	25.430
09/18/94	0.537	0.014	0.520	0.564	25.005	0.425	24.426	25.858	0.530	0.008	0.517	0.544	24.860	0.170	24.591	25.123
09/19/94	0.541	0.017	0.516	0.575	24.888	0.569	24.223	26.373	0.538	0.008	0.522	0.547	24.469	0.137	24.328	24.848
09/20/94	0.568	0.031	0.518	0.625	24.716	0.624	23.861	25.750	0.532	0.013	0.505	0.546	23.996	0.173	23.805	24.335
09/21/94	0.581	0.029	0.541	0.639	24.183	0.322	23.737	24.660	0.532	0.014	0.506	0.567	23.870	0.185	23.624	24.198

	Station 1A								Station 1B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
09/22/94	0.558	0.019	0.520	0.589	23.612	0.229	23.164	24.016	0.557	0.020	0.532	0.587	23.595	0.211	23.251	24.059
09/23/94	0.527	0.007	0.521	0.552	23.134	0.307	22.766	23.776	0.538	0.008	0.531	0.568	22.826	0.145	22.612	23.169
09/24/94	0.541	0.004	0.533	0.551	22.369	0.135	22.258	22.727	0.551	0.008	0.541	0.576	22.230	0.139	22.013	22.490
09/25/94	0.538	0.007	0.530	0.550	21.978	0.151	21.611	22.210	0.549	0.008	0.540	0.568	21.569	0.171	21.293	21.971
09/26/94	0.545	0.010	0.532	0.559	21.166	0.208	20.792	21.572	0.555	0.009	0.542	0.568	20.718	0.237	20.314	21.161
09/27/94	0.559	0.004	0.556	0.577	20.518	0.112	20.347	20.755	0.566	0.004	0.561	0.580	19.887	0.099	19.771	20.272
09/28/94	0.564	0.006	0.556	0.575	20.372	0.275	19.996	20.900	0.576	0.010	0.558	0.590	19.617	0.109	19.390	19.803
09/29/94	0.588	0.011	0.578	0.621	20.331	0.479	19.780	21.390	0.580	0.010	0.561	0.600	19.338	0.129	19.175	19.573
09/30/94	0.620	0.047	0.579	0.712	20.531	0.539	19.893	21.425	0.576	0.010	0.558	0.594	19.429	0.217	19.173	19.787
10/01/94	0.601	0.031	0.573	0.680	21.104	0.530	20.471	21.837	0.576	0.013	0.560	0.599	19.798	0.223	19.542	20.323
10/02/94	0.555	0.007	0.545	0.571	21.572	0.469	21.016	22.417	0.550	0.005	0.542	0.557	19.938	0.214	19.708	20.370
10/03/94	0.545	0.002	0.542	0.547	21.750	0.437	21.170	22.451	0.545	0.010	0.535	0.573	20.012	0.189	19.665	20.218
10/04/94	0.556	0.008	0.545	0.571	21.362	0.233	21.034	21.831	0.574	0.019	0.542	0.605	20.052	0.254	19.637	20.464
10/05/94	0.585	0.033	0.551	0.638	20.977	0.343	20.509	21.804	0.540	0.011	0.509	0.560	19.698	0.234	19.422	20.112
10/06/94	0.601	0.044	0.561	0.698	20.189	0.355	19.716	20.921	0.547	0.017	0.511	0.584	20.009	0.184	19.806	20.323
10/07/94	0.589	0.047	0.545	0.701	20.160	0.221	19.851	20.668	0.557	0.035	0.498	0.619	20.118	0.155	19.894	20.371
10/08/94	0.547	0.008	0.532	0.569	19.924	0.202	19.544	20.174	0.521	0.023	0.495	0.577	20.097	0.635	19.620	23.012
10/09/94	0.515	0.019	0.485	0.556	19.486	0.176	19.221	19.824	0.502	0.014	0.493	0.540	19.455	0.139	19.095	19.664
10/10/94	0.518	0.024	0.479	0.548	18.916	0.377	18.578	19.531	0.507	0.012	0.497	0.541	18.967	0.175	18.721	19.292
10/11/94	0.536	0.006	0.524	0.545	18.607	0.225	18.251	19.194	0.523	0.021	0.502	0.564	18.480	0.211	18.047	18.918
10/12/94	0.523	0.010	0.505	0.539	18.327	0.180	18.044	18.652	0.528	0.021	0.503	0.557	18.006	0.230	17.749	18.413
10/13/94	0.523	0.011	0.494	0.537	18.058	0.087	17.947	18.248	0.514	0.014	0.500	0.544	17.842	0.140	17.743	18.291
10/14/94	0.536	0.007	0.526	0.551	17.854	0.045	17.765	17.951	0.529	0.023	0.503	0.561	17.815	0.022	17.770	17.888
10/15/94	0.535	0.001	0.532	0.538	17.961	0.124	17.797	18.154	0.545	0.008	0.530	0.555	17.846	0.025	17.806	17.905
10/16/94	0.526	0.005	0.517	0.540	18.320	0.390	17.842	18.834	0.538	0.014	0.504	0.553	18.036	0.247	17.876	18.596
10/17/94	0.516	0.003	0.511	0.525	18.461	0.099	18.339	18.706	0.513	0.011	0.506	0.543	18.147	0.146	17.983	18.480
10/18/94	0.506	0.003	0.498	0.512	18.309	0.027	18.264	18.344	0.508	0.006	0.488	0.525	18.157	0.315	17.788	19.075
10/19/94	0.503	0.007	0.492	0.516	18.496	0.298	17.921	19.077	0.521	0.011	0.504	0.537	18.079	0.127	17.820	18.419
10/20/94	0.503	0.007	0.490	0.515	18.092	0.641	17.423	19.533	0.509	0.011	0.494	0.540	17.953	0.269	17.652	18.527
10/21/94	0.500	0.009	0.488	0.529	17.467	0.229	17.158	17.970	0.495	0.008	0.485	0.510	17.772	0.163	17.673	18.184
10/22/94	0.497	0.011	0.486	0.529	17.264	0.443	16.646	18.100	0.503	0.009	0.490	0.520	17.714	0.103	17.623	18.082
10/23/94	0.507	0.012	0.490	0.529	16.804	0.302	16.253	17.363	0.517	0.011	0.505	0.552	17.867	0.215	17.650	18.203
10/24/94	0.537	0.010	0.522	0.556	15.778	0.247	15.278	16.422	0.539	0.010	0.523	0.563	17.471	0.142	17.168	17.688
10/25/94	0.540	0.013	0.519	0.560	14.815	0.239	14.332	15.303	0.548	0.008	0.534	0.563	16.708	0.176	16.357	17.128
10/26/94	0.545	0.020	0.516	0.569	15.027	1.111	13.860	16.601	0.568	0.010	0.552	0.587	16.116	0.130	15.892	16.299
10/27/94	0.536	0.018	0.521	0.573	15.889	0.253	15.545	16.476	0.562	0.008	0.552	0.579	15.713	0.160	15.455	15.968
10/28/94	0.531	0.019	0.515	0.590	15.493	0.167	15.091	15.718	0.559	0.016	0.537	0.600	15.438	0.132	15.239	15.702
10/29/94	0.525	0.002	0.520	0.529	15.366	0.336	14.927	16.108	0.534	0.007	0.529	0.559	15.208	0.108	15.023	15.406
10/30/94	0.524	0.003	0.520	0.528	15.307	0.349	14.892	15.994	0.536	0.008	0.526	0.566	15.054	0.105	14.928	15.310
10/31/94	0.526	0.006	0.519	0.549	15.142	0.153	14.861	15.489	0.550	0.012	0.536	0.574	15.082	0.086	14.839	15.301
11/01/94	0.526	0.005	0.517	0.532	14.764	0.228	14.394	15.116	0.543	0.007	0.531	0.553	14.601	0.107	14.416	14.799
11/02/94	0.537	0.012	0.525	0.571	14.349	0.124	14.020	14.647	0.561	0.019	0.535	0.595	14.376	0.120	14.190	14.663
11/03/94	0.531	0.002	0.526	0.533	14.494	0.173	14.324	14.828	0.548	0.012	0.530	0.580	14.402	0.139	14.235	14.652
11/04/94	0.531	0.016	0.523	0.577	14.966	0.124	14.749	15.095	0.552	0.021	0.525	0.607	14.882	0.147	14.651	15.108
11/05/94	0.521	0.016	0.508	0.597	15.116	0.077	14.930	15.348	0.529	0.021	0.519	0.615	15.107	0.078	14.980	15.272
11/06/94	0.434	0.067	0389	0.653	15.341	0.203	14.976	15.564	0.449	0.066	0.404	0.658	15.336	0.096	15.184	15.479
11/07/94	0.446	0.027	0.382	0.480	14.899	0.180	14.598	15.320	0.457	0.020	0.399	0.486	14.818	0.164	14.541	15.094
11/08/94	0.334	0.009	0.306	0.360	14.821	0.178	14.304	15.116	0.353	0.008	0.345	0.383	14.696	0.145	14.495	14.918
11/09/94	0.355	0.016	0.335	0.386	14.753	0.180	14.400	14.990	0.376	0.012	0.356	0.392	14.723	0.149	14.400	14.912
11/10/94	0.353	0.010	0.343	0.377	14.182	0.098	13.940	14.360	0.387	0.008	0.372	0.395	14.143	0.110	13.850	14.320
11/11/94	0.367	0.020	0.345	0.400	13.903	0.380	13.520	14.910	0.388	0.013	0.371	0.412	13.562	0.190	13.350	13.900
11/12/94	0.420	0.016	0.399	0.450	13.520	0.065	13.430	13.600	0.421	0.016	0.411	0.464	13.435	0.075	13.310	13.560
11/13/94	0.450	0.012	0.413	0.461	13.670	0.189	13.470	14.070	0.450	0.018	0.415	0.478	13.518	0.132	13.310	13.730
11/14/94	0.401	0.007	0.391	0.412	13.985	0.218	13.730	14.400	0.400	0.011	0.387	0.417	13.706	0.024	13.640	13.730
11/15/94	0.395	0.002	0.392	0.400	13.505	0.158	13.180	13.770	0.397	0.008	0.388	0.412	13.496	0.171	13.260	13.850
11/16/94	0.411	0.006	0.401	0.423	13.093	0.242	12.760	13.520	0.406	0.005	0.398	0.418	12.890	0.203	12.710	13.260
11/17/94	0.434	0.009	0.417	0.452	12.603	0.109	12.380	12.800	0.402	0.007	0.392	0.418	12.654	0.088	12.460	12.800
11/18/94	0.477	0.014	0.452	0.494	12.583	0.306	12.330	13.520	0.485	0.031	0.415	0.542	12.416	0.131	12.210	12.630
11/19/94	0.488	0.004	0.478	0.494	12.388	0.118	12.290	12.760	0.492	0.008	0.485	0.511	12.252	0.097	12.120	12.460
11/20/94	0.484	0.003	0.477	0.490	12.340	0.059	12.210	12.420	0.490	0.009	0.480	0.520	12.236	0.138	12.120	12.500
11/21/94	0.488	0.024	0.446	0.536	12.022	0.262	11.530	12.380	0.490	0.027	0.423	0.538	11.951	0.310	11.530	12.500

	Station 1A								Station 1B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
11/22/94	0.407	0.027	0.371	0.451	10.824	0.296	10.430	11.450	0.403	0.010	0.392	0.426	10.987	0.318	10.480	11.530
11/23/94	0.458	0.012	0.420	0.472	9.946	0.232	9.630	10.430	0.430	0.010	0.421	0.452	10.003	0.195	9.710	10.520
11/24/94	0.378	0.013	0.363	0.400	8.957	0.229	8.660	9.460	0.395	0.009	0.379	0.411	8.869	0.378	8.450	9.710
11/25/94	0.385	0.012	0.373	0.408	8.639	0.120	8.320	8.910	0.402	0.001	0.400	0.404	8.415	0.067	8.280	8.490
11/26/94	0.429	0.007	0.415	0.439	8.350	0.072	8.240	8.450	0.414	0.011	0.402	0.430	8.150	0.047	8.110	8.280
11/27/94	0.432	0.030	0.388	0.545	8.868	0.418	8.410	9.930	0.431	0.027	0.403	0.515	8.633	0.482	8.150	9.710
11/28/94	0.387	0.015	0.368	0.409	8.864	0.204	8.700	9.380	0.407	0.012	0.389	0.447	8.592	0.151	8.450	9.080
11/29/94	0.409	0.012	0.381	0.424	8.861	0.521	8.410	10.100	0.423	0.009	0.403	0.431	8.435	0.107	8.240	8.660
11/30/94	0.404	0.005	0.395	0.413	8.394	0.288	8.110	9.330	0.424	0.006	0.413	0.432	8.240	0.122	8.070	8.450
12/01/94	0.399	0.003	0.396	0.409	7.844	0.143	7.650	8.070	0.421	0.005	0.412	0.433	7.868	0.185	7.560	8.240
12/02/94	0.404	0.005	0.397	0.414	7.634	0.123	7.430	7.900	0.429	0.004	0.422	0.438	7.372	0.295	7.010	7.770
12/03/94	0.425	0.011	0.411	0.445	7.478	0.112	7.270	7.690	0.435	0.006	0.425	0.444	6.978	0.036	6.930	7.050
12/04/94	0.443	0.002	0.439	0.446	7.584	0.172	7.350	7.940	0.438	0.002	0.434	0.444	7.135	0.210	6.970	7.600
12/05/94	0.453	0.006	0.444	0.463	7.917	0.167	7.650	8.190	0.450	0.019	0.434	0.480	7.732	0.257	7.180	8.110
12/06/94	0.455	0.006	0.443	0.465	8.095	0.255	7.810	8.530	0.460	0.017	0.434	0.484	8.080	0.247	7.770	8.490
12/07/94	0.440	0.003	0.434	0.448	8.643	0.024	8.570	8.660	0.430	0.001	0.427	0.433	8.822	0.159	8.530	9.000
12/08/94	0.442	0.003	0.436	0.447	8.662	0.008	8.660	8.700	0.430	0.001	0.427	0.432	8.940	0.072	8.790	9.000
12/09/94	0.444	0.003	0.441	0.450	8.583	0.085	8.410	8.660	0.432	0.002	0.429	0.437	8.723	0.165	8.360	9.000
12/10/94	0.446	0.003	0.442	0.451	7.933	0.365	7.220	8.410	0.437	0.002	0.433	0.444	7.969	0.505	6.970	8.450
12/11/94	0.447	0.005	0.440	0.455	6.513	0.267	6.120	7.180	0.431	0.002	0.426	0.436	6.560	0.220	6.210	6.930
12/12/94	0.434	0.007	0.424	0.444	5.438	0.288	5.030	6.040	0.441	0.003	0.434	0.446	5.586	0.312	5.150	6.210
12/13/94	0.419	0.002	0.414	0.421	4.705	0.119	4.560	5.030	0.444	0.004	0.438	0.450	4.672	0.233	4.350	5.150
12/14/94	0.415	0.002	0.412	0.419	4.434	0.137	4.180	4.650	0.452	0.003	0.446	0.455	4.286	0.082	4.180	4.440
12/15/94	0.413	0.001	0.410	0.416	4.589	0.240	4.310	4.900	0.449	0.007	0.440	0.457	4.493	0.311	4.180	4.900
12/16/94	0.409	0.002	0.405	0.412	5.061	0.118	4.860	5.240	0.441	0.003	0.437	0.446	5.042	0.105	4.860	5.200
12/17/94	0.419	0.007	0.410	0.432	5.027	0.131	4.860	5.240	0.440	0.002	0.438	0.446	5.031	0.120	4.900	5.280
12/18/94	0.421	0.002	0.418	0.425	4.862	0.064	4.690	4.940	0.440	0.001	0.440	0.442	4.886	0.041	4.770	4.940
12/19/94	0.422	0.002	0.418	0.425	4.468	0.117	4.270	4.690	0.451	0.004	0.442	0.455	4.320	0.153	4.140	4.730
12/20/94	0.433	0.006	0.424	0.439	4.313	0.020	4.270	4.350	0.455	0.001	0.451	0.455	4.188	0.026	4.140	4.220
12/21/94	0.433	0.004	0.424	0.439	4.508	0.070	4.350	4.600	0.452	0.002	0.449	0.455	4.300	0.070	4.180	4.390
12/22/94	0.430	0.006	0.423	0.439	4.733	0.121	4.560	4.900	0.445	0.004	0.440	0.450	4.574	0.217	4.350	4.900
12/23/94	0.423	0.004	0.417	0.430	4.759	0.072	4.600	4.900	0.443	0.002	0.441	0.450	4.707	0.133	4.350	4.900
12/24/94	0.419	0.001	0.418	0.420	4.537	0.040	4.480	4.600	0.450	0.002	0.448	0.453	4.408	0.034	4.350	4.480
12/25/94	0.419	0.001	0.417	0.421	4.560	0.146	4.390	4.770	0.450	0.004	0.443	0.457	4.422	0.193	4.220	4.690
12/26/94	0.418	0.001	0.416	0.420	4.515	0.158	4.310	4.770	0.451	0.004	0.443	0.455	4.372	0.192	4.140	4.690
12/27/94	0.417	0.002	0.414	0.420	4.313	0.170	4.050	4.600	0.452	0.002	0.449	0.455	4.207	0.124	3.930	4.440
12/28/94	0.415	0.001	0.413	0.418	4.371	0.217	4.100	4.690	0.450	0.003	0.443	0.455	4.283	0.183	3.930	4.650
12/29/94	0.418	0.002	0.414	0.422	4.575	0.153	4.390	4.820	0.450	0.005	0.443	0.454	4.407	0.203	4.220	4.690
12/30/94	0.423	0.002	0.418	0.425	4.560	0.134	4.350	4.770	0.449	0.003	0.443	0.454	4.412	0.171	4.180	4.690
12/31/94	0.430	0.003	0.425	0.435	4.728	0.032	4.690	4.770	0.445	0.002	0.443	0.447	4.648	0.045	4.560	4.690
01/01/95	0.435	0.001	0.431	0.438	4.564	0.187	4.180	4.770	0.448	0.004	0.443	0.455	4.452	0.185	4.140	4.690
01/02/95	0.447	0.005	0.438	0.454	4.002	0.108	3.800	4.180	0.451	0.002	0.447	0.456	3.993	0.156	3.760	4.220
01/03/95	0.458	0.001	0.455	0.460	3.381	0.144	3.210	3.720	0.470	0.017	0.453	0.500	3.473	0.116	3.290	3.720

Note: N.A. indicates data not available.

	Station 2A								Station 2B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
05/23/93	1.091	0.007	1.081	1.100	26.372	0.602	25.771	27.330	1.115	0.004	1.108	1.121	26.249	0.564	25.643	27.240
05/24/93	1.082	0.007	1.072	1.094	26.174	0.849	25.131	27.712	1.104	0.009	1.095	1.119	26.010	0.826	24.926	27.421
05/25/93	1.058	0.006	1.046	1.073	25.748	0.799	24.674	26.995	1.075	0.009	1.061	1.096	25.570	0.831	24.388	26.842
05/26/93	1.021	0.010	1.007	1.045	24.869	0.648	23.409	25.778	1.033	0.012	1.010	1.061	24.652	0.680	23.227	25.672
05/27/93	1.012	0.009	0.999	1.028	23.077	0.894	21.760	24.641	1.015	0.012	0.990	1.035	22.947	0.845	21.411	24.375
05/28/93	1.018	0.018	0.995	1.046	23.215	1.217	21.592	25.183	1.014	0.020	0.984	1.043	23.069	1.199	21.342	24.976
05/29/93	1.055	0.004	1.047	1.063	23.910	1.155	22.355	25.566	1.053	0.005	1.045	1.061	23.762	1.099	22.284	25.368
05/30/93	1.057	0.009	1.043	1.076	24.462	0.797	23.588	25.789	1.049	0.009	1.038	1.074	24.313	0.841	23.395	25.969
05/31/93	1.081	0.009	1.060	1.093	25.247	1.108	23.930	26.881	1.068	0.012	1.043	1.081	25.132	1.126	23.825	26.781
06/01/93	1.015	0.024	0.981	1.053	26.772	1.189	25.363	28.624	0.997	0.025	0.965	1.042	26.610	1.168	25.227	28.482
06/02/93	0.982	0.015	0.950	1.004	25.017	0.970	23.388	26.675	0.961	0.015	0.934	0.983	24.866	0.991	23.267	26.586
06/03/93	0.998	0.008	0.976	1.006	22.307	0.422	21.450	23.218	0.975	0.006	0.960	0.982	22.288	0.430	21329	23.098
06/04/93	0.956	0.006	0.944	0.967	22.863	1.355	21.191	24.952	0.938	0.007	0.929	0.953	22.747	1.359	21.081	24.677
06/05/93	0.988	0.010	0.969	1.004	25.191	1.468	23.263	27.155	0.956	0.009	0.939	0.969	25.159	1.492	23.201	27.098
06/06/93	0.975	0.015	0.953	0.994	27.244	1.192	25.806	28.967	0.942	0.016	0.917	0.963	27.205	1.145	25.755	28.879
06/07/93	0.964	0.007	0.953	0.974	28.114	0.994	26.899	29.690	0.943	0.016	0.918	0.971	28.145	1.075	26.817	29.909
06/08/93	0.955	0.014	0.926	0.974	27.630	0.419	26.587	28.282	0.962	0.012	0.936	0.977	27.890	0.413	26.718	28.532
06/09/93	0.924	0.004	0.918	0.930	25.220	0.560	24.160	26.376	0.927	0.003	0.920	0.933	25.500	0.552	24.463	26.668
06/10/93	0.935	0.009	0.917	0.948	24.233	0.608	23.483	25.287	0.939	0.007	0.926	0.949	24.480	0.613	23.697	25.551
06/11/93	0.965	0.007	0.953	0.984	25.409	1.300	23.758	27.261	0.965	0.007	0.953	0.978	25.640	1.310	23.974	27.517
06/12/93	0.979	0.006	0.971	0.991	27.130	1.276	25.473	28.974	0.979	0.004	0.974	0.986	27.352	1.285	25.738	29.192
06/13/93	0.972	0.007	0.962	0.984	27.909	0.906	26.723	29.378	0.974	0.006	0.963	0.983	28.161	0.903	26.992	29.727
06/14/93	0.964	0.004	0.956	0.970	28.615	1.142	27.126	30.420	0.964	0.004	0.958	0.971	28.872	1.139	27.397	30.682
06/15/93	0.962	0.004	0.955	0.971	29.313	1.089	27.870	31.072	0.961	0.004	0.954	0.971	29.569	1.090	28.142	31.345
06/16/93	0.968	0.008	0.956	0.982	29.899	1.000	28.612	31.526	0.970	0.008	0.957	0.983	30.136	1.004	28.926	31.791
06/17/93	0.951	0.008	0.938	0.971	30.288	1.056	28.934	31.929	0.952	0.010	0.940	0.976	30.546	1.066	29.160	32.245
06/18/93	0.928	0.016	0.904	0.952	30.699	0.783	29.677	32.001	0.929	0.017	0.901	0.950	30.945	0.775	29.956	32.179
06/19/93	0.944	0.018	0.916	0.984	30.805	0.924	29.540	32.274	0.940	0.019	0.909	0.977	31.051	0.924	29.730	32.465
06/20/93	0.949	0.020	0.926	0.984	31.261	0.860	30.283	32.977	0.952	0.020	0.928	0.982	31.505	0.853	30.555	33.299
06/21/93	0.920	0.014	0.898	0.937	31.404	0.984	30.096	32.959	0.924	0.014	0.900	0.939	31.678	0.974	30.409	33.233
06/22/93	0.924	0.009	0.906	0.939	31.508	0.747	30.458	32.813	0.926	0.011	0.903	0.943	31.783	0.753	30.694	33.220
06/23/93	0.959	0.020	0.925	0.983	30.769	0.795	29.369	32.166	0.958	0.021	0.927	0.984	31.062	0.778	29.608	32.404
06/24/93	0.959	0.011	0.944	0.978	27.448	0.868	25.932	29.238	0.959	0.013	0.941	0.980	27.818	0.875	26.263	29.608
06/25/93	0.985	0.011	0.966	1.002	26.695	1.184	25.037	28.500	0.981	0.012	0.960	1.001	26.977	1.192	25.368	28.782
06/26/93	0.940	0.031	0.875	0.977	26.108	0.641	24.980	27.252	0.938	0.033	0.872	0.997	26.415	0.642	25.264	27.547
06/27/93	0.950	0.009	0.936	0.964	26.517	1.119	24.962	28.336	0.948	0.010	0.930	0.963	26.817	1.122	25.298	28.622
06/28/93	0.952	0.009	0.939	0.966	27.867	1.340	26.255	29.969	0.950	0.008	0.937	0.965	28.129	1.366	26.462	30.217
06/29/93	0.946	0.007	0.938	0.964	28.293	0.949	26.998	29.741	0.946	0.009	0.936	0.965	28.564	0.927	27.337	30.031
06/30/93	0.953	0.016	0.936	0.985	28.716	1.173	27.148	30.649	0.955	0.018	0.938	0.992	28.880	1.171	27.309	30.794
07/01/93	0.981	0.007	0.970	0.994	29.459	1.287	27.754	31.595	0.992	0.008	0.979	1.010	29.603	1.259	27.939	31.646
07/02/93	0.984	0.008	0.974	0.996	29.548	0.748	28.699	30.892	1.002	0.006	0.994	1.012	29.705	0.737	28.880	31.058
07/03/93	0.965	0.010	0.952	0.981	29.182	1.000	27.914	30.954	0.987	0.009	0.974	1.003	29.319	0.971	28.157	31.014
07/04/93	0.953	0.017	0.937	0.982	30.346	1.264	28.780	32.281	0.973	0.019	0.952	1.005	30.451	1.250	28.921	32.376
07/05/93	0.928	0.008	0.917	0.943	31.085	1.063	29.685	32.926	0.947	0.009	0.932	0.962	31.191	1.075	29.811	32.926
07/06/93	0.920	0.010	0.905	0.935	31.323	0.989	30.211	33.203	0.940	0.011	0.925	0.956	31.412	0.939	30.361	33.098
07/07/93	0.942	0.020	0.916	0.978	30.724	0.736	29.789	32.249	0.951	0.011	0.937	0.980	30.810	0.751	29.744	32.430
07/08/93	0.983	0.008	0.963	0.991	29.442	0.758	28.244	30.835	0.982	0.007	0.964	0.990	29.467	0.763	28.234	30.819
07/09/93	0.989	0.005	0.981	0.996	28.333	0.824	27.137	29.750	0.987	0.005	0.980	0.995	28.385	0.861	27.163	29.901
07/10/93	0.957	0.019	0.923	0.986	28.537	1.183	26.943	30.354	0.967	0.011	0.955	0.988	28.545	1.195	26.955	30.317
07/11/93	0.956	0.015	0.933	0.985	28.905	1.117	27.338	30.759	0.983	0.019	0.958	1.012	28.961	1.164	27.424	30.829
07/12/93	0.912	0.061	0.792	0.969	29.233	1.078	27.654	31.026	0.984	0.013	0.968	1.010	29.255	1.110	27.724	31.081
07/13/93	0.871	0.030	0.826	0.968	29.965	0.953	28.690	31.511	0.972	0.016	0.950	0.995	29.961	1.032	28.605	31.510
07/14/93	0.960	0.012	0.932	0.977	30.623	0.897	29.518	32.257	0.977	0.012	0.962	0.996	30.648	1.006	29.402	32.574
07/15/93	0.959	0.012	0.937	0.974	30.613	0.886	29.513	32.236	0.948	0.027	0.907	0.981	30.560	1.017	29.066	32.358
07/16/93	0.987	0.034	0.940	1.047	30.425	0.594	29.753	31.750	0.939	0.025	0.912	0.984	30.359	0.674	29.580	31.771
07/17/93	1.056	0.005	1.044	1.062	30.063	0.710	29.059	31.273	0.973	0.015	0.943	0.993	29.874	0.813	28.824	31.315
07/18/93	1.074	0.028	1.038	1.122	30.172	0.701	29.299	31.339	0.978	0.033	0.939	1.038	29.929	0.791	28.998	31.229
07/19/93	1.110	0.024	1.050	1.133	30.735	0.989	29.486	32.382	1.046	0.007	1.036	1.061	30.506	1.127	29.161	32.423
07/20/93	1.105	0.005	1.093	1.111	31.015	0.647	30.278	32.285	1.050	0.012	1.034	1.069	30.784	0.678	30.016	32.167
07/21/93	1.096	0.038	0.989	1.115	30.097	0.461	29.257	30.918	1.008	0.021	0.977	1.041	29.682	0.512	28.842	30.571
07/22/93	0.995	0.010	0.976	1.007	29.367	0.618	28.387	30.357	0.932	0.057	0.863	0.995	28.961	0.670	27.913	29.945

	Station 2A								Station 2B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
07/23/93	0.996	0.014	0.981	1.028	29.518	0.868	28.247	30.930	0.874	0.012	0.860	0.902	29.034	0.881	27.747	30.239
07/24/93	1.002	0.045	0.947	1.055	29.775	0.756	28.736	31.050	0.924	0.007	0.907	0.935	29.210	0.760	28.171	30333
07/25/93	0.955	0.011	0.936	0.967	30.257	0.812	29.186	31.622	0.917	0.013	0.893	0.933	29.670	0.863	28.515	31.136
07/26/93	0.953	0.012	0.935	0.969	29.354	0.734	27.732	30.368	0.944	0.012	0.912	0.959	28.951	0.681	27.684	30.161
07/27/93	0.997	0.018	0.968	1.025	27.032	0.579	25.873	28.132	0.971	0.017	0.948	0.994	27.003	0.553	25.896	27.820
07/28/93	0.985	0.011	0.967	1.004	26.322	0.978	25.021	28.087	0.966	0.015	0.942	0.986	26.322	0.979	25.016	27.950
07/29/93	0.986	0.014	0.957	1.013	26.489	0.924	25.062	28.008	0.974	0.015	0.953	1.000	26.540	1.000	25.099	28.061
07/30/93	0.995	0.030	0.960	1.044	26.609	0.616	25.833	27.593	0.989	0.032	0.952	1.036	26.671	0.591	25.841	27.840
07/31/93	0.990	0.045	0.920	1.047	26.922	0.971	25.744	28.519	1.026	0.009	1.011	1.037	27.049	0.992	25.834	28.677
08/01/93	0.971	0.015	0.943	0.998	27.438	1.043	26.085	29.242	1.033	0.009	1.014	1.053	27.633	1.098	26.287	29.639
08/02/93	0.974	0.009	0.960	0.987	28.077	0.878	27.066	29.669	0.966	0.030	0.931	1.029	28.374	0.873	27380	29.882
08/03/93	0.969	0.021	0.920	0.991	28.507	0.964	27.196	30.052	0.934	0.017	0.916	0.976	28.869	0.971	27.623	30.425
08/04/93	0.969	0.005	0.958	0.979	28.572	0.598	27.829	29.597	0.929	0.029	0.900	0.978	29.029	0.634	28.244	30.205
08/05/93	0.949	0.024	0.913	0.982	27.159	0.858	25.520	28.535	0.926	0.017	0.905	0.955	27.766	0.774	26.231	28.970
08/06/93	0.949	0.014	0.919	0.975	25.692	0.974	24.249	27.316	0.948	0.023	0.930	0.996	26.315	0.985	24.851	28.243
08/07/93	0.956	0.034	0.903	0.994	26.274	1.162	24.710	28.127	0.966	0.015	0.926	0.991	26.977	1.204	25.394	28.946
08/08/93	0.981	0.016	0.950	1.012	27.317	1.123	25.862	29.008	0.975	0.006	0.968	0.988	28.047	1.161	26.605	29.789
08/09/93	0.974	0.044	0.896	1.023	28.835	1.520	26.751	31.000	0.970	0.026	0.921	0.994	28.990	1.008	27.649	30.620
08/10/93	0.910	0.028	0.874	0.989	29.629	0.736	28.550	31.090	0.930	0.029	0.882	1.016	29.028	0.864	27.790	30.670
08/11/93	0.978	0.056	0.862	1.036	30.034	0.590	29.400	31.300	0.999	0.059	0.878	1.057	29.362	0.743	28.550	30.880
08/12/93	1.013	0.023	0.979	1.050	29.794	0.715	28.760	31.340	1.038	0.016	1.018	1.069	29.092	0.890	27.920	30.920
08/13/93	1.042	0.008	1.022	1.053	30.065	0.764	28.930	31.510	1.059	0.015	1.035	1.082	29.380	0.978	28.090	31.130
08/14/93	1.000	0.012	0.982	1.022	29.510	0.595	28.170	30.500	1.020	0.012	1.001	1.039	28.631	0.684	27.160	29.740
08/15/93	1.001	0.006	0.988	1.010	27.438	0.730	26.230	28.680	1.010	0.006	1.000	1.021	26.756	0.809	25.600	28.220
08/16/93	0.981	0.013	0.953	0.996	27.219	1.042	25.680	28.850	0.983	0.010	0.962	1.000	26.576	1.110	25.050	28340
08/17/93	0.955	0.016	0.918	0.978	27.839	1.092	26.230	29.400	0.960	0.011	0.936	0.974	27.143	1.149	25.600	28.980
08/18/93	0.938	0.014	0.912	0.963	28.661	0.976	27.160	30.030	0.951	0.007	0.941	0.964	27.983	1.070	26.480	29.610
08/19/93	0.958	0.020	0.925	0.985	28.739	0.416	28.000	29.520	0.962	0.015	0.940	0.993	27.964	0.530	27.290	28.890
08/20/93	0.953	0.022	0.918	0.985	27.303	0.475	26.190	28.170	0.923	0.024	0.879	0.958	26.584	0.406	25.600	27.160
08/21/93	0.896	0.011	0.875	0.917	26.449	0.825	25.090	27.620	0.865	0.006	0.855	0.876	25.853	0.783	24.750	27.120
08/22/93	0.940	0.018	0.906	0.967	26.859	0.947	25.550	28.300	0.916	0.023	0.875	0.940	26.216	0.908	25.010	27.710
08/23/93	0.989	0.025	0.950	1.024	27.220	0.706	26.100	28.260	0.964	0.025	0.931	1.010	26.555	0.731	25.550	27.710
08/24/93	1.028	0.008	1.007	1.039	27.624	1.002	26.230	29.100	1.021	0.007	1.008	1.036	26.937	1.045	25.600	28.640
08/25/93	1.033	0.012	1.008	1.048	28.475	1.032	26.990	30.160	1.041	0.006	1.029	1.049	27.733	1.141	26.270	29.650
08/26/93	1.009	0.013	0.987	1.027	28.806	0.527	28.050	29.650	1.033	0.007	1.020	1.043	27.954	0.628	27.080	28.930
08/27/93	0.968	0.014	0.944	0.988	29.160	0.911	27.920	30.670	1.004	0.009	0.991	1.023	28.387	1.031	27.120	30.120
08/28/93	0.939	0.012	0.918	0.953	29.653	0.788	28.550	31.090	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
08/29/93	0.925	0.006	0.909	0.934	27.706	0.733	26.270	29.270	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
08/30/93	0.940	0.006	0.926	0.949	26.243	0.656	25.170	27.290	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
08/31/93	0.924	0.027	0.877	0.951	26.127	0.418	25.430	26.990	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/01/93	0.949	0.057	0.885	1.032	23.392	1.066	21.460	25.130	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/02/93	1.051	0.006	1.039	1.063	21.607	0.902	20.270	23.060	1.073	0.004	1.064	1.081	22.998	0.994	21.559	24.710
09/03/93	1.032	0.012	1.017	1.059	22.540	1.246	21.160	24.670	1.057	0.010	1.043	1.077	24.110	1.267	22.640	26.126
09/04/93	1.065	0.014	1.037	1.097	22.746	0.777	21.880	24.120	1.089	0.016	1.063	1.123	24.525	0.748	23.636	25.902
09/05/93	1.093	0.012	1.066	1.107	23.097	0.704	22.300	23.990	1.122	0.013	1.096	1.140	24.943	0.631	24.122	25.795
09/06/93	1.014	0.028	0.981	1.076	24.510	0.996	23.270	26.100	1.050	0.027	1.016	1.104	26.319	0.999	25.112	27.926
09/07/93	0.994	0.010	0.980	1.012	24.787	0.873	23.610	26.360	1.033	0.013	1.015	1.050	26.657	0.892	25.388	28.147
09/08/93	0.974	0.020	0.951	1.013	25.025	0.963	23.820	26.650	1.016	0.021	0.991	1.054	26.923	0.966	25.662	28.513
09/09/93	0.942	0.024	0.912	0.978	25.504	1.016	24.160	27.240	0.986	0.023	0.957	1.022	27.468	1.015	26.192	29.123
09/10/93	0.911	0.016	0.888	0.935	25.993	0.951	24.790	27.620	0.959	0.016	0.939	0.984	28.029	0.983	26.756	29.697
09/11/93	0.889	0.014	0.867	0.907	26.518	0.953	25.300	28.090	0.931	0.030	0.856	0.964	28.611	0.927	27.412	30.143
09/12/93	0.900	0.013	0.879	0.923	26.728	0.793	25.680	28.000	0.916	0.012	0.902	0.942	28.869	0.797	27.852	30.203
09/13/93	0.922	0.020	0.896	0.954	26.862	0.801	25.890	28.260	0.940	0.006	0.932	0.957	28.619	0.799	27.497	30.474
09/14/93	0.945	0.004	0.937	0.953	26.928	0.838	25.926	28.472	0.947	0.005	0.934	0.957	27.822	0.874	26.490	29.272
09/15/93	0.945	0.002	0.941	0.949	26.707	0.754	25.845	28.061	0.953	0.005	0.941	0.961	27.621	0.722	26.477	28.815
09/16/93	0.952	0.006	0.937	0.962	25.872	0.432	25.160	26.623	0.961	0.006	0.943	0.970	26.718	0.407	26.099	27.361
09/17/93	0.944	0.017	0.914	0.967	25.123	0.626	24.243	26.162	0.958	0.022	0.922	0.985	25.827	0.664	24.826	26.949
09/18/93	0.940	0.022	0.915	0.977	24.195	0.695	23.271	25.528	0.951	0.023	0.920	0.995	24.816	0.723	23.739	26.146
09/19/93	0.967	0.006	0.955	0.979	23.707	0.808	22.520	25.157	0.988	0.007	0.976	1.009	24.203	0.924	22.596	25.713
09/20/93	0.958	0.017	0.942	0.993	23.588	0.834	22.439	25.035	0.980	0.012	0.965	1.010	23.992	0.945	22.628	25.470
09/21/93	0.948	0.013	0.929	0.977	23.437	0.666	22.481	24.614	0.957	0.032	0.900	1.003	23.840	0.737	22.505	25.088

	Station 2A								Station 2B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
09/22/93	0.940	0.004	0.930	0.947	22.485	0.595	21.197	23.181	0.937	0.006	0.923	0.947	22.737	0.603	21.455	23.639
09/23/93	0.907	0.013	0.891	0.928	20.851	0.523	20.224	21.873	0.914	0.012	0.899	0.938	21.093	0.534	20.390	22.166
09/24/93	0.863	0.016	0.842	0.898	19.804	0.240	19.413	20.306	0.871	0.016	0.851	0.905	20.109	0.246	19.568	20.503
09/25/93	0.904	0.025	0.876	0.947	18.887	0.287	18.266	19.369	0.920	0.026	0.891	0.960	19.045	0.281	18.495	19.560
09/26/93	0.961	0.016	0.940	0.990	18.099	0.236	17.710	18.562	0.981	0.018	0.957	1.010	18.247	0.261	17.852	18.747
09/27/93	0.927	0.010	0.915	0.952	17.609	0.377	17.157	18.505	0.954	0.008	0.944	0.978	17.778	0.357	17.427	18.644
09/28/93	0.912	0.009	0.893	0.925	17.979	0.829	16.941	19.308	0.945	0.008	0.931	0.957	18.117	0.797	17.075	19.391
09/29/93	0.923	0.019	0.891	0.964	18.843	0.949	17.613	20.311	0.959	0.019	0.934	0.997	18.960	0.945	17.692	20.518
09/30/93	0.979	0.011	0.964	1.000	20.087	1.060	18.827	21.744	1.018	0.011	1.001	1.036	20.247	1.075	18.950	21.855
10/01/93	0.972	0.007	0.962	0.984	21.530	0.892	20.430	22.997	1.017	0.007	1.006	1.030	21.670	0.875	20.587	22.982
10/02/93	0.922	0.027	0.892	0.961	22.589	0.855	21.473	24.011	0.965	0.031	0.929	1.008	22.732	0.820	21.623	24.159
10/03/93	0.953	0.033	0.906	0.995	22.448	0.498	21.631	23.364	0.987	0.031	0.939	1.027	22.584	0.501	21.651	23.427
10/04/93	1.003	0.008	0.991	1.015	21.087	0.442	20.274	21.837	1.035	0.008	1.023	1.048	21.208	0.447	20.408	21.934
10/05/93	1.030	0.031	0.991	1.083	20.226	0.605	19.422	21.330	1.055	0.019	1.035	1.086	20.154	0.468	19.514	20.991
10/06/93	1.044	0.010	1.021	1.067	20.608	0.653	19.714	21.646	1.092	0.011	1.078	1.113	20.013	0.607	19.256	21.119
10/07/93	1.012	0.008	0.995	1.028	20.876	0.469	20.279	21.620	1.123	0.013	1.103	1.141	19.978	0.514	19.295	20.885
10/08/93	0.981	0.026	0.922	1.013	20.057	0.618	18.839	20.682	1.160	0.013	1.137	1.178	19.000	0.675	17.693	19.762
10/09/93	0.893	0.021	0.854	0.920	18.423	0.409	17.730	19.253	1.140	0.008	1.131	1.155	17.171	0.431	16.542	17.937
10/10/93	0.845	0.012	0.816	0.865	17.587	0.368	16.905	18.169	N.A.	N.A.	N.A.	N.A.	13.153	2.533	8.730	16.489
10/11/93	0.851	0.011	0.831	0.864	16.656	0.455	15.911	17.384	N.A.	N.A.	N.A.	N.A.	10.206	2.753	6.322	13.979
10/12/93	0.887	0.018	0.865	0.919	16.509	0.448	15.847	17.060	N.A.	N.A.	N.A.	N.A.	11.522	3.893	6.533	18.120
10/13/93	0.940	0.025	0.908	0.995	16.410	0.286	15.886	16.955	N.A.	N.A.	N.A.	N.A.	11.246	1.585	8.416	14.753
10/14/93	0.981	0.011	0.963	0.999	15.964	0.357	15.457	16.631	N.A.	N.A.	N.A.	N.A.	11.706	2.135	7.250	15.277
10/15/93	0.968	0.006	0.954	0.981	16.545	0.497	15.815	17.156	N.A.	N.A.	N.A.	N.A.	13.995	2.672	9.716	19.116
10/16/93	0.965	0.010	0.947	0.981	17.857	1.054	16.509	19.332	N.A.	N.A.	N.A.	N.A.	15.396	4.578	9.715	22.899
10/17/93	1.011	0.016	0.984	1.037	18.711	0.277	18.217	19.138	N.A.	N.A.	N.A.	N.A.	14.446	1.884	11.798	18.918
10/18/93	0.980	0.018	0.948	1.007	18.323	0.210	17.754	18.618	N.A.	N.A.	N.A.	N.A.	13.413	1.099	12.029	15.849
10/19/93	0.946	0.010	0.922	0.972	18.502	0.607	17.793	19.680	N.A.	N.A.	N.A.	N.A.	16.865	2.888	12.766	20.595
10/20/93	0.913	0.005	0.906	0.925	18.805	0.677	17.974	20.087	0.913	0.006	0.904	0.920	18.979	0.669	18.124	20.366
10/21/93	0.926	0.012	0.913	0.946	18.529	0.497	17.781	19.386	0.932	0.014	0.917	0.955	18.743	0.500	17.920	19.571
10/22/93	0.929	0.008	0.919	0.948	18.777	0.699	17.848	19.951	0.940	0.006	0.932	0.958	18.988	0.691	18.006	20.247
10/23/93	0.955	0.006	0.944	0.971	18.642	0.521	17.995	19.678	0.972	0.007	0.962	0.990	18.896	0.520	18.221	19.833
10/24/93	0.981	0.005	0.974	0.992	17.229	0.496	16.097	17.889	1.007	0.008	0.995	1.020	17.492	0.506	16.331	18.145
10/25/93	0.982	0.007	0.970	0.992	15.158	0.559	14.134	15.966	1.019	0.006	1.006	1.033	15.361	0.620	14.433	16.384
10/26/93	0.981	0.017	0.956	1.004	13.877	0.550	13.065	14.960	0.997	0.009	0.975	1.013	14.107	0.482	13.509	15.037
10/27/93	0.995	0.011	0.983	1.011	13.441	0.660	12.622	14.727	0.979	0.017	0.960	1.019	13.613	0.579	12.823	14.709
10/28/93	1.022	0.010	1.005	1.037	13.392	0.744	12.431	14.744	1.010	0.014	0.983	1.030	13.505	0.636	12.719	14.732
10/29/93	1.011	0.005	0.998	1.017	13.688	0.708	12.788	14.891	1.005	0.007	0.996	1.026	13.596	0.709	12.651	14.874
10/30/93	0.988	0.005	0.979	0.998	14.291	0.782	13.225	15.417	0.975	0.009	0.957	0.992	14.164	0.770	13.173	15.266
10/31/93	0.997	0.017	0.978	1.032	14.765	0.557	13.697	15.817	0.996	0.013	0.978	1.017	14.579	0.568	13.533	15.634
11/01/93	1.017	0.012	0.993	1.033	12.974	0.469	12.194	13.736	1.006	0.012	0.977	1.024	12.854	0.436	12.105	13.570
11/02/93	0.989	0.006	0.980	1.002	12.463	0.551	11.725	13.449	0.976	0.015	0.951	1.000	12.236	0.521	11.449	13.253
11/03/93	0.971	0.005	0.964	0.981	13.515	0.694	12.510	14.388	0.963	0.010	0.952	0.982	13.189	0.680	12.204	13.919
11/04/93	0.945	0.019	0.911	0.970	15.607	0.566	14.477	16.152	0.928	0.016	0.899	0.951	15.220	0.536	14.126	15.751
11/05/93	0.787	0.111	0.624	0.918	16.126	0.182	15.782	16.590	0.785	0.107	0.626	0.911	15.704	0.198	15.384	16.216
11/06/93	0.787	0.014	0.769	0.810	15.378	0.363	14.699	16.019	0.248	0.287	0.049	0.785	13.315	2.070	9.029	15.344
11/07/93	0.850	0.027	0.811	0.892	14.481	0.396	13.931	15.275	0.061	0.015	0.015	0.079	11.996	1.917	8.422	14.813
11/08/93	0.900	0.005	0.893	0.910	14.570	0.669	13.658	15.381	0.304	0.392	0.015	0.916	13.059	3.820	-0.068	16.991
11/09/93	0.878	0.025	0.844	0.914	15.437	0.283	14.870	15.880	0.897	0.025	0.863	0.933	15.667	0.256	15.064	16.078
11/10/93	0.835	0.006	0.826	0.849	13.462	0.698	12.160	14.740	0.854	0.007	0.841	0.869	13.654	0.713	12.351	14.934
11/11/93	0.846	0.009	0.838	0.870	11.957	0.445	11.150	12.800	0.865	0.014	0.849	0.900	12.079	0.354	11.537	12.894
11/12/93	0.905	0.009	0.877	0.915	12.511	0.306	12.040	12.880	0.931	0.009	0.910	0.945	12.662	0.326	11.998	13.001
11/13/93	0.890	0.015	0.866	0.909	13.762	0.680	12.880	14.660	0.917	0.015	0.893	0.935	13.924	0.682	12.994	14.808
11/14/93	0.867	0.008	0.846	0.880	14.821	0.202	14.450	15.330	0.893	0.007	0.878	0.905	15.020	0.214	14.633	15.345
11/15/93	0.822	0.010	0.808	0.844	13.879	0.480	12.930	14.530	0.856	0.012	0.843	0.878	14.019	0.527	13.048	14.870
11/16/93	0.870	0.013	0.837	0.891	12.200	0.399	11.620	12.880	0.900	0.013	0.879	0.922	12.335	0.409	11.683	13.039
11/17/93	0.885	0.032	0.847	0.937	11.823	0.159	11.530	12.080	0.922	0.030	0.887	0.973	11.883	0.164	11.663	12.177
11/18/93	0.919	0.017	0.883	0.939	11.698	0.427	11.070	12.500	0.956	0.019	0.920	0.981	11.790	0.445	11.158	12.634
11/19/93	0.865	0.009	0.850	0.881	11.872	0.322	11.490	12.500	0.905	0.008	0.891	0.916	11.913	0.267	11.529	12.403
11/20/93	0.898	0.028	0.787	0.929	11.933	0.281	11.530	12.330	0.937	0.030	0.820	0.969	12.007	0.272	11.592	12.389
11/21/93	0.837	0.045	0.739	0.881	11.443	0.345	10.770	12.120	0.872	0.049	0.761	0.920	11.499	0.339	10.812	12.094

	Station 2A								Station 2B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
11/22/93	0.892	0.004	0.882	0.900	9.624	0.415	8.700	10.480	0.926	0.007	0.913	0.939	9.793	0.478	8.729	10.641
11/23/93	0.893	0.011	0.878	0.910	8.385	0.322	7.980	9.080	0.932	0.008	0.919	0.945	8.380	0.394	7.624	9.062
11/24/93	0.903	0.011	0.888	0.921	8.090	0.399	7.520	8.870	0.942	0.009	0.929	0.956	8.006	0.594	6.772	8.878
11/25/93	0.904	0.014	0.877	0.919	8.823	0.376	8.240	9.330	0.943	0.016	0.914	0.962	8.850	0.342	8.411	9.335
11/26/93	0.838	0.020	0.811	0.876	9.280	0.128	9.040	9.630	0.875	0.019	0.856	0.914	9.298	0.057	9.199	9.365
11/27/93	0.830	0.022	0.802	0.871	10.207	0.811	9.250	11.450	0.867	0.019	0.840	0.901	10.302	0.820	9.267	11.460
11/28/93	0.845	0.026	0.805	0.883	9.948	0.186	9.590	10.180	0.856	0.020	0.820	0.899	10.022	0.234	9.680	10.485
11/29/93	0.871	0.007	0.861	0.890	8.994	0.355	8.450	9.590	0.843	0.017	0.823	0.878	8.833	0.263	8.530	9.290
11/30/93	0.900	0.006	0.890	0.912	8.643	0.380	8.110	9.380	0.887	0.007	0.877	0.898	8.595	0.315	8.030	9.120
12/01/93	0.927	0.010	0.909	0.940	8.194	0.334	7.600	8.740	0.918	0.008	0.899	0.928	7.877	0.392	7.350	8.740
12/02/93	0.925	0.006	0.911	0.939	7.985	0.410	7.310	8.530	0.914	0.008	0.895	0.930	7.754	0.413	7.270	8.530
12/03/93	0.940	0.010	0.928	0.966	8.756	0.389	8.240	9.250	0.929	0.007	0.918	0.944	8.639	0.629	7.860	9.380
12/04/93	0.898	0.023	0.854	0.931	10.132	0.692	9.250	11.110	0.877	0.034	0.825	0.920	10.192	0.760	9.210	11.150
12/05/93	0.939	0.034	0.870	0.987	11.235	0.100	11.110	11.400	0.922	0.030	0.863	0.955	11.260	0.187	10.900	11.620
12/06/93	0.895	0.021	0.876	0.953	11.280	0.083	11.150	11.400	0.884	0.015	0.866	0.923	11.227	0.075	11.110	11.400
12/07/93	0.956	0.014	0.922	0.973	10.900	0.260	10.260	11.240	0.941	0.011	0.914	0.956	10.776	0.402	9.880	11.240
12/08/93	0.901	0.016	0.872	0.928	9.360	0.262	8.950	9.930	0.889	0.017	0.845	0.911	9.019	0.369	8.530	9.930
12/09/93	0.881	0.025	0.850	0.922	8.588	0.317	7.810	8.910	0.867	0.030	0.829	0.911	8.106	0.291	7.650	8.530
12/10/93	0.956	0.019	0.922	0.990	6.923	0.492	5.960	7.810	0.948	0.018	0.920	0.983	6.925	0.430	6.040	7.430
12/11/93	0.981	0.016	0.952	0.997	4.678	0.544	3.670	5.620	0.968	0.021	0.937	1.005	4.598	0.339	3.970	5.200
12/12/93	0.956	0.022	0.932	0.994	3.497	0.211	3.170	3.930	0.935	0.029	0.901	0.999	3.648	0.284	3.210	4.220
12/13/93	0.992	0.007	0.972	1.002	3.718	0.331	3.250	4.140	0.978	0.015	0.953	1.004	3.776	0.480	3.170	4.520
12/14/93	0.956	0.004	0.949	0.968	3.896	0.315	3.290	4.440	0.939	0.013	0.919	0.960	4.105	0.418	3.510	4.770
12/15/93	0.986	0.024	0.950	1.021	5.104	0.691	4.140	6.080	0.971	0.031	0.919	1.008	5.248	0.394	4.690	5.960
12/16/93	0.943	0.023	0.899	0.983	6.506	0.526	5.490	7.050	0.939	0.030	0.889	0.994	5.991	0.620	5.200	6.930
12/17/93	0.970	0.007	0.951	0.979	6.429	0.502	5.790	7.390	0.962	0.011	0.942	0.977	6.390	0.363	5.700	7.010
12/18/93	0.962	0.008	0.947	0.981	5.975	0.374	5.450	6.880	0.965	0.013	0.935	0.987	5.535	0.441	4.820	6.420
12/19/93	0.966	0.016	0.947	0.989	5.250	0.420	4.650	6.250	0.959	0.019	0.931	0.996	5.120	0.340	4.690	5.620
12/20/93	0.990	0.011	0.965	1.002	5.801	0.539	5.150	6.460	0.985	0.010	0.962	1.002	5.575	0.208	5.410	5.960
12/21/93	0.912	0.018	0.889	0.956	6.733	0.425	6.120	7.270	0.899	0.026	0.871	0.959	6.187	0.600	5.410	6.880
12/22/93	0.923	0.015	0.898	0.954	7.541	0.249	6.970	7.860	0.912	0.022	0.868	0.939	7.144	0.378	6.550	7.650
12/23/93	1.000	0.020	0.960	1.025	6.738	0.480	5.960	7.480	0.991	0.024	0.942	1.030	6.663	0.514	5.450	7.350
12/24/93	1.020	0.004	1.012	1.027	5.752	0.164	5.450	6.000	1.019	0.003	1.015	1.026	5.422	0.018	5.410	5.450
12/25/93	1.020	0.007	1.005	1.029	5.574	0.503	5.070	6.670	1.017	0.010	0.995	1.032	5.364	0.227	4.940	5.910
12/26/93	1.021	0.008	1.006	1.034	5.518.	0.583	4.860	6.670	1.019	0.011	1.002	1.044	5.120	0.408	4.690	5.910
12/27/93	1.031	0.013	1.014	1.057	5.693	0.690	4.900	6.970	1.035	0.017	1.014	1.061	5.206	0.520	4.650	6.550
12/28/93	1.018	0.027	0.972	1.050	6.200	0.642	5.530	7.180	1.009	0.029	0.962	1.064	5.819	0.754	4.940	7.050
12/29/93	1.002	0.008	0.987	1.017	6.372	0.332	5.870	7.050	0.992	0.016	0.969	1.019	5.977	0.396	5.410	6.550
12/30/93	1.000	0.017	0.974	1.021	5.824	0.489	5.030	6.630	0.998	0.016	0.977	1.034	5.268	0.254	4.690	5.620
12/31/93	0.965	0.007	0.954	0.976	6.366	0.268	6.000	6.840	0.959	0.012	0.945	0.977	5.957	0.425	5.410	6.420
01/01/94	0.992	0.026	0.957	1.043	5.259	0.695	3.760	6.170	0.982	0.024	0.949	1.027	5.083	0.707	3.720	6.380
01/02/94	1.062	0.010	1.043	1.076	3.101	0.320	2.660	3.670	1.052	0.010	1.031	1.070	3.188	0.399	2.620	3.760
01/03/94	1.041	0.010	1.025	1.060	2.859	0.233	2.620	3.250	1.026	0.010	1.015	1.043	2.828	0.325	2.410	3.290

Note: N.A. indicates data not available.

	Station 3A								Station3B							
	Specific Conductance (mS/cm)				Temperature (C)				Specfic Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
05/23/94	0.462	0.023	0.426	0.503	23.083	0.117	22.940	23.320	0.438	0.026	0.396	0.474	22.841	0.154	22.613	23.060
05/24/94	0.460	0.047	0.389	0.543	22.815	0.220	22.300	23.150	0.462	0.049	0.398	0.547	22.795	0.298	22.245	23.228
05/25/94	0.511	0.027	0.468	0.585	22.615	0.305	22.090	23.100	0.522	0.033	0.436	0.564	22.908	0.355	22.281	23.435
05/26/94	0.453	0.070	0.379	0.643	21.821	0.490	20.990	22.980	0.478	0.055	0.414	0.617	22.400	0.422	21.768	23.617
05/27/94	0.460	0.072	0.381	0.618	20.952	0.496	20.270	22.050	0.495	0.066	0.429	0.630	21.727	0.510	21.152	22.629
05/28/94	0.469	0.075	0.381	0.610	20.921	0.910	19.770	22.130	0.502	0.065	0.421	0.611	21.998	0.872	20.900	23.046
05/29/94	0.482	0.077	0.386	0.588	21.523	0.903	20.360	22.640	0.508	0.061	0.444	0.632	22.796	0.855	21.735	24.077
05/30/94	0.528	0.054	0.414	0.627	22.088	0.641	21.081	23.061	0.552	0.033	0.473	0.627	23.792	0.616	22.847	24.693
05/31/94	0.531	0.074	0.417	0.655	22.951	0.912	21.801	24.631	0.565	0.058	0.458	0.688	25.095	0.911	23.983	26.629
06/01/94	0.515	0.050	0.429	0.646	23.487	0.553	22.641	24.371	0.573	0.023	0.533	0.632	26.281	0.988	24.964	28.054
06/02/94	0.539	0.031	0.458	0.591	22.913	0.436	22.181	23.651	0.581	0.036	0.473	0.666	25.694	0.387	25.092	26.258
06/03/94	0.486	0.035	0.442	0.589	21.378	0.252	21.121	22.051	0.570	0.038	0.527	0.668	24.415	0.261	24.120	25.037
06/04/94	0.505	0.051	0.437	0.593	21.708	0.854	20.701	23.061	0.587	0.047	0.506	0.652	25.040	0.917	23.856	26.526
06/05/94	0.541	0.044	0.459	0.621	22.915	0.964	21.671	24.331	0.606	0.029	0.541	0.663	26.427	0.829	25.202	27.532
06/06/94	0.523	0.048	0.424	0.594	24.369	0.601	23.571	25.811	0.592	0.032	0.496	0.632	28.236	0.539	27.492	29.573
06/07/94	0.533	0.024	0.481	0.572	25.615	0.890	24.671	28.890	0.552	0.041	0.491	0.643	27.641	1.345	25.768	29.192
06/08/94	0.512	0.036	0.431	0.568	25.706	0.254	25.149	26.133	0.513	0.036	0.432	0.568	25.702	0.254	25.143	26.129
06/09/94	0.471	0.054	0.411	0.632	23.962	0.511	23.284	25.028	0.473	0.054	0.413	0.633	23.955	0.512	23.274	25.022
06/10/94	0.498	0.055	0.405	0.598	23.029	0.377	22.557	23.863	0.500	0.055	0.408	0.601	23.017	0.377	22.546	23.851
06/11/94	0.502	0.056	0.410	0.614	23.678	0.892	22.415	24.820	0.506	0.056	0.413	0.617	23.663	0.892	22.400	24.804
06/12/94	0.564	0.036	0.500	0.639	25.055	0.711	23.881	25.984	0.569	0.036	0.505	0.643	25.036	0.710	23.862	25.963
06/13/94	0.534	0.032	0.469	0.583	25.932	0.611	25.006	27.071	0.539	0.032	0.474	0.588	25.908	0.611	24.984	27.048
06/14/94	0.555	0.039	0.422	0.637	26.833	0.863	25.499	28.615	0.561	0.039	0.429	0.643	26.806	0.862	25.473	28.586
06/15/94	0.525	0.039	0.442	0.579	26.959	0.775	26.035	28.430	0.533	0.039	0.449	0.587	26.927	0.774	26.004	28.398
06/16/94	0.517	0.055	0.431	0.584	27.059	0.450	26.480	28.467	0.526	0.055	0.439	0.592	27.023	0.450	26.446	28.431
06/17/94	0.505	0.041	0.409	0.586	27.387	0.767	26.504	29.040	0.514	0.041	0.418	0.595	27.348	0.766	26.465	29.001
06/18/94	0.533	0.033	0.434	0.610	27.895	0.674	26.664	29.195	0.544	0.033	0.444	0.620	27.852	0.673	26.623	29.151
06/19/94	0.542	0.021	0.499	0.592	28.594	0.831	27.407	30.020	0.553	0.021	0.509	0.603	28.546	0.830	27.361	29.972
06/20/94	0.546	0.046	0.417	0.640	29.518	0.816	28.151	31.236	0.558	0.046	0.429	0.652	29.467	0.815	28.101	31.185
06/21/94	0.529	0.070	0.392	0.640	29.997	0.959	28.725	31.171	0.542	0.070	0.405	0.653	29.941	0.958	28.671	31.115
06/22/94	0.530	0.065	0.381	0.623	30.290	0.617	29.141	31.327	0.544	0.065	0.395	0.636	30.231	0.616	29.083	31.267
06/23/94	0.500	0.085	0.377	0.621	29.928	0.583	29.156	30.971	0.514	0.085	0.392	0.635	29.865	0.583	29.090	30.907
06/24/94	0.397	0.017	0.383	0.444	28.354	0.317	27.791	29.115	0.413	0.017	0.398	0.460	28.286	0.318	27.721	29.049
06/25/94	0.409	0.024	0.369	0.454	27.646	0.361	27.096	28.201	0.425	0.024	0.386	0.470	27.575	0.360	27.023	28.129
06/26/94	0.366	0.055	0.330	0.548	25.210	0.893	23.961	26.845	0.384	0.055	0.347	0.565	25.134	0.895	23.884	26.772
06/27/94	0.407	0.087	0.309	0.544	24.828	0.854	23.739	25.892	0.425	0.088	0.327	0.563	24.749	0.853	23.661	25.812
06/28/94	0.467	0.079	0.332	0.554	25.777	0.608	25.032	27.186	0.486	0.079	0.350	0.573	25.694	0.607	24.949	27.102
06/29/94	0.389	0.083	0.312	0.550	25.556	0.329	24.976	26.276	0.409	0.083	0.332	0.570	25.469	0.329	24.890	26.187
06/30/94	0.314	0.004	0.309	0.321	26.155	0.452	25.556	26.766	0.389	0.056	0.330	0.481	26.445	0.795	25.466	27.580
07/01/94	0.334	0.006	0.323	0.342	26.837	0.422	26.387	27.775	0.414	0.062	0.342	0.536	27.201	0.580	26.530	28.220
07/02/94	0.347	0.003	0.341	0.351	26.901	0.288	26.505	27.288	0.458	0.046	0.359	0.564	27.448	0.433	26.690	28.260
07/03/94	0.363	0.033	0.327	0.443	26.651	0.165	26.364	26.938	0.445	0.061	0.367	0.533	27.174	0.278	26.780	27.750
07/04/94	0.344	0.012	0.325	0.360	26.727	0.256	26.355	27.166	0.445	0.028	0.398	0.514	27.447	0.408	26.740	28.130
07/05/94	0.328	0.004	0.321	0.336	27.187	0.400	26.706	27.791	0.468	0.026	0.401	0.511	28.227	0.447	27.580	29.060
07/06/94	0.345	0.003	0.338	0.351	27.800	0.487	27.205	28.619	0.476	0.018	0.429	0.498	28.860	0.586	28.130	29.950
07/07/94	0.350	0.002	0.346	0.354	27.846	0.292	27.485	28.479	0.485	0.030	0.429	0.533	28.802	0.300	28.430	29.400
07/08/94	0.355	0.002	0.353	0.359	27.415	0.314	27.084	28.127	0.436	0.060	0.367	0.578	28.160	0.455	27.620	29.310
07/09/94	0.377	0.015	0.360	0.411	26.963	0.273	26.439	27.387	0.414	0.053	0.374	0.595	27.610	0.339	27.080	28.300
07/10/94	0.359	0.010	0.345	0.373	26.689	0.302	26.171	27.169	0.416	0.045	0.364	0.531	27.464	0.488	26.740	28.220
07/11/94	0.358	0.007	0.347	0.367	26.854	0.507	26.191	27.792	0.454	0.088	0.359	0.617	27.911	0.934	26.780	29.570
07/12/94	0.355	0.007	0.346	0.366	26.815	0.472	25.966	27.847	0.439	0.050	0.371	0.508	27.678	0.533	26.740	28.600
07/13/94	0.376	0.007	0.366	0.389	27.662	0.967	26.587	29.442	0.530	0.068	0.395	0.672	28.756	0.839	27.750	30.450
07/14/94	0.383	0.004	0.376	0.389	29.038	1.016	28.000	31.590	0.517	0.063	0.424	0.635	29.433	0.758	28.511	31.681
07/15/94	0.385	0.002	0.381	0.389	29.065	0.468	28.550	30.450	0.505	0.080	0.404	0.631	29.643	0.576	28.982	31.053
07/16/94	0.394	0.006	0.387	0.406	29.317	0.393	28.930	30.290	0.504	0.068	0.433	0.647	29.630	0.344	29.235	30.504
07/17/94	0.390	0.012	0.378	0.408	28.937	0.260	28.600	29.570	0.506	0.098	0.416	0.665	29.427	0.395	28.895	30.126
07/18/94	0.384	0.005	0.374	0.397	29.361	0.923	28.510	31.340	0.499	0.088	0.418	0.669	29.486	0.513	28.897	30.547
07/19/94	0.395	0.003	0.390	0.401	28.985	0.692	28.170	30.580	0.545	0.098	0.432	0.740	29.410	0.610	28.518	30.549
07/20/94	0.394	0.005	0.382	0.400	29.250	0.787	28.510	31.130	0.579	0.073	0.461	0.730	29.653	0.534	29.070	30.590
07/21/94	0.396	0.005	0.390	0.406	29.156	0.392	28.720	29.820	0.508	0.094	0.434	0.756	29.459	0.314	29.151	30.042
07/22/94	0.403	0.003	0.396	0.407	28.959	0.425	28.510	29.950	0.492	0.074	0.436	0.646	29.282	0.293	28.903	29.833

	Station 3A								Station3B							
	Specific Conductance (mS/cm)				Temperature (C)				Specfic Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
07/23/94	0.404	0.004	0397	0.411	28.904	0.604	28.130	30.160	0.514	0.075	0.444	0.645	29.197	0.471	28.524	29.925
07/24/94	0.411	0.004	0.403	0.416	28.641	0.356	28.170	29.440	0.547	0.111	0.449	0.769	29.094	0.446	28.526	29.876
07/25/94	0.414	0.003	0.409	0.419	28.643	0.377	28.130	29.520	0.521	0.057	0.466	0.648	29.151	0.528	28.527	30.138
07/26/94	0.443	0.063	0.412	0.614	28.370	0.344	28.000	29.230	0.506	0.071	0.451	0.661	28.539	0.443	27.900	29.589
07/27/94	0.415	0.003	0.409	0.421	27.456	0.237	27.030	27.960	0.455	0.004	0.449	0.461	27.421	0.233	26.971	27.810
07/28/94	0.433	0.035	0.415	0.573	27.041	0.310	26.650	27.580	0.462	0.010	0.451	0.496	27.129	0.497	26.592	28.192
07/29/94	0.463	0.054	0.419	0.613	26.980	0.378	26.480	27.620	0.487	0.028	0.463	0.575	26.988	0.419	26.463	27.774
07/30/94	0.451	0.036	0.431	0.562	26.595	0.276	26.230	27.460	0.504	0.054	0.478	0.689	26.563	0.262	26.215	27355
07/31/94	0.510	0.075	0.442	0.651	26.861	0.680	26.150	28.090	0.568	0.084	0.492	0.710	26.802	0.599	26.126	27.777
08/01/94	0.497	0.061	0.438	0.652	27.170	0.832	26.230	28.720	0.581	0.082	0.486	0.737	27.106	0.779	26.218	28.578
08/02/94	0.512	0.058	0.455	0.656	27.566	0.926	26.400	28.890	0.592	0.056	0.525	0.733	27.513	0.880	26.469	29.050
08/03/94	0.507	0.035	0.464	0.623	28.211	0.723	27.160	29.570	0.594	0.045	0.524	0.740	28.242	0.761	27.111	29.551
08/04/94	0.586	0.101	0.470	0.768	28.100	0.578	27.290	28.930	0.667	0.079	0.561	0.806	28.123	0.548	27.322	29.223
08/05/94	0.564	0.100	0.477	0.780	27.402	0.429	26.820	28.170	0.634	0.091	0.546	0.831	27.406	0.432	26.854	28.164
08/06/94	0.518	0.033	0.483	0.633	26.980	0.448	26.400	27.840	0.605	0.043	0.575	0.747	26.914	0.460	26.345	27.786
08/07/94	0.541	0.059	0.495	0.686	27.033	0.636	26.230	28.090	0.638	0.073	0.576	0.795	26.982	0.578	26.267	27.957
08/08/94	0.565	0.057	0.506	0.700	27.610	0.924	26.480	28.930	0.658	0.066	0.592	0.795	27.512	0.883	26.478	28.889
08/09/94	0.666	0.106	0.560	0.847	27.825	0.859	27.030	29.780	0.720	0.065	0.602	0.844	28.042	0.725	26.990	29.138
08/10/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.615	0.046	0.550	0.737	28.088	0.536	27.231	28.965
08/11/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.676	0.066	0.580	0.816	28.368	0.472	27.648	29.164
08/12/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.618	0.062	0.555	0.746	28.275	0.554	27.545	29.271
08/13/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.621	0.071	0.557	0.765	28.554	0.594	27.872	29.557
08/14/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.625	0.063	0.564	0.762	28.195	0.311	27.720	28.785
08/15/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.586	0.020	0.560	0.622	27.692	0.473	27.085	28.601
08/16/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.618	0.025	0.584	0.682	27.379	0.501	26.733	28.419
08/17/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.663	0.075	0.596	0.842	27.290	0.501	26.639	28.445
08/18/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.695	0.084	0.605	0.848	27.541	0.633	26.746	28.862
08/19/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.652	0.054	0.606	0.773	27.432	0.279	27.073	27.959
08/20/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.620	0.016	0.599	0.656	26.841	0.166	26.548	27.155
08/21/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.615	0.010	0.603	0.642	26.515	0.249	26.157	27.003
08/22/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.658	0.069	0.599	0.824	26.842	0.602	26.064	27.750
08/23/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.641	0.047	0.595	0.756	26.628	0.375	26.091	27.397
08/24/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.677	0.040	0.647	0.826	26.753	0.611	26.039	27.803
08/25/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.679	0.054	0.650	0.908	27.099	0.868	26.195	28.811
08/26/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.660	0.051	0.619	0.831	27.033	0.497	26.432	27.948
08/27/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.651	0.054	0.594	0.745	27.355	0.715	26.459	28.655
08/28/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.656	0.047	0.593	0.767	27.682	0.641	26.877	28.942
08/29/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.606	0.009	0.588	0.621	26.951	0.224	26.555	27.497
08/30/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.618	0.014	0.599	0.647	26.489	0.290	26.129	27.307
08/31/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.598	0.012	0.580	0.620	26.062	0.138	25.809	26.363
09/01/94	0.570	0.006	0.561	0.577	24.721	0.117	24.512	24.843	0.598	0.010	0.583	0.620	25.133	0.321	24.728	25.768
09/02/94	0.569	0.008	0.558	0.584	24.753	0.538	23.977	25.680	0.590	0.011	0.573	0.607	24.780	0.518	24.110	25.785
09/03/94	0.574	0.007	0.563	0.586	24.580	0.490	23.976	25.546	0.601	0.009	0.586	0.629	24.508	0.410	23.956	25.330
09/04/94	0.586	0.007	0.575	0.602	24.027	0.213	23.751	24.528	0.611	0.007	0.599	0.627	23.885	0.188	23.649	24.280
09/05/94	0.576	0.008	0.561	0.587	24.139	0.280	23.794	24.694	0.595	0.010	0.578	0.610	23.898	0.256	23.581	24.329
09/06/94	0.619	0.071	0.566	0.819	24.535	0.507	23.923	25.539	0.602	0.014	0.581	0.635	24.189	0.460	23.606	24.971
09/07/94	0.649	0.077	0.576	0.809	24.841	0.529	24.086	25.716	0.650	0.061	0.591	0.763	24.384	0.565	23.658	25.357
09/08/94	0.632	0.037	0.594	0.729	25.306	1.021	24.174	27.059	0.642	0.040	0.593	0.713	24.565	0.818	23.584	25.839
09/09/94	0.609	0.047	0.555	0.754	25.514	1.098	24.256	27.607	0.619	0.038	0.556	0.715	24.719	0.990	23.589	26.868
09/10/94	0.646	0.040	0.586	0.711	25.486	0.857	24.422	26.800	0.649	0.037	0.593	0.716	24.556	0.741	23.602	25.637
09/11/94	0.669	0.023	0.640	0.721	25.835	0.686	24.880	26.967	0.654	0.028	0.611	0.716	24.744	0.539	23.954	25.826
09/12/94	0.647	0.050	0.589	0.762	26.210	0.723	25.173	27.348	0.627	0.046	0.566	0.727	25.115	0.682	24.126	26.261
09/13/94	0.641	0.045	0.590	0.756	25.924	0.424	25.364	26.867	0.612	0.044	0.561	0.701	25.171	0.583	24.262	26.063
09/14/94	0.691	0.052	0.593	0.793	25.415	0.591	24.723	26.834	0.680	0.042	0.601	0.769	25.632	0.519	24.885	26.638
09/15/94	0.689	0.052	0.592	0.758	25.006	0.429	24.419	25.810	0.658	0.057	0.585	0.757	25.592	0.318	24.998	26.126
09/16/94	0.621	0.054	0.557	0.758	24.116	0.209	23.731	24.493	0.621	0.047	0.564	0.741	25.280	0.178	24.979	25.643
09/17/94	0.591	0.044	0.530	0.689	23.459	0.248	23.007	23.920	0.581	0.036	0.531	0.662	25.088	0.234	24.712	25.628
09/18/94	0.557	0.037	0.521	0.658	22.685	0.218	22.323	23.106	0.547	0.025	0.514	0.647	24.791	0.255	24.406	25.234
09/19/94	0.590	0.082	0.504	0.760	21.964	0.264	21.601	22.447	0.572	0.063	0.503	0.721	24.662	0.389	24.139	25.473
09/20/94	0.588	0.073	0.499	0.711	21.637	0.548	20.856	22.714	0.605	0.082	0.503	0.729	24.476	0.518	23.743	25.244
09/21/94	0.558	0.020	0.519	0.607	20.634	0.257	20.230	21.193	0.562	0.022	0.526	0.610	24.009	0.278	23.516	24.432

	Station 3A								Station 3B							
	Specific Conductance (mS/cm)				Temperature (C)				Specf ic Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
09/22/94	0.532	0.016	0.495	0.561	21359	1.833	19.523	23.798	0.537	0.015	0.506	0.562	23.431	0.240	22.822	23.818
09/23/94	0.494	0.010	0.483	0.527	23.182	0.367	22.758	24.037	0.506	0.011	0.496	0.544	22.798	0.199	22.470	23.262
09/24/94	0.499	0.008	0.487	0.515	22.504	0.126	22.313	22.731	0.515	0.005	0.505	0.525	22.203	0.150	21.977	22.473
09/25/94	0.497	0.009	0.486	0.508	21.917	0.135	21.662	22.231	0.516	0.007	0.505	0.524	21.590	0.145	21.260	21.952
09/26/94	0.496	0.011	0.484	0.512	21.257	0.228	20.837	21.631	0.523	0.009	0.509	0.538	20.803	0.251	20.399	21.262
09/27/94	0.512	0.005	0.505	0.525	20.737	0.227	20.496	21.291	0.535	0.004	0.530	0.548	20.189	0.154	19.953	20.679
09/28/94	0.524	0.013	0.509	0.566	20.529	0.209	20.257	20.895	0.550	0.007	0.536	0.560	19.932	0.428	19.258	20.829
09/29/94	0.551	0.023	0.525	0.620	20.818	0.738	20.188	22.507	0.609	0.057	0.557	0.761	19.811	0.589	19.204	21.289
09/30/94	0.564	0.042	0.522	0.658	21.034	0.691	20.293	22.322	0.617	0.062	0.567	0.760	20.125	0.747	19.199	21.396
10/01/94	0.584	0.056	0.510	0.679	21.785	0.832	20.818	23.147	0.643	0.068	0.556	0.739	20.890	0.745	19.985	22.016
10/02/94	0.647	0.026	0.590	0.685	22.593	0.643	21.808	23.792	0.700	0.021	0.640	0.727	21.743	0.644	20.933	22.894
10/03/94	0.685	0.035	0.596	0.745	22.764	0.264	22.392	23.240	0.717	0.068	0.563	0.811	21.869	0.347	21.395	22.454
10/04/94	0.583	0.066	0.512	0.720	22.137	0.375	21.656	22.733	0.605	0.066	0.547	0.759	21.102	0.325	20.633	21.641
10/05/94	0.780	0.316	0.503	1.157	22.584	1.178	21.332	24.554	0.632	0.082	0.547	0.762	20.787	0.420	20.263	21.544
10/06/94	0.921	0.272	0.563	1.169	20.262	1.542	17.297	24.500	0.604	0.050	0.555	0.725	20.199	0.388	19.714	20.999
10/07/94	0.609	0.060	0.528	0.775	20.053	0.435	19.600	20.870	0.613	0.061	0.542	0.787	20.218	0.331	19.851	20.883
10/08/94	0.582	0.041	0.517	0.719	19.704	0.200	19.430	20.190	0.587	0.039	0.527	0.697	19.941	0.186	19.552	20.158
10/09/94	0.523	0.016	0.502	0.562	19.275	0.137	19.050	19.510	0.532	0.011	0.515	0.558	19.467	0.142	19.232	19.796
10/10/94	0.534	0.017	0.507	0.572	18.752	0.192	18.500	19.180	0.552	0.014	0.537	0.583	19.029	0.203	18.735	19.463
10/11/94	0.531	0.007	0.516	0.541	18.321	0.238	17.910	18.840	0.550	0.005	0.541	0.561	18.691	0.295	18.229	19.341
10/12/94	0.524	0.014	0.502	0.550	17.933	0.160	17.700	18.250	0.545	0.010	0.529	0.568	18.322	0.261	17.858	18.706
10/13/94	0.521	0.011	0.501	0.535	17.640	0.096	17.530	17.870	0.543	0.008	0.528	0.554	17.959	0.127	17.866	18.270
10/14/94	0.539	0.010	0.526	0.563	17.417	0.058	17.360	17.570	0.553	0.008	0.543	0.574	17.855	0.045	17.783	17.927
10/15/94	0.542	0.005	0.537	0.555	17.464	0.101	17.320	17.700	0.561	0.006	0.553	0.572	17.906	0.091	17.754	18.096
10/16/94	0.551	0.040	0.529	0.722	17.867	0.456	17.360	18.800	0.574	0.043	0.551	0.735	18.420	0.459	17.876	19.244
10/17/94	0.551	0.025	0.528	0.605	17.904	0.085	17.780	18.080	0.574	0.022	0.550	0.617	18.522	0.090	18.351	18.673
10/18/94	0.541	0.014	0.522	0.567	17.728	0.037	17.660	17.820	0.564	0.015	0.538	0.586	18.264	0.107	18.143	18.451
10/19/94	0.559	0.061	0.516	0.716	18.209	0.534	17.660	19.349	0.573	0.062	0.522	0.715	18.501	0.406	18.156	19.390
10/20/94	0.560	0.063	0.501	0.721	18.395	0.502	17.814	19.552	0.569	0.072	0.494	0.728	18.479	0.517	17.897	19.468
10/21/94	0.520	0.032	0.497	0.633	18.293	0.400	17.808	19.115	0.539	0.053	0.493	0.659	18.364	0.400	17.931	19.162
10/22/94	0.556	0.061	0.494	0.691	18.402	0.604	17.800	19.657	0.569	0.076	0.488	0.724	18.524	0.592	17.841	19.673
10/23/94	0.531	0.023	0.501	0.602	18.082	0.259	17.752	18.601	0.526	0.021	0.496	0.582	18.301	0.237	17.962	18.901
10/24/94	0.540	0.012	0.516	0.560	17.526	0.166	17.111	17.837	0.544	0.014	0.514	0.570	17.717	0.280	17.012	18.075
10/25/94	0.545	0.011	0.524	0.568	16.729	0.218	16.254	17.110	0.542	0.012	0.521	0.561	17.019	0.046	16.840	17.075
10/26/94	0.559	0.007	0.544	0.571	16.190	0.194	15.988	16.777	0.560	0.010	0.547	0.592	16.417	0.315	15.800	17.110
10/27/94	0.574	0.009	0.558	0.592	15.845	0.263	15.531	16.428	0.572	0.010	0.557	0.592	15.837	0.259	15.670	16.470
10/28/94	0.574	0.020	0.549	0.623	15.459	0.125	15.225	15.665	0.562	0.023	0.522	0.618	15.553	0.112	15.290	15.670
10/29/94	0.554	0.008	0.544	0.570	15.436	0.312	15.049	16.118	0.536	0.017	0.521	0.570	15.496	0.335	15.080	16.390
10/30/94	0.550	0.006	0.542	0.564	15.406	0.356	15.001	16.154	0.529	0.011	0.515	0.570	15.387	0.252	14.990	15.760
10/31/94	0.565	0.018	0.543	0.591	15.253	0.155	14.967	15.543	0.540	0.019	0.516	0.570	15.270	0.188	14.990	15.590
11/01/94	0.574	0.018	0.547	0.602	14.801	0.207	14.560	15.291	0.536	0.022	0.507	0.571	14.930	0.320	14.570	15.590
11/02/94	0.603	0.029	0.556	0.642	14.306	0.194	13.964	14.622	0.559	0.031	0.510	0.594	14.359	0.141	14.150	14.610
11/03/94	0.592	0.020	0.566	0.625	14.539	0.300	14.036	14.987	0.548	0.025	0.519	0.590	14.514	0.216	14.190	14.870
11/04/94	0.622	0.028	0.574	0.688	15.240	0.219	14.900	15.652	0.578	0.024	0.520	0.620	15.123	0.203	14.700	15.540
11/05/94	0.630	0.041	0.568	0.695	15.644	0.127	15.395	15.886	0.585	0.032	0.531	0.648	15.453	0.112	15.250	15.590
11/06/94	0.472	0.051	0.435	0.666	15.652	0.099	15.430	15.784	0.431	0.051	0.409	0.619	15.478	0.125	15.160	15.590
11/07/94	0.492	0.031	0.415	0.526	15.102	0.192	14.761	15.341	0.441	0.032	0.376	0.484	14.877	0.166	14.610	15.080
11/08/94	0.386	0.011	0.374	0.426	15.071	0.170	14.718	15.277	0.342	0.016	0.323	0.390	14.835	0.171	14.490	14.990
11/09/94	0.423	0.025	0.391	0.478	15.104	0.165	14.740	15.249	0.387	0.032	0.347	0.437	14.834	0.209	14.450	15.290
11/10/94	0.404	0.019	0.377	0.441	14.316	0.143	14.110	14.610	0.380	0.020	0.352	0.432	14.129	0.109	13.900	14.360
11/11/94	0.409	0.015	0.383	0.432	13.931	0.191	13.600	14.400	0.375	0.016	0.353	0.404	13.768	0.185	13.430	14.190
11/12/94	0.449	0.015	0.430	0.480	13.557	0.046	13.520	13.730	0.421	0.017	0.394	0.448	13.430	0.034	13.390	13.560
11/13/94	0.490	0.021	0.445	0.531	13.783	0.251	13.520	14.400	0.462	0.023	0.428	0.518	13.655	0.232	13.390	14.190
11/14/94	0.495	0.031	0.444	0.581	14.098	0.165	13.850	14.490	0.448	0.018	0.416	0.490	13.913	0.111	13.770	14.110
11/15/94	0.464	0.023	0.423	0.499	13.688	0.203	13.350	14.020	0.428	0.017	0.396	0.449	13.512	0.205	13.180	13.850
11/16/94	0.446	0.010	0.433	0.491	13.129	0.127	12.930	13.430	0.413	0.005	0.405	0.426	13.102	0.248	12.760	13.640
11/17/94	0.448	0.008	0.440	0.470	12.783	0.127	12.540	12.970	0.431	0.008	0.416	0.451	12.635	0.088	12.460	12.800
11/18/94	0.496	0.022	0.461	0.559	12.739	0.223	12.540	13.260	0.470	0.019	0.442	0.532	12.661	0.369	12.330	13.560
11/19/94	0.508	0.009	0.494	0.524	12.576	0.055	12.460	12.710	0.485	0.009	0.474	0.516	12.353	0.083	12.210	12.460
11/20/94	0.499	0.010	0.491	0.532	12.558	0.059	12.460	12.630	0.479	0.012	0.471	0.522	12.297	0.088	12.160	12.420
11/21/94	0.510	0.026	0.455	0.560	12.017	0.536	11.240	12.630	0.485	0.027	0.435	0.532	11.825	0.303	11.490	12.380

	Station 3A								Station3B							
	Specific Conductance (mS/cm)				Temperature (C)				Specfic Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
11/22/94	0.425	0.020	0.395	0.453	11.066	0.189	10.730	11.240	0.397	0.018	0.374	0.433	10.958	0.243	10.560	11.450
11/23/94	0.465	0.013	0.433	0.483	10.210	0.249	9.760	10.640	0.438	0.012	0.410	0.455	10.141	0.237	9.670	10.520
11/24/94	0.403	0.010	0.390	0.426	9.106	0.264	8.790	9.670	0.377	0.010	0.363	0.396	8.924	0.344	8.450	9.590
11/25/94	0.409	0.009	0.397	0.424	8.708	0.127	8.490	8.830	0.383	0.006	0.377	0.398	8.305	0.036	8.240	8.360
11/26/94	0.464	0.024	0.425	0.505	8.496	0.081	8.360	8.740	0.444	0.024	0.395	0.490	8.257	0.031	8.190	8.280
11/27/94	0.471	0.024	0.433	0.522	9.063	0.466	8.490	9.800	0.449	0.024	0.409	0.498	8.890	0.567	8.280	9.880
11/28/94	0.414	0.012	0.381	0.442	9.021	0.235	8.790	9.420	0.406	0.016	0.383	0.433	8.824	0.292	8.450	9.420
11/29/94	0.427	0.023	0.384	0.473	8.474	0.364	8.110	9.120	0.444	0.037	0.403	0.535	7.852	0.129	7.650	8.070
11/30/94	0.426	0.017	0.409	0.474	8.085	0.054	8.030	8.190	0.442	0.022	0.404	0.483	7.473	0.151	7.270	7.810
12/01/94	0.421	0.011	0.404	0.443	8.054	0.118	7.860	8.240	0.423	0.016	0.402	0.450	7.072	0.118	6.930	7.350
12/02/94	0.436	0.017	0.411	0.460	7.839	0.128	7.650	8.110	0.424	0.015	0.402	0.449	6.882	0.143	6.670	7.140
12/03/94	0.460	0.013	0.433	0.486	7.631	0.148	7.350	7.860	0.453	0.015	0.422	0.484	6.686	0.148	6.380	6.970
12/04/94	0.508	0.043	0.460	0.593	7.903	0.262	7.560	8.360	0.510	0.042	0.457	0.584	7.197	0.483	6.670	8.030
12/05/94	0.573	0.027	0.529	0.627	8.468	0.399	8.030	9.380	0.576	0.031	0.549	0.651	7.914	0.197	7.600	8.450
12/06/94	0.582	0.034	0.474	0.642	9.014	0.313	8.240	9.590	0.602	0.042	0.468	0.644	8.303	0.213	7.900	8.660
12/07/94	0.466	0.033	0.436	0.570	8.836	0.323	8.240	9.420	0.476	0.038	0.443	0.555	8.105	0.210	7.900	8.620
12/08/94	0.473	0.019	0.448	0.525	8.895	0.070	8.790	9.080	0.485	0.013	0.464	0.498	8.018	0.050	7.940	8.150
12/09/94	0.453	0.003	0.447	0.461	8.418	0.331	8.030	8.870	0.450	0.003	0.444	0.453	7.873	0.099	7.650	8.030
12/10/94	0.457	0.003	0.452	0.465	7.970	0.229	7.430	8.240	0.449	0.003	0.443	0.455	7.147	0.350	6.380	7.600
12/11/94	0.467	0.004	0.459	0.473	6.625	0.323	6.080	7.350	0.460	0.003	0.454	0.465	5.743	0.313	5.280	6.380
12/12/94	0.452	0.008	0.437	0.467	5.483	0.264	5.110	6.040	0.444	0.012	0.425	0.464	4.648	0.273	4.310	5.200
12/13/94	0.434	0.003	0.430	0.441	4.770	0.124	4.650	5.110	0.417	0.006	0.408	0.426	3.963	0.124	3.840	4.270
12/14/94	0.429	0.003	0.423	0.436	4.493	0.190	4.220	4.690	0.410	0.002	0.406	0.413	3.788	0.116	3.590	3.890
12/15/94	0.428	0.003	0.421	0.436	4.600	0.298	4.220	4.940	0.410	0.002	0.406	0.412	3.932	0.223	3.630	4.180
12/16/94	0.430	0.005	0.421	0.439	5.105	0.103	4.900	5.280	0.411	0.002	0.409	0.417	4.303	0.096	4.180	4.440
12/17/94	0.440	0.005	0.431	0.450	5.086	0.108	4.940	5.240	0.422	0.012	0.409	0.439	4.280	0.107	4.180	4.480
12/18/94	0.444	0.004	0.435	0.452	4.941	0.077	4.770	5.110	0.427	0.006	0.412	0.435	4.159	0.070	3.930	4.220
12/19/94	0.439	0.003	0.432	0.445	4.498	0.157	4.270	4.770	0.426	0.003	0.419	0.431	3.809	0.087	3.590	3.930
12/20/94	0.448	0.007	0.438	0.459	4.272	0.008	4.270	4.310	0.441	0.007	0.430	0.451	3.650	0.043	3.590	3.720
12/21/94	0.450	0.005	0.445	0.459	4.559	0.130	4.270	4.690	0.440	0.006	0.430	0.450	3.843	0.040	3.760	3.890
12/22/94	0.447	0.006	0.439	0.456	4.787	0.120	4.650	4.980	0.439	0.010	0.427	0.454	4.013	0.136	3.840	4.180
12/23/94	0.441	0.004	0.436	0.448	4.822	0.085	4.650	4.940	0.434	0.005	0.423	0.451	4.035	0.106	3.890	4.180
12/24/94	0.440	0.001	0.436	0.442	4.560	0.057	4.480	4.650	0.429	0.007	0.418	0.446	3.871	0.024	3.840	3.890
12/25/94	0.447	0.003	0.441	0.452	4.601	0.128	4.440	4.770	0.431	0.005	0.424	0.445	3.884	0.066	3.760	3.970
12/26/94	0.450	0.005	0.441	0.456	4.524	0.201	4.220	4.940	0.423	0.010	0.409	0.442	3.856	0.123	3.630	4.180
12/27/94	0.447	0.007	0.435	0.459	4.365	0.103	4.220	4.520	0.414	0.003	0.407	0.421	3.664	0.172	3.420	3.890
12/28/94	0.439	0.005	0.432	0.450	4.431	0.159	4.270	4.730	0.413	0.003	0.409	0.423	3.692	0.187	3.420	3.930
12/29/94	0.446	0.003	0.440	0.453	4.613	0.171	4.440	4.940	0.418	0.006	0.409	0.427	3.888	0.092	3.760	4.050
12/30/94	0.459	0.004	0.450	0.467	4.550	0.151	4.270	4.900	0.430	0.004	0.421	0.435	3.868	0.075	3.720	4.010
12/31/94	0.463	0.004	0.454	0.468	4.769	0.061	4.690	4.900	0.436	0.001	0.435	0.439	3.960	0.031	3.890	4.010
01/01/95	0.472	0.004	0.466	0.477	4.565	0.190	4.270	4.860	0.442	0.004	0.435	0.449	3.832	0.131	3.590	3.970
01/02/95	0.488	0.007	0.475	0.500	4.132	0.175	3.840	4.350	0.455	0.004	0.450	0.464	3.405	0.101	3.170	3.590
01/03/95	0.507	0.003	0.500	0.511	3.503	0.167	3.290	3.840	0.467	0.002	0.462	0.469	2.724	0.188	2.530	3.040

Note: N.A. indicates data not available.

	Station 4A								Station 4B							
	Specific Condutance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
05/24/94	0.409	0.006	0.400	0.400	22.572	0.167	22.300	22.300	0.397	0.004	0.391	0.406	22.057	0.128	21.880	22.249
05/25/94	0.412	0.011	0.397	0.397	22.270	0.330	21.840	21.840	0.395	0.009	0.383	0.407	21.754	0.119	21.593	21.961
05/26/94	0.410	0.006	0.401	0.401	21.625	0.264	21.030	21.030	0.399	0.008	0.382	0.418	21.506	0.186	21.132	21.748
05/27/94	0.414	0.006	0.401	0.401	20.631	0.253	20.230	20.230	0.400	0.008	0.386	0.413	20.520	0.272	20.157	20.968
05/28/94	0.414	0.007	0.406	0.406	20.577	0.590	19.810	19.810	0.401	0.005	0.393	0.415	20.718	0.613	19.955	21.550
05/29/94	0.424	0.008	0.413	0.413	21.150	0.619	20.320	20.320	0.411	0.005	0.401	0.419	21.364	0.679	20.433	22.244
05/30/94	0.431	0.012	0.411	0.411	21.680	0.467	21.120	21.120	0.417	0.010	0.400	0.436	22.064	0.416	21.605	22.746
05/31/94	0.444	0.013	0.424	0.424	22.520	0.599	21.880	21.880	0.428	0.013	0.408	0.455	22.804	0.372	22.446	23.503
06/01/94	0.443	0.012	0.423	0.423	22.876	0.400	22.390	22.390	0.426	0.013	0.412	0.451	23.278	0.233	22.942	23.897
06/02/94	0.450	0.023	0.428	0.428	22.686	0.398	22.090	22.090	0.444	0.023	0.414	0.518	23.495	0.341	22.991	23.869
06/03/94	0.490	0.023	0.457	0.457	21.383	0.278	21.120	21.120	0.481	0.024	0.447	0.543	22.456	0.209	22.216	22.913
06/04/94	0.473	0.013	0.454	0.454	21.407	0.607	20.610	20.610	0.457	0.009	0.446	0.480	22.435	0.486	21.820	23.279
06/05/94	0.462	0.010	0.448	0.448	22.454	0.651	21.580	21.580	0.453	0.010	0.436	0.478	23.574	0.549	22.900	24.337
06/06/94	0.463	0.023	0.438	0.438	24.270	0.884	23.060	23.060	0.432	0.015	0.410	0.456	25.077	0.413	24.422	25.825
06/07/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.445	0.008	0.426	0.458	25.687	0.327	24.880	26.150
06/08/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.443	0.009	0.426	0.464	25.226	0.201	25.042	25.597
06/09/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.436	0.009	0.422	0.449	23.611	0.408	23.177	24.742
06/10/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.439	0.027	0.406	0.488	22.644	0.119	22.541	23.086
06/11/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.445	0.012	0.426	0.481	23.133	0.609	22.409	23.966
06/12/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.466	0.032	0.402	0.503	24.216	0.637	23.453	25.101
06/13/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.428	0.011	0.411	0.454	25.228	0.629	24.428	26.235
06/14/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.440	0.015	0.413	0.475	26.054	0.625	25.432	27.420
06/15/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.440	0.016	0.420	0.475	26.345	0.507	25.726	27.284
06/16/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.428	0.010	0.413	0.459	26.435	0.433	26.010	27.318
06/17/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.418	0.011	0.396	0.434	26.611	0.365	26.175	27.353
06/18/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.408	0.005	0.395	0.417	26.864	0.263	26.510	27.228
06/19/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.426	0.015	0.402	0.449	27.690	0.636	26.884	28.441
06/20/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.426	0.011	0.404	0.446	28.660	0.492	28.098	29.616
06/21/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.418	0.008	0.402	0.431	29.203	0.535	28.522	29.910
06/22/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.418	0.010	0.402	0.441	29.522	0.392	28.976	30.033
06/23/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.416	0.023	0.375	0.466	29.468	0.305	29.097	29.979
06/24/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.416	0.014	0.399	0.453	28.307	0.338	27.571	29.006
06/25/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.430	0.019	0.391	0.460	27.657	0.325	27.189	28.197
06/26/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.370	0.018	0.348	0.410	25.274	0.966	23.880	27.015
06/27/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.348	0.013	0.330	0.373	24.486	0.585	23.629	25.056
06/28/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.374	0.009	0.358	0.390	25.237	0.195	25.051	25.560
06/29/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.347	0.009	0.332	0.365	25.414	0.321	25.046	25.854
06/30/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.342	0.009	0.327	0.361	26.192	0.394	25.722	26.909
07/01/94	0.360	0.014	0.343	0.343	26.913	0.582	26.360	26.360	0.364	0.012	0.349	0.390	26.863	0.317	26.525	27.452
07/02/94	0.378	0.010	0.366	0.366	26.976	0.382	26.530	26.530	0.384	0.005	0.374	0.396	27.172	0.327	26.639	27.607
07/03/94	0.391	0.034	0.351	0.351	26.785	0.304	26.530	26.530	0.391	0.033	0.354	0.471	27.050	0.130	26.759	27.224
07/04/94	0.371	0.018	0.342	0.342	26.935	0.412	26.530	26.530	0.368	0.021	0.330	0.394	27.194	0.276	26.718	27.645
07/05/94	0.360	0.012	0.343	0.343	27.509	0.738	26.610	26.610	0.353	0.008	0.334	0.364	27.679	0.375	27.262	28.229
07/06/94	0.377	0.017	0.356	0.356	28.259	0.795	27.460	27.460	0.375	0.012	0.355	0.411	28.370	0.578	27.675	29.443
07/07/94	0.382	0.016	0.361	0.361	28.287	0.427	27.840	27.840	0.380	0.008	0.369	0.401	28.412	0.185	28.128	28.846
07/08/94	0.384	0.014	0.369	0.369	27.900	0.487	27.370	27.370	0.389	0.007	0.379	0.413	27.994	0.266	27.662	28.590
07/09/94	0.408	0.031	0.378	0.378	27.425	0.405	26.650	26.650	0.414	0.021	0.390	0.467	27.654	0.254	27.236	28.114
07/10/94	0.392	0.017	0.367	0.367	27.210	0.471	26.650	26.650	0.402	0.012	0.381	0.427	27.419	0.262	27.020	27.779
07/11/94	0.402	0.037	0.365	0.365	27.680	0.956	26.610	26.610	0.406	0.019	0.385	0.454	27.563	0.442	27.014	28.483
07/12/94	0.404	0.022	0.370	0.370	27.674	0.727	26.650	26.650	0.406	0.016	0.379	0.445	27.573	0.387	27.008	28.476
07/13/94	0.434	0.038	0.391	0.391	28.280	0.883	27.370	27.370	0.434	0.020	0.406	0.469	28.066	0.413	27.671	29.190
07/14/94	0.450	0.022	0.427	0.427	28.680	0.633	27.924	27.924	0.436	0.018	0.396	0.471	28.464	0.317	28.084	29.250
07/15/94	0.438	0.013	0.422	0.422	28.886	0.330	28.450	28.450	0.413	0.018	0.389	0.439	28.782	0.220	28.479	29.155
07/16/94	0.449	0.026	0.424	0.424	29.233	0.402	28.853	28.853	0.429	0.022	0.387	0.483	29.058	0.292	28.826	29.554
07/17/94	0.439	0.017	0.409	0.409	28.907	0.309	28.517	28.517	0.417	0.017	0.382	0.455	28.740	0.189	28.479	29.234
07/18/94	0.445	0.041	0.413	0.413	29.053	0.669	28.491	28.491	0.403	0.022	0.381	0.446	28.658	0.275	28.380	29.262
07/19/94	0.437	0.017	0.420	0.420	29.000	0.634	28.244	28.244	0.415	0.018	0.380	0.448	28.793	0.556	28.110	30.255
07/20/94	0.452	0.029	0.415	0.415	29.249	0.635	28.517	28.517	0.430	0.028	0.385	0.499	28.863	0.512	28.341	29.936
07/21/94	0.431	0.018	0.409	0.409	29.183	0.420	28.701	28.701	0.413	0.023	0.370	0.456	28.799	0.299	28.491	29.495
07/22/94	0.431	0.014	0.413	0.413	29.063	0.460	28.544	28.544	0.413	0.023	0.392	0.476	28.559	0.249	28.262	29.185
07/23/94	0.444	0.026	0.420	0.420	28.780	0.444	28.257	28.257	0.415	0.021	0.395	0.466	28.679	0.540	27.984	29.548

	Station 4A								Station 4B							
	Specific Condutance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
07/24/94	0.441	0.025	0.419	0.419	28.745	0.377	28.270	28.270	0.415	0.024	0.393	0.481	28.420	0.360	27.924	29.269
07/25/94	0.440	0.015	0.419	0.419	28.604	0.277	28.282	28.282	0.425	0.017	0.392	0.459	28.537	0.550	27.905	29.839
07/26/94	0.431	0.013	0.419	0.419	28.177	0.197	27.750	27.750	0.421	0.024	0.393	0.467	28.001	0.184	27.712	28.303
07/27/94	0.430	0.009	0.418	0.418	27.174	0.253	26.650	26.650	0.425	0.017	0.405	0.458	27.343	0.216	26.914	27.806
07/28/94	0.437	0.020	0.416	0.416	26.581	0.328	26.190	26.190	0.439	0.030	0.413	0.514	26.835	0.358	26.337	27.583
07/29/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.458	0.033	0.417	0.536	26.647	0.238	26.338	27.366
07/30/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.466	0.009	0.449	0.486	26.479	0.196	26.127	26.893
07/31/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.491	0.011	0.474	0.520	26.633	0.431	26.164	27.491
08/01/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.479	0.012	0.462	0.506	26.881	0.557	26.204	27.857
08/02/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.492	0.008	0.475	0.509	27.321	0.815	26.451	28.751
08/03/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.490	0.007	0.476	0.510	28.166	0.624	27.294	29.293
08/04/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.540	0.027	0.507	0.616	27.910	0.427	27.331	28.694
08/05/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.533	0.011	0.513	0.561	27.376	0.244	26.912	27.687
08/06/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.560	0.011	0.540	0.585	27.139	0.390	26.651	27.974
08/07/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.566	0.013	0.552	0.590	27.081	0.465	26.439	27.765
08/08/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.580	0.022	0.551	0.626	27.561	0.691	26.766	28.772
08/09/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.587	0.019	0.556	0.622	27.808	0.429	27.109	28.430
08/10/94	0.554	0.013	0.535	0.535	28.183	0.687	27.248	27.248	0.560	0.012	0.542	0.590	28.106	0.474	27.368	28.848
08/11/94	0.559	0.012	0.542	0.542	28.453	0.644	27.642	27.642	0.569	0.010	0.551	0.587	28.285	0.405	27.666	28.925
08/12/94	0.553	0.006	0.536	0.536	28.398	0.538	27.655	27.655	0.560	0.003	0.552	0.567	28.220	0.401	27.614	28.973
08/13/94	0.562	0.012	0.545	0.545	28.513	0.569	27.837	27.837	0.567	0.011	0.554	0.597	28.332	0.416	27.742	29.091
08/14/94	0.587	0.019	0.557	0.557	28.162	0.234	27.609	27.609	0.592	0.017	0.561	0.622	28.168	0.217	27.698	28.460
08/15/94	0.578	0.011	0.566	0.566	27.550	0.281	27.194	27.194	0.578	0.012	0.559	0.602	27.534	0.187	27.227	27.866
08/16/94	0.589	0.012	0.571	0.571	27.340	0.399	26.737	26.737	0.594	0.011	0.578	0.614	27.297	0.363	26.725	28.074
08/17/94	0.618	0.017	0.587	0.587	27.275	0.403	26.789	26.789	0.621	0.017	0.594	0.654	27.142	0.347	26.672	27.772
08/18/94	0.630	0.023	0.594	0.594	27.731	0.731	26.683	26.683	0.632	0.021	0.606	0.673	27.418	0.528	26.670	28.199
08/19/94	0.622	0.021	0.595	0.595	27.457	0.286	27.036	27.036	0.621	0.022	0.592	0.669	27.266	0.182	26.928	27.649
08/20/94	0.621	0.025	0.592	0.592	26.943	0.164	26.718	26.718	0.609	0.021	0.580	0.671	26.826	0.186	26.624	27.216
08/21/94	0.598	0.008	0.581	0.581	26.682	0.242	26.252	26.252	0.602	0.006	0.590	0.616	26.550	0.247	26.163	27.133
08/22/94	0.609	0.011	0.596	0.596	26.542	0.277	26.264	26.264	0.611	0.008	0.599	0.622	26.347	0.146	26.071	26.620
08/23/94	0.607	0.016	0.586	0.586	26.817	0.436	26.158	26.158	0.612	0.015	0.593	0.645	26.526	0.323	25.989	27.048
08/24/94	0.649	0.015	0.626	0.626	27.063	0.546	26.381	26.381	0.654	0.012	0.625	0.672	26.726	0.430	26.156	27.846
08/25/94	0.644	0.012	0.631	0.631	27.218	0.628	26.473	26.473	0.651	0.013	0.634	0.679	26.828	0.482	26.274	27.923
08/26/94	0.634	0.027	0.607	0.607	27.254	0.349	26.657	26.657	0.636	0.025	0.608	0.687	26.905	0.263	26.442	27.421
08/27/94	0.604	0.016	0.583	0.583	27.547	0.614	26.710	26.710	0.607	0.019	0.591	0.653	27.083	0.431	26.440	27.749
08/28/94	0.604	0.015	0.587	0.587	27.843	0.643	27.064	27.064	0.612	0.013	0.594	0.643	27.423	0.492	26.817	28.216
08/29/94	0.594	0.005	0.582	0.582	27.319	0.171	27.045	27.045	0.597	0.005	0.585	0.608	27.012	0.174	26.694	27.416
08/30/94	0.615	0.008	0.604	0.604	26.914	0.256	26.630	26.630	0.618	0.007	0.604	0.632	26.507	0.147	26.311	26.772
08/31/94	0.597	0.022	0.563	0.563	26.454	0.154	26.141	26.141	0.602	0.019	0.572	0.631	26.112	0.111	25.879	26.310
09/01/94	0.583	0.008	0.573	0.573	25.464	0.441	24.748	24.748	0.582	0.015	0.561	0.607	25.329	0.268	24.957	25.839
09/02/94	0.588	0.008	0.577	0.577	24.445	0.197	24.154	24.154	0.571	0.011	0.564	0.601	24.628	0.160	24.406	24.957
09/03/94	0.586	0.015	0.572	0.572	24.507	0.482	23.935	23.935	0.580	0.018	0.566	0.613	24.628	0.340	24.193	25.243
09/04/94	0.611	0.005	0.604	0.604	23.882	0.185	23.626	23.626	0.603	0.010	0.571	0.618	24.178	0.153	23.931	24.442
09/05/94	0.607	0.010	0.590	0.590	23.966	0.316	23.616	23.616	0.591	0.018	0.566	0.615	24.245	0.278	23.849	24.568
09/06/94	0.599	0.010	0.589	0.589	24.265	0.403	23.778	23.778	0.580	0.016	0.564	0.614	24.617	0.368	24.137	25.276
09/07/94	0.611	0.009	0.592	0.592	24.462	0.544	23.859	23.859	0.601	0.016	0.564	0.647	24.600	0.313	24.224	25.533
09/08/94	0.618	0.011	0.597	0.597	24.951	1.085	23.800	23.800	0.617	0.011	0.605	0.647	24.920	0.694	24.182	26.161
09/09/94	0.599	0.019	0.580	0.580	24.873	0.881	23.792	23.792	0.589	0.025	0.556	0.639	24.980	0.635	24.220	26.159
09/10/94	0.601	0.005	0.593	0.593	25.010	0.829	24.001	24.001	0.591	0.017	0.562	0.609	25.194	0.669	24.428	26.157
09/11/94	0.620	0.013	0.601	0.601	25.301	0.561	24.492	24.492	0.615	0.014	0.595	0.638	25.614	0.503	24.845	26.665
09/12/94	0.607	0.015	0.580	0.580	25.493	0.687	24.573	24.573	0.608	0.010	0.594	0.637	25.734	0.519	25.053	26.782
09/13/94	0.588	0.013	0.566	0.566	25.585	0.478	24.814	24.814	0.594	0.005	0.583	0.600	25.686	0.287	25.311	26.150
09/14/94	0.570	0.005	0.562	0.562	25.758	0.432	25.210	25.210	0.584	0.007	0.566	0.599	25.404	0.516	24.710	26.440
09/15/94	0.575	0.004	0.566	0.566	25.771	0.333	25.366	25.366	0.578	0.005	0.567	0.587	25.525	0.453	24.790	26.360
09/16/94	0.583	0.011	0.565	0.565	25.610	0.174	25.301	25.301	0.580	0.009	0.565	0.601	25.351	0.258	24.710	25.640
09/17/94	0.582	0.017	0.545	0.545	25.427	0.200	25.167	25.167	0.573	0.015	0.540	0.600	25.067	0.330	24.710	25.600
09/18/94	0.548	0.010	0.528	0.528	25.211	0.275	24.772	24.772	0.538	0.010	0.518	0.564	24.813	0.236	24.580	25.340
09/19/94	0.560	0.009	0.545	0.545	24.896	0.265	24.547	24.547	0.545	0.008	0.534	0.561	24.589	0.119	24.330	24.710
09/20/94	0.557	0.012	0.537	0.537	25.188	0.949	24.062	24.062	0.542	0.011	0.520	0.560	24.781	0.737	24.030	26.060
09/21/94	0.572	0.010	0.554	0.554	24.667	0.305	24.218	24.218	0.548	0.008	0.531	0.561	24.430	0.205	24.030	24.750
09/22/94	0.581	0.007	0.569	0.569	23.966	0.192	23.587	23.587	0.555	0.007	0.542	0.563	23.770	0.192	23.440	24.200

	Station 4A								Station 4B							
	Specific Condutance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
09/23/94	0.526	0.007	0.519	0.519	23.307	0.392	22.805	22.805	0.503	0.011	0.493	0.547	23.175	0.282	22.770	23.700
09/24/94	0.548	0.007	0.531	0.531	22.513	0.222	22.120	22.120	0.523	0.008	0.508	0.536	22.363	0.253	21.920	22.890
09/25/94	0.542	0.009	0.528	0.528	21.880	0.130	21.616	21.616	0.515	0.009	0.503	0.531	21.718	0.123	21.370	21.880
09/26/94	0.542	0.010	0.530	0.530	21.250	0.193	20.903	20.903	0.510	0.009	0.503	0.530	20.896	0.290	20.400	21.290
09/27/94	0.557	0.002	0.554	0.554	20.756	0.299	20.399	20.399	0.517	0.003	0.511	0.523	20.368	0.095	20.190	20.440
09/28/94	0.570	0.007	0.557	0.557	20.497	0.368	20.030	20.030	0.529	0.006	0.520	0.540	20.086	0.280	19.730	20.440
09/29/94	0.579	0.006	0.570	0.570	20.583	0.607	19.613	19.613	0.543	0.011	0.526	0.559	20.078	0.523	19.470	21.460
09/30/94	0.605	0.013	0.585	0.585	20.775	0.533	20.037	20.037	0.569	0.007	0.556	0.579	20.234	0.341	19.680	20.870
10/01/94	0.606	0.018	0.576	0.576	21.463	0.590	20.721	20.721	0.570	0.008	0.559	0.579	20.925	0.467	20.400	21.630
10/02/94	0.604	0.032	0.559	0.559	22.069	0.440	21.481	21.481	0.562	0.024	0.524	0.603	21.328	0.412	20.440	21.920
10/03/94	0.591	0.018	0.577	0.577	22.036	0.344	21.528	21.528	0.545	0.008	0.533	0.574	21.292	0.282	20.950	21.920
10/04/94	0.575	0.007	0.565	0.565	21.673	0.190	21.414	21.414	0.531	0.007	0.522	0.548	20.820	0.297	20.440	21.330
10/05/94	0.585	0.009	0.571	0.571	21.303	0.299	20.895	20.895	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/06/94	0.598	0.007	0.588	0.588	20.475	0.353	19.991	19.991	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/07/94	0.594	0.006	0.575	0.575	20.281	0.274	19.951	19.951	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/08/94	0.593	0.010	0.571	0.571	19.912	0.207	19.507	19.507	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/09/94	0.525	0.025	0.499	0.499	19.294	0.167	18.983	18.983	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/10/94	0.520	0.011	0.507	0.507	18.801	0.243	18.523	18.523	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/11/94	0.523	0.008	0.511	0.511	18.355	0.271	18.022	18.022	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/12/94	0.523	0.013	0.502	0.502	17.886	0.212	17.640	17.640	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/13/94	0.520	0.011	0.498	0.498	17.552	0.089	17.371	17.371	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/14/94	0.524	0.009	0.514	0.514	17.257	0.075	17.162	17.162	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/15/94	0.532	0.003	0.527	0.527	17.284	0.203	17.057	17.057	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/16/94	0.532	0.004	0.523	0.523	17.656	0.452	17.018	17.018	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/17/94	0.515	0.008	0.503	0.503	17.745	0.126	17.578	17.578	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/18/94	0.534	0.008	0.523	0.523	17.460	0.073	17.366	17.366	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/19/94	0.528	0.007	0.520	0.520	18.085	0.651	17.331	17.331	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
10/20/94	0.523	0.013	0.490	0.490	18.140	0.461	17.574	17.574	0.579	0.010	0.550	0.597	18.475	0.391	18.095	19.283
10/21/94	0.504	0.009	0.489	0.489	17.899	0.293	17.410	17.410	0.558	0.008	0.546	0.577	18.356	0.268	17.908	18.795
10/22/94	0.520	0.015	0.489	0.489	18.119	0.485	17.416	17.416	0.570	0.015	0.542	0.594	18.650	0.501	18.009	19.328
10/23/94	0.533	0.007	0.519	0.519	17.979	0.208	17.681	17.681	0.576	0.008	0.558	0.587	18.441	0.203	18.163	18.876
10/24/94	0.553	0.012	0.531	0.531	17.401	0.144	17.091	17.091	0.589	0.011	0.568	0.601	17.932	0.146	17.648	18.179
10/25/94	0.565	0.006	0.553	0.553	16.729	0.154	16.427	16.427	0.592	0.007	0.582	0.611	17.261	0.186	16.912	17.702
10/26/94	0.580	0.007	0.565	0.565	16.189	0.240	15.799	15.799	0.602	0.007	0.588	0.614	16.610	0.202	16.329	17.189
10/27/94	0.587	0.007	0.575	0.575	16.082	0.252	15.840	15.840	0.597	0.006	0.587	0.612	16.311	0.167	16.069	16.649
10/28/94	0.600	0.007	0.587	0.587	15.662	0.181	15.420	15.420	0.606	0.008	0.592	0.619	15.865	0.120	15.695	16.101
10/29/94	0.576	0.010	0.557	0.557	15.572	0.327	15.120	15.120	0.583	0.010	0.562	0.597	15.800	0.250	15.424	16.306
10/30/94	0.551	0.004	0.544	0.544	15.590	0.339	15.080	15.080	0.562	0.003	0.555	0.567	15.751	0.242	15.356	16.109
10/31/94	0.562	0.015	0.543	0.543	15.463	0.252	14.990	14.990	0.573	0.015	0.556	0.601	15.660	0.192	15.312	15.915
11/01/94	0.581	0.014	0.549	0.549	14.847	0.112	14.700	14.700	0.589	0.018	0.558	0.614	15.291	0.289	14.905	15.886
11/02/94	0.585	0.022	0.544	0.544	14.356	0.183	14.020	14.020	0.601	0.023	0.568	0.638	14.531	0.121	14.303	14.774
11/03/94	0.609	0.005	0.602	0.602	14.516	0.291	14.150	14.150	0.631	0.003	0.625	0.638	14.677	0.247	14.399	15.029
11/04/94	0.607	0.003	0.600	0.600	15.232	0.207	14.830	14.830	0.635	0.003	0.630	0.639	15.324	0.157	15.055	15.506
11/05/94	0.558	0.026	0.532	0.532	15.443	0.143	15.290	15.290	0.587	0.025	0.557	0.660	15.501	0.104	15.345	15.734
11/06/94	0.450	0.064	0.416	0.416	15.651	0.164	15.370	15.370	0.496	0.059	0.452	0.698	15.620	0.109	15.448	15.837
11/07/94	0.467	0.027	0.413	0.413	15.072	0.298	14.610	14.610	0.503	0.020	0.447	0.541	15.085	0.257	14.587	15.549
11/08/94	0.364	0.011	0.352	0.352	14.986	0.227	14.610	14.610	0.406	0.012	0.390	0.434	15.057	0.266	14.597	15.483
11/09/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.433	0.024	0.397	0.468	14.957	0.205	14.563	15.168
11/10/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.450	0.007	0.430	0.460	14.242	0.118	14.089	14.522
11/11/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.441	0.012	0.426	0.465	13.845	0.211	13.534	14.540
11/12/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.478	0.011	0.464	0.502	13.532	0.040	13.433	13.605
11/13/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.520	0.010	0.496	0.533	13.713	0.267	13.418	14.133
11/14/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.472	0.011	0.459	0.496	13.921	0.155	13.706	14.121
11/15/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.467	0.007	0.459	0.481	13.535	0.177	13.262	13.905
11/16/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.475	0.004	0.466	0.482	13.069	0.276	12.738	13.544
11/17/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.488	0.017	0.473	0.523	12.594	0.218	12.045	12.738
11/18/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.520	0.017	0.497	0.550	12.261	0.298	11.922	12.886
11/19/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.543	0.007	0.532	0.560	12.203	0.219	11.984	12.703
11/20/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.542	0.011	0.527	0.562	12.130	0.147	11.977	12.609
11/21/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.540	0.024	0.489	0.580	11.825	0.190	11.491	12.092
11/22/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.458	0.014	0.442	0.487	10.828	0.339	10.207	11.450

	Station 4A								Station 4B							
	Specific Condutance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
11/23/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.488	0.008	0.477	0.505	9.885	0.238	9.435	10.207
11/24/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.444	0.011	0.424	0.474	8.818	0.291	8.492	9.393
11/25/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.445	0.007	0.437	0.465	8.513	0.036	8.397	8.572
11/26/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.469	0.005	0.459	0.480	8.191	0.097	8.052	8.386
11/27/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.481	0.010	0.465	0.501	8.755	0390	8.213	9.344
11/28/94	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.444	0.024	0.405	0.488	8.827	0.279	8.444	9.170
11/29/94	0.427	0.018	0.395	0.395	8.488	0.180	8.240	8.240	0.434	0.017	0.405	0.478	8.994	0.133	8.790	9.210
11/30/94	0.423	0.005	0.416	0.416	8.175	0.260	7.860	7.860	0.428	0.008	0.417	0.450	8.556	0.151	8.360	8.830
12/01/94	0.416	0.007	0.405	0.405	7.841	0.272	7.480	7.480	0.421	0.009	0.408	0.451	8.166	0.155	7.900	8.490
12/02/94	0.418	0.004	0.412	0.412	7.558	0.186	7.310	7.310	0.424	0.008	0.412	0.447	7.935	0.200	7.560	8320
12/03/94	0.439	0.012	0.424	0.424	7.383	0.173	7.100	7.100	0.443	0.012	0.415	0.457	7.805	0.341	7.180	8.530
12/04/94	0.463	0.007	0.455	0.455	7.365	0.122	7.220	7.220	0.466	0.010	0.443	0.482	7.883	0.212	7.560	8.190
12/05/94	0.478	0.006	0.468	0.468	7.800	0.131	7.650	7.650	0.478	0.007	0.468	0.496	8.339	0.137	8.150	8.530
12/06/94	0.476	0.006	0.467	0.467	7.863	0.094	7.770	7.770	0.480	0.006	0.471	0.494	8.528	0.260	8.280	9.040
12/07/94	0.456	0.007	0.450	0.450	8.440	0.162	8.110	8.110	0.467	0.007	0.456	0.486	8.998	0.275	7.810	9.210
12/08/94	0.452	0.003	0.449	0.449	8.654	0.059	8.570	8.570	0.468	0.010	0.454	0.479	9.172	0.025	9.120	9.210
12/09/94	0.462	0.003	0.455	0.455	8.539	0.067	8.410	8.410	0.477	0.004	0.463	0.482	9.019	0.150	8.660	9.210
12/10/94	0.460	0.003	0.456	0.456	8.071	0.197	7.690	7.690	0.468	0.009	0.447	0.485	8.165	0.407	7.390	8.790
12/11/94	0.460	0.003	0.454	0.454	6.763	0.438	6.250	6.250	0.464	0.010	0.449	0.478	6.825	0.240	6.420	7.390
12/12/94	0.450	0.006	0.441	0.441	5.603	0.364	5.150	5.150	0.438	0.012	0.420	0.457	5.513	0.504	4.730	6.290
12/13/94	0.438	0.002	0.435	0.435	4.680	0.202	4.440	4.440	0.438	0.003	0.429	0.441	4.755	0.071	4.600	4.900
12/14/94	0.434	0.001	0.431	0.431	4.325	0.162	4.050	4.050	0.425	0.010	0.414	0.445	4.584	0.183	4.310	4.860
12/15/94	0.432	0.002	0.428	0.428	4.352	0.183	4.140	4.140	0.421	0.006	0.412	0.432	4.592	0.213	4.140	4.820
12/16/94	0.429	0.002	0.426	0.426	4.850	0.152	4.650	4.650	0.408	0.006	0.395	0.420	4.750	0.129	4.390	5.110
12/17/94	0.441	0.006	0.431	0.431	4.877	0.104	4.730	4.730	0.428	0.007	0.411	0.435	4.815	0.157	4.690	5.240
12/18/94	0.442	0.004	0.436	0.436	4.805	0.101	4.690	4.690	0.433	0.002	0.426	0.435	4.783	0.022	4.770	4.820
12/19/94	0.443	0.002	0.438	0.438	4.489	0.154	4.310	4.310	0.437	0.005	0.417	0.442	4.668	0.146	4.390	4.820
12/20/94	0.454	0.006	0.443	0.443	4.193	0.046	4.140	4.140	0.444	0.004	0.438	0.450	4.445	0.050	4.310	4.520
12/21/94	0.453	0.004	0.445	0.445	4.342	0.098	4.220	4.220	0.437	0.005	0.429	0.447	4.740	0.087	4.520	4.820
12/22/94	0.450	0.006	0.439	0.439	4.538	0.066	4.480	4.480	0.436	0.003	0.431	0.444	4.799	0.028	4.770	4.860
12/23/94	0.444	0.004	0.438	0.438	4.735	0.062	4.600	4.600	0.433	0.003	0.426	0.435	4.799	0.028	4.770	4.860
12/24/94	0.439	0.002	0.436	0.436	4.510	0.037	4.480	4.480	0.437	0.002	0.434	0.440	4.736	0.061	4.560	4.820
12/25/94	0.438	0.001	0.435	0.435	4.395	0.110	4.270	4.270	0.437	0.003	0.434	0.440	4.740	0.098	4.560	4.860
12/26/94	0.437	0.001	0.434	0.434	4.421	0.158	4.180	4.180	0.435	0.008	0.418	0.445	4.638	0.132	4.390	4.820
12/27/94	0.435	0.001	0.433	0.433	4.219	0.226	3.890	3.890	0.434	0.007	0.420	0.445	4.463	0.228	4.140	4.770
12/28/94	0.434	0.002	0.432	0.432	4.169	0.183	3.930	3.930	0.433	0.009	0.414	0.443	4.494	0.202	4.220	4.770
12/29/94	0.438	0.002	0.434	0.434	4.410	0.102	4.270'	4.270	0.437	0.005	0.420	0.443	4.695	0.144	4.480	5.030
12/30/94	0.441	0.002	0.436	0.436	4.465	0.149	4.220	4.220	0.439	0.003	0.431	0.443	4.721	0.124	4.440	4.860
12/31/94	0.445	0.002	0.440	0.440	4.583	0.047	4.520	4.520	0.434	0.002	0.431	0.437	4.788	0.067	4.560	4.860
01/01/95	0.448	0.002	0.445	0.445	4.542	0.051	4.440	4.440	0.435	0.004	0.428	0.444	4.683	0.202	4.270	4.860
01/02/95	0.457	0.005	0.451	0.451	3.981	0.158	3.720	3.720	0.446	0.005	0.436	0.455	4.145	0.145	3.840	4.350
01/03/95	0.469	0.002	0.466	0.466	3.464	0.260	3.130	3.130	0.452	0.005	0.443	0.462	3.572	0.178	3.210	3.840

Note: N.A indicates data not available.

	Station 5A								Station 5B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
05/24/94	0.392	0.002	0.387	0.395	22.692	0.181	22.391	23.100	0.389	0.002	0.386	0.395	22.097	0.075	21.943	22.220
05/25/94	0.395	0.003	0.388	0.399	22.196	0.119	22.012	22.393	0.392	0.002	0.388	0.396	21.747	0.129	21.538	21.945
05/26/94	0.396	0.003	0.387	0.401	21.789	0.252	21.167	22.136	0.398	0.003	0.391	0.403	21384	0.215	20.854	21.675
05/27/94	0.405	0.004	0.398	0.411	20.872	0.349	20.408	21.809	0.405	0.004	0.400	0.412	20.429	0.224	20.069	20.718
05/28/94	0.403	0.003	0.397	0.408	20.931	0.798	19.951	22.312	0.410	0.002	0.406	0.414	20.261	0.585	19.435	21.109
05/29/94	0.413	0.004	0.407	0.422	21.231	0.593	20.414	22.025	0.423	0.005	0.412	0.429	20.836	0.563	20.070	21.669
05/30/94	0.418	0.005	0.408	0.427	21.847	0363	21.387	22.528	0.430	0.006	0.420	0.443	21.429	0.301	21.050	21.966
05/31/94	0.437	0.006	0.424	0.448	22.994	0.945	22.029	25.151	0.448	0.004	0.442	0.457	22.125	0.331	21.773	22.846
06/01/94	0.449	0.005	0.443	0.462	23.749	1.077	22.832	26.384	0.461	0.004	0.455	0.471	22.615	0.076	22.504	22.743
06/02/94	0.451	0.007	0.445	0.477	22.925	0.468	22.117	23.766	0.468	0.005	0.457	0.486	22.694	0.307	22.103	23.111
06/03/94	0.502	0.021	0.480	0.550	21.678	0.236	21.230	22.117	0.520	0.019	0.498	0.565	21.584	0.262	21.297	22.105
06/04/94	0.479	0.007	0.467	0.495	21.659	0.631	20.981	22.922	0.496	0.007	0.483	0.519	21.307	0.393	20.899	22.018
06/05/94	0.470	0.003	0.465	0.477	22.544	0.663	21.664	23.735	0.495	0.003	0.490	0.501	22.310	0.531	21.694	23.070
06/06/94	0.465	0.005	0.456	0.473	23.817	0.593	22.886	24.918	0.490	0.008	0.479	0.501	23.707	0.488	22.912	24.426
06/07/94	0.458	0.014	0.439	0.474	25.011	0.602	24.069	25.850	0.491	0.006	0.479	0.501	24.927	0.472	24.357	25.674
06/08/94	0.441	0.001	0.439	0.442	25.360	0.132	25.117	25.595	0.467	0.014	0.449	0.485	25.475	0.127	25.319	25.713
06/09/94	0.445	0.006	0.439	0.458	23.870	0.490	23.337	25.116	0.454	0.007	0.449	0.477	24.172	0.494	23.495	25.278
06/10/94	0.459	0.023	0.427	0.502	22.943	0.324	22.568	23.752	0.463	0.024	0.433	0.509	22.886	0.281	22.557	23.493
06/11/94	0.450	0.006	0.436	0.460	23.310	0.758	22.306	24.973	0.449	0.007	0.442	0.471	23.260	0.833	22.334	24.346
06/12/94	0.474	0.026	0.420	0.509	24.539	0.718	23.606	25.423	0.486	0.025	0.437	0.514	24.488	0.484	23.879	25.182
06/13/94	0.423	0.005	0.417	0.435	25.450	0.683	24.617	26.633	0.436	0.002	0.432	0.440	25.259	0.481	24.754	26.058
06/14/94	0.431	0.002	0.426	0.435	26.372	0.707	25.408	27.645	0.437	0.010	0.426	0.461	25.999	0.432	25.499	26.712
06/15/94	0.429	0.002	0.423	0.432	26.735	0.636	25.778	28.146	0.429	0.006	0.424	0.454	26.276	0.395	25.813	26.958
06/16/94	0.428	0.003	0.423	0.433	26.983	0.714	26.070	28.217	0.424	0.002	0.419	0.427	26.467	0.375	26.020	27.154
06/17/94	0.420	0.005	0.409	0.427	27.100	0.742	26.220	28.627	0.421	0.003	0.414	0.424	26.631	0.425	26.124	27.350
06/18/94	0.411	0.003	0.406	0.417	27.122	0.505	26.471	27.948	0.414	0.004	0.407	0.420	26.831	0.318	26.411	27.295
06/19/94	0.421	0.011	0.406	0.444	27.956	0.858	26.843	29.288	0.417	0.011	0.407	0.440	27.591	0.659	26.817	28.418
06/20/94	0.414	0.004	0.408	0.421	28.849	0.600	28.103	29.870	0.405	0.002	0.401	0.409	28.555	0.458	28.030	29.375
06/21/94	0.413	0.002	0.408	0.416	29.441	0.600	28.593	30.240	0.400	0.002	0.397	0.404	29.192	0.579	28.475	29.950
06/22/94	0.410	0.003	0.403	0.415	29.890	0.512	29.174	30.992	0.396	0.002	0.394	0.401	29.506	0.412	28.799	29.972
06/23/94	0.408	0.002	0.404	0.412	29.640	0.273	29.254	30.052	0.393	0.001	0.390	0.396	29.494	0.260	29.125	29.890
06/24/94	0.406	0.004	0.402	0.418	28.397	0.372	27.839	29.208	0.390	0.003	0.385	0.395	28.249	0.351	27.741	29.115
06/25/94	0.426	0.019	0.400	0.461	27.902	0.478	27.206	28.933	0.404	0.020	0.381	0.441	27.579	0.350	27.026	28.110
06/26/94	0.367	0.016	0.348	0.400	25.560	0.949	24.282	27.370	0.346	0.017	0.326	0.381	25.433	0.906	24341	27.225
06/27/94	0.341	0.008	0.330	0.361	24.560	0.631	23.768	25.286	0.321	0.011	0.300	0.346	24.539	0.446	23.957	25.090
06/28/94	0.368	0.011	0.348	0.388	25.493	0.509	24.901	26.756	0.361	0.010	0.346	0.376	25.204	0.183	24.955	25.574
06/29/94	0.340	0.007	0.330	0.360	25.474	0.347	24.970	25.857	0.339	0.008	0.328	0.354	25.311	0.255	25.016	25.689
06/30/94	0.333	0.003	0.327	0.339	26.254	0.650	25.512	27.957	0.337	0.004	0.328	0.345	26.001	0.446	25.473	26.552
07/01/94	0.343	0.003	0.340	0.356	26.940	0.636	26.216	28.200	0.362	0.005	0.346	0.368	26.658	0303	26.227	27.178
07/02/94	0.361	0.008	0.342	0.369	26.915	0.406	26.328	27.544	0.377	0.005	0.368	0.388	26.999	0.326	26.562	27.439
07/03/94	0.384	0.029	0.346	0.449	26.927	0.507	26.380	28.285	0.395	0.033	0.347	0.475	26.921	0.197	26.634	27.429
07/04/94	0.364	0.013	0.341	0.383	27.043	0.614	26.375	28.190	0.372	0.011	0.356	0.390	27.030	0.297	26.641	27.483
07/05/94	0.344	0.002	0.342	0.347	27.637	0.746	26.779	28.973	0.355	0.006	0.345	0.367	27.555	0.357	27.156	27.993
07/06/94	0.361	0.008	0.345	0.372	28.215	0.817	27.362	29.806	0.369	0.007	0.359	0.381	28.195	0.454	27.668	28.920
07/07/94	0.368	0.004	0.360	0.375	28.145	0.326	27.765	28.941	0.373	0.004	0.367	0.380	28.292	0.272	27.956	28.703
07/08/94	0.373	0.003	0.366	0.379	27.779	0.410	27.237	28.583	0.379	0.002	0.375	0.385	27.959	0.217	27.683	28.539
07/09/94	0.399	0.017	0.377	0.431	27.340	0.261	26.841	27.687	0.405	0.015	0.387	0.437	27.758	0.248	27.309	28.129
07/10/94	0.386	0.008	0.365	0.396	27.110	0.390	26.485	27.829	0.390	0.008	0.372	0.401	27.599	0.320	27.090	28.000
07/11/94	0.375	0.006	0.365	0.386	27.278	0.649	26.428	29.333	0.379	0.005	0.371	0.389	27.563	0.298	27.092	28.050
07/12/94	0.380	0.007	0.367	0.395	27.150	0.266	26.709	27.716	0.384	0.011	0365	0.403	27.693	0.229	27.280	28.057
07/13/94	0.398	0.010	0.379	0.424	28.150	0.948	27.195	29.689	0.398	0.006	0.384	0.409	27.957	0.156	27.670	28.117
07/14/94	0.410	0.007	0.397	0.423	29.291	1.124	28.096	31.700	0.410	0.003	0.405	0.415	28.070	0.271	27.750	28.470
07/15/94	0.405	0.006	0.389	0.413	29.273	0.746	28.496	31.346	0.403	0.004	0.399	0.415	28.739	0.330	28.300	29.230
07/16/94	0.410	0.008	0.390	0.425	29.671	0.741	29.024	31.409	0.406	0.003	0.401	0.412	29.066	0.175	28.810	29.310
07/17/94	0.415	0.011	0.386	0.430	29.147	0.386	28.705	30.041	0.413	0.008	0.396	0.423	28.875	0.185	28.600	29.190
07/18/94	0.393	0.010	0.379	0.413	29.595	0.990	28.600	31.282	0.404	0.004	0.398	0.415	28.704	0.180	28.510	29.060
07/19/94	0.406	0.006	0.391	0.416	29.154	0.605	28.460	30.627	0.415	0.003	0.408	0.420	28.727	0.277	28.380	29.230
07/20/94	0.406	0.008	0.392	0.421	29.200	0.611	28.566	30.490	0.421	0.003	0.414	0.426	28.735	0.164	28.550	29.020
07/21/94	0.406	0.007	0.392	0.420	28.972	0.329	28.591	29.711	0.419	0.003	0.414	0.424	28.793	0.111	28.640	28.980
07/22/94	0.412	0.007	0.388	0.425	28.914	0.479	28.351	30.058	0.425	0.002	0.421	0.431	28.685	0.169	28.470	29.060
07/23/94	0.414	0.007	0.406	0.435	28.879	0.701	28.119	30.339	0.429	0.005	0.424	0.441	28.448	0.162	28.220	28.720

	Station 5A								Station 5B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
07/24/94	0.415	0.009	0.405	0.434	28.599	0.420	28.057	29.307	0.460	0.021	0.433	0.488	28.472	0.211	28.170	28.831
07/25/94	0.423	0.005	0.408	0.433	28.476	0.408	27.995	29.794	0.476	0.008	0.457	0.488	29.065	0.252	28.814	29.551
07/26/94	0.415	0.005	0.405	0.424	28.077	0.225	27.790	28.600	0.435	0.010	0.419	0.456	29.328	0.192	28.928	29.533
07/27/94	0.418	0.005	0.406	0.431	27.347	0.228	26.610	27.670	0.434	0.006	0.426	0.443	28.362	0.167	28.082	28.758
07/28/94	0.423	0.009	0.402	0.440	26.785	0.405	26.270	27.580	0.428	0.007	0.421	0.441	27.410	0.211	27.189	27.952
07/29/94	0.427	0.006	0.413	0.438	26.691	0.451	26.150	27.710	0.436	0.005	0.426	0.443	27.161	0.149	26.973	27.526
07/30/94	0.439	0.003	0.433	0.444	26.363	0.271	25.890	27.080	0.442	0.003	0.436	0.446	27.090	0.150	26.838	27310
07/31/94	0.446	0.006	0.439	0.461	26.559	0.583	25.890	27.670	0.454	0.006	0.445	0.469	27.111	0.247	26.793	27.550
08/01/94	0.462	0.005	0.453	0.469	26.705	0.619	25.890	27.920	0.470	0.005	0.459	0.482	26.958	0.165	26.746	27.209
08/02/94	0.452	0.005	0.440	0.460	27.180	0.755	26.360	28.600	0.462	0.005	0.452	0.470	27.168	0.056	27.038	27333
08/03/94	0.455	0.003	0.450	0.462	27.880	0.500	27.120	28.720	0.479	0.007	0.469	0.493	27.352	0.319	26.986	28.083
08/04/94	0.469	0.009	0.457	0.487	27.565	0.378	26.740	28.130	0.477	0.011	0.465	0.498	27.486	0.319	27.071	28.036
08/05/94	0.484	0.002	0.480	0.488	26.794	0.282	26.530	27.500	0.494	0.002	0.491	0.501	27.679	0.227	27.443	28.246
08/06/94	0.485	0.006	0.472	0.495	26.688	0.552	25.930	27.840	0.501	0.004	0.496	0.512	27.163	0.246	26.849	27.606
08/07/94	0.499	0.008	0.488	0.518	26.780	0.544	26.100	27.670	0.525	0.012	0.507	0.543	27.216	0.214	26.883	27.640
08/08/94	0.515	0.007	0.504	0.525	27.013	0.540	26.360	27.880	0.544	0.004	0.537	0.553	27.350	0.250	27.125	27.765
08/09/94	0.526	0.009	0.511	0.544	27.552	0.931	26.610	29.228	0.545	0.004	0.537	0.555	27.347	0.237	26.820	27.713
08/10/94	0.542	0.005	0.530	0.548	28.214	0.586	27.396	29.291	0.549	0.004	0.543	0.559	27.140	0.272	26.780	27.670
08/11/94	0.547	0.006	0.534	0.555	28.503	0.629	27.848	29.992	0.552	0.010	0.542	0.566	27.435	0.227	27.120	27.790
08/12/94	0.553	0.004	0.542	0.557	28.416	0.470	27.789	29.555	0.556	0.008	0.543	0.566	27.838	0.229	27.580	28.340
08/13/94	0.551	0.002	0.546	0.554	28.517	0.355	28.022	29.156	0.559	0.003	0.553	0.565	28.244	0.281	27.880	28.640
08/14/94	0.552	0.002	0.549	0.555	28.181	0.210	27.741	28.548	0.567	0.004	0.560	0.577	28.054	0.144	27.790	28.380
08/15/94	0.557	0.004	0.550	0.571	27.785	0.456	27.225	28.650	0.576	0.005	0.568	0.585	27.283	0.205	26.990	27.710
08/16/94	0.559	0.009	0.546	0.593	27.633	0.778	26.786	29.392	0.575	0.004	0.570	0.581	26.977	0.234	26.690	27.330
08/17/94	0.572	0.011	0.555	0.588	27.307	0.448	26.679	28.152	0.577	0.003	0.572	0.585	26.870	0.222	26.530	27.240
08/18/94	0.589	0.005	0.578	0.601	27.867	1.079	26.700	30.035	0.592	0.004	0.585	0.599	26.752	0.121	26.530	27.120
08/19/94	0.607	0.007	0.598	0.622	27.388	0.194	27.100	27.828	0.611	0.007	0.599	0.621	27.109	0.221	26.740	27.410
08/20/94	0.626	0.003	0.619	0.629	26.707	0.188	26.362	27.010	0.626	0.004	0.620	0.631	26.655	0.206	26.400	27.120
08/21/94	0.613	0.008	0.603	0.628	26.365	0.340	26.014	26.899	0.612	0.006	0.604	0.625	26.304	0.197	25.980	26.530
08/22/94	0.606	0.006	0.596	0.615	26.613	0.552	25.997	27.640	0.614	0.005	0.606	0.624	26.089	0.135	25.980	26.440
08/23/94	0.610	0.003	0.605	0.616	26.366	0.350	25.939	27.033	0.609	0.002	0.605	0.613	26.110	0.210	25.850	26.480
08/24/94	0.617	0.006	0.607	0.626	26.384	0.418	25.959	27.135	0.611	0.008	0.604	0.629	26.260	0.210	25.980	26.570
08/25/94	0.631	0.007	0.615	0.643	26.732	0.596	25.943	27.798	0.637	0.011	0.622	0.656	26.488	0.281	26.230	27.030
08/26/94	0.640	0.005	0.632	0.647	26.868	0.372	26.434	27.528	0.644	0.006	0.636	0.658	26.705	0.140	26.570	27.030
08/27/94	0.628	0.006	0.619	0.638	27.037	0.468	26.456	27.891	0.631	0.006	0.622	0.640	26.943	0.342	26.570	27.460
08/28/94	0.616	0.007	0.603	0.626	27.318	0.534	26.648	28.333	0.620	0.006	0.608	0.627	27.211	0.309	26.820	27.710
08/29/94	0.608	0.003	0.602	0.614	26.784	0.200	26.489	27.266	0.612	0.002	0.606	0.615	27.014	0.218	26.690	27.500
08/30/94	0.611	0.002	0.606	0.615	26.397	0.240	25.851	26.906	0.612	0.002	0.608	0.617	26.519	0.068	26.360	26.610
08/31/94	0.613	0.005	0.602	0.623	25.898	0.165	25.652	26.247	0.617	0.002	0.612	0.620	26.267	0.163	25.930	26.530
09/01/94	0.591	0.005	0.583	0.602	25.002	0.248	24.711	25.481	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/02/94	0.581	0.003	0.576	0.587	24.963	0.472	24.513	26.273	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/03/94	0.581	0.003	0.575	0.587	24.881	0.568	24.056	25.948	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/04/94	0.584	0.009	0.573	0.606	24.339	0.261	23.885	24.767	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/05/94	0.603	0.004	0.592	0.610	24.284	0.404	23.844	24.940	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/06/94	0.604	0.004	0.598	0.611	24.476	0.406	23.810	25.147	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/07/94	0.601	0.004	0.593	0.610	24.862	0.691	23.903	26.125	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/08/94	0.596	0.006	0.584	0.606	25.450	1.194	24.244	27.901	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/09/94	0.611	0.005	0.598	0.619	25.080	0.821	24.116	27.406	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/10/94	0.598	0.007	0.582	0.615	25.360	0.963	24.207	26.814	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/11/94	0.594	0.008	0.576	0.603	25.540	0.748	24.508	26.777	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/12/94	0.600	0.004	0.587	0.605	25.449	0.491	24.718	26.267	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/13/94	0.600	0.006	0.590	0.609	25.419	0.358	24.891	26.228	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
09/14/94	0.594	0.007	0.580	0.604	25.485	0.556	24.709	26.765	0.583	0.004	0.577	0.589	25.491	0.308	25.130	26.020
09/15/94	0.589	0.006	0.580	0.600	25.570	0.369	24.862	26.153	0.584	0.002	0.580	0.588	25.697	0.211	25.260	25.980
09/16/94	0.584	0.003	0.580	0.589	25.395	0.134	25.064	25.602	0.587	0.001	0.585	0.589	25.616	0.115	25.340	25.770
09/17/94	0.578	0.003	0.571	0.584	25.099	0.218	24.711	25.488	0.589	0.002	0.585	0.591	25.445	0.173	25.170	25.770
09/18/94	0.559	0.010	0.542	0.575	24.819	0.267	24.439	25.315	0.583	0.006	0.573	0.594	24.886	0.241	24.710	25.340
09/19/94	0.544	0.005	0.536	0.552	24.540	0.154	24.302	24.743	0.572	0.003	0.570	0.579	24.677	0.046	24.540	24.710
09/20/94	0.532	0.006	0.515	0.537	24.820	0.839	23.905	26.588	0.571	0.003	0.564	0.575	24.474	0.118	24.290	24.710
09/21/94	0.526	0.003	0.520	0.531	24.173	0.290	23.715	24.593	0.573	0.002	0.568	0.576	24.498	0.191	24.200	24.750
09/22/94	0.527	0.006	0.520	0.537	23.665	0.169	23.233	23.979	0.562	0.020	0.536	0.585	23.738	0.782	20.820	24.500

	Station 5A								Station 5B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
09/23/94	0.548	0.008	0.535	0.566	23.019	0.275	22.601	23.549	0.558	0.009	0.545	0.569	22.688	0.205	22.361	23.013
09/24/94	0.531	0.003	0.525	0.539	22.446	0.160	22.172	22.796	0.547	0.002	0.543	0.551	22.239	0.156	21.941	22.548
09/25/94	0.527	0.004	0.522	0.535	21.867	0.202	21.306	22.136	0.550	0.005	0.544	0.559	21.509	0.161	21.119	21.814
09/26/94	0.527	0.003	0.524	0.535	21.236	0.142	20.950	21.658	0.545	0.006	0.535	0.558	20.826	0.170	20.551	21.122
09/27/94	0.523	0.022	0.449	0.547	20.952	0.266	20.649	21.448	0.545	0.012	0.528	0.562	20.313	0.089	20.186	20.518
09/28/94	0.547	0.003	0.541	0.552	20.584	0.265	20.155	21.078	0.562	0.003	0.556	0.566	19.963	0.291	19.409	20.312
09/29/94	0.551	0.002	0.547	0.556	20.761	0.453	20.218	21.688	0.569	0.002	0.565	0.573	19.762	0.334	19.405	20.302
09/30/94	0.558	0.008	0.548	0.573	21.165	0.465	20.569	21.756	0.581	0.009	0.570	0.600	20.369	0.399	19.841	20.915
10/01/94	0.575	0.004	0.569	0.584	21.892	0.579	21.142	22.795	0.604	0.009	0.594	0.618	20.798	0.290	20.419	21.229
10/02/94	0.585	0.008	0.567	0.597	22.654	0.613	21.908	23.440	0.620	0.002	0.616	0.623	21.272	0.217	20.959	21.688
10/03/94	0.583	0.010	0.573	0.601	22.789	0.186	22.439	23.140	0.623	0.003	0.615	0.627	21.549	0.133	21.240	21.718
10/04/94	0.579	0.003	0.575	0.584	22.116	0.091	21.928	22.314	0.606	0.007	0.594	0.618	21.121	0.141	20.959	21.460
10/05/94	0.584	0.003	0.580	0.589	21.812	0.146	21.630	22.300	0.597	0.006	0.587	0.606	20.674	0.114	20.494	20.896
10/06/94	0.592	0.004	0.586	0.600	21.302	0.192	21.030	21.630	0.594	0.002	0.590	0.599	20.692	0.191	20.392	21.126
10/07/94	0.603	0.009	0.588	0.615	21.078	0.154	20.820	21.370	0.596	0.004	0.589	0.603	20.569	0.207	20.261	20.869
10/08/94	0.608	0.007	0.597	0.616	20.723	0.270	20.230	21.030	0.601	0.004	0.592	0.607	20.286	0.267	19.871	20.594
10/09/94	0.584	0.023	0.549	0.608	20.040	0.238	19.680	20.490	0.593	0.025	0.550	0.626	19.627	0.194	19.251	19.985
10/10/94	0.547	0.004	0.539	0.554	19.550	0.518	18.840	20.910	0.566	0.005	0.552	0.572	19.174	0.133	18.820	19.440
10/11/94	0.540	0.008	0.527	0.550	18.990	0.400	18.590	19.890	0.568	0.001	0.563	0.570	18.644	0.102	18.405	18.862
10/12/94	0.537	0.010	0.523	0.550	18.605	0.070	18.540	18.840	0.565	0.001	0.562	0.568	18.530	0.106	18.328	18.681
10/13/94	0.544	0.006	0.526	0.548	18.380	0.136	18.080	18.590	0.567	0.004	0.559	0.573	18.166	0.146	18.036	18.438
10/14/94	0.542	0.008	0.525	0.549	18.052	0.077	17.990	18.330	0.558	0.002	0.555	0.563	18.063	0.028	18.024	18.102
10/15/94	0.548	0.002	0.544	0.552	18.144	0.169	17.910	18.500	0.562	0.002	0.559	0.566	18.092	0.055	17.946	18.145
10/16/94	0.550	0.008	0.542	0.576	18.408	0.311	17.990	18.800	0.569	0.010	0.558	0.587	18.445	0.325	18.112	18.858
10/17/94	0.567	0.009	0.549	0.577	18.608	0.056	18.540	18.710	0.584	0.008	0.564	0.593	18.842	0.047	18.779	18.936
10/18/94	0.550	0.002	0.546	0.555	18.533	0.054	18.430	18.590	0.563	0.002	0.560	0.568	18.611	0.058	18.480	18.732
10/19/94	0.560	0.007	0.554	0.580	18.724	0.445	18.224	20.192	0.564	0.006	0.558	0.574	18.616	0.113	18.455	18.964
10/20/94	0.566	0.006	0.549	0.571	18.285	0.227	17.988	18.778	0.572	0.004	0.557	0.576	18.173	0.127	17.985	18.444
10/21/94	0.555	0.005	0.542	0.561	18.639	0.317	18.168	19.230	0.556	0.005	0.549	0.565	17.992	0.181	17.680	18.405
10/22/94	0.553	0.004	0.544	0.558	19.006	0.561	18.338	19.872	0.550	0.003	0.544	0.560	17.840	0.157	17.523	18.023
10/23/94	0.554	0.004	0.544	0.561	18.805	0.224	18.516	19.430	0.550	0.006	0.531	0.562	17.895	0.171	17.496	18.212
10/24/94	0.564	0.006	0.553	0.574	18.343	0.127	18.044	18.588	0.549	0.003	0.543	0.555	17.450	0.181	16.983	17.742
10/25/94	0.581	0.004	0.571	0.587	17.635	0.164	17.372	17.918	0.559	0.004	0.547	0.566	16.480	0.199	16.134	16.937
10/26/94	0.592	0.005	0.586	0.604	16.912	0.325	16.303	17.374	0.564	0.003	0.559	0.568	15.785	0.182	15.446	16.099
10/27/94	0.590	0.004	0.585	0.602	16.156	0.242	15.767	16.609	0.569	0.004	0.561	0.578	15.308	0.246	14.920	15.709
10/28/94	0.594	0.004	0.586	0.604	15.706	0.137	15.516	16.069	0.574	0.005	0.565	0.584	14.953	0.110	14.777	15.218
10/29/94	0.602	0.003	0.596	0.606	15.549	0.298	15.146	16.169	0.584	0.003	0.578	0.589	14.822	0.184	14.548	15.099
10/30/94	0.604	0.004	0.598	0.610	15.736	0.504	15.155	16.509	0.588	0.002	0.584	0.592	14.789	0.131	14.615	15.045
10/31/94	0.594	0.011	0.568	0.606	15.721	0.318	15.041	16.097	0.575	0.012	0.553	0.587	15.024	0.196	14.565	15.256
11/01/94	0.568	0.007	0.561	0.582	14.862	0.130	14.590	15.091	0.553	0.002	0.549	0.556	14.283	0.127	14.131	14.537
11/02/94	0.564	0.005	0.557	0.574	14.527	0.135	14.214	14.846	0.557	0.003	0.552	0.561	14.146	0.140	13.908	14.475
11/03/94	0.571	0.008	0.561	0.581	14.759	0.227	14.520	15.027	0.569	0.002	0.564	0.572	14.375	0.204	14.162	14.776
11/04/94	0.587	0.004	0.577	0.592	15.298	0.180	14.989	15.544	0.577	0.003	0.569	0.580	15.034	0.168	14.742	15.226
11/05/94	0.578	0.021	0.537	0.594	15.535	0.138	15.308	15.855	0.567	0.022	0.524	0.587	15.316	0.134	15.192	15.582
11/06/94	0.474	0.063	0.429	0.630	15.527	0.179	15.219	15.864	0.464	0.068	0.413	0.623	15.375	0.151	15.093	15.650
11/07/94	0.463	0.016	0.445	0.491	15.138	0.237	14.721	15.653	0.459	0.019	0.426	0.485	14.992	0.197	14.596	15.340
11/08/94	0.370	0.027	0.342	0.443	15.118	0.234	14.780	15.663	0.364	0.026	0.345	0.434	15.050	0.188	14.782	15.370
11/09/94	0.374	0.021	0.353	0.411	14.861	0.265	14.230	15.080	0.371	0.017	0.353	0.406	15.115	0.275	14.280	15.330
11/10/94	0.394	0.008	0.382	0.410	13.791	0.355	13.260	14.280	0.396	0.005	0.386	0.408	14.036	0.055	13.900	14.110
11/11/94	0.377	0.008	0.364	0.394	13.570	0.436	13.220	14.490	0.380	0.007	0.371	0.397	13.815	0.114	13.600	13.980
11/12/94	0.405	0.011	0.380	0.421	13.222	0.018	13.180	13.260	0.409	0.008	0.384	0.424	13.639	0.083	13.520	13.900
11/13/94	0.446	0.019	0.421	0.469	13.390	0.285	13.220	14.150	0.451	0.013	0.432	0.467	13.847	0.228	13.560	14.110
11/14/94	0.437	0.020	0.412	0.465	13.652	0.428	13.260	14.450	0.449	0.015	0.413	0.467	14.071	0.015	14.020	14.110
11/15/94	0.412	0.005	0.407	0.420	13.219	0.048	13.140	13.310	0.414	0.004	0.410	0.424	13.680	0.168	13.390	14.020
11/16/94	0.411	0.007	0.404	0.424	12.980	0.129	12.760	13.220	0.413	0.004	0.407	0.421	13.109	0.113	12.880	13.350
11/17/94	0.425	0.002	0.422	0.431	12.640	0.147	12.420	12.880	0.426	0.007	0.421	0.447	12.865	0.134	12.590	13.010
11/18/94	0.455	0.012	0.426	0.468	12.473	0.173	12.290	13.180	0.459	0.004	0.449	0.462	12.504	0.086	12.380	12.710
11/19/94	0.477	0.016	0.454	0.497	12.553	0.137	12.380	12.800	0.479	0.016	0.460	0.498	12.575	0.103	12.460	12.880
11/20/94	0.493	0.003	0.485	0.496	12.426	0.081	12.290	12.540	0.497	0.002	0.490	0.501	12.536	0.093	12.380	12.670
11/21/94	0.492	0.015	0.469	0.515	12.139	0.261	11.450	12.500	0.495	0.015	0.476	0.524	12.232	0.217	11.700	12.590
11/22/94	0.418	0.027	0.390	0.494	10.753	0.247	10.390	11.400	0.419	0.034	0.388	0.513	11.029	0.245	10.560	11.570

	Station 5A								Station 5B							
	Specific Conductance (mS/cm)				Temperature (C)				Specific Conductance (mS/cm)				Temperature (C)			
Date	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max	Avg	S.D.	Min	Max
11/23/94	0.436	0.014	0.408	0.457	9.912	0.239	9.330	10.390	0.438	0.017	0.404	0.460	10.197	0.203	9.710	10.520
11/24/94	0.384	0.021	0.356	0.434	8.965	0.164	8.700	9.290	0.399	0.023	0.380	0.455	9.225	0.144	8.950	9.630
11/25/94	0.380	0.004	0.372	0.389	8.546	0.145	8.410	8.830	0.391	0.001	0.388	0.394	8.823	0.074	8.740	8.950
11/26/94	0.401	0.011	0.384	0.424	8.428	0.020	8.410	8.450	0.411	0.009	0.398	0.424	8.622	0.060	8.570	8.740
11/27/94	0.431	0.002	0.426	0.436	8.875	0.417	8.410	9.590	0.439	0.005	0.424	0.446	9.053	0.435	8.570	9.710
11/28/94	0.422	0.012	0.391	0.435	8.985	0.311	8.410	9.590	0.439	0.004	0.431	0.444	9.055	0.175	8.740	9.210
11/29/94	0.404	0.010	0.388	0.416	8.926	0.464	8.450	10.220	N.A	N.A	N.A.	N.A	8.962	0.152	8.660	9.120
11/30/94	0.426	0.005	0.416	0.434	8.564	0.405	8.150	9.550	0.439	0.006	0.426	0.454	8.601	0.163	8.320	8.950
12/01/94	0.419	0.004	0.414	0.427	7.908	0.128	7.690	8.150	0.425	0.003	0.420	0.432	8.232	0.125	8.030	8.450
12/02/94	0.420	0.003	0.416	0.429	7.773	0.183	7.480	8.110	0.421	0.007	0.408	0.432	8.124	0.165	7.900	8.410
12/03/94	0.424	0.004	0.419	0.434	7.816	0.182	7.560	8.110	0.423	0.007	0.415	0.444	8.036	0.050	7.900	8.110
12/04/94	0.452	0.007	0.435	0.460	8.013	0.266	7.650	8.570	0.459	0.006	0.447	0.466	8.080	0.155	7.900	8.410
12/05/94	0.461	0.004	0.455	0.466	8.185	0.179	7.980	8.570	0.468	0.003	0.460	0.471	8.316	0.125	8.190	8.620
12/06/94	0.471	0.004	0.465	0.477	8.178	0.131	8.030	8.450	0.471	0.001	0.469	0.473	8.428	0.163	8.240	8.790
12/07/94	0.456	0.007	0.446	0.467	8.642	0.048	8.490	8.700	0.467	0.005	0.456	0.472	8.980	0.071	8.790	9.120
12/08/94	0.451	0.005	0.444	0.458	8.702	0.027	8.660	8.740	0.464	0.005	0.456	0.469	9.064	0.052	9.000	9.170
12/09/94	0.453	0.003	0.448	0.457	8.553	0.111	8.320	8.660	0.469	0.002	0.465	0.472	8.880	0.146	8.530	9.080
12/10/94	0.453	0.002	0.448	0.457	7.883	0.303	7.180	8.280	0.463	0.008	0.445	0.470	8.226	0.270	7.600	8.570
12/11/94	0.451	0.003	0.444	0.455	6.583	0.249	6.120	7.180	0.453	0.004	0.446	0.459	6.953	0.244	6.550	7.600
12/12/94	0.440	0.004	0.431	0.444	5.586	0.298	4.940	6.080	0.432	0.006	0.423	0.448	6.091	0.263	5.410	6.500
12/13/94	0.429	0.002	0.424	0.435	4.721	0.108	4.560	4.900	0.426	0.001	0.425	0.429	5.327	0.061	5.110	5.410
12/14/94	0.423	0.002	0.418	0.426	4.488	0.197	4.140	4.860	0.425	0.004	0.418	0.429	5.106	0.199	4.730	5.360
12/15/94	0.421	0.002	0.417	0.425	4.682	0.270	4.350	5.240	0.420	0.003	0.416	0.425	5.227	0.204	4.940	5.580
12/16/94	0.417	0.002	0.414	0.421	5.120	0.211	4.770	5.450	0.415	0.003	0.410	0.419	5.676	0.251	5.320	6.040
12/17/94	0.426	0.006	0.416	0.436	5.113	0.231	4.820	5.530	0.422	0.004	0.416	0.430	5.639	0.286	5.320	6.170
12/18/94	0.429	0.003	0.426	0.434	4.931	0.138	4.690	5.240	0.425	0.002	0.420	0.428	5.449	0.168	5.280	5.790
12/19/94	0.430	0.002	0.427	0.434	4.549	0.142	4.310	4.820	0.427	0.002	0.425	0.431	5.174	0.155	4.860	5.410
12/20/94	0.438	0.006	0.430	0.446	4.448	0.114	4.310	4.650	0.437	0.007	0.430	0.448	5.060	0.158	4.900	5.360
12/21/94	0.440	0.003	0.434	0.446	4.625	0.124	4.440	4.860	0.440	0.005	0.433	0.448	5.236	0.132	5.070	5.360
12/22/94	0.436	0.006	0.429	0.446	4.836	0.131	4.650	5.030	0.433	0.008	0.425	0.445	5.361	0.050	5.320	5.580
12/23/94	0.432	0.004	0.425	0.440	4.849	0.085	4.690	4.980	0.431	0.005	0.425	0.445	5.360	0.032	5.280	5.410
12/24/94	0.425	0.001	0.423	0.429	4.639	0.047	4.520	4.690	0.425	0.001	0.425	0.428	5.324	0.084	5.070	5.360
12/25/94	0.425	0.001	0.424	0.428	4.622	0.193	4.390	5.030	0.427	0.002	0.422	0.429	5.205	0.173	5.030	5.580
12/26/94	0.425	0.001	0.422	0.427	4.582	0.257	4.220	5.150	0.427	0.002	0.423	0.433	5.153	0.207	4.860	5.580
12/27/94	0.423	0.001	0.420	0.425	4.412	0.290	3.970	5.030	0.429	0.004	0.424	0.436	4.998	0.324	4.350	5.410
12/28/94	0.422	0.002	0.419	0.426	4.459	0.261	4.100	4.860	0.428	0.003	0.422	0.432	5.095	0.255	4.690	5.360
12/29/94	0.424	0.001	0.422	0.427	4.624	0.127	4.440	4.820	0.426	0.002	0.425	0.429	5.236	0.137	5.030	5.360
12/30/94	0.429	0.002	0.425	0.431	4.646	0.200	4.310	4.940	0.428	0.001	0.425	0.431	5.236	0.162	4.940	5.410
12/31/94	0.431	0.002	0.429	0.437	4.823	0.046	4.730	4.860	0.430	0.002	0.427	0.436	5.342	0.033	5.280	5.410
01/01/95	0.435	0.001	0.433	0.439	4.502	0.226	3.930	4.690	0.436	0.004	0.432	0.449	5.116	0.323	4.050	5.360
01/02/95	0.441	0.003	0.436	0.447	3.883	0.268	3.510	4.270	0.449	0.004	0.443	0.455	4.553	0.298	4.220	5.030
01/03/95	0.455	0.004	0.446	0.459	3.590	0.182	3.380	3.970	0.469	0.004	0.458	0.473	4.162	0.276	3.550	4.730

Note: N.A. indicates data not available.

APPENDIX B

Results of three dye-tracer injections

APPENDIX B1

Dye-tracer injection - Run 1
August 25, 1994

August 25,1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-9+10	15	0	11:43	8.3			
		1		8.3			
		2		5.2			
		3		0.7			
		4		0.2			
		5		0.0			
		6		0.0			
		7		-0.2			
-9+10	36	0	11:29	6.4			
		1		8.6			
		2		5.5			
		2.5		4.5			
		3		1.0			
		4		0.4			
		5		0.1			
-9+10	55	0	12:30	21.2			
		1		15.9			
		2		10.6			
		3		6.4			
		4		7.1			
		6		0.0			
		8		-0.1			
		10		-0.2			
		20		1.5			
-9+10	75	0	11:10	0.6			
		2		0.7			
		4		0.0			
		6		0.0			
		10		0.0			
		12		0.0			
-9+10	130	0	12:10	2.2			
		1		1.5			
		2		0.4			
		4		0.0			
		6		0.0			
		10		0.0			
		14		0.0			
		20		1.1			
-6+10	15	0	12:50	25.0			
		1		20.5			
		2		19.0			
		3		6.9			
		4		5.5			
		5		10.6			
-6+10	25	0	13:10	17.0			
		1.5		14.2			
		3		12.7			
-6+10	55	0	13:15	36.4			
		1		32.8			
		2		25.6			
		3		25.6			
		4		9.8			
		5		2.0			
		6		0.1			
		10		-0.2			
		15		-0.2			
		18		0.0			
		20		5.2			

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-6+10	72	0	13:25	42.3			
		1		32.9			
		2		30.5			
		3		18.3			
		4		14.1			
		5		6.1			
		6		0.0			
		10		0.0			
		18		0.0			
		20		0.1			
-6+10	98	0	13:35	9.7			
		1		11.0			
		2		59.2			
		3		17.8			
		4		7.3			
		5		1.1			
		6		6.8			
		10		3.8			
		20		4.7			
-6+10	125	0	13:55	7.4			
		1		7.4			
		2		8.3			
		3		4.3			
		4		2.5			
		5		0.4			
		12		-0.2			
		20		0.1			
-6+10	200	0	14:07	4.7			
		2		4.0			
		4		3.3			
		5		4.5			
		6		0.0			
		9		-0.2			
		18		-0.2			
-6+10	285	0	14:18	5.2			
		2		4.7			
		4		2.6			
		6		-0.2			
		9		-0.2			
		18		-0.2			
-6+10	340	0	14:30	5.0			
		1.5		4.0			
		3		3.5			
-6+10	72	0	14:40	42.4		23.6	1.82
		1		32.8			
		2		30.4			
		3		19.0			
		4		14.4			
		5		6.2			
		6		0.0			
		10		-0.2			
		16		-0.2			
		18		0.4			
		20		9.8			
-4+10	20	0	15:07	52.0			
		1		42.4			
		2		40.0			
		3		47.2			

August 25,1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-4+10	58	0	15:17	32.8			
		1		32.8			
		2		44.8			
		3		54.4		53.8	4.15
		4		28.0			
		5		5.0			
		6		0.4			
		7.5		-0.1			
		10		-0.2			
		15		0.2			
-4+10	80	0	15:35	15.2			
		1		34.1			
		2		12.1			
		3		9.1			
		4		4.0			
		5		8.1			
		6		0.5			
		8		-0.2			
		10		-0.2			
		18		0.0			
-4+10	130	0	15:50	4.0			
		2		3.8			
		4		2.8			
		6		16.7			
		8		5.3			
		9.5		3.8			
		19		5.3			
-4+10	200	0	16:00	2.6			
		2		2.5			
		4		1.6			
		6		0.3			
		10		-0.2			
		19		1.3			
-4+10	270	0	16:10	4.0			
		1		4.0			
		2		4.0			
		3		2.9			
		4.5		1.9			
		9		0.1			
-2+10	50	0	16:25	49.6			
		1		49.6			
		2		47.2			
		3		59.2		61.4	4.74
		4		29.2			
		5		21.2			
		6		9.1			
		8		4.7			
		10		2.1			
		14		0.4			
-2+10	90	0	16:45	37.6		38.5	2.97
		1		3.8			
		2		30.4			
		3		59.2			
		4		8.3			
		5		4.3			
		6		3.1			
		8		4.0			
		10		0.3			
		18		0.0			
		20		1.8			
-2+10	150	0	17:00	2.5			
		2		2.3			
		4		2.3			
		6		1.3			
		8		3.1			
		10		0.7			
		20		0.5			
-1+10	15	0	17:42	29.6			
		1		19.7			
-1+10	36	0	17:50	31.9			
		1		30.3			
		3		16.3			
		5		9.8			
		7		7.9			
-1+10	60	0	18:00	12.9		29.5	2.28
		2		7.6			
		4		9.1			
		6		4.0			
		8		3.1			
		10		2.3			
		12		2.1			
		14		1.0			
-1 + 10	85	0	18:15	18.2			
		1		23.5			
		2		24.3		16.7	1.29
		3		19.0			
		4		11.0			
		6		7.1			
		8		5.7			
		10		3.8			
		12		1.1			
		15		0.6			
		20		0.4			
-1+10	125	0	18:30	19.0			
		2		7.6			
		4		6.9			
		6		6.7			
		8		5.5			
		10		4.0			
		12		2.8			
		20		0.4			
-1+10	190	0	18:45	8.8			
		2		8.6			
		4		7.4			
		6		3.8			
		8		3.1			
		10		1.9			
		14		5.0			
		20		3.3			
-1+10	270	0	18:55	3.5			
		2		3.5			
		4		3.3			
		6		1.9			
		8		1.9			
		10		1.2			
		11		1.0			
outrall	0	0	18:40	100.0			
outfall	10	0	18:45	117.1			

August 25, 1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
outfall	30	2	18:50	89.1			
		1		83.6			
		0		65.6			
outfall	49	0	18:54	64.2			
		2		55.9			
		4		29.9			
		6		49.0			
		8		4.3			
		10		4.5			
outfall	64	0	19:01	68.4		48.1	3.71
		2		61.5			
		4		55.9			
		6		12.1			
		8		2.9			
		10		*23*			
		12		2.8			
		15		2.1			
outfall	80	0	19:15	42.1			
		2		33.4			
		4		15.1			
		6		8.9			
		8		5.2			
		10		2.2			
		14		1.3			
		18		1.3		3.3	0.26
outfall	113	0	19:24	21.2		24.2	1.87
		2		7.9			
		4		6.3			
		6		4.0			
		8		2.0			
		10		1.4			
		14		1.1			
		19		0.8			
outfall	152	0	19:32	14.6			
		2		13.7			
		4		9.2			
		6		4.9			
		10		2.4			
		14		1.1			
		20		0.7		2.5	0.2
outfall	162	0	19:40	12.0		14.6	1.13
		2		10.4			
		4		12.5			
		6		4.0			
		10		2.8			
		14		13			
		19		0.9			
outfall	230	0	19:49	12.4			
		2		9.3			
		4		8.3			
		6		5.2			
		8		3.0			
		12		2.0			
		18		0.8			
outfall	329	0	19:57	3.5			
		2		3.5			
		4		3.8			
		6		3.6			
		10		2.1			
outfall	0	0	19:05	100.0		100.0	7.71

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
outfall	0	0	11:35	100.0			
1+00	10	1	19:02	31.4			
1+00	42	0	19:06	35.6			
		1		36.5			
		2		40.1			
		3		40.6			
		4		38.3			
		5		39.2			
		6		38.3		50.7	3.91
		7		26.1			
1+00	72	0	19:23	18.5			
		2		20.3			
		4		33.8			
		6		38.8			
		8		19.8		61.8	4.77
		10		3.0			
		12		2.6			
		14		2.1			
		17		2.3			
1+00	133	0	19:38	10.0			
		2		8.2			
		4		0.3		14.0	1.09
		6		0.2			
		8		5.5			
		10		3.5			
		12		2.3			
		14		2.0			
		16		1.9			
		19		1.6			
1+00	220	0	19:52	9.1		13.3	1.03
		2		8.5			
		4		7.8			
		6		8.1			
		8		5.8			
		10		3.3			
		12		2.5			
		14		2.0			
		16		1.8			
		19		1.6			
1+00	262	0	20:07	8.8		12.4	0.96
		2		8.4			
		4		4.5			
		6		4.8			
		8		2.8			
		14		1.9			
5+25	25	0	17:00	2.8			
5+25	91	0	17:05	3.6			
		2		3.5			
		4		2.8			
		6		6.2			
		8		1.6			
		10		1.1			
		12		0.5			
		14		1.6			
		16		3.5			
		18		3.5			

August 25,1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
5+25	158	0	17:15	2.9		10.7	0.83
		2		2.9			
		4		3.1			
		6		3.1			
		8		1.1			
		10		0.0			
		12		0.0			
		14		0.0			
		16		0.0			
		18		0.2			
		20		3.1			
		22		5.7			
5+25	192	0	17:29	2.8			
		2		2.8			
		4		2.9			
		6		1.4			
		8		0.2			
		10		0.0			
		12		0.0			
		14		0.0			
		16		0.0			
		18		0.3			
		20		2.4			
		22		5.6			
5+25	248	0	17:42	2.5			
		2		2.8			
		4		2.8			
		6		2.1			
		8		0.7			
		10		0.1			
		12		0.0			
		14		0.0			
		16		0.6			
		18		2.0			
		20		5.6			
		23		6.3			
5+25	310	0	18:11	2.9			
		2		3.1			
		4		3.1			
		6		3.1			
8+25	12	0	14:55	4.6	9.0		
8+25	42	0	15:06	4.0	6.9		
		2		5.0	8.6		
		4		5.9	10.0		
		6		5.9	9.6		
		8		5.7	9.0		
8+25	76	0	15:14	3.1	6.5		
		2		3.8	7.1		
		4		5.2	8.3		
		6		7.1	9.4		
		8		4.0	5.9		
		10		4.3	5.5		
		12		3.2	4.8		
		14		3.4	4.8		
		16		7.8	8.3		
		18		12.9	17.5	18.1	1.4
		21		19.6	24.5		
8+25	120	0	15:28	2.9	6.1		
		2		5.8			
		4		5.2			
		6		5.6	9.2		
		8		4.0	5.7		
		10		0.1	1.1		
		12		0.0	0.5		
		14		0.5	1.5		
		16		16.3	16.7		
		18		15.4	16.6		
		20		19.6	21.6		
		23		20.5	25.0		
8+25	129	23	16:10	20.3			
		20		15.9		16.7	1.29
		18		12.0			
		16		3.1			
		14		0.8			
		12		0.0			
		10		0.0			
		8		0.3			
		6		5.6			
		4		3.5			
		2		3.2			
		0		3.4			
8+25	162	0	16:22	2.7			
		2		2.7			
		4		3.1			
		6		4.0			
		8		2.7			
		10		0.0			
		12		0.0			
		14		0.0			
		16		3.4			
		18		8.1			
		20		12.0			
		22		17.7			
8+25	190	0	16:44	3.3			
		2		3.2			
		4		3.3			
		6		2.0			
		8		0.2			
		10		0.0		1.8	0.14
		12		-0.1			
		14		0.0			
		16		2.0			
		18		8.7			
		20		14.6			
		22		18.5			
8+25	246	0	16:46	3.2			
		2		3.8			
		4		3.2			
		6		3.6			
		8		0.0			
		10		0.0			
		12		0.1			
		14		0.3			
		16		2.4			
		18		3.8			
		20		4.0			
8+25	300	0	16:55	4.0			

August 25,1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
10+00	10	0	13:06	9.8	9.6		
10+00	40	0	13:12	6.2	10.4		
		2		6.3	11.0		
		4		6.4	11.3		
		6		6.8	11.5		
		8		6.1	11.3		
		9		5.7	10.4		
10+00	69	0	13:19	5.9	10.4		
		2		5.6	10.0		
		4		6.3	9.0		
		6		7.6	9.4		
		8		8.6	10.2		
		10		10.7	14.6		
		12		11.1	13.7		
		14		12.8	16.2		
		16		23.8	28.5		
		18		17.5	28.5		
10+00	115	0	13:35	5.2	9.0		
		2		4.1	9.4		
		6		3.5	6.3		
		10		8.8	3.6		
		14		5.2	5.7		
		18		17.1	12.9		
		20		23.0	23.1	17.1	1.32
		22		21.3	26.8		
10+00	135	0	13:47	4.4	8.1		
		2		4.9	8.3		
		4		4.9	7.3		
		6		4.0	6.3		
		8		3.2	4.8		
		10		1.8	4.0		
		12		0.8	2.1		
		14		0.3	0.9		
		16		2.0	3.2		
		18		14.6	15.4	3.3	0.26
		20		19.6	20.4		
10+00	176	0	14:02	3.7	7.5		
		2		3.7	7.5		
		4		4.8	8.1		
		6		4.6	7.3		
		8		2.9	5.0		
		10		1.8	3.2		
		12		0.7	1.1		
		14		1.0	1.7	3.6	0.28
		16		16.3	13.5		
		18		19.2	20.6		
		21		17.1	22.2		
10+00	223	0	14:18	3.1	7.9		
		2		4.0	7.7		
		4		4.7	7.7	9.4	0.73
		6		4.3	7.1		
		8		1.8	2.7		
		10		0.8	1.7		
		12		2.4	2.1		
		14		4.4	6.3		
		16		8.7	9.0		
		19		15.2	18.5		

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
10+00	250	0	14:38	3.6	7.9		
		2		4.0	7.5		
		4		4.4	7.5		
		6		6.0	8.8		
		8		2.8	5.2		
		10		1.5	2.8		
		12		2.1	2.8		
		14		3.6	4.0		
		16		9.9	10.2		
		18		12.9	15.0		
10+00	340	0	14:50	4.2	8.3		
25+00	345	0	17:41	3.5			
		2		3.5			
		4		3.7			
		6		3.8			
25+00	315	0	17:48	3.1			
		2		3.1			
		4		3.1			
		6		2.6			
		8		2.2			
		10		3.5			
		12		8.0			
25+00	277	0	17:58	2.8			
		2		2.9			
		4		2.8			
		6		1.9			
		8		0.7			
		10		1.5			
		11		8.1			
		12		9.7			
		13		4.0			
25+00	190	0	18:12	2.8			
		2		2.7			
		4		2.4			
		6		1.7			
		8		1.4			
		10		4.4			
		12		9.4			
25+00	15	0	18:21	3.1			
		1		3.2			
29+00	400	0	16:30	2.9			
		2		3.1			
29+00	310	0	16:38	3.2			
		2		3.5			
		4		3.7			
		6		4.2			
		8		3.5			
		9		9.2			
29+00	255	0	16:45	3.4			
		2		3.4			
		4		3.8			
		6		3.8			
		8		3.2			
		10		8.5			
		11		8.8			

August 25,1994

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
29+00	210	0	16:52	3.2			
		2		3.5			
		4		3.5			
		6		3.0			
		8		6.1			
		10		7.5			
		12		8.1			
29+00	147	0	17:04	2.6		11.8	0.91
		2		2.9			
		4		3.0			
		6		2.8			
		8		1.8			
		10		5.8			
		11		9.4			
		12		9.9			
		14		6.0			
29+00	56	0	17:20	2.6			
		2		2.8			
		4		4.1			
		6		5.2			
		8		6.5			
		10		6.5			
		12		8.2			
		14		8.5			
29+00	12	0	17:31	8.1			
		1		9.2			
32+00	370	0	14:34	2.2			
		1		2.0			
32+00	305	0	14:41	2.3			
		2		3.2			
		4		4.1			
		6		4.4			
		8		3.8			
		10		5.7			
32+00	270	0	14:51	2.6			
		2		3.4			
		4		5.4			
		6		5.4			
		8		3.4			
		10		6.8			
		12		6.5			
32+00	200	0	15:00	2.3			
		2		2.9			
		4		5.0			
		6		4.0			
		8		3.4			
		9		9.1			
		10		10.7		11.4	0.88
		12		9.2			
32+00	155	0	15:19	2.2			
		2		3.4			
		4		4.7			
		6		5.8			
		8		6.0			
		10		10.0			
		12		11.4			
		14		11.4			

Transect	X (ft)	Depth (ft)	Time	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
32+00	97	0	15:35	1.9			
		2		2.5			
		4		3.8			
		6		5.4			
		8		6.7			
		10		6.4			
		11		12.0			
		12		11.0		13.4	1.04
		14		10.2			
		15		8.0			
32+00	10	0	16:09	2.3			
		1		2.3			
42+00	365	0	12:26	1.1			
		2		1.5			
		4		2.0			
42+00	305	0	12:37	1.4			
		2		2.8			
		4		4.5			
		6		6.2			
		8		6.0			
		10		5.9			
		12		5.9			
42+00	145	0	12:52	1.8			
		2		2.1			
		4		4.4			
		6		6.0			
		8		6.2			
		10		6.4			
		11		6.2			
		13		5.7			
42+00	240	0	13:13	1.9			
		2		3.1			
		4		4.2			
		6		5.5			
		8		6.1			
		10		6.1			
		12		6.4			
		13		6.7			
42+00	157	0	13:22	5.4			
		2		3.4			
		4		4.8			
		6		5.1			
		8		6.5			
		10		6.8			
		12		6.7			
		13		5.7			
42+00	58	0	14:06	3.2			
		2		2.3			
		4		1.4			
		6		1.1			
		8		2.3			
		10		4.0			
		12		4.5			
		13		4.5			
42+00	12	0	12:19	1.8			
		1		1.8			

APPENDIX B2

Dye-tracer injection - Run 2
September 28-29, 1994

September 28,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-9+10	60	0	10:50	19.7	0.4			
		2		19.7	0.4			
		4		19.6	0.8			
		6		19.5	1.8			
		8		19.5	2.2			
		10		19.4	6.8			
		11		19.4	8.4			
		12		19.4	9.4			
		14		19.3	14.3			
		16		19.3	17.4			
		18		19.2	21.2			
		20		19.1	22.3			
		22		19.0	21.3			
-9+10	40	0	11:10	20.0	0.1			
		2		19.7	0.2			
		4		19.7	0.5			
		6		19.6	0.8			
		8		19.5	1.7			
		10		19.5	3.3			
		12		19.5	4.5			
		14		19.4	10.1			
-9+10	145	0	11:25	20.0	0.0			
		2		19.8	0.1			
		4		19.7	0.1			
		6		19.6	0.9			
		8		19.5	2.8			
		10		19.5	4.3			
		12		19.4	8.7			
		14		19.3	15.7			
		16		19.2	17.4			
		18		19.1	19.2			
		20		19.1	20.9			
-9+10	105	0	11:37	20.0	0.1			
		2		19.9	0.1			
		4		19.7	0.4			
		6		19.6	1.6			
		8		19.5	2.8			
		10		19.5	3.3			
		12		19.4	9.8			
		14		19.3	15.3			
		16		19.2	17.4			
		18		19.1	20.2			
		20		19.0	22.6			
		22		19.0	21.6			
-9+10	218	0	11:55	20.0	0.0			
		2		20.0	0.1			
		4		19.8	0.3			
		6		19.6	0.4			
		8		19.6	0.5			
		10		19.5	1.5			
		12		19.4	11.2			
		14		19.3	13.6			
		16		19.3	14.6			
-9+10	278	0	12:07	20.1	0.0			
		2		20.0	0.0			
		4		19.8	0.1			
		6		19.6	0.7			
		8		19.6	1.2			
		10		19.5	4.2			
		11		19.5	7.4			

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-7+10	36	0	12:18	20.2	0.5			
		2		20.0	0.8			
		4		19.8	1.1			
		6		19.6	1.4			
		8		19.5	1.9			
		10		19.5	5.6			
		12		19.5	5.6			
		14		19.5	7.4			
-7+10	64	0	12:30	20.2	0.2			
		2		20.0	0.5			
		4		19.8	1.6			
		6		19.6	1.8			
		8		19.5	2.9			
		10		19.5	6.0			
		12		19.3	13.3			
		14		19.2	16.3			
		16		19.2	18.8			
		18		19.1	19.5			
		20		19.1	19.5			
		22		19.1	20.9			
-7+10	107	0	12:46	20.1	0.2			
		2		19.9	0.5			
		4		19.8	0.7			
		6		19.7	0.7			
		8		19.5	1.7			
		10		19.5	4.1			
		12		19.4	7.4			
		14		19.2	16.4			
		16		19.1	18.1			
		18		19.0	20.9			
		20		19.0	22.3			
		21		19.0	21.6			
-7+10	120	0	13:00	20.1	0.1			
		2		20.0	0.2			
		4		19.8	0.7			
		6		19.7	0.8			
		8		19.6	0.8			
		10		19.5	6.6			
		12		19.4	11.9			
		14		19.2	16.0			
		16		19.0	18.5			
		18		19.1	21.6			
		20		19.0	23.0			
-7+10	175	0	13:10	20.3	0.0			
		2		20.1	0.1			
		4		19.9	0.4			
		6		19.8	0.5			
		8		19.7	0.6			
		10		19.5	6.0			
		12		19.4	8.7			
		14		19.2	15.0			
		16		19.1	21.6			
		18		19.1	21.6			
-7+10	250	0	13:26	20.4	0.0			
		2		20.1	0.1			
		4		19.9	0.0			
		6		19.8	0.1			
		8		19.7	0.1			
		10		19.5	6.0			
		12		19.3	12.6			

September 28,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-7+10	250	14		19.3	13.6			
		16		19.2	16.4			
-7+10	295	0	13:38	20.1	0.1			
		2		20.1	0.1			
		4		20.1	0.1			
-5+10	40	0	13:45	20.8	0.4			
		2		20.2	0.4			
		4		19.9	1.7			
		6		19.8	1.7			
		8		19.7	2.5			
		10		19.4	7.0			
		12		19.4	10.1			
-5+10	30	0	17:16	20.9	1.2			
		2		20.4	1.8			
		4		20.2	2.7			
		6		20.0	4.1			
-5+10	70	0	17:24	20.7	0.7			
		2		20.4	1.7			
		4		20.1	2.8			
		6		19.9	3.1			
		8		19.6	12.6			
		10		19.6	18.5			
		12		19.6	21.9			
		14		19.6	23.7			
		16		19.6	23.3			
		18		19.5	23.3			
		20		19.6	21.6			
-5+10	121	0	17:04	20.5	0.6			
		2		20.2	2.0			
		4		20.0	2.9			
		6		20.0	3.1			
		8		19.7	16.4			
		10		19.6	19.2			
		12		19.5	16.0			
		14		19.5	15.3			
		16		19.5	18.8			
		18		19.5	22.3			
		20		19.6	25.4			
-5+10	184	0	17:56	20.3	0.7			
		2		20.2	1.0			
		4		20.1	2.3			
		6		20.1	2.3			
		8		19.7	10.5			
		10		19.7	18.8			
		12		19.5	15.7			
		14		19.5	16.4			
		16		19.5	22.6			
		18		19.5	24.7			
		20		19.5	21.2			
-5+10	225	0	18:10	20.1	1.0			
		2		20.1	1.0			
		4		20.1	1.6			
		6		19.8	5.0			
		8		19.8	5.4			
		10		19.7	9.1			
		12		19.6	17.8			
		14		19.5	20.5			
		16		19.5	21.2			

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-5+10	297	0	18:02	20.1	1.3			
		2		20.2	1.3			
		4		20.1	1.5			
-3+10	58	0	16:05	20.8	1.2			
		2		20.7	1.5			
		4		20.3	2.7			
		6		19.9	4.2			
		8		19.7	9.1			
		10		19.7	9.8			
-3+10	105	0	16:13	20.7	1.3			
		2		20.6	1.6			
		4		20.2	2.5			
		6		19.8	6.3			
		8		19.7	12.2			
		10		19.6	13.6			
		12		19.6	24.0			
		14		19.6	24.4			
		16		19.6	25.0			
		18		19.5	24.0			
		20		19.5	26.8			
-3+10	145	0	16:26	20.7	1.2			
		2		20.4	1.8			
		4		20.2	2.2			
		6		19.9	3.0			
		8		19.7	13.3			
		10		19.7	14.3			
		12		19.6	20.2			
		14		19.7	27.1			
		16		19.6	24.0			
		18		19.5	23.0			
		20		19.5	24.0			
-3+10	200	0	16:39	20.7	1.1			
		2		20.4	1.4			
		4		20.3	1.7			
		6		19.9	3.6			
		8		19.7	13.6			
		10		19.7	23.0			
		12		19.7	25.0			
		14		19.7	26.8			
		16		19.6	23.0			
		18		19.5	18.8			
		20		19.6	21.2			
-3+10	242	0	16:51	20.6	1.4			
		2		20.5	1.3			
		4		20.3	3.0			
		6		20.0	7.7			
		8		19.7	12.6			
		10		19.7	24.7			
		12		19.6	21.9			
		14		19.6	19.2			
		16		19.6	19.2			
		18		19.6	19.8			
-1+10	48	0	14:20	20.0	2.9			
		2		20.0	4.3			
		4		19.9	4.2			
		6		19.9	5.3			
		8		19.9	5.9			
		10		19.9	6.0			
		12		19.7	9.4			
		13		19.7	8.8			

September 28,1994

Transcect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-3+00	32	0	16:00	21.0	1.5			
		2		20.7	1.6			
		3		20.6	1.8			
-1+10	64	0	14:30	20.2	3.9			
		2		20.0	4.9			
		4		19.8	7.6			
		6		19.7	10.4			
		8		19.6	15.6			
		10		19.6	18.4			
		12		19.5	19.4			
		14		19.5	19.1			
-1+10	85	0	14:40	20.4	2.1			
		2		20.3	3.0			
		4		19.9	5.4			
		6		19.7	10.4			
		8		19.6	14.2			
		10		19.6	15.9			
		12		19.5	20.4			
		14		19.5	20.4			
		16		19.5	21.8			
		18		19.5	23.9			
		20		19.4	19.7			
		21		19.5	22.9			
-1+10	115	0	14:55	20.3	2.2			
		2		20.3	2.7			
		4		20.1	3.8			
		6		19.8	10.7			
		8		19.7	13.8			
		10		19.7	14.5			
		12		19.7	15.2			
		14		19.6	25.3			
		16		19.5	23.2			
		18		19.6	23.9			
		20		19.5	22.5			
		21		19.5	21.8			
-1+10	158	0	15:08	20.5	2.6			
		2		20.4	2.2			
		4		20.0	6.4			
		6		19.8	11.7			
		8		19.7	15.9			
		10		19.7	22.5			
		12		19.7	26.0			
		14		19.7	28.1			
		16		19.7	29.1			
		18		19.8	29.5			
		20		19.6	30.2			
		21		19.6	28.8			
-1+10	200	0	15:23	20.8	1.8			
		2		20.5	2.5			
		4		19.9	6.1			
		6		19.8	8.3			
		8		19.7	9.3			
		10		19.7	12.5			
		12		19.6	13.8			
		14		19.5	13.8			
		16		19.4	13.5			
		18		19.4	16.1			
		19		19.6	26.0			
-1+10	220	0	15:38	20.8	2.1			
		2		20.5	2.7			
		4		20.1	3.2			
		6		19.7	10.4			
		8		19.7	10.7			
		10		19.5	14.9			
		12		19.5	14.2			
		14		19.5	15.9			
		16		19.5	14.5			
-1+10	280	0	15:50	20.4	2.8			
		2		20.3	3.3			
		4		20.1	4.8			
-1+10	303	0	15:55	20.4	2.9			
outfall	0	0	10:27	18.4	97.8	96.8	95.3	4.995
outfall	0	0	12:38	18.6	94.3	98.8		
outfall	0	0	14:13	20.4	100.0	100.0		
outfall	18	1	12:40	18.7	94.3	98.0		
outfall	58	3	12:45	19.9	1.7	0.0		
		4		19.7	5.2	3.7		
		5		19.8	3.6	2.7		
		6		19.6	6.1	4.8		
		7		19.5	6.6	5.6		
		2		20.1	3.5	0.3		
		1		20.2	2.3	-0.7		
		0		20.3	0.5	-0.7		
outfall	76	0	12:50	20.4	1.4	-0.7		
		1		20.3	1.6	-0.7		
		3		20.0	2.0	0.5		
		5		19.8	4.6	3.2		
		7		19.8	1.6	4.5		
		9		19.7	8.5	5.6		
		10		19.6	16.9	18.7		
		12		19.6	16.3	21.1		
		14		19.6	25.5	28.3		
		15		19.6	27.3	30.9		
		16		19.6	21.8	26.7		
		17		19.6	27.3	33.3		
		18		19.5	28.2	36.0		
outfall	93	0	13:05	20.5	0.3	-0.7		
		2		20.2	0.2	-1.0		
		4		20.1	0.5	-0.2		
		6		19.9	3.5	1.9		
		7		19.9	3.6	2.1		
		8		19.8	10.0	10.4		
		9		19.7	14.9	17.6		
		10		19.6	19.1	22.9		
		12		19.6	21.8	25.1		
		14		19.6	20.9	25.6		
		15		19.6	20.9	26.7		
		17		19.6	24.6	28.5		
		18		19.6	29.2	34.4		
		19		19.6	30.1	36.5		
		20		19.5	31.9	40.0		

September 28,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
outfall	104	0	13:20	20.5	0.1	-0.7		
		3		20.1	0.2	-0.7		
		6		19.9	3.4	0.8		
		8		19.8	5.6	4.8		
		9		19.8	6.5	6.9		
		10		19.8	9.1	9.3		
		11		19.7	20.0	23.7		
		13		19.7	20.0	24.3		
		15		19.6	21.8	27.7		
		17		19.6	21.8	27.7		
		19		19.6	21.9	26.1		
		21		19.6	21.9	26.9		
outfall	162	0	13:30	20.5	0.0	-1.0		
		4		20.2	0.0	-1.0		
		8		20.0	2.3	0.0		
		9		19.8	11.8	10.9		
		10		19.7	16.4	13.1		
		11		19.7	21.0	26.7		
		12		19.7	21.0	30.4		
		13		19.7	25.6	13.6		
		15		19.7	23.7	28.8		
		17		19.6	25.5	30.1		
		19		19.6	26.4	32.0		
		20		19.6	26.4	31.7		
		21		19.6	25.5	28.8		
outfall	265	0	13:44	20.8	0.1	-0.4		
		1		20.6	2.5	0.8		
		2		20.0	7.7	8.3		
		4		19.9	12.1	10.7		
		6		19.7	12.3	14.1		
		8		19.7	12.3	14.9		
		10		19.6	13.1	16.0		
		10		19.6	9.7	7.5		
		11		19.5	6.1	9.1		
		12		19.6	13.7	14.4		
outfall	228	0	14:10	20.5	2.9	0.8		
		1		20.5	2.7	1.1		
		2		20.0	7.1	7.5		
		4		19.8	10.6	11.5		
		6		19.8	9.4	11.5		
		8		19.7	12.3	14.1		
		10		19.7	7.6	13.3		
		14		19.7	9.1	14.9		
		16		19.7	12.6	15.5		
		18		19.7	13.2	15.5		
outfall	316	1	14:32	0.2	2.2	2.4		
1+00	1	1	14:35	20.5	11.1	14.1		
1+00	38	0	14:40	20.2	8.6	9.1		
		1		20.2	8.9	9.3		
		2		20.2	9.2	10.1		
		3		20.1	8.0	9.9		
		4		1.9	5.8	11.5		
1+00	53	0	14:45	20.3	7.4	7.5		
		1		20.2	7.7	8.0		
		2		20.1	10.7	9.9		
		4		19.8	11.1	13.3		
		6		19.7	10.8	12.3		
		8		19.6	11.4	13.3		
		10		19.6	11.4	13.6		

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
1+00	89	0	14:51	20.5	3.1	1.9		
		1		20.5	4.5	2.7		
		2		20.3	4.8	4.0		
		3		20.0	12.1	12.3		
		4		19.8	12.6	14.7		
		6		19.7	10.8	12.3		
		8		19.6	11.4	12.5		
		10		19.6	11.4	13.1		
		15		19.6	12.5	14.4		
		18		19.7	11.1	14.7		
1+00	108	0	15:00	20.4	3.5	2.7		
		1		20.4	4.0	2.7		
		2		20.3	4.8	4.0		
		4		20.0	10.6	9.3		
		6		19.8	10.6	13.1		
		10		19.6	10.8	11.7		
		16		19.6	12.5	14.7		
		18		19.6	11.1	14.7		
1+00	140	0	15:05	20.7	2.2	4.0		
		1		20.5	4.2	2.4		
		2		20.2	7.4	5.9		
		5		19.8	9.1	10.4		
		7		19.6	11.7	12.5		
		9		19.6	12.5	14.7		
		14		19.5	13.4	15.7		
		18		19.5	17.8	17.3		
		20		19.6	14.3	21.1		
1+00	169.	0	13:15	20.7	2.2	4.0		
		2		20.5	4.2	2.4		
		4		20.2	7.4	5.9		
		6		19.8	9.1	10.4		
		8		19.6	11.7	12.5		
		12		19.6	12.0	14.7		
		16		19.5	13.4	15.7		
		18		19.5	17.8	17.3		
		20		19.6	14.3	21.1		
1+00	190	0	13:27	20.8	2.2	1.3		
		2		20.7	2.5	4.0		
		4		20.2	6.8	5.6		
		6		20.1	8.9	8.5		
		10		19.6	12.3	13.6		
		14		19.6	13.4	16.0		
		16		19.6	21.6	23.2		
		18		19.7	22.8	29.1		
		20		19.7	25.6	31.5		
1+00	210	0	15:35	21.0	4.4	1.1		
		4		20.1	8.0	6.4		
		6		19.8	8.8	10.1		
		10		19.7	12.3	14.1		
		15		19.6	14.3	16.8		
		17		19.6	16.6	20.3		
		18		19.6	23.7	27.5		
		19		19.7	24.7	32.8		
1+00	256	0	13:46	20.9	2.6	13		
		2		20.6	2.5	1.6		
		4		20.2	2.2	4.0		
		12		19.6	12.6	16.0		
		15		19.6	15.8	20.3		
		17		19.6	17.8	22.4		

September 28,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
1+00	400	0	15:54	20.7	3.0	1.9			10+00	115	0	17:35	20.4	5.0	4.8		
		1		20.5	2.9	2.1					2		20.4	5.3	4.8		
		2		20.5	2.9	2.1					4		20.2	5 3	5.1		
		3		20.4	6.8	2.4					8		20.2	5.3	5.3		
		4		20.3	8.3	5.1					12		19.8	5.9	6.9		
		5		20.0	9.2	9.6			10+00	160	0	17:40	20.5	5.1	4.5		
3+00	8	0	16:02	21.0	4.5	4.3					3		20.3	5.2	4.8		
3+00	68	0	16:06	20.7	4.0	2.9					5		20.2	5.5	5.3		
		1		20.6	4.5	4.0					10		19.9	6.2	6.4		
		2		20.4	5.7	5.1					14		19.8	5.8	8.0		
		5		20.0	8.0	9.1			10+00	210	0	17:47	20.4	5.1	4.5		
		7		19.8	8.5	9.3					3		20.4	5.1	4.5		
		9		19.8	7.7	9.6					5		20.3	5.4	5.1		
3+00	85	0	16:12	20.8	2.6	1.9					10		19.9	6.0	6.4		
		2		20.4	5.5	5.1					15		19.8	7.0	9.6		
		4		20.2	7.1	6.9			10+00	280	0	17:52	20.4	5.1	4.5		
		8		19.8	9.1	10.1					3		20.4	5.1	4.8		
		12		19.7	10.3	11.5					6		20.1	6.3	6.1		
		14		19.7	10.2	12.5					13		19.8	6.1	7.2		
3+00	115	0	16:17	20.7	2.7	2.1			10+00	325	0	18:00	20.4	5.2	4.5		
		3		20.5	4.7	4.0					3		20.3	5.2	4.5		
		8		19.7	9.1	10.9					7		19.0	6.1	6.4		
		16		19.6	11.7	14.4					13		19.8	7.2	7.2		
3+00	141	0	16:31	20.7	3.0	2.1			10+00	367	0	18:03	20.4	4.4	3.7		
		1		20.7	3.3	2.4					3		20.4	4.6	3.7		
		3		20.4	6.3	5.9					6		20.3	4.9	4.5		
		6		19.9	8.8	8.8					12		19.9	6.5	7.5		
		12		19.6	10.8	12.5			10+00	357	0	18:10	20.4	4.8	4.0		
		18		19.5	12.2	14.9			42+00	6	0	10:45	19.5	8.5	10.4		
3+00	160	0	16:45	21.0	1.7	3.5			42+00	180	0	10:55	19.8	8.2	9.9		
		2		20.6	3.1	2.4					2		19.7	8.5	9.9		
		4		20.2	7.7	8.3					4		19.6	8.2	9.9		
		10		19.7	9.7	10.7					6		19.6	8.8	10.1		
		18		19.5	12.2	14.9					8		19.6	8.5	10.1		
3+00	182	0	16:50	20.9	1.7	1.1					10		19.6	8.2	10.1		
		2		20.7	2.2	1.9					12		19.6	8.2	9.9		
		4		20.3	6.0	5.3					14		19.6	7.9	9.9		
		6		19.9	8.0	8.5			42+00	360	0	11:00	20.6	7.5	8.8		
		10		19.7	10.2	11.7					2		19.9	7.0	8.5		
		20		19.5	12.2	14.9					4		19.7	5.7	7.7		
3+00	200	0	17:00	20.9	1.7	0.8					6		19.6	5.6	6.9		
		2		20.7	2.3	1.6					8		19.6	5.6	7.5		
		4		20.5	4.4	3.2			80+00	10	0	11:13	20.1	2.2	3.0		
		9		19.8	8.8	9.6			80+00	44	0	11:17	20.0	2.1	2.7		
		20		19.5	13.1	15.5					2		20.0	2.1	2.7		
3+00	240	0	17:10	20.6	1.1	4.0					4		19.9	2.0	2.4		
		2		20.7	2.4	1.6					6		19.8	1.6	2.4		
		4		20.5	3.6	2.9			80+00	186	0	11:20	20.0	1.9	2.7		
		6		20.1	6.8	6.4					2		19.9	1.5	2.7		
		8		19.9	8.3	8.3					4		19.8	1.4	2.1		
		12		19.7	9.1	10.7					6		19.7	1.6	2.1		
		20		19.5	12.5	15.7					10		19.7	1.6	2.4		
3+00	260	0	17:15	20.6	1.0	1.6					13		19.7	1.6	2.4		
		2		20.7	2.4	1.6			80+00	140	0	11:40	20.1	1.9	2.7		
		4		20.5	3.3	2.7					2		20.0	1.9	2.7		
		6		20.3	6.1	5.3					4		19.9	1.5	2.4		
		8		19.8	8.5	9.3					6		19.8	1.2	2.4		
		17		19.7	10.3	11.5					10		19.7	1.2	2.1		
3+00	334	0	17:25	20.6	1.2	1.3					14		19.7	1.2	2.4		
10+00	10	0	17:30	0.2	3.2	5.3					18		19.7	1.0	2.1		

September 28,1994																	
Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
80+00	240	0	11:45	20.1	1.9	2.4											
		2		20.1	1.9	2.4											
		4		19.9	1.7	2.7											
		6		19.8	1.4	2.7											
		10		19.6	1.0	2.1											
		14		19.6	1.1	2.4											
		18		19.7	1.2	2.4											
80+00	346	0	11:54	20.4	1.2	2.4											

September 29,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-7+10	59	0	15:33	21.4	1.2			
		2		20.7	0.7			
		4		20.4	0.0			
		6		19.3	0.0			
		8		19.3	0.2			
		10		19.3	2.0			
		12		19.2	11.1			
		14		19.2	20.4			
		16		19.1	23.6			
-7+10	91	0	15:46	21.6	1.6			
		2		20.6	0.6			
		4		19.6	0.0			
		6		19.4	0.0			
		8		19.3	1.7			
		10		19.2	1.0			
		12		19.2	7.5			
		14		19.2	19.8			
		16		19.1	22.2			
		18		19.0	23.2			
		20		19.0	22.5			
		22		19.1	22.9			
-7+10	155	0	16:04	20.9	1.0			
		2		20.4	0.6			
		4		19.7	0.5			
		6		19.4	1.7			
		8		19.3	1.9			
		10		19.3	6.8			
		12		19.3	8.1			
		14		19.2	17.0			
		16		19.1	21.5			
		18		19.0	23.6			
		19		19.0	22.9			
-7+10	255	0	16:21	20.7	0.4			
		2		19.9	0.7			
		4		19.5	0.6			
		6		19.4	0.6			
		8		19.3	1.5			
		10		19.3	0.6			
		12		19.3	5.0			
		14		19.2	16.3			
		16		19.2	20.1			
		17		19.3	19.8			
-7+10	295	0	16:38	20.4	0.0			
		2		19.7	-0.3			
		4		19.7	-0.3			
		6		19.4	-0.3			
		8		19.4	-0.2			
-7+10	64	0	11:00	20.2	2.4	0.5		
		2		19.8	2.2	0.0		
		4		19.5	1.9	0.2		
		6		19.4	2.3	0.7		
		8		19.4	2.9	0.7		
		10		19.4	7.3	5.2		
		12		19.4	19.4	17.5		
		14		19.3	22.3	24.3		
		16		19.2	23.2	25.1		
		19		19.2	23.2	25.9		
		21		19.1	23.2	26.4	30.6	1.53
-7+10	61	0	17:45	21.1	12.0	123		
		1		21.0	9.3	11.2		
		2		20.4	3.7	4.1		
		3		20.4	3.4	3.6		
		4		20.1	1.2	1.8		
		6		19.5	0.0	0.5		
		10		19.4	0.9	1.5		
		14		19.4	7.2	6.0		
		15		19.4	18.4	17.2		
		21		19.2	23.6	26.4	28.4	1.49
-3+10	290	0	15:06	20.5	1.7			
		2		20.4	1.8			
		4		20.2	4.0			
		6		20.1	5.9			
-3+10	52	0	14:29	20.4	1.7			
		2		20.0	1.9			
		4		19.8	2.7			
		6		19.7	2.2			
		8		19.5	5.9			
-3+10	103	0	14:39	20.6	1.2			
		2		20.1	0.9			
		4		19.8	1.0			
		6		19.5	1.7			
		8		19.3	2.1			
		10		19.2	2.5			
		12		19.2	17.0			
		14		19.1	18.7			
		16		19.2	18.7			
		18		19.1	19.4			
		20		19.1	23.2			
-3+10	146	0	14:52	21.0	1.0			
		2		19.9	0.9			
		4		19.5	0.8			
		6		19.4	1.9			
		8		19.3	3.3			
		10		19.3	5.6			
		12		19.3	13.2			
		14		19.2	19.1			
		16		19.2	23.6			
		18		19.1	24.3			
		19		19.1	25.0			
-3+10	210	0	15:14	21.3	1.7			
		2		20.3	1.0			
		4		19.6	0.4			
		6		19.4	0.4			
		8		19.3	1.8			
		10		19.3	2.6			
		12		19.3	13.5			
		14		19.2	21.5			
		16		19.2	21.1			
		18		19.1	22.9			
		19		19.2	22.2			
-3+10	287	0	15:25	20.5	1.6			
		2		19.8	1.6			
		4		19.4	2.8			
		5		19.5	2.3			

September 29,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-3+60	170	0	17:26	21.1	13.0	12.3		
		I		21.1	12.9	12.3		
		2		21.0	11.6	13.6		
		2		20.9	15.2	15.9	18.1	0.95
		3		20.6	6.7	8.9		
		4		19.8	1.5	3.4		
		5		19.8	1.0	1.5		
		8		19.5	0.4	1.0		
		10		19.5	0.8	1.0		
		12		19.5	5.2	4.1		
		14		19.4	6.4	6.0		
		16		19.4	14.3	10.4		
		18		19.2	23.0	21.7		
		20		19.2	24.9	25.3	9.7	0.51
-3+10	172	0	10:40	20.4	2.4	0.2		
		2		19.6	2.8	0.7	5.1	0.27
		4		19.4	2.3	1.0		
		6		19.4	5.0	2.6		
		8		19.4	7.0	4.9		
		10		19.4	6.0	3.6		
		11		19.4	12.1	7.3		
		12		19.4	15.5	10.7		
		14		19.3	15.8	15.1		
		16		19.1	24.2	22.5		
		18		19.1	25.2	25.3		
		20		19.1	25.2	26.9	33.7	1.77
outfall	0	0	16:20					6.24
1+00	91	0	16:22	21.6	9.8	8.6		
		1		21.5	14.8	10.4		
		2		21.1	32.8	29.3		
		3		20.8	40.8	42.1		
		5		20.6	41.7	46.3		
		5		20.8	49.1	53.6	61.3	2.84
		7		20.3	31.1	38.2		
		9		19.5	5.4	3.6		
		10		19.5	2.1	1.3		
		12		19.4	16.2	7.5		
		14		19.4	19.4	19.3		
		16		19.4	26.3	29.0		
		18		19.3	24.3	29.5		
		20.5		19.3	23.3	29.5		
1+00	150	0	16:37	21.5	9.1	7.5		
		1		21.5	8.8	7.8		
		2		21.3	11.4	9.1		
		3		20.9	24.7	21.2		
		4		20.7	32.5	34.8		
		6		20.6	10.5	47.3	40.6	2.13
		6		20.6	42.6	46.6		
		8		20.0	18.7	20.6		
		10		19.5	1.7	1.5		
		10		19.5	1.0	0.5	2.6	0.14
		12		19.4	10.2	8.3		
		14		19.4	17.8	14.6		
		15		19.3	19.3	20.6		
		18		19.3	25.3	29.3		

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
1+00	240	0	17:06	21.2	6.3	4.4		
		2		21.0	7.3	6.2		
		3		20.7	11.2	15.4		
		4		20.1	5.7	9.9	19.8	1.04
		4		20.3	11.1	11.5		
		5		20.0	3.2	7.3		
		6		19.9	4.1	2.8		
		7		19.9	1.7	1.8		
		8		19.6	0.8	0.7		
		11		19.5	4.2	3.1		
		12		19.4	9.9	12.0		
		14		19.4	21.4	23.5		
		16		19.3	25.3	27.7		
3+00	244	0	15:50	21.2	4.4	3.2		
		1		20.8	18.1	11.5		
		2		20.7	17.2	20.1		
		3		20.7	27.8	36.2		
		4		20.6	35.9	45.6		
		5		20.4	28.7	43.2		
		6		19.6	3.4	2.1		
		8		19.5	4.3	2.4		
		10		19.5	10.3	7.0		
		12		19.5	21.5	21.4		
		14		19.5	26.9	30.3		
		16		19.4	25.2	28.7		
		18		19.2	22.4	25.5		
		21		19.1	24.4	28.4		
3+00	128	0	14:43	21.5	13.4	5.7		
		2		20.6	33.4	39.5		
		4		20.1	32.0	36.1		
		6		19.7	13.4	14.9		
		8		19.7	24.3	13.3		
		9		19.8	28.7	24.6		
		10		19.9	27.7	36.9		
		11		19.6	14.7	21.2		
		12		19.7	33.7	31.4		
		13		19.5	27.4	34.0		
		15		19.4	27.3	30.3		
		17		19.3	26.3	29.3		
3+00	128	0	15:06	21.3	10.0	8.1	9.5	0.5
		8		19.6	8.3	11.7	12.7	0.67
		13		19.7	31.6	33.5	35.8	1.88
3+00	160	0	15:19	21.2	4.9	3.6	6.6	0.35
		1		21.1	5.5	3.9		
		2		20.7	7.1	4.4		
		3		20.5	6.9	5.5		
		4		20.3	38.3	41.3		
		6		19.9	17.0	25.6		
		8		19.5	4.8	3.6		
		10		19.6	30.6	28.0		
		12		19.7	29.6	33.2		
		14		19.6	31.5	37.7		
		16		19.2	26.3	28.2		
		19		19.1	25.2	28.5		
3+00	160	10.5	15:35	19.5	8.0	7.3	10.5	0.555
		16		19.4	30.4	30.3	29.9	1.57

September 29,1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
3+00	244	0	15:05	21.2	4.8	3.6	6.3	0.33	10+00	260	0	10:48	19.6	6.4			
		1		20.8	11.2	11.7					2		19.3	6.0			
		2		20.7	19.4	20.1					4		19.2	6.2			
		3		20.7	31.4	35.8					6		19.2	9.7			
		4		20.6	40.6	45.0					8		19.2	9.3			
		5		20.5	34.3	42.1					10		19.2	9.0			
		6		19.6	3.4	2.6					12		19.2	9.3			
		8		19.5	4.4	2.8					14		19.2	19.8			
		10		19.5	11.2	7.3					16		19.0	23.6			
		12		19.5	23.5	21.4					18		19.1	23.2			
		14		19.5	29.4	30.1			15+00	62	0	11:07	19.7	7.6			
		16		19.4	27.5	28.5					2		19.4	7.8			
		18		19.2	24.2	25.3					4		19.3	7.8			
		21		19.1	26.4	28.2					6		19.3	8.2			
3+00	244	5	16:09	20.4	32.2	42.6	41.6	2.18			7		19.3	8.6			
10+00	165	0	14:26	21.6	4.1	1.8			15+00	111	0	11:14	19.7	7.3			
10+00	60	0	10:00	19.4	6.9						2		19.4	7.3			
		2		19.4	6.9						4		19.3	7.9			
		4		19.3	6.9						6		19.2	8.3			
		6		19.2	8.3						8		19.2	8.6			
		8		19.2	7.6						10		19.2	15.2			
		10		19.2	7.9						12		19.1	16.3			
		11		19.1	8.3						14		19.1	20.8			
10+00	110	0	10:15	19.7	6.2						16		19.2	21.8			
		2		19.4	6.6				15+00	196	0	11:42	19.9	7.4			
		4		19.3	6.2						2		19.3	6.2			
		6		19.2	7.6						4		19.3	7.9			
		8		19.2	8.3						6		19.2	8.3			
		10		19.2	10.0						8		19.2	8.3			
		12		19.1	17.0						10		19.2	11.4			
		14		19.0	19.8						12		19.2	21.1			
		16		19.0	25.3						14		19.1	18.4			
		18		19.0	25.3						16		19.0	21.8			
		20		18.9	25.0						17		19.1	20.1			
10+00	165	0	10:25	19.5	6.6				15+00	252	0	11:54	20.5	6.6			
		2		19.3	6.4						2		19.5	6.9			
		4		19.2	28.1						4		19.3	7.6			
		6		19.2	8.6						6		19.2	7.3			
		8		19.2	8.6						8		19.2	7.9			
		10		19.2	9.3						10		19.2	13.5			
		12		19.1	13.8						12		19.2	21.5			
		14		19.0	18.4						14		19.1	21.8			
		16		19.0	21.8						16		19.0	22.2			
		18		18.9	23.9						17		19.1	22.9			
		20		19.0	23.9				15+00	340	0	12:06	20.9	6.6			
10+00	200	0	10:37	19.7	6.4						2		19.7	6.6			
		2		19.3	6.2						4		19.3	7.9			
		4		19.2	9.0						6		19.3	8.3			
		6		19.2	10.0						8		19.3	8.3			
		8		19.2	9.0						10		19.2	9.3			
		10		19.2	9.3						12		19.3	10.4			
		12		19.1	12.8				20+00	76	6	13:54	19.5	8.9	7.3	11.8	0.62
		14		19.0	17.7				20+00	131	6		19.4	9.2	7.3	12.0	0.63
		16		19.0	23.9				20+00	197	6		19.7	7.1	4.4	10.3	0.54
		18		19.0	23.9				20+00	290	6		19.7	8.3	7.0	11.4	0.6
		19		19.0	24.3				20+00	425	6	14:13	19.6	8.0	6.0	10.5	0.55

September 29,1994																	
Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
30+00	224	0	13:40	22.3	9.0	6.0			54+00	345	0	13:06	21.4	5.9	0.7		
		2		19.9	10.3	7.8					2		20.1	6.1	0.5		
		4		19.4	9.5	7.5					4		19.7	5.2	1.0		
		6		19.4	9.5	7.8					6		19.5	5.1	1.3		
		8		19.4	9.9	8.6					10		19.5	5.0	1.3		
		10		19.4	10.8	9.1					13		19.5	5.1	1.5	7.8	0.41
42+00	180	0	13:25	21.4	10.1	9.6	12.6	0.66	73+00	133	0	12:46	21.6	6.3	1.0		
		2		20.7	8.9	6.0					2		20.4	5.9	1.8		
		4		19.9	9.0	6.0					4		19.7	5.6	2.0		
		6		19.6	6.3	3.1					6		19.7	5.3	2.0		
		8		19.5	6.4	3.1					8		19.5	53	2.0		
		10		19.5	6.7	3.4					10		19.5	5.3	2.0		
		13		19.5	6.6	3.4					12		19.5	5.3	2.0		
		2		20.0	4.5	2.8					14		19.5	5.3	2.0		
		4		19.7	7.4	6.2					16		19.5	5.0	2.0	8.9	0.47
		6		19.5	8.6	7.5			100+00	290	0	12:13	20.2	0.7	1.6		
		8		19.4	8.6	7.0					3		20.1	0.5	1.6		
		10		19.4	14.6	14.4					5		20.0	0.4	1.6		
		12		19.3	18.7	18.3					7		20.0	0.1	1.3		
		14		19.3	20.8	21.2					9		19.9	0.1	1.6		
		16		19.2	25.2	24.0					12		19.8	0.1	1.3		
		18		19.2	24.2	23.8			100+00	270	0	12:30	20.8	5.3	3.4	9.1	0.48
		20		19.2	24.9	23.8	26.9	1.41			2		20.0	4.5	3.1		
42+00	68	0	12:19	20.7	5.8						4		19.7	4.5	2.6		
		2		19.4	5.8						6		19.6	4.6	2.8		
		4		19.3	5.8						8		19.6	4.2	2.8		
		6		19.3	5.8						10		19.6	3.9	2.8		
		8		19.3	5.8						12		19.6	3.8	3.1		
		10		19.3	5.6				100+00	60	0	13:04	22.1	4.3			
		12		19.3	5.4						2		20.1	4.7			
		13		19.3	5.3						4		19.6	3.9			
42+00	141	0	12:25	20.4	9.4						6		19.5	4.0			
		2		19.9	7.8						8		19.5	4.1			
		4		19.5	6.0						10		19.4	4.1			
		6		19.4	6.0						12		19.4	3.4			
		8		19.4	6.0						14		19.4	3.2			
		10		19.3	5.9						15		19.4	3.2			
		12		19.3	5.6				100+00	140	0	13:50	21.8	4.3			
42+00	220	0	12:40	21.1	5.9						2		20.3	5.1			
		2		19.6	6.0						4		19.9	4.2			
		4		19.4	5.8						6		19.5	4.0			
		6		19.3	6.0						8		19.5	4.2			
		8		19.3	6.7						10		19.4	4.1			
		10		19.3	6.4						12		19.4	3.8			
		12		19.3	6.1						14		19.4	3.4			
		14		19.4	5.9				100+00	255	0	14:00	20.7	4.0			
42+00	340	0	12:52	21.1	8.2						2		19.9	4.1			
		2		20.3	6.1						4		19.7	4.0			
		4		19.4	6.0						6		19.6	4.0			
		6		19.3	6.1						8		19.6	4.0			
		8		19.3	6.1						10		19.5	3.9			
		10		19.3	6.1						11		19.6	3.8			
		12		19.4	5.9				100+00	340	0	14:07	21.4	4.1			
42+00	426	0	13:02	21.1	7.7						2		19.8	4.1			
		2		20.0	5.8						4		19.6	4.0			
		4		19.6	5.8						6		19.5	4.1			
54+00	89	0	13:00	21.5	5.8	0.5					8		19.5	4.0			
		2		19.7	5.2	1.5			100+00	440	0	14:14	21.5	4.1			
		4		19.6	5.0	1.5					2		20.2	4.1			
		5		19.6	5.0	1.5											

APPENDIX B3

Dye-tracer injection - Run 3
November 2, 1994

November 2, 1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-10+10	190	0	15:36	14.5	6.1	6.6		
		5		14.5	6.8	6.6		
		10		14.4	7.5	7		
		15		14.4	7.4	7.2		
		18		14.4	9.9	9.2	9.6	0.54
-9+10	66	0	13:15	14.5	1.1			
		2		14.2	1.3			
		4		14.2	1.3			
		6		14.2	1.5			
		8		14.1	1.5			
		10		14.1	1.2			
		12		14.1	1.4			
		14		14.1	1.6			
		16		14.1	1.6			
		18		14.1	1.6			
		20		14.1	1.4			
		22		14.1	1.3			
-9+10	89	0	13:30	14.2	1.1			
		2		14.2	1.2			
		4		14.2	1.2			
		6		14.2	1.3			
		8		14.2	1.6			
		10		14.1	1.6			
		12		14.1	2.2			
		14		14.1	1.7			
		16		14.1	1.7			
		18		14.1	1.5			
		20		14.1	1.3			
-9+10	159	0	13:45	14.2	1.5			
		2		14.2	1.4			
		4		14.2	1.6			
		6		14.2	1.5			
		8		14.2	1.3			
		10		14.2	2.3			
		12		14.2	2.5			
		14		14.1	3.4			
		16		14.1	4.6			
		18		14.1	5			
		19		14.1	5.4			
-9+10	258	0	14:01	14.2	3.2			
		2		14.2	4.5			
		4		14.2	4.7			
		6		14.2	4.5			
		8		14.2	4.4			
		10		14.2	4.3			
		12		14.2	4.4			
		14		14.2	4.3			
		16		14.2	4.2			
-9+10	296	0	14:10	14.3	4.3			
		2		14.3	4.3			
		4		14.2	4.2			
		6		14.2	4.2			
		7		14.2	4.1			
-8+10	159	0	15:16	14.4	68.7	6.6		
		4		14.4	64.7	6.6		
		6		14.4	58.2	12.4		
		8		14.4	10.8	6.8		
		12		14.4	11.7	10		
		20		14.3	13.5	14.5	15.3	0.86
-7+10	66	0	12:12	14.2	2.5			
		2		14.1	2.5			
		4		14.1	2.4			
		6		14.1	2.4			
		8		14.1	2.4			
		10		14.1	2.4			
		12		14.1	2.4			
		14		14.1	2.4			
		16		14.1	2.4			
-7+10	106	0	12:25	14.1	2.5			
		2		14.1	2.5			
		4		14.1	2.2			
		6		14.1	2.6			
		8		14.1	2.2			
		10		14.1	2			
		12		14	1.6			
		14		14	2.3			
		16		14	2.2			
		18		14	2.5			
		20		14	9.4			
		21		14	9.7			
-7+10	172	0	12:43	14.1	4.6			
		2		14.1	4.7			
		4		14.1	4.8			
		6		14.1	4.8			
		8		14.1	4.8			
		10		14.1	5			
		12		14.1	4.9			
		14		14.1	5.1			
		16		14.1	5.1			
		18		14.1	4.9			
		19		14.1	4.7			
-7+10	240	0	12:55	14.2	4.8			
		2		14.2	5.4			
		4		14.1	4.7			
		6		14.1	5.8			
		8		14.1	5.6			
		10		14.1	6			
		12		14.1	5.7			
		14		14.1	6			
		16		14.1	5.7			
		17		14.1	5.6			
-7+10	320	0	13:08	14.3	5.3			
		2		14.2	4.9			
		3		14.2	4.8			
-5+10	62	0	11:05	14.1	2.2			
		2		14.1	2.6			
		4		14	2.5			
		6		14	2.7			
		8		14	2.9			
		10		14	3.2			
		12		14	3.9			
		14		14	4.2			
		16		13.9	10.6			
		18		13.9	13.7			

November 2, 1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-5+10	94	0	11:18	14.1	2.7				-3+10	160	0	10:15	14	3.4			
		2		14.1	2.5						2		14	3.7			
		4		14	3						4		14	3.4			
		6		14	3.8						6		14	3.6			
		8		14	4.5						8		14	5.5			
		10		14	5.3						10		14	6.9			
		12		14	5.4						12		13.9	10.9			
		14		14	6						14		13.9	12.5			
		16		14	6.2						16		13.9	22.5			
		18		13.9	12.5						18		13.7	23.7			
		19		13.9	13.7						19		13.6	27.7			
-5+10	155	0	1133	14.1	4.1				-3+10	218	14		13.9	10.6			
		2		14.1	4.1						16		13.8	17.5			
		4		14.1	4.6						18		13.6	24.7			
		6		14.1	4.9						20		13.6	24.7			
		8		14	5.3				-3+10	283	0		13.9	4.8			
		10		14	5.5						2		13.9	4.7			
		12		14	6						4		13.9	4.8			
		14		14	6.6						6		13.9	4.9			
		16		14	7.5						8		13.9	5.1			
		18		14	8.7						10		13.9	5.5			
		19		13.9	12.5				-3+10	228	0		14	5.7			
-5+10	222	0	11:48	14.1	4.7						2		14	7.2			
		2		14.1	5.1						4		14	6.9			
		4		14.1	5.5						6		14	7.5			
		6		14.1	5.4						8		13.9	8.1			
		8		14.1	5.5						10		13.9	9.1			
		10		14	6.2						12		13.9	10.9			
		12		14	5.9						14		13.9	10.3			
		14		14	6.7						16		13.9	8.1			
		16		14	6.7						18		13.9	9.4			
		18		14	6.6						20		13.9	9.1			
		19		14	7.7				-3+10	103	13	15:01	14.3	16.6	16	17.1	0.96
-5+10	267	0	12:01	14.1	6.1						21		14	33	32.3	29.8	1.68
		2		14.1	5.6				-1+10	57	0	08:25	14	2.5			
		4		14.1	5.3						2		14	2.8			
		6		14.1	5.1						4		14	2.5			
		7		14.1	5.2						6		13.9	2.4			
-5+10	160	5	15:09	14.4	9.4	8.5	10	0.56			8		14	8.7			
		21		14.3	18.2	17.3	18.3	1.03			10		14.1	13.1			
-3+10	44	0	09:50	13.9	2.5						12		14.1	16.2			
		2		14	2.3						14		14	17.8			
		4		13.9	1.9				-1+10	98	0	08:45	14	3.2			
		5		13.9	1.9						2		14	3.2			
-3+10	115	0	10:00	14	2.4						4		14	3.4			
		2		14	2.5						6		14	3.7			
		4		14	2.3						8		13.9	2.8			
		6		14	2.9						10		14.1	9.1			
		8		14	5.1						12		14	18.1			
		10		14	8.7						14		13.9	19.7			
		12		14	9.7						16		13.8	22.7			
		14		14	12.2						18		13.6	27.7			
		16		13.8	22.7						20		13.5	27.7			
		18		13.6	25.7												
		20		13.5	27.7												

November 2, 1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
-1+10	165	0	09:03	14	6.3			
		2		14	5.5			
		4		14	5.5			
		6		14	6.3			
		8		14	8.4			
		10		14	10.6			
		12		14	14.4			
		14		13.9	20.6			
		16		13.8	21.7			
		18		13.7	26.7			
		20		13.5	27.7			
		22		13.5	26.2			
-1+10	228	0	09:18	13.9	6.9			
		2		13.9	6.9			
		4		13.9	7.5			
		6		13.9	8.7			
		8		13.9	8.7			
		10		13.9	9.7			
		12		13.9	20.6			
		14		13.8	22.2			
		16		13.7	23.7			
		18		13.6	26.7			
		20		13.5	30.6			
-1+10	303	0	09:35	14	3			
		2		13.9	3			
		4		13.9	2.9			
		6		13.9	2.8			
		7		13.9	2.6			
outfall	0	0	08:20	12	96.8	99.4		
outfall	0	0	14:33	13.7	86.1	100		
outfall	30	0	08:23	12.3	85.4	80.7		
		1		12.4	82.4	77.7		
		2		12.5	79.3	80.7		
		3		12.2	98.5	92.5		
outfall	68	0	08:31	14	13.5	14.5		
		2		13.6	28	27		
		4		14	11.6	13		
		6		13.7	23.4	31.3		
		8		13.6	24.1	29.3		
		10		13.7	22.8	28.1		
		12		13.8	26.4	28.3		
		14		13.4	36.7	40.9		
		16		13.1	50.3	51.9		
outfall	100	0	08:44	14.1	15.2	15		
		2		14.2	16.8	15.4		
		4		14.2	16.5	15.8		
		6		14.2	17.4	17.1		
		8		14.1	14.7	15		
		10		14.2	18	18		
		12		14.3	24.2	25.5		
		14		14.2	28.4	27		
		16		14	27.4	29.3		
		18		13.6	33.1	35.8		
		20		13.5	35.6	37.7		
outfall	125	0	09:03	14.1	15	14.7		
		2		14.1	16.5	15.6		
		4		14.1	15.8	16.5		
		6		14.1	17.4	16.7		
		8		14.1	17.3	16.7		
		10		14.1	17.3	16.7		
		12		14.1	25.2	25.5		
		14		13.8	35.4	32.3		
		16		13.8	33.7	32.1		
		18		13.6	34.5	36.4		
		20		13.7	32.5	35.4		
outfall	180	0	09:16	14	15.9	15		
		2		14	16.4	16.2		
		4		14	17.1	16.2		
		6		14	17.1	16.2		
		8		14	17.3	17.3		
		10		14	18.4	19.2		
		12		14	15.9	16.7		
		14		13.8	31.4	31.7		
		16		13.7	33.7	33.6		
		18		13.7	35.5	35.8		
		19		13.7	35.9	36.2		
outfall	210	0	09:25	14	14	13.9		
		2		14	14.9	14.3		
		4		14.1	14.8	15.4		
		6		14	16.2	15.8		
		8		14	16.8	16.9		
		10		14	16.9	16		
		12		13.8	23.9	24.2		
		14		13.7	32.6	32.6		
		16		13.7	35.1	35.4		
outfall	238	0	09:34	14	15.9	13.7		
		2		14	12.8	13.7		
		4		14	14.6	13.7		
		6		14	16.5	16		
		8		14	17.9	17.3		
		10		14	16.9	17.7		
		12		13.9	20.6	21.2		
		14		13.7	35.1	34.9		
		15		13.7	35	34.7		
outfall	271	0	09:43	14.1	13.1	12.4		
		1		14.1	13.3	12.6		
		3		14.1	12.7	12.4		
		5		14	12.6	12.4		
		7		14	13.3	12.4		
outfall	302	0	09:47	14.5	12.5	12.8		
outfall	210	19	14:45	14.1	36.7	37.1	35.2	1.98
outfall	190	15	14:50	14.2	18.5	19	19.3	1.09
		21		14.1	39.5	39.4	37.2	1.98
outfall	265	14	14:56	14.2	21.4	21.8	21.7	1.22
1+50	10	0	09:51	14	9.4	8.9		
1+50	40	0	09:54	14	14.5	14.1		
		2		14	10.2	10.7		
		4		14	11.4	11.1		
1+50	76	14	14:56	14.2	12.8	21.7	64	1.13

November 2, 1994																	
Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)	Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
1+50	82	0	09:57	14.1	15.7	14.7			1+50	135	12	15:35	14.3	20.2	19.5		
		1		14.1	15	14.7					19		14.2	30.3	30.2	33	1.86
		3		14	15	14.5			3+00	10	0	10:59	14.2	13.7	13		
		5		14	14.7	14.7			3+00	89	0	11:03	14.1	15.9	15.4		
		7		14	15.5	15.2					3		14.1	17.2	16.7		
		9		14	16.1	16.7					6		14	19.2	18.4		
		11		14	16.6	17.5					10		14	18.5	18.4		
		13		14	18.8	18.2					13		14	19.1	18.6		
		15		14	18.8	18.2			3+00	148	0	11:09	14.1	17.3	17.1		
		17		14	19.2	18.6					4		14.1	15.7	16.5		
1+50	111	0	10:05	14.1	13.5	14.3					8		14.1	21	21		
		2		14.1	14.4	14.5					12		14	21.7	21.8		
		4		14	14.4	14.7					17		14	21.4	22.3		
		6		14	15.4	15.2			3+00	170	0	11:16	14.1	16.2	15.6		
		8		14	14.7	15.4					5		14.1	16.4	15.8		
		10		14	17.6	17.1					10		14	17.5	18.4		
		12		14	17.9	18.6					15		14	19	18.2		
		14		14	19	19.5					20		14	21.5	21.2		
		16		13.9	21.5	21.8			3+00	178	20	15:42	14.2	18.7	27.9	71.8	1.5
		19		13.9	24.8	24.6			3+00	285	5	15:46	14.2	10	20.3	65.5	1.16
1+50	141	0	10:13	14.1	14.9	14.5					20		14.2	20.4	31.3	85.2	1.78
		2		14.1	14	14.5			3+00	286	0	11:27	14.1	15.4	15.8		
		4		14	15.7	15.4					4		14.1	15.1	16		
		6		14	14.8	15					8		14	20	19.2		
		8		14	16.1	15.4					12		14	25.8	25.5		
		10		14	16.9	16.5					16		13.9	29	28.1		
		12		14	16.9	16.5					21		13.9	26.5	26.6		
		14		14	17.7	18.6			3+00	327	0	11:32	14.2	14.6	15.4		
		16		13.9	20.7	20.8					4		14.2	16.4	15.6		
		19		13.8	26.2	25.7					8		14	20.1	20.3		
1+50	190	0	10:24	14.1	14.8	14.7					11		14	25.3	24.4		
		2		14.1	15.3	14.5			3+00	374	0	11:37	15.2	12.7	12.4		
		4		14.1	14	14.7			3+00	178	20	15:42	14.2	28.9	28.1	26.6	1.5
		6		14.1	15.6	15			3+00	285	5	15:46	14.2	19.3	20.3	20.6	1.16
		8		14.1	14.7	15.4					20		14.2	32.2	31.5	31.6	1.78
		10		14	16.2	16.5			5+00	146	5	15:09	14.4	9.4	8.5	10	0.56
		12		14	16	16.7					20		14.3	18.2	17.3	18.3	1.03
		14		14	18.5	19			6+00	10	0	11:46	14.8	12.5	11.9		
		16		13.9	20.2	20.5			6+00	42	0	11:52	14.2	15.3	15.8		
		18		13.8	27	27.4					4		14.1	16.2	16		
		20		13.7	35.1	35.6					8		14.1	16.7	16.2		
1+50	290	0	10:35	14.1	14.2	14.5					12		14.1	16.3	16.9		
		2		14.1	14.2	14.5					17		14.1	18.1	17.1		
		4		14.1	15	15.4			6+00	158	0	11:57	14.2	17	16.7		
		6		14.1	15.8	15.8					5		14.1	16.4	16.9		
		8		14	18	17.5					10		14.1	17.8	16.9		
		10		14	18.1	17.5					14		14.1	17.3	17.3		
		12		14	21.6	21.6					18		14	20.7	21		
1+50	205	0	10:45	14.1	15.1	14.5					20		14	25.1	24.2		
		2		14.1	14.4	15					22		13.9	28.7	28.5		
		4		14.1	16.1	15.2			6+00	252	0	12:05	14.2	15.3	16		
		6		14.1	14.1	14.7					4		14.2	16.1	16.2		
		8		14.1	14.2	15.2					8		14.1	16.4	16.7		
		10		14.1	15.3	15.6					12		14.1	16.9	17.7		
		12		14	16.5	16.7					16		14.1	18.8	18		
		14		14	19.5	18.6					18		14.1	21.3	21		
		16		13.9	22	22.7					21		13.9	29.7	29.1		
		18		13.8	29.5	29.3											
		20		13.8	34.2	34.3											
1+50	255	0	10:54	15.1	10.6	11.3											

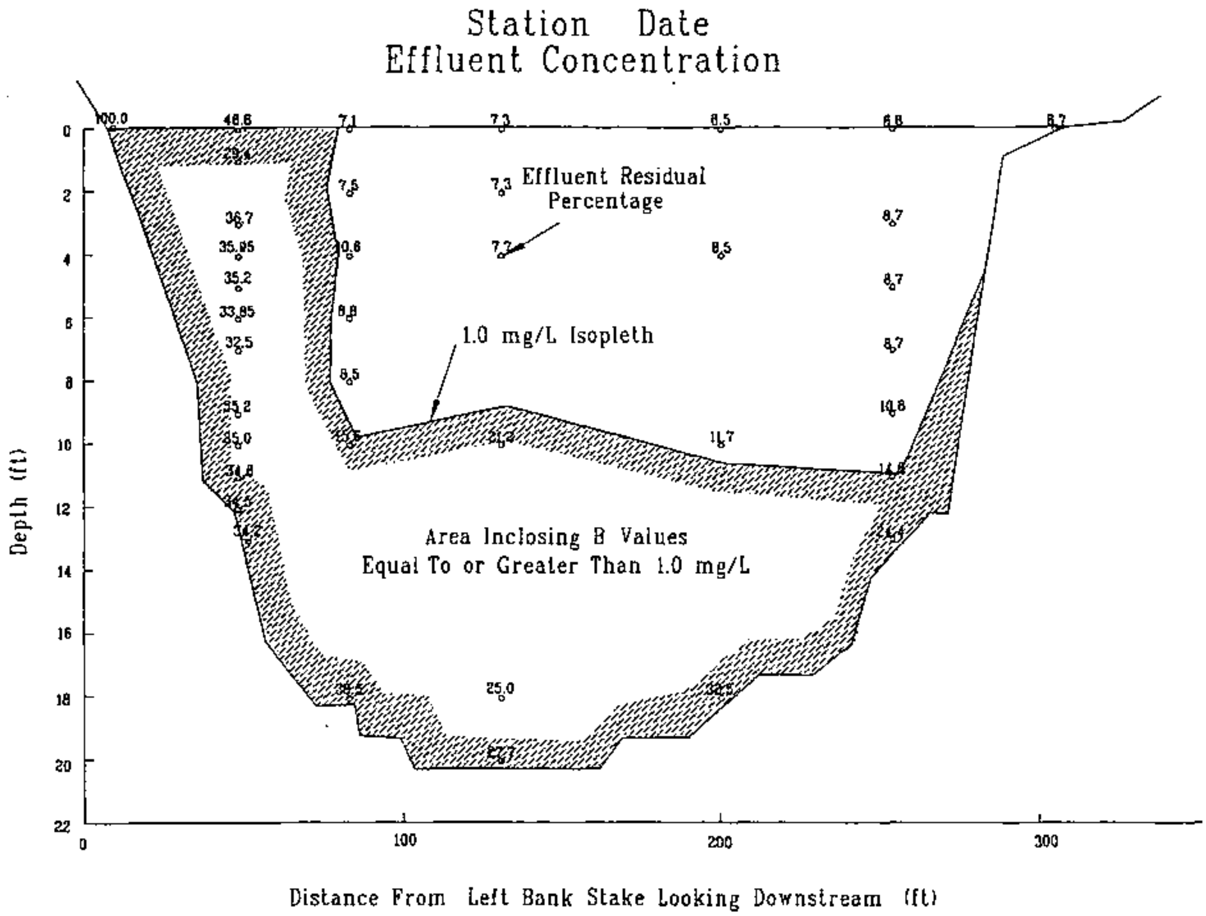
November 2, 1994

Transect	X (ft)	Depth (ft)	Time	Temp	Dye (%)	S.C. (%)	Boron (%)	Boron (mg/L)
6+00	315	0	12:13	14.2	15	15.4		
		3		14.2	15.4	15.6		
		5		14.1	15.9	16.2		
		9		14.1	16.8	16.7		
6+00	352	0	12:17	14.5	14.6	14.3		
6+00	175	22	15:54	14.2	33.1	32.3	29	1.63
8+00	168	0	15:57	14.3	17.3	17.7	18.3	1.03
		5		14.3	18.7	18		
		10		14.3	17.3	18.2		
		15		14.2	19.2	18.4		
		22		14.2	26.9	26.1		
10+00	10	0	12:21	14.8	13	12.4		
10+00	70	0	12:26	14.2	13.6	14.3		
		4		14.2	15.1	14.5		
		8		14.2	14.8	14.7		
		12		14.2	15.1	15.4		
10+00	131	0	12:30	14.2	15	14.7		
		6		14.2	14.7	15.2		
		12		14.1	15.7	16.2		
		16		14.1	16.9	17.1		
		21		14	19.5	18.6		
10+00	194	0	12:37	14.2	14	14.7		
		5		14.2	14.6	15		
		10		14.1	16.2	16.2		
		15		14.1	18.8	18.4		
		19		14	23.2	22.9		
		21		14	23.8	23.8		
10+00	240	0	12:50	14.2	15.1	15.4		
		5		14.2	14.5	15.4		
		10		14.1	17	16.5		
		15		14.1	19.4	18.4		
		17		14	20.4	20.5		
		19		14	25	25		
10+00	276	0	12:55	14.3	16	15		
		5		14.2	16.2	15.6		
		10		14.1	15.9	16.7		
		15		14.1	18.4	18.4		
10+00	314	0	12:59	14.7	12.6	12.8		
10+00	168	15	16:02	14.3	18.8	19	20.6	1.16
		21		14.2	28.9	28.9	29.1	1.64
15+00	225	8	16:08	14.3	-1.1	-0.9	17.3	0.98
		21		14.2	26.1	26.8	28.1	1.58
20+00	10	0	13:03	14.9	12.7	12.2		
20+00	70	0	13:06	14.5	13.4	13		
		2		14.4	12.4	13.2		
		4		14.3	12.4	13.2		
20+00	122	0	13:12	14.4	12.2	12.8		
		4		14.4	13	12.6		
		8		14.3	12.6	11.9		
		11		14.3	12.2	12.6		
20+00	182	0	13:16	14.4	11.4	12.2		
		5		14.4	12.9	12.2		
		10		14.3	13.1	12.8		
		14		14.3	13.7	12.8		
20+00	215	0	13:20	14.4	12	11.9		
		5		14.4	12.5	11.9		
		10		14.4	12	11.9		
		14		14.3	11.9	11.9		
20+00	280	0	13:28	14.4	10.6	113		
		5		14.4	11.9	11.5		
		10		14.3	12.6	12.6		
		14		14.3	13.8	13.2		
20+00	350	0	13:33	14.4	11.3	12.2		
		5		14.3	13.3	12.6		
		10		14.3	13	13		
		14		14.2	13.8	13.9		
20+00	418	0	13:38	14.4	11	11.9		
		3		14.4	12.9	12.4		
		6		14.4	12.9	12.4		
		9		14.4	11.7	12.6		
20+00	474	0	13:43	14.5	10.5	11.3		
20+00	226	14	16:16	14.2	20.7	21	21.3	1.2
30+00	185	14	16:21	14.4	13.3	13	14.2	0.8
40+00	185	14	16:26	14.4	12.5	12.4	13.1	0.74
48+00	225	12	16:31	14.4	13	13	13.7	0.77
60+00	210	11	16:37	14.4		9.8	10.8	0.61
80+00	198	0	16:41	14.3		9.8		
		5		14.3		9.8		
		10		14.3		9.8		
		17		14.3		9.8	11	0.62
80+00	86	0	16:45	14.3		9.8		
		5		14.3		10		
		11		14.3		9.8	10.5	0.59
100+00	205	0	16:50	14.5		8.9		
		6		14.5		8.9		
		13		14.5		8.9	9.6	0.54
100+00	52	0	16:54	14.5		8.5		
		4		14.5		8.5		
		7		14.5		8.5	9.6	0.54

APPENDIX C

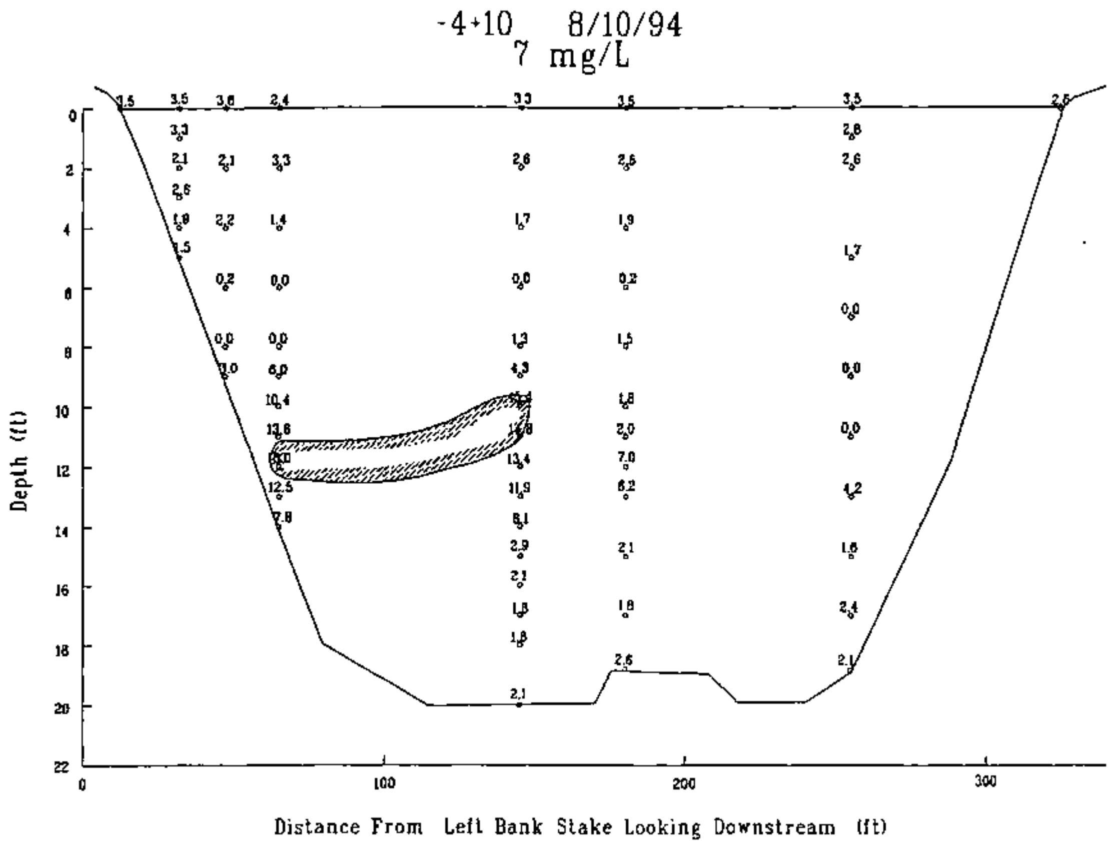
Isoplethic plots of cross sections

Appendix - C Legend

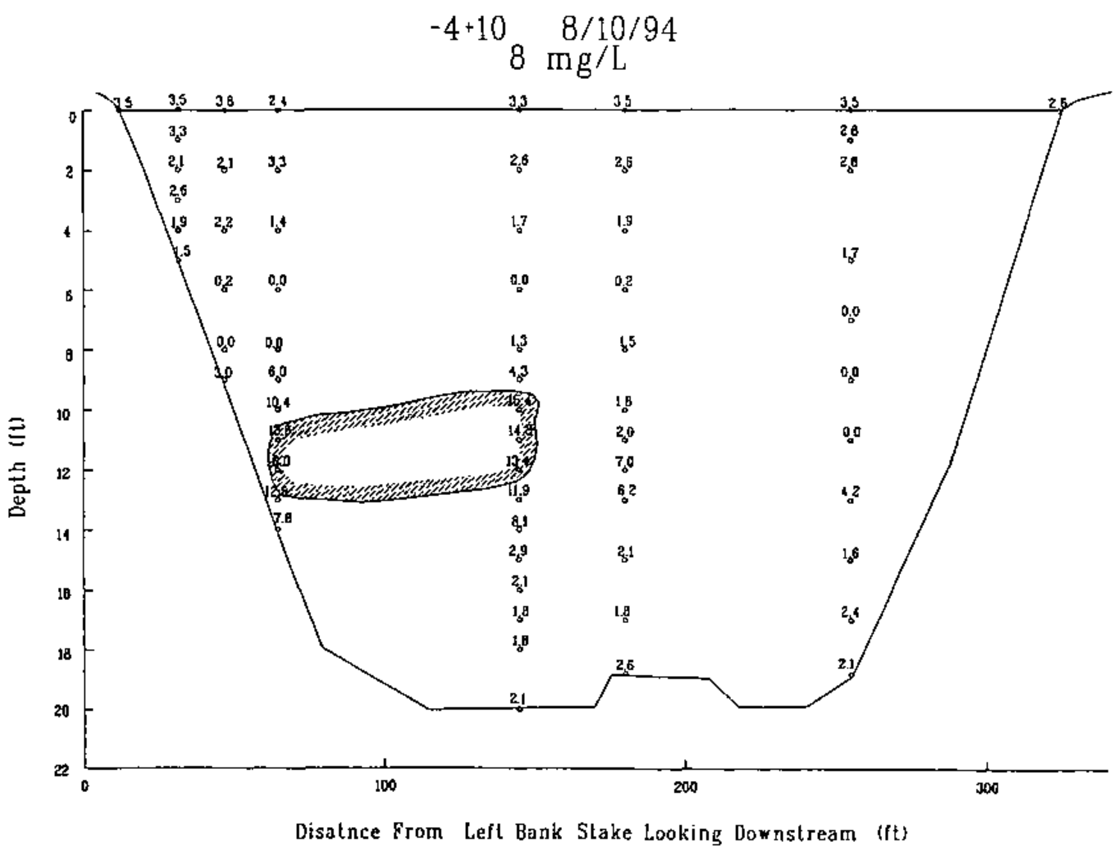


APPENDIX C1

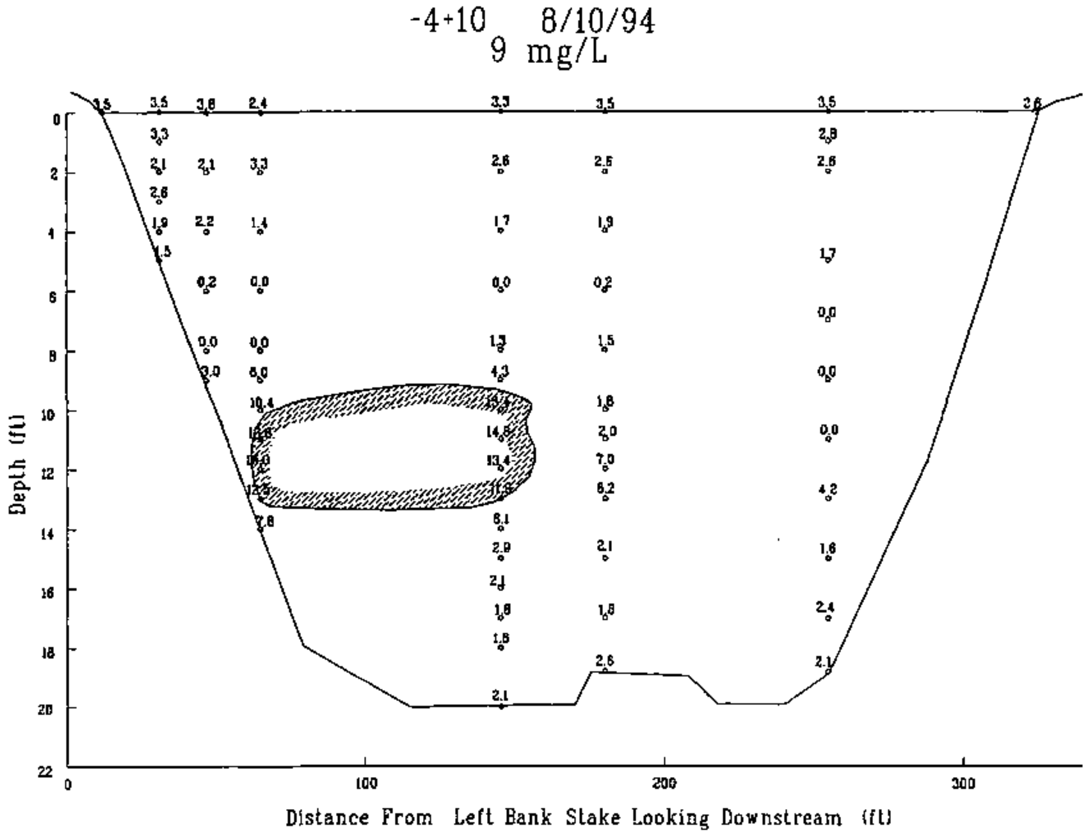
Isoplethic Cross Sections for Station -4+10

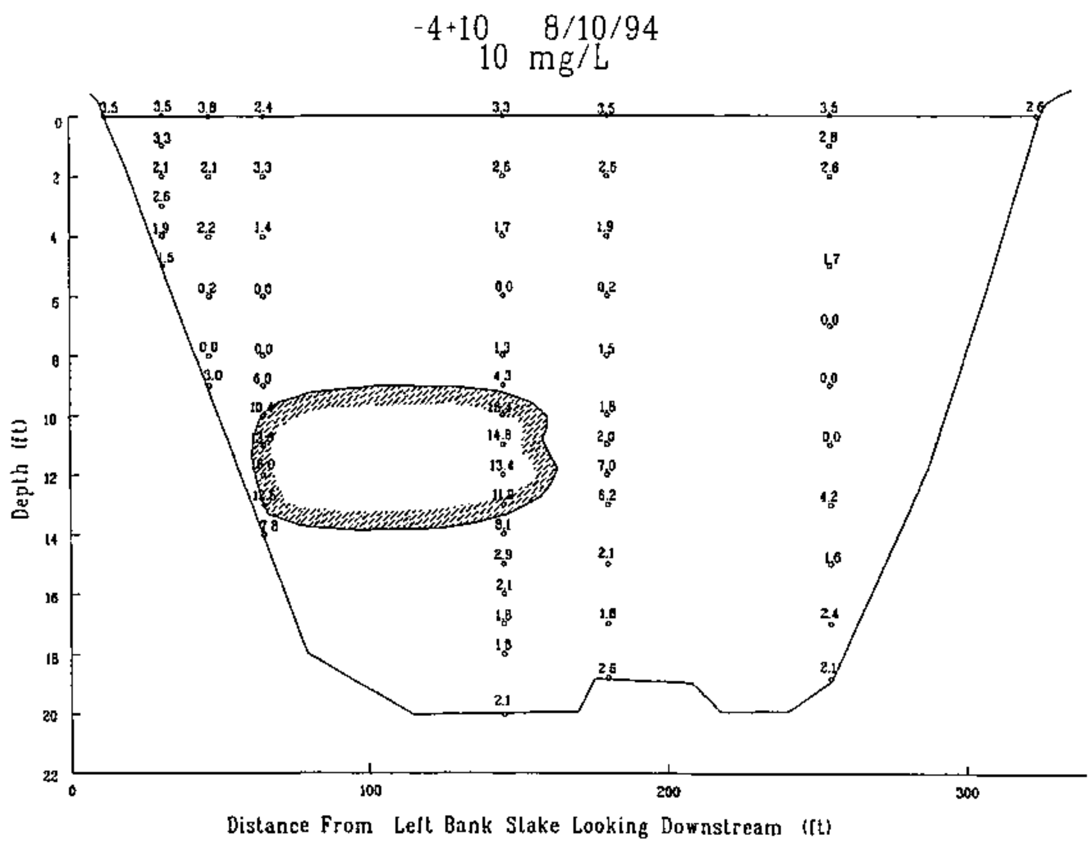


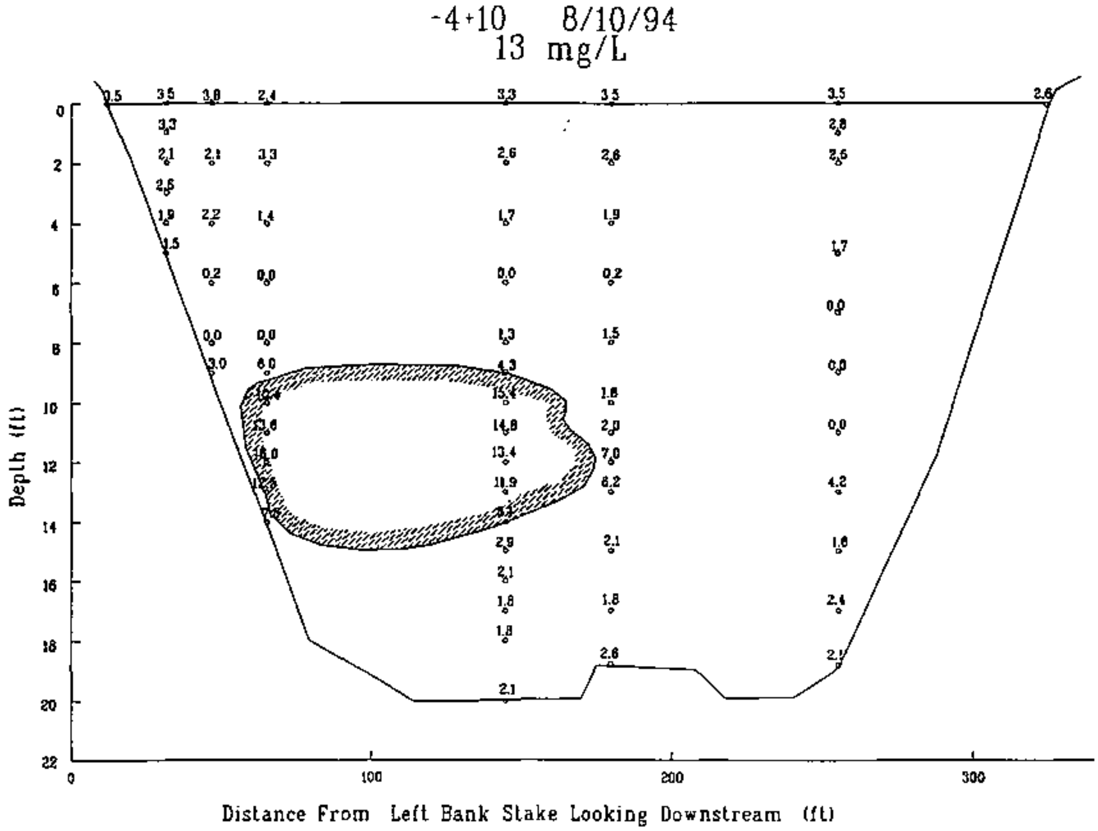
-4+10 8/10/94
7 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)



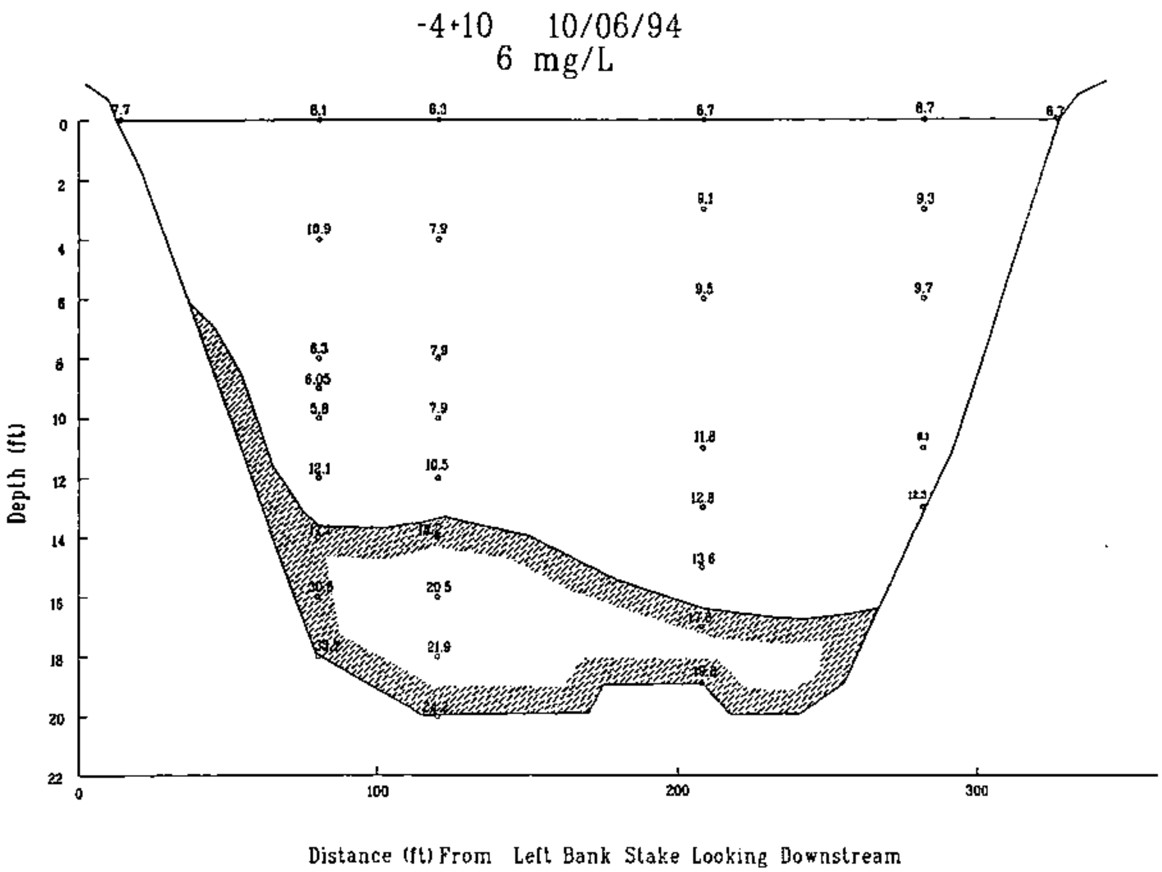
-4+10 8/10/94
8 mg/L
Depth (ft)
Disatnce From Left Bank Stake Looking Downstream (ft)

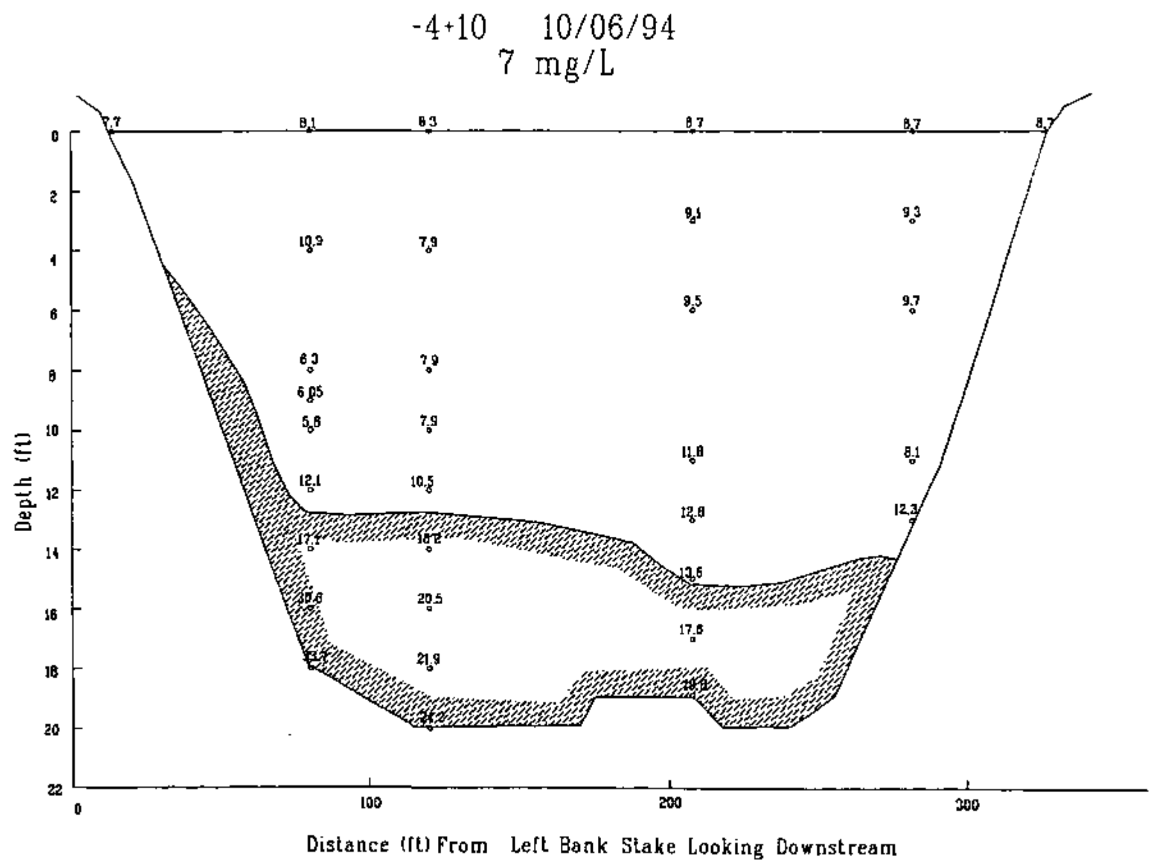

-4+10 8/10/94
9 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

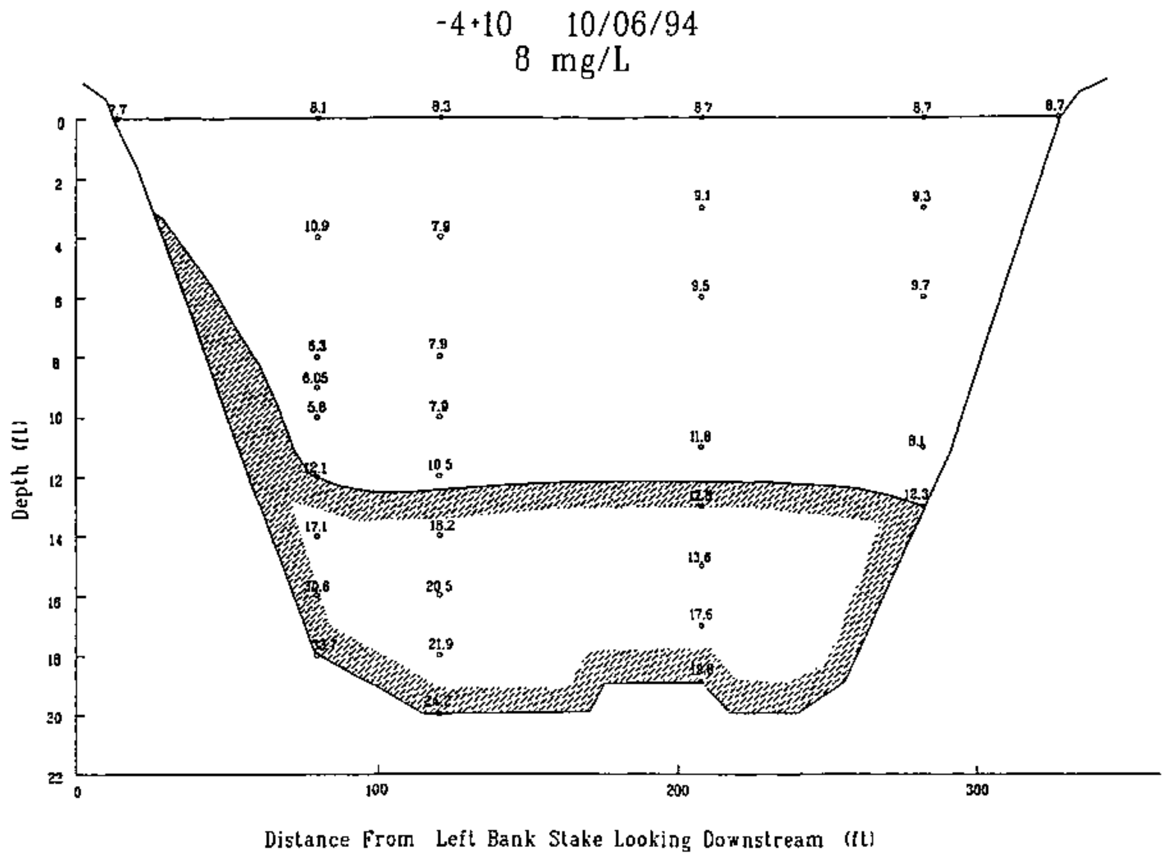

-4+10 8/10/94
10 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

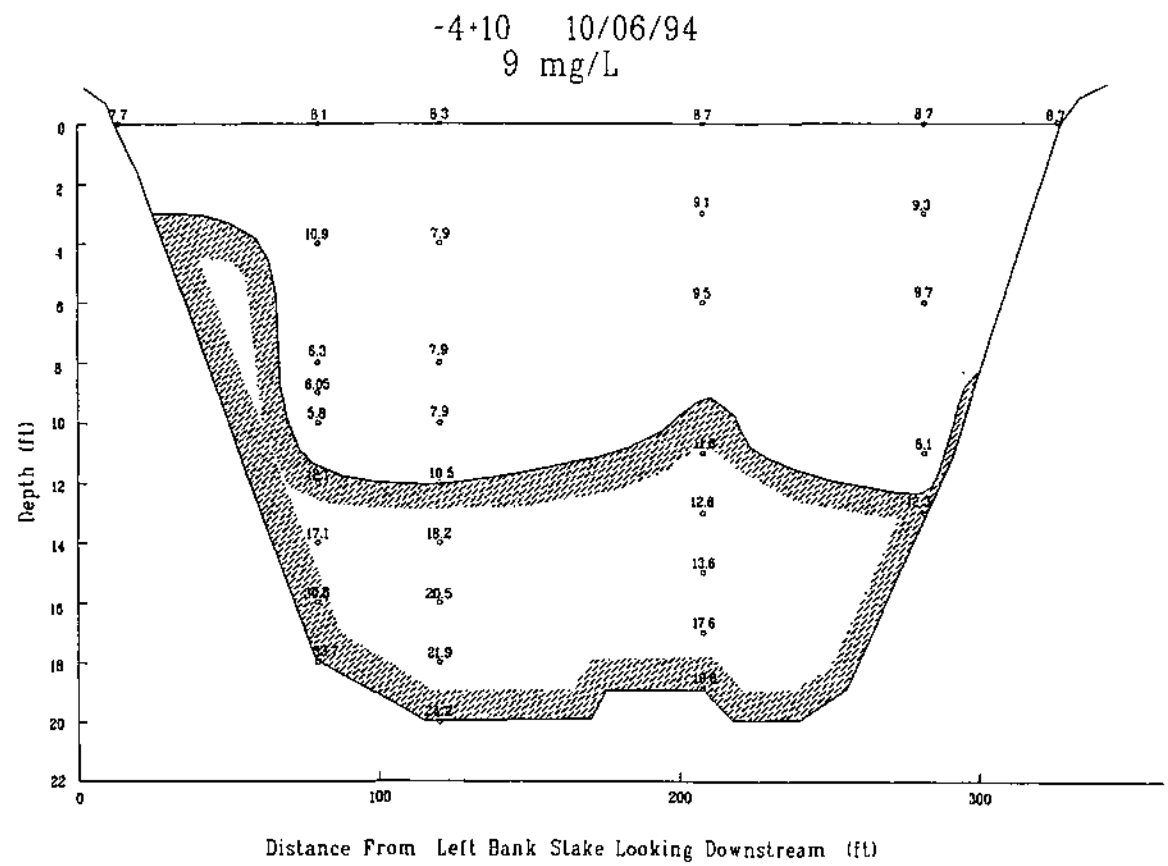


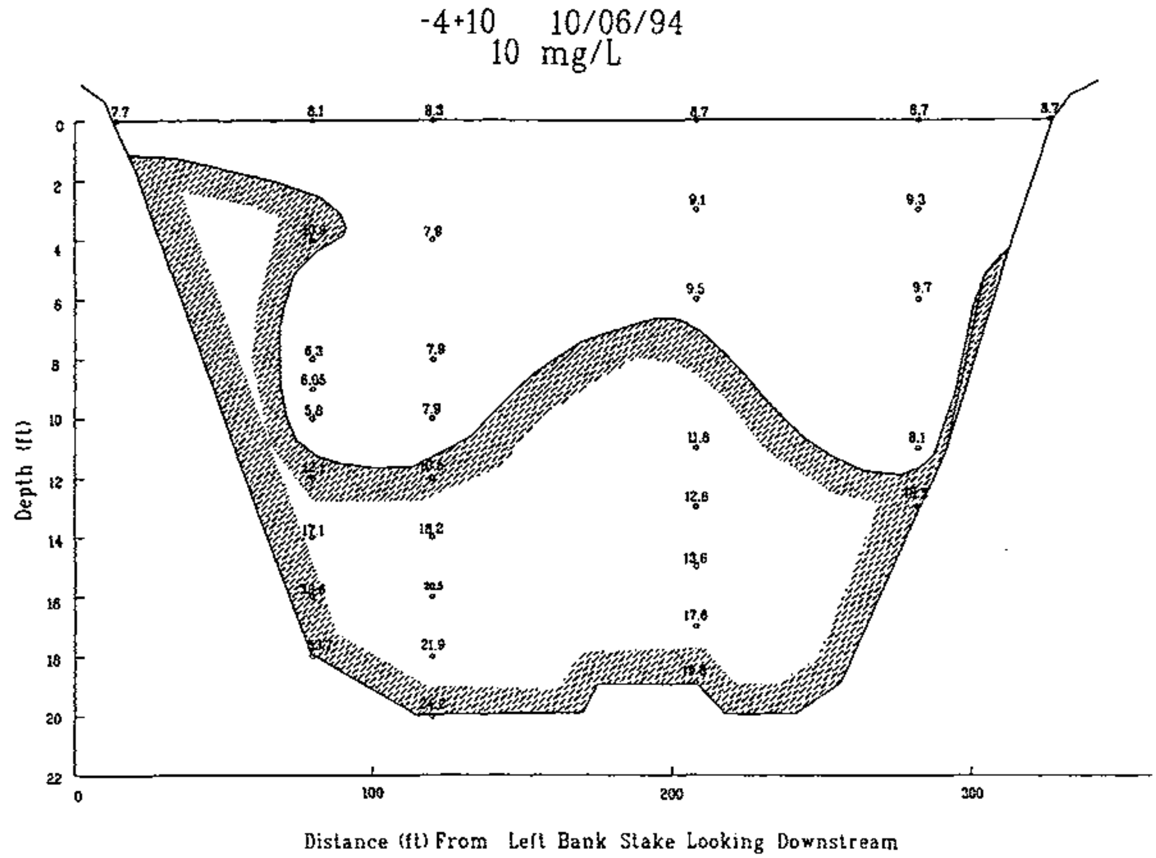
-4+10 8/10/94
13 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


-4+10 10/06/94
6 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream

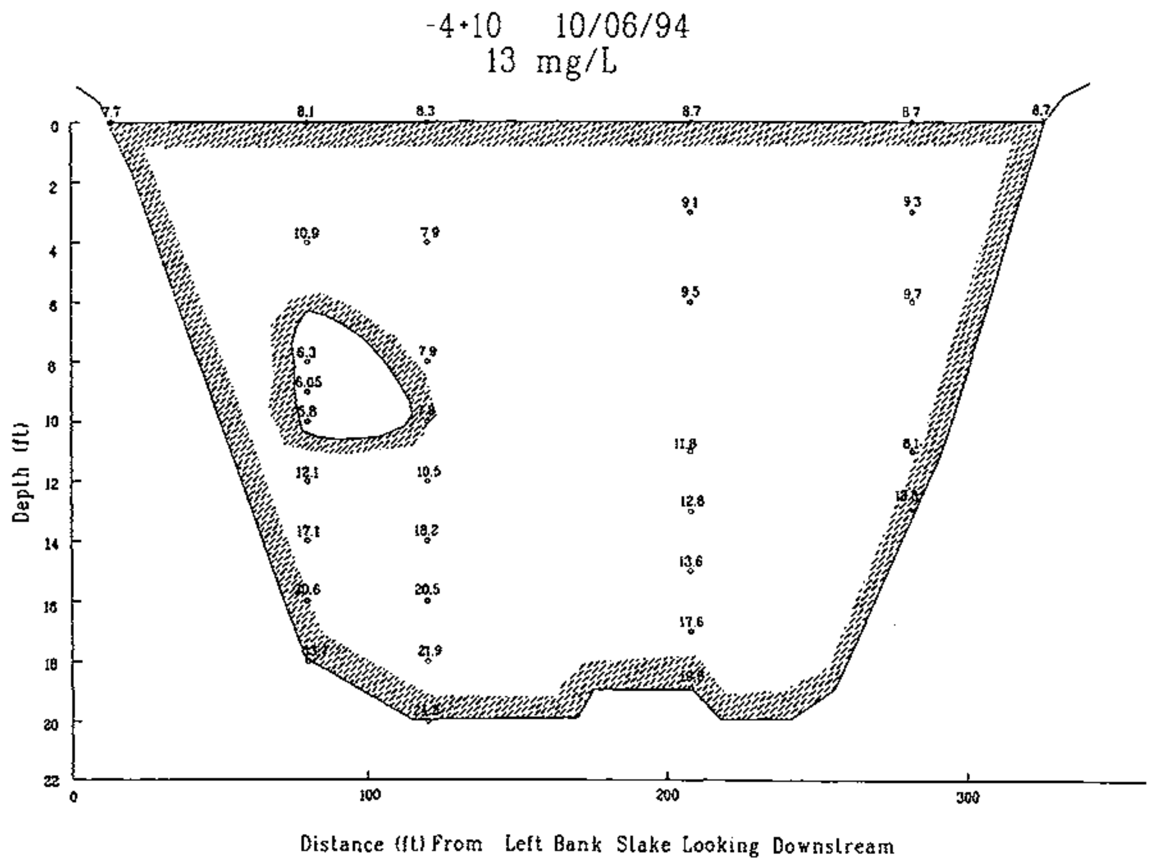

-4+10 10/06/94
7 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream


-4+10 10/06/94
8 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


-4+10 10/06/94
9 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)



-4+10 10/06/94
10 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream

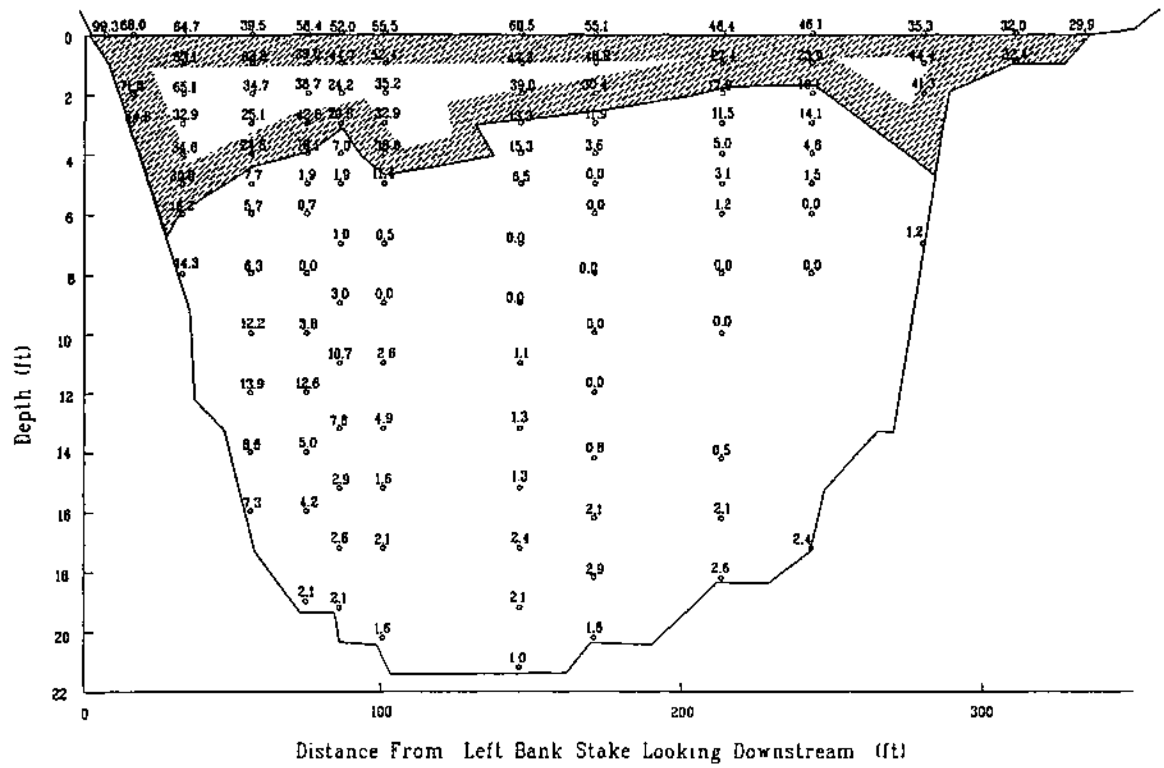


-4+10 10/06/94
13 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream

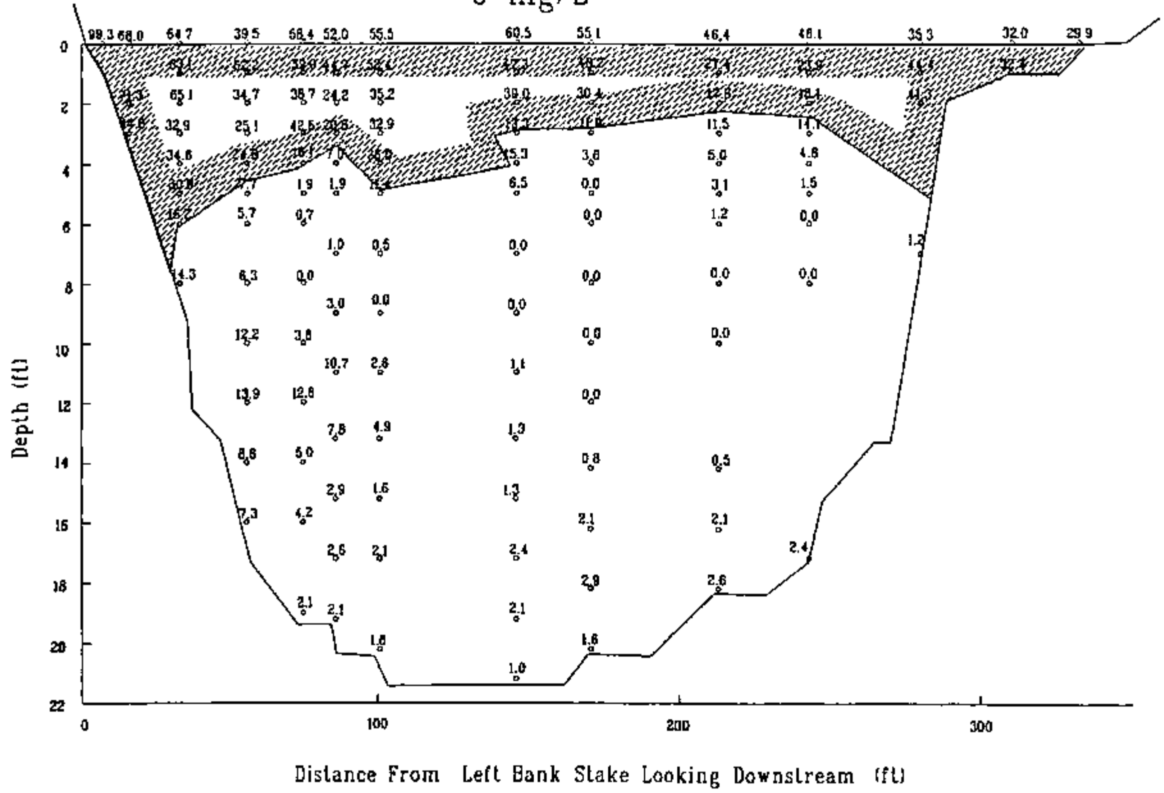
APPENDIX C2

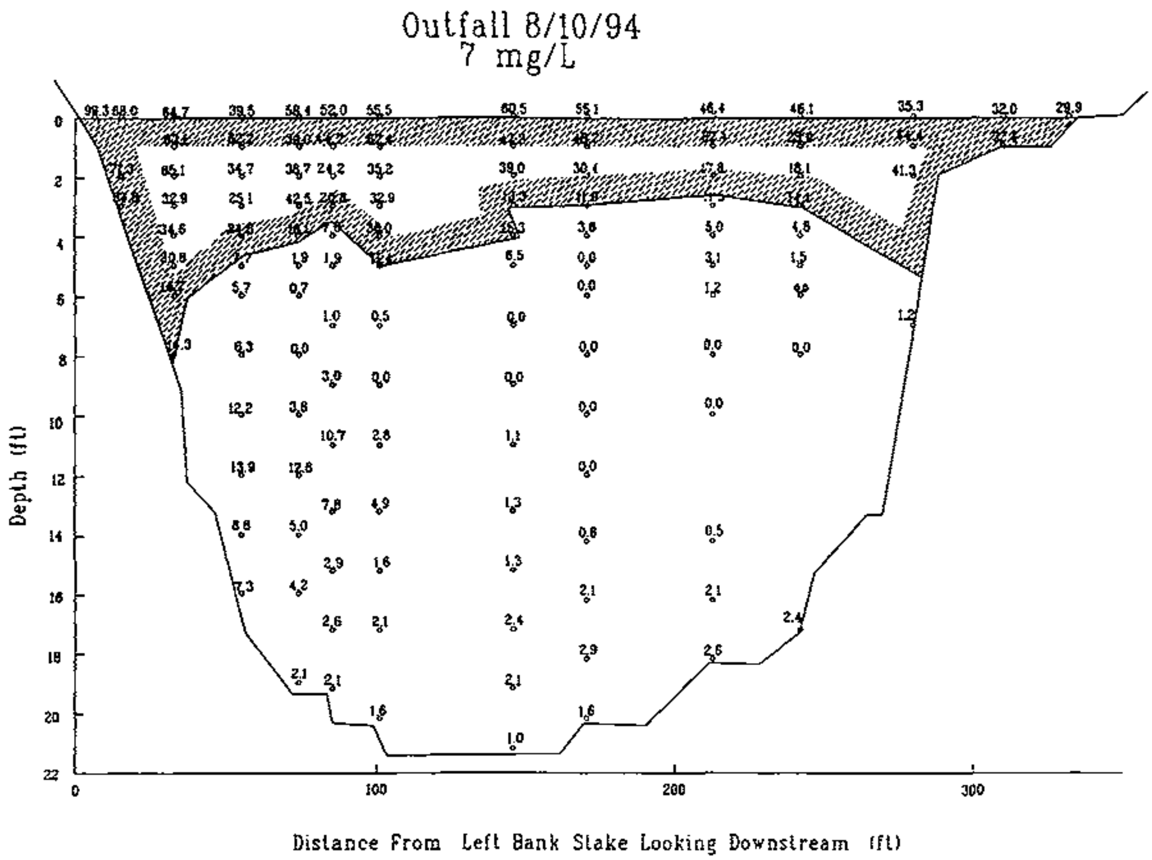
Isoplethic Cross Sections for Station -0+19
(outfall)

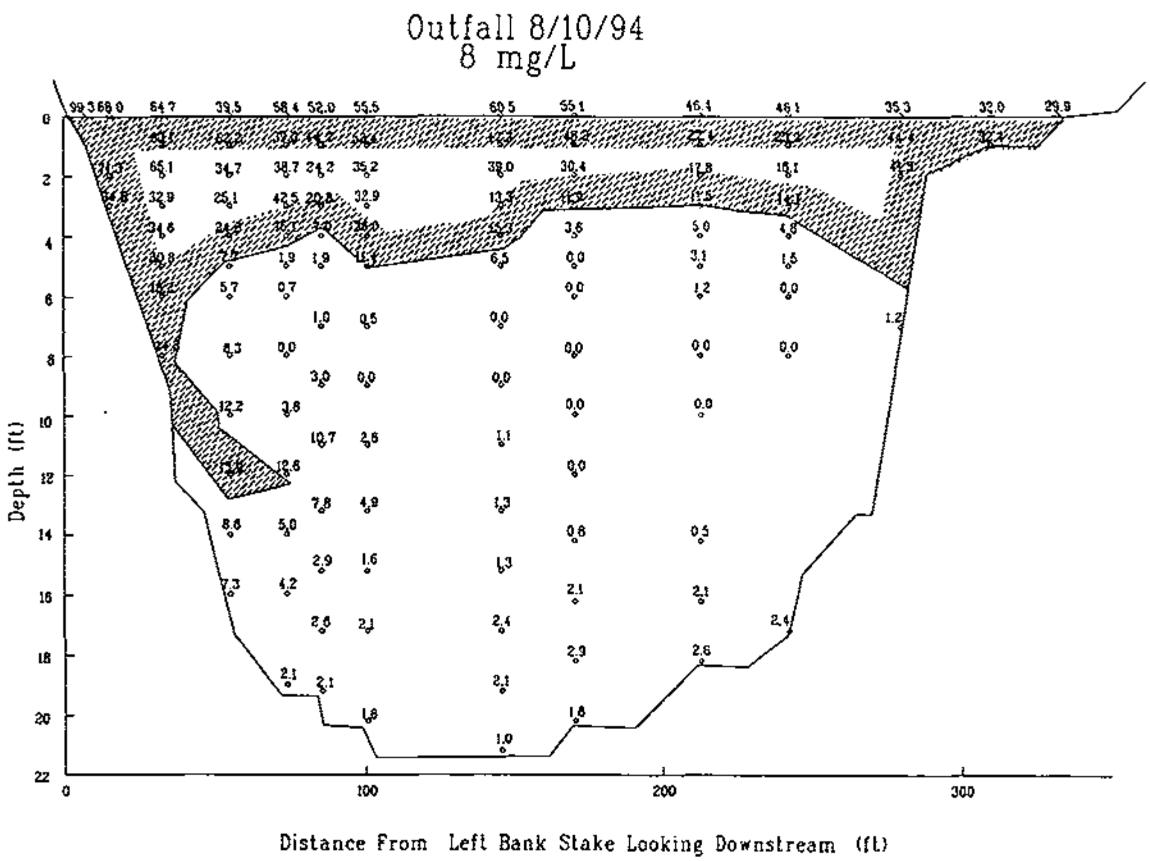
Outfall 8/10/94
5 mg/L

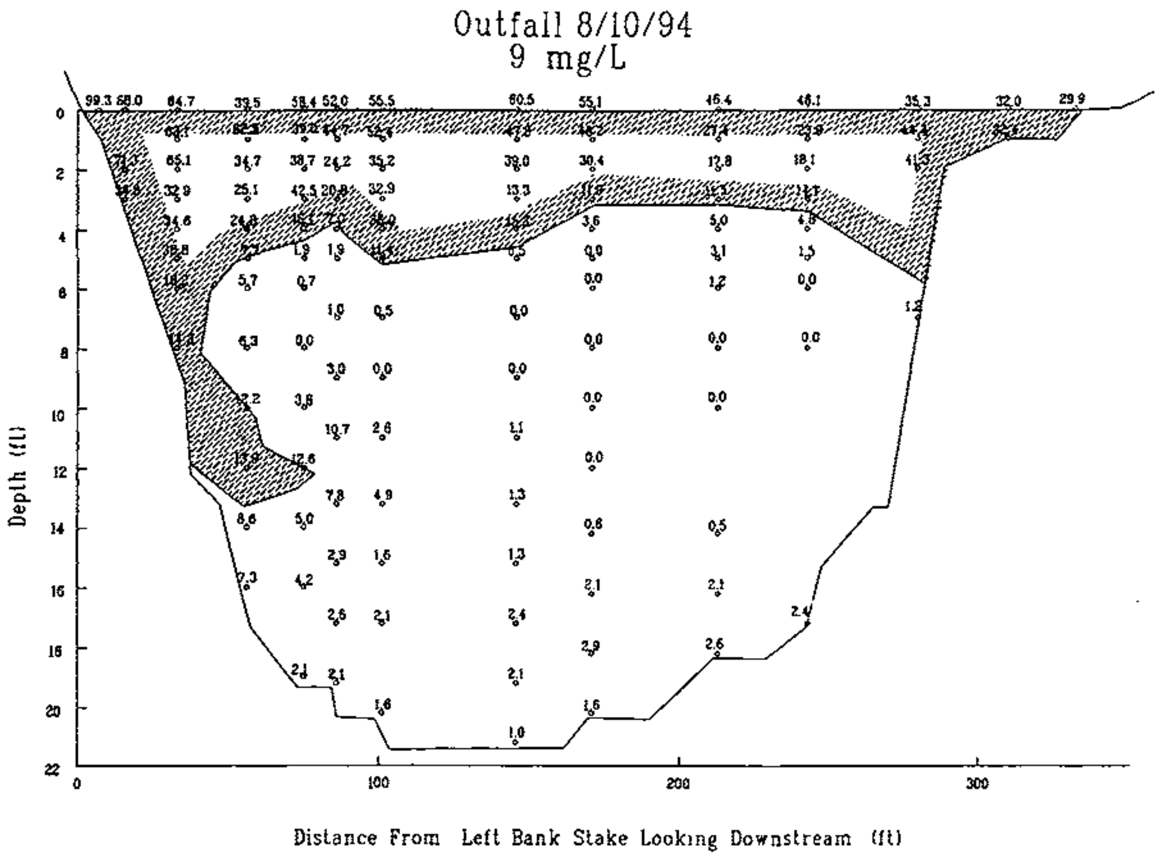


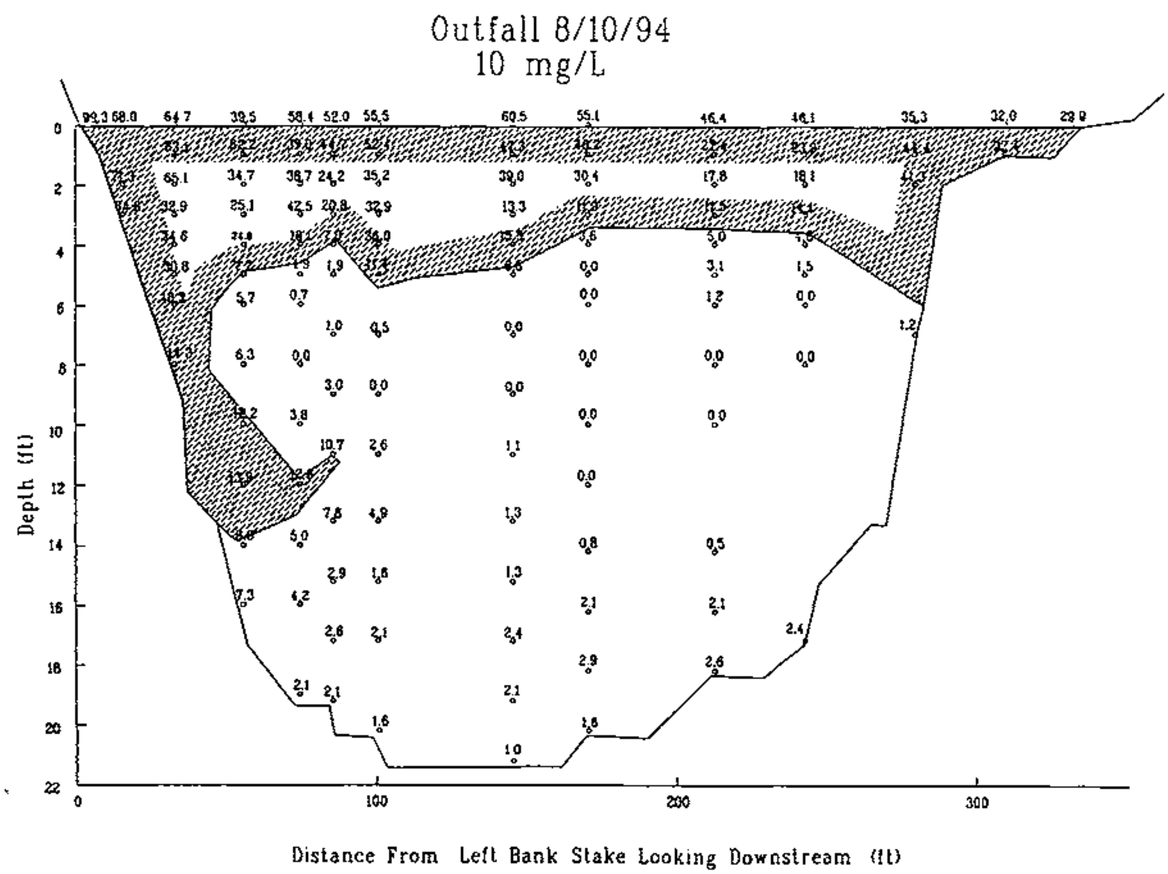
Outfall 8/10/94
6 mg/L



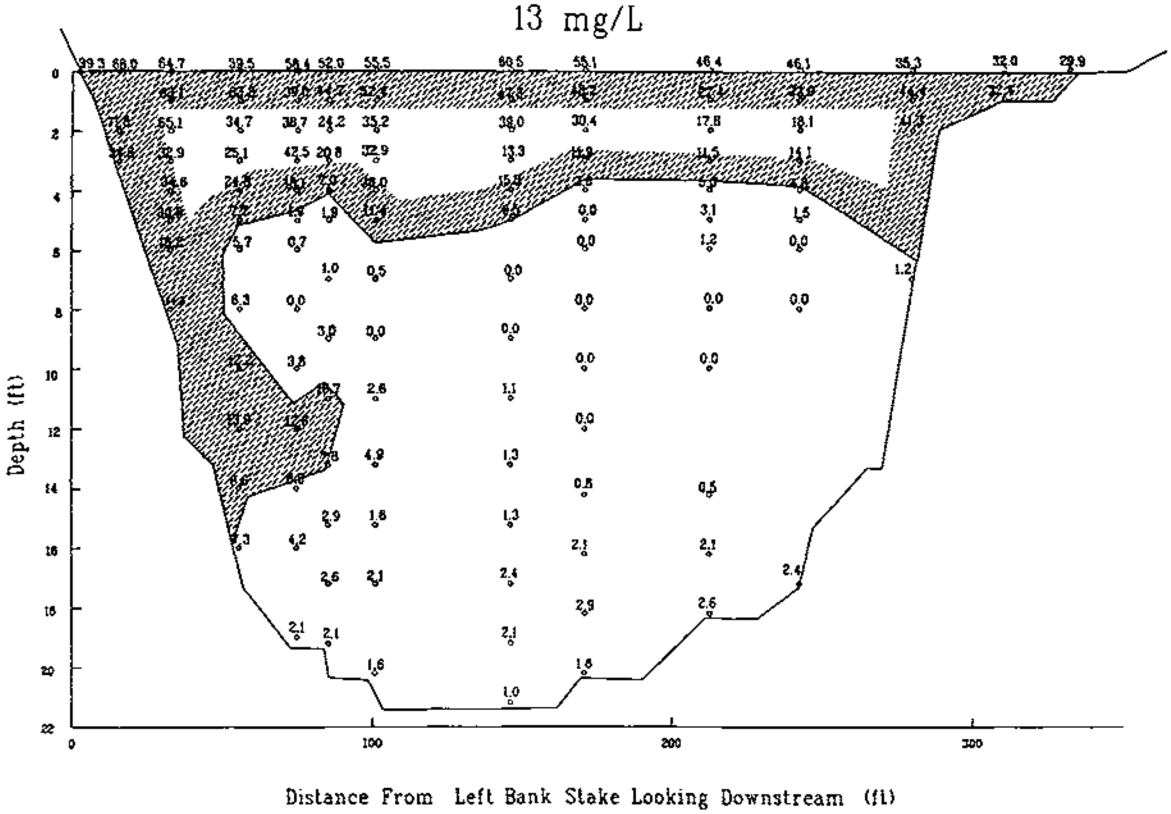

Outfall 8/10/94
7 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

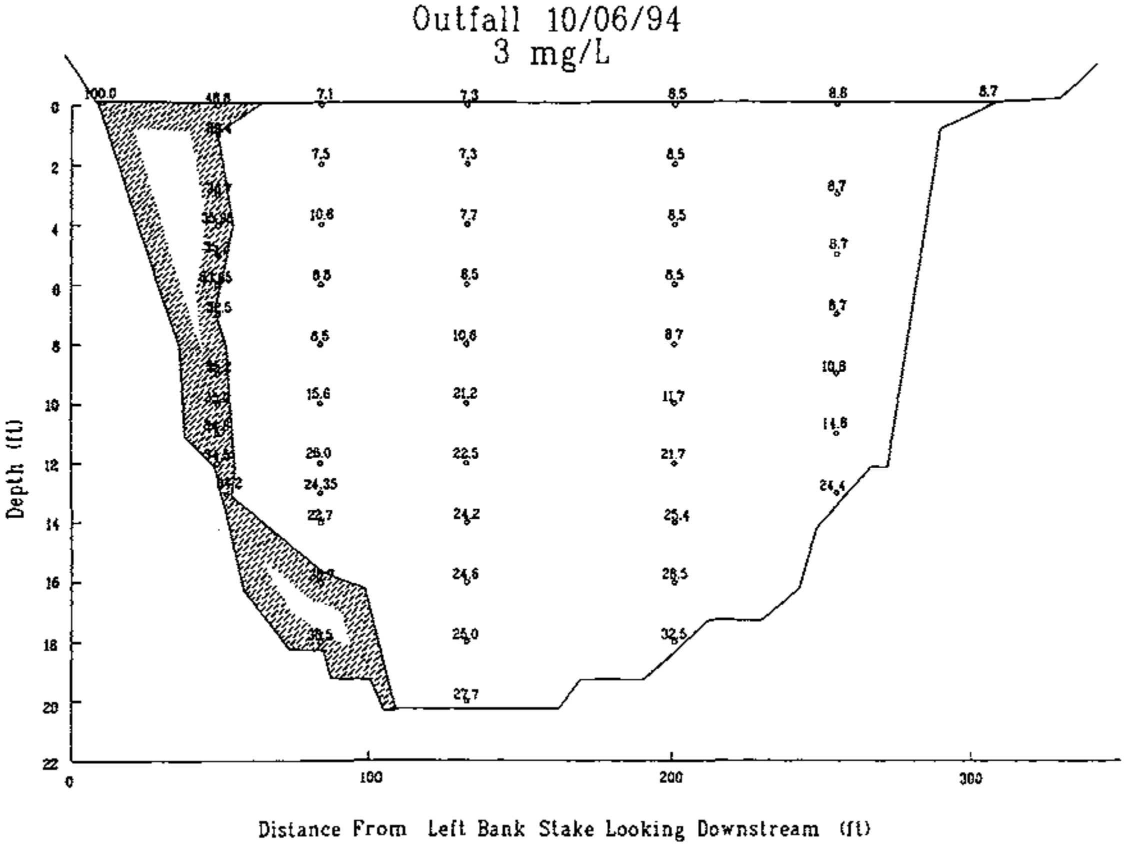

Outfall 8/10/94
8 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

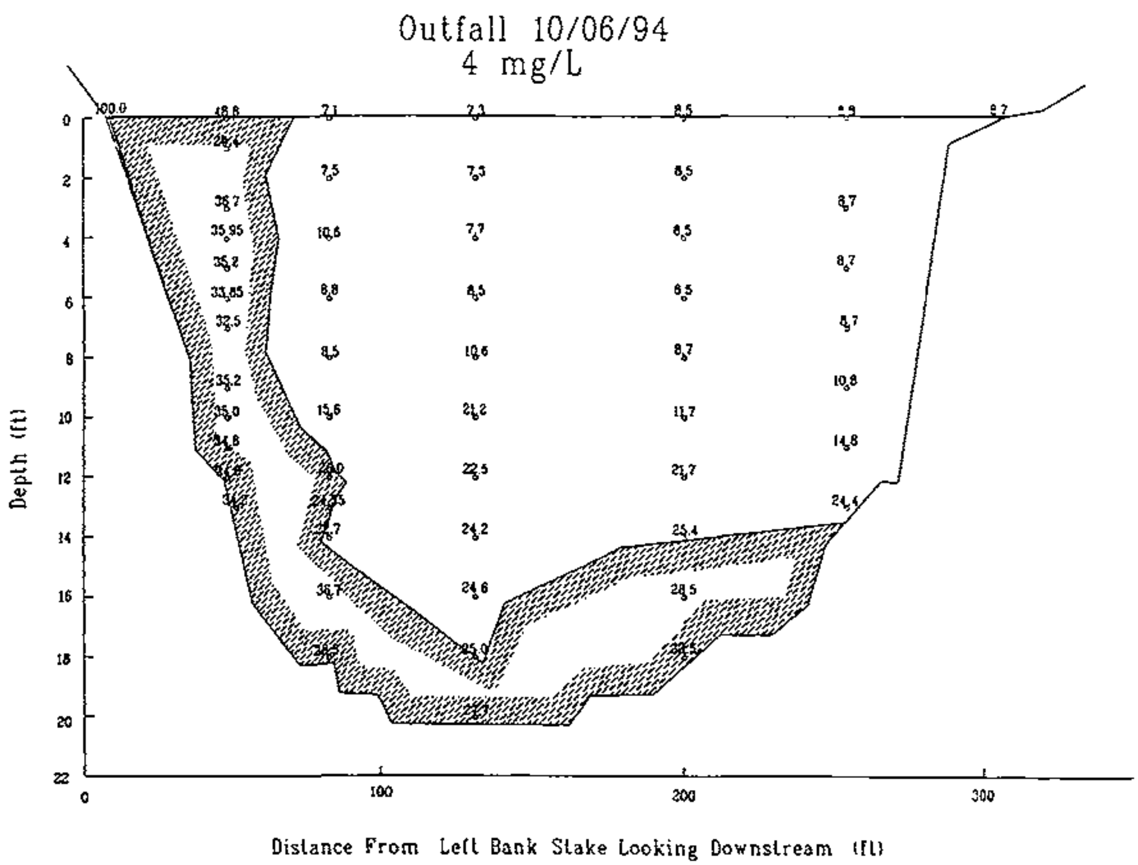

Outfall 8/10/94
9 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


Outfall 8/10/94
10 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

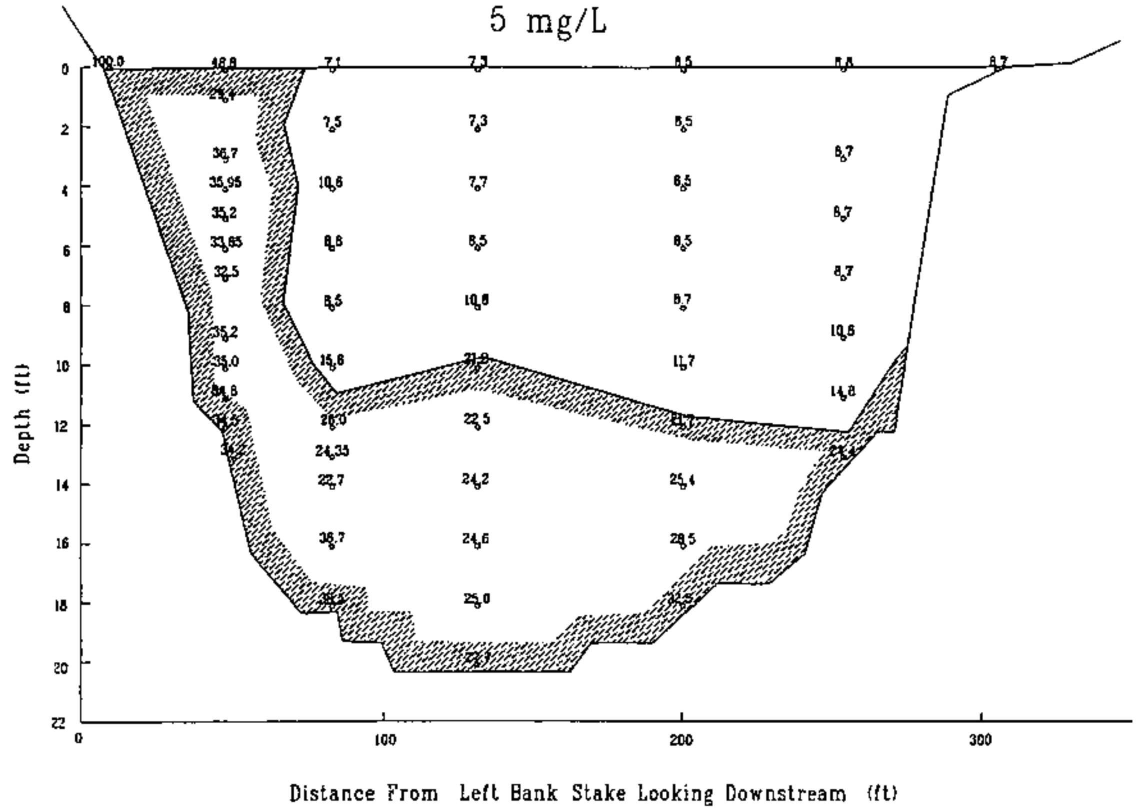
Outfall 8/10/94
13 mg/L



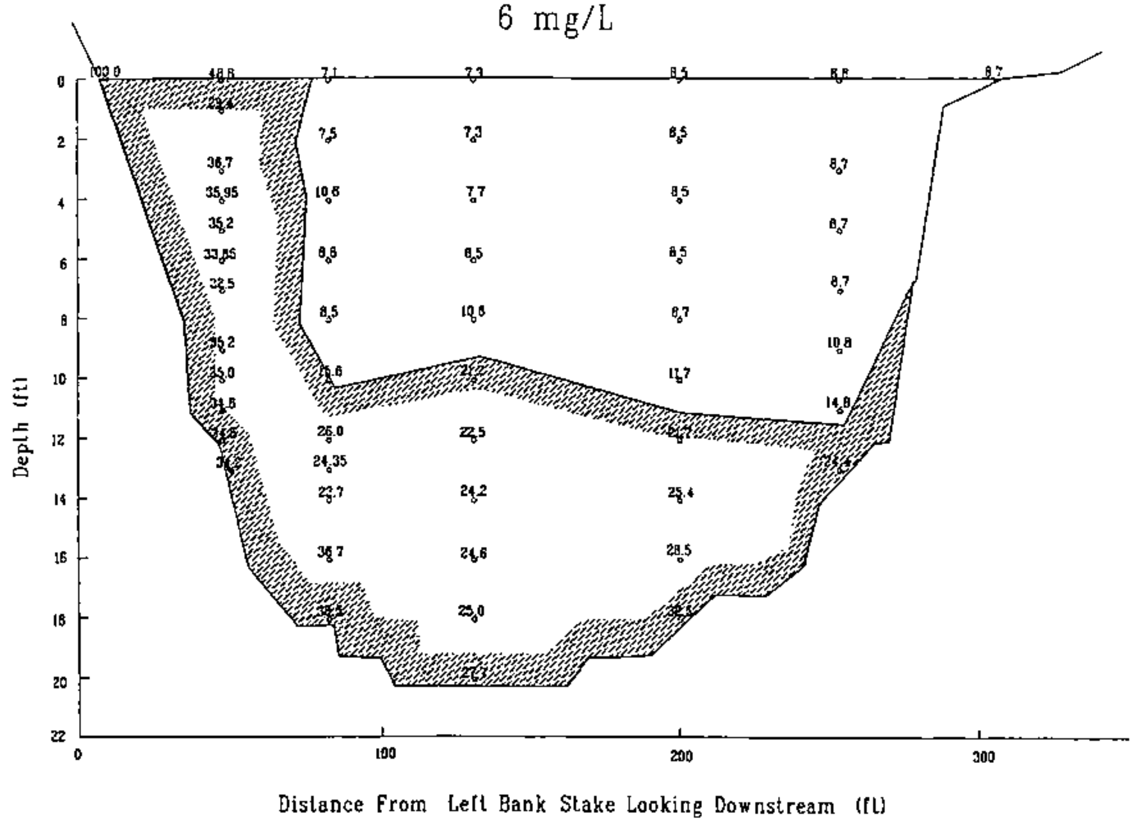

Outfall 10/06/94
3 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


Outfall 10/06/94
4 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

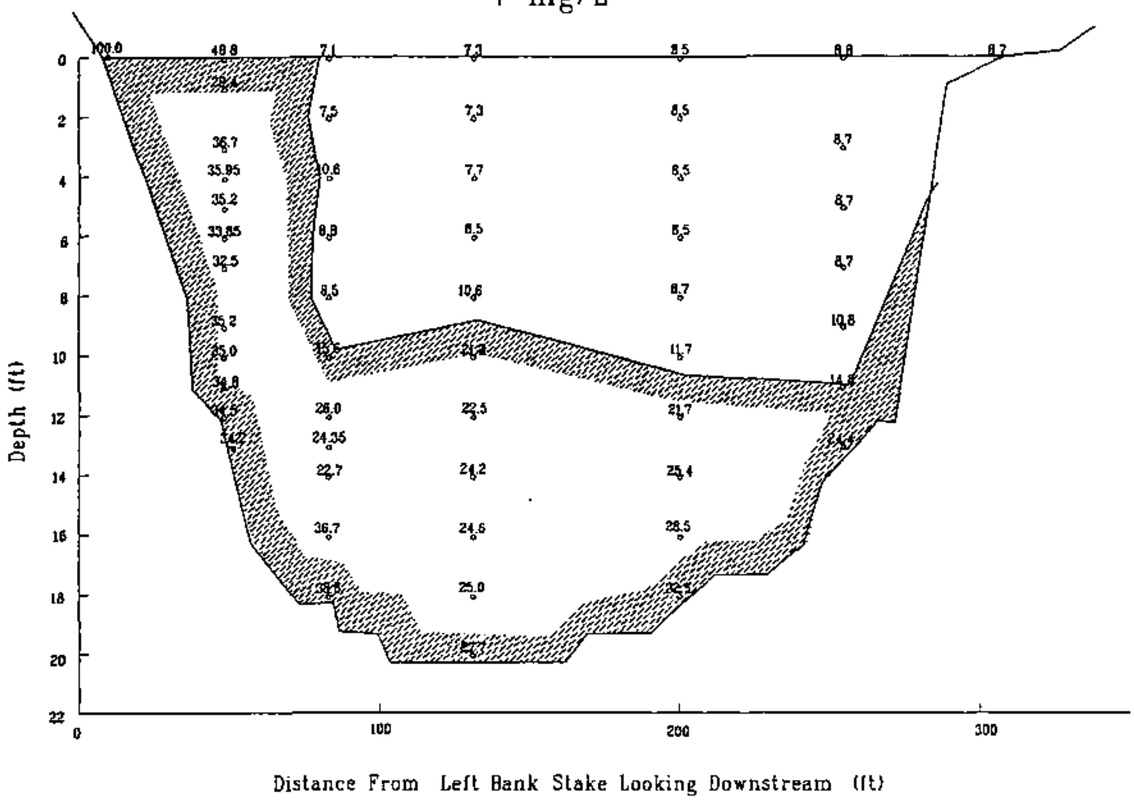
Outfall 10/06/94
5 mg/L



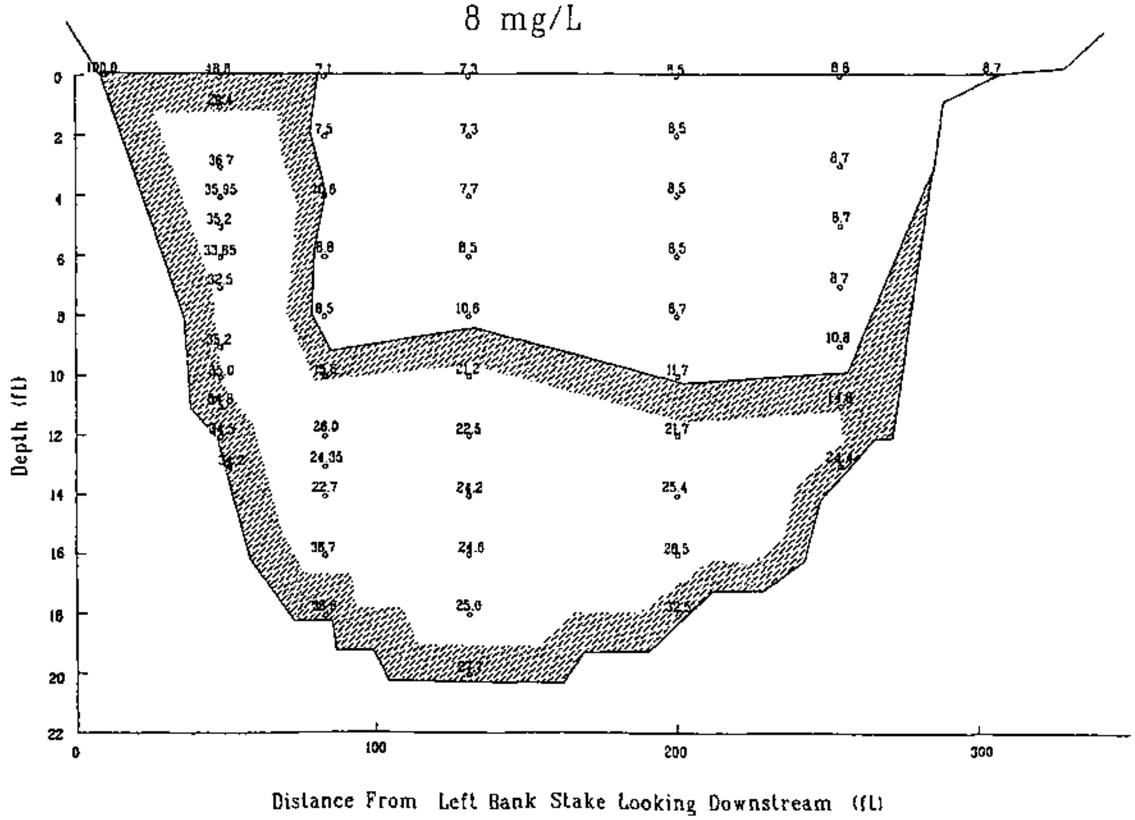
Outfall 10/06/94
6 mg/L

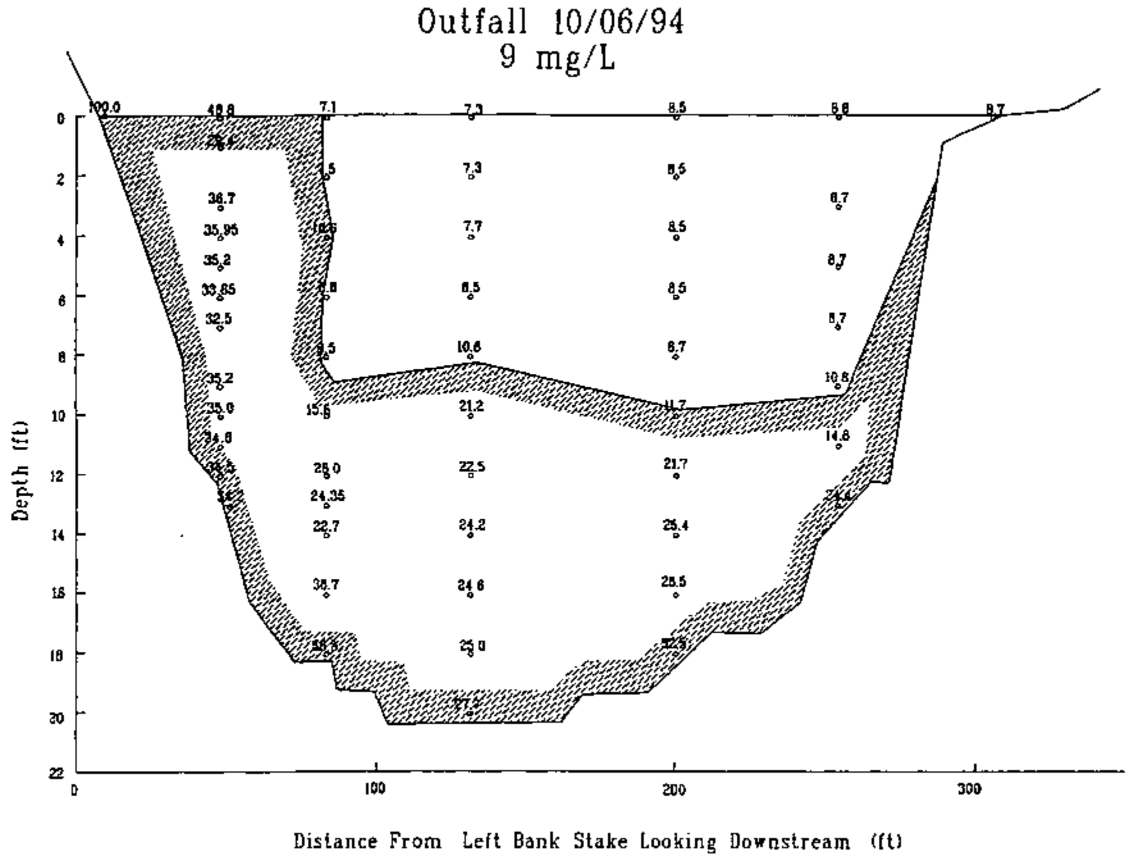


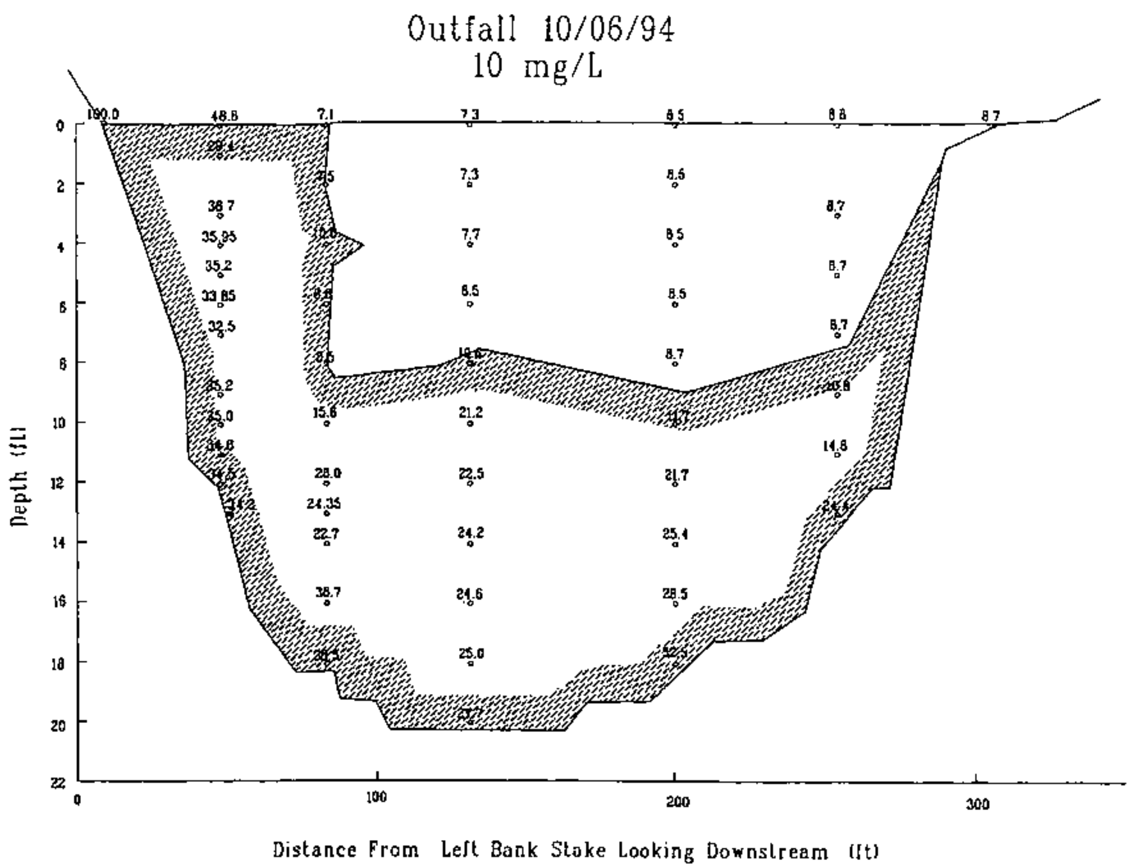
Outfall 10/06/94
7 mg/L

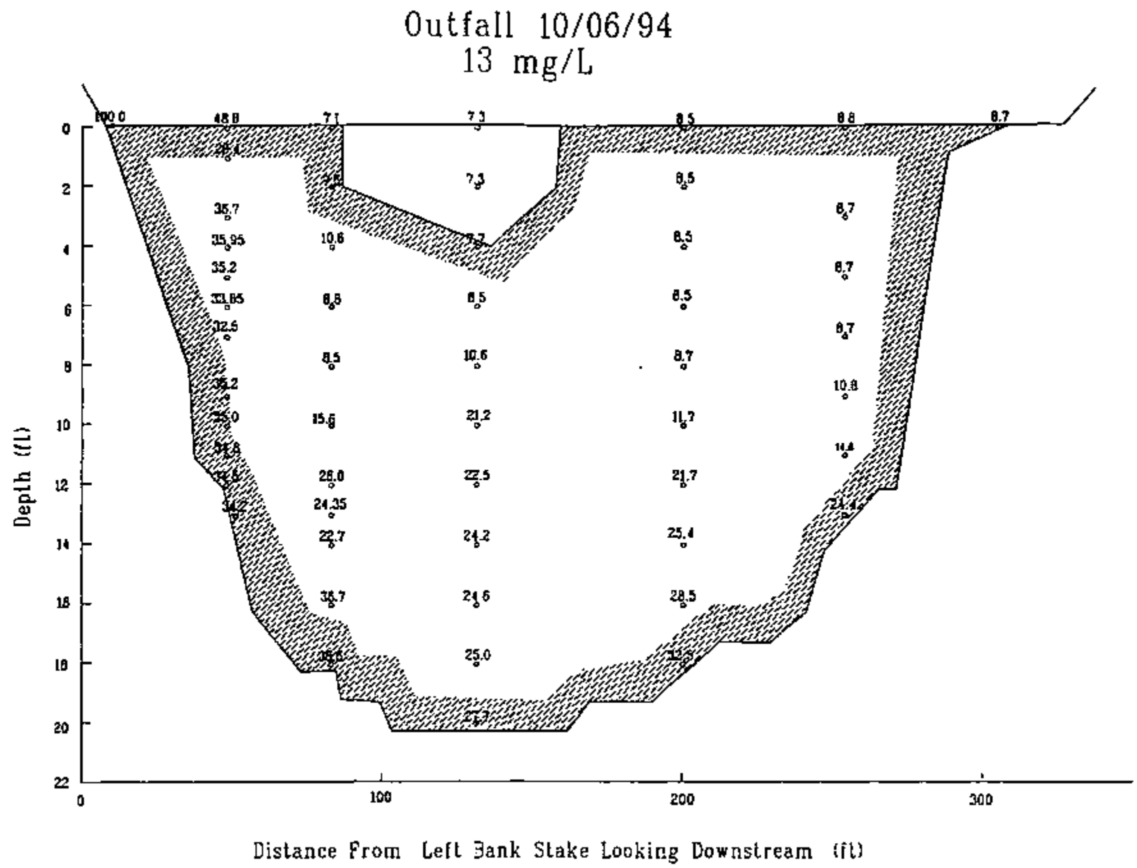


Outfall 10/06/94
8 mg/L

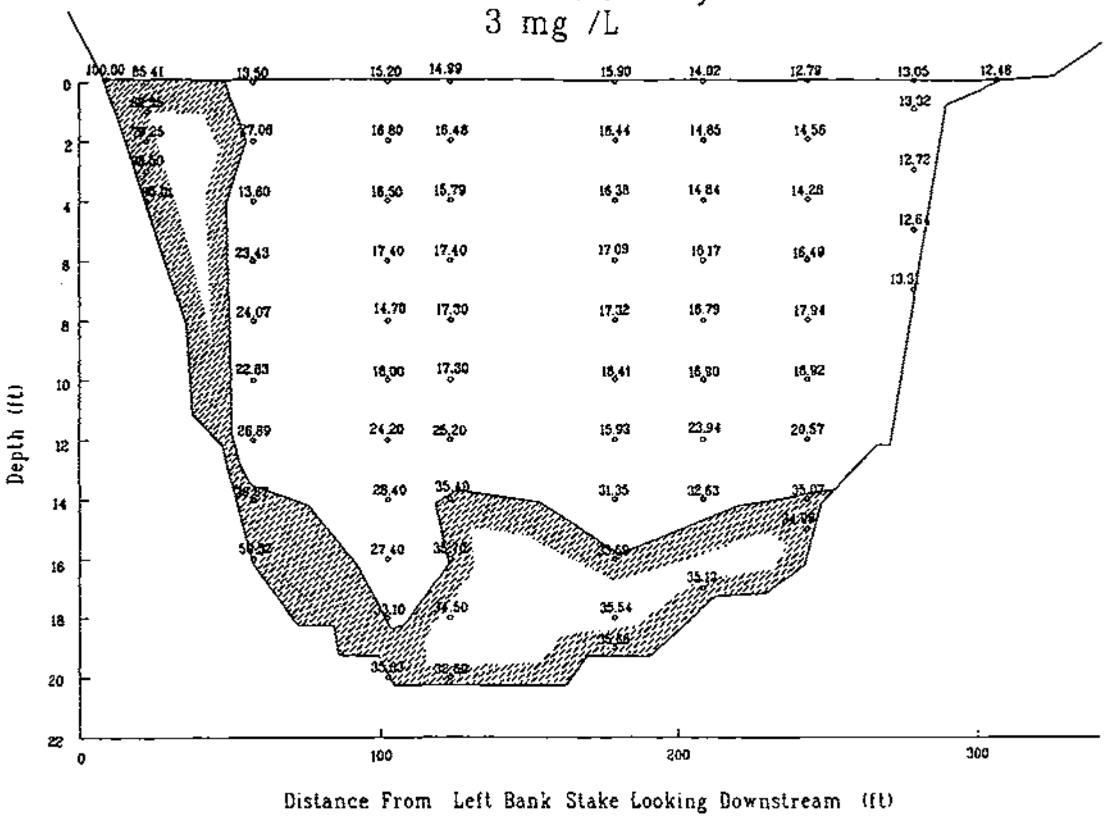



Outfall 10/06/94
9 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

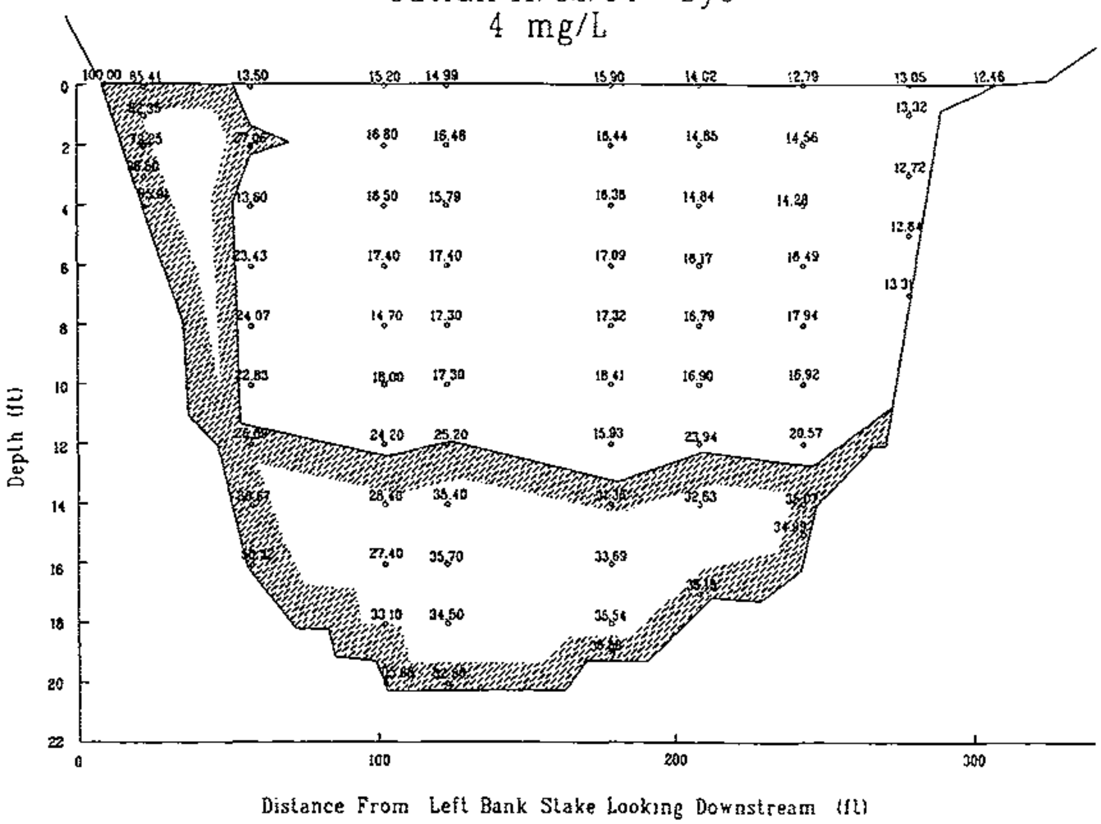

Outfall 10/06/94
10 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

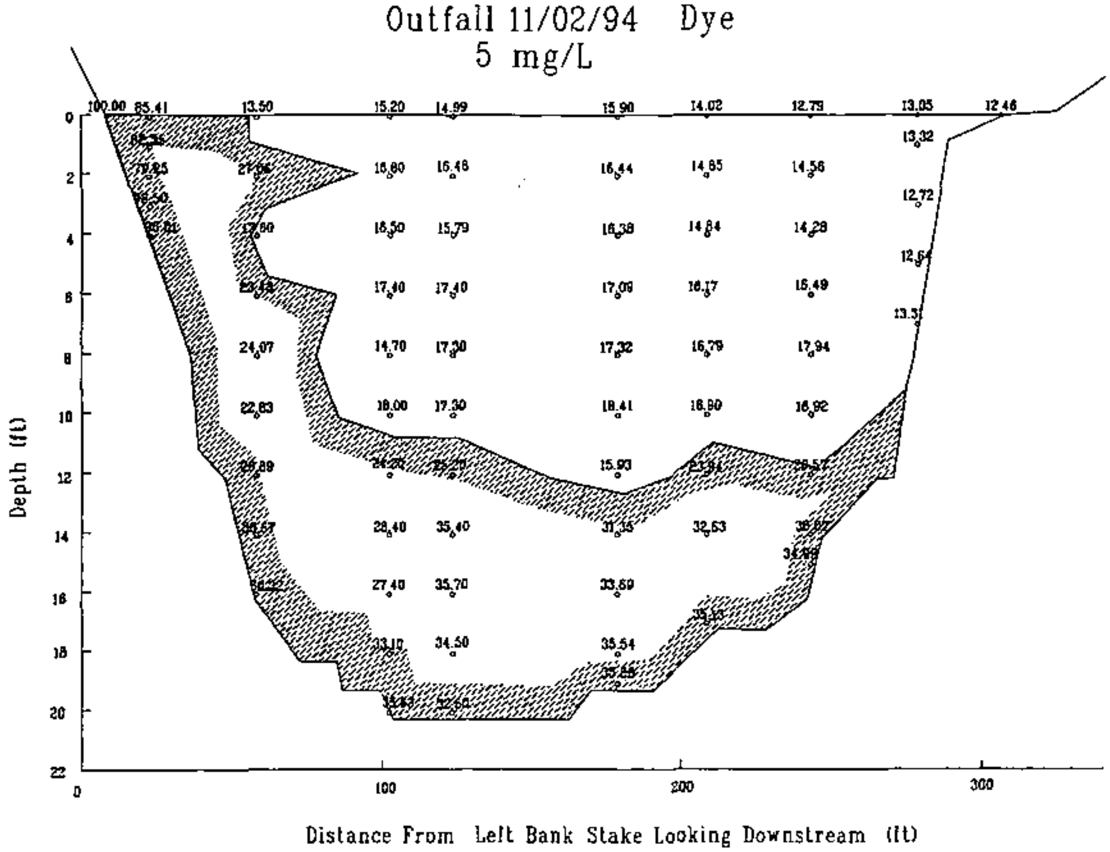

Outfall 10/06/94
13 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

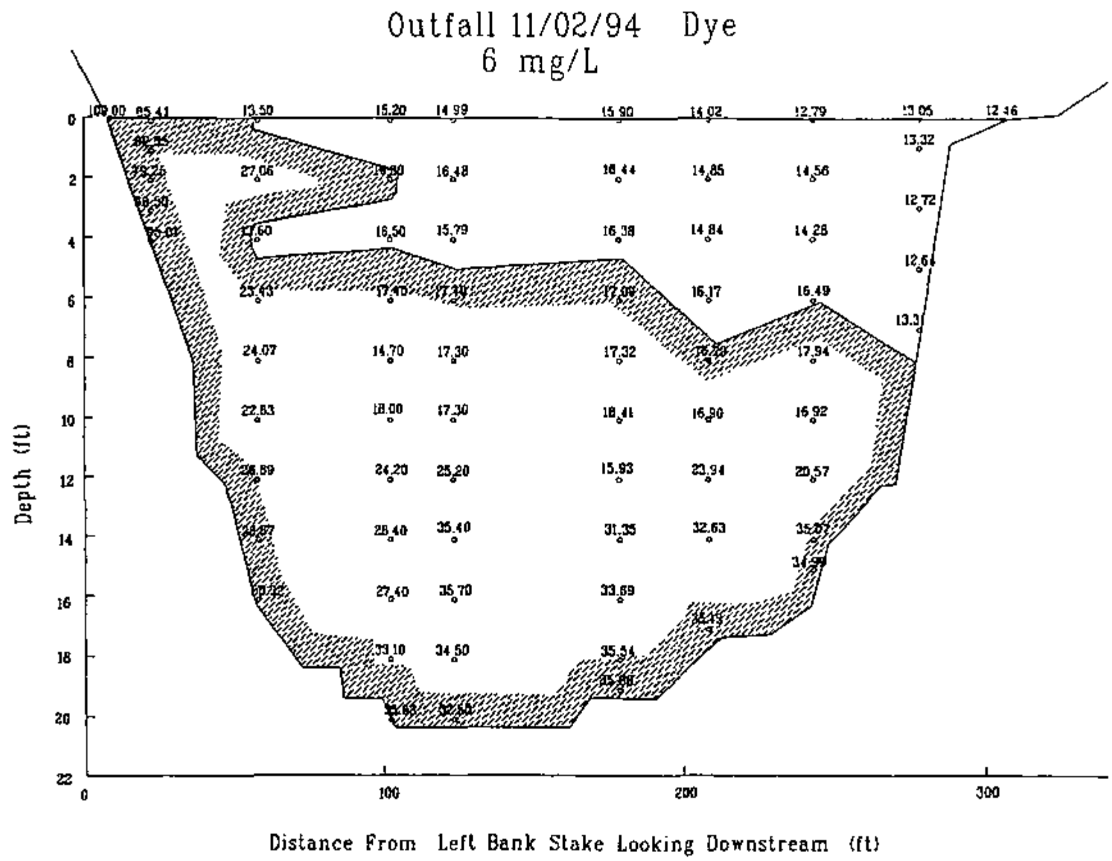
Outfall 11/02/94 Dye
3 mg /L

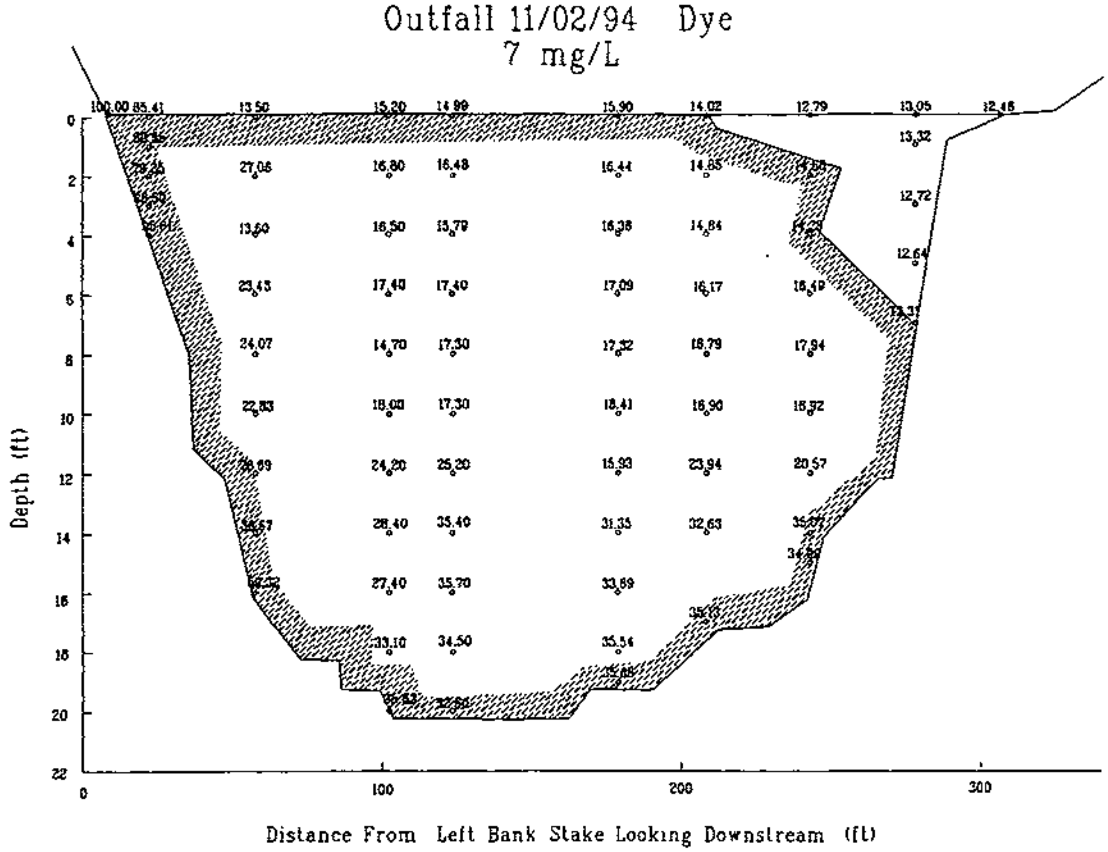


Outfall 11/02/94 Dye
4 mg/L

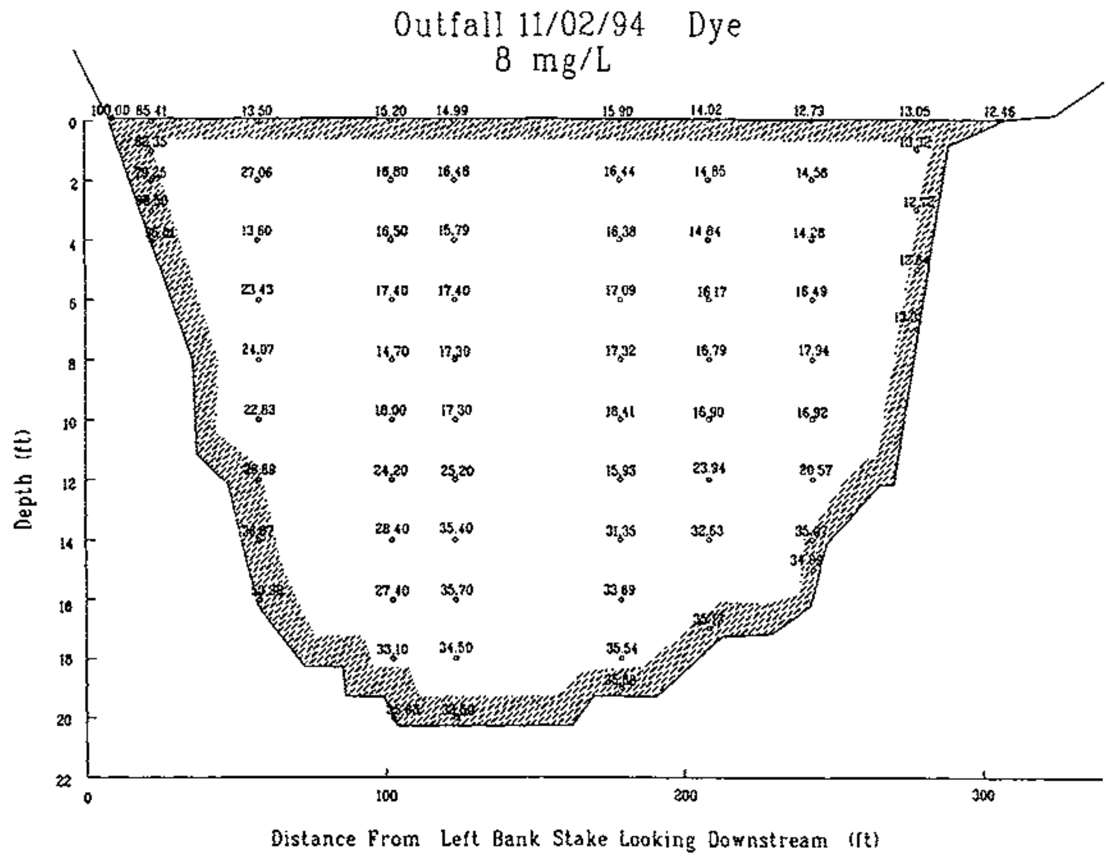



Outfall 11/02/94 Dye
5 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


Outfall 11/02/94 Dye
6 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)



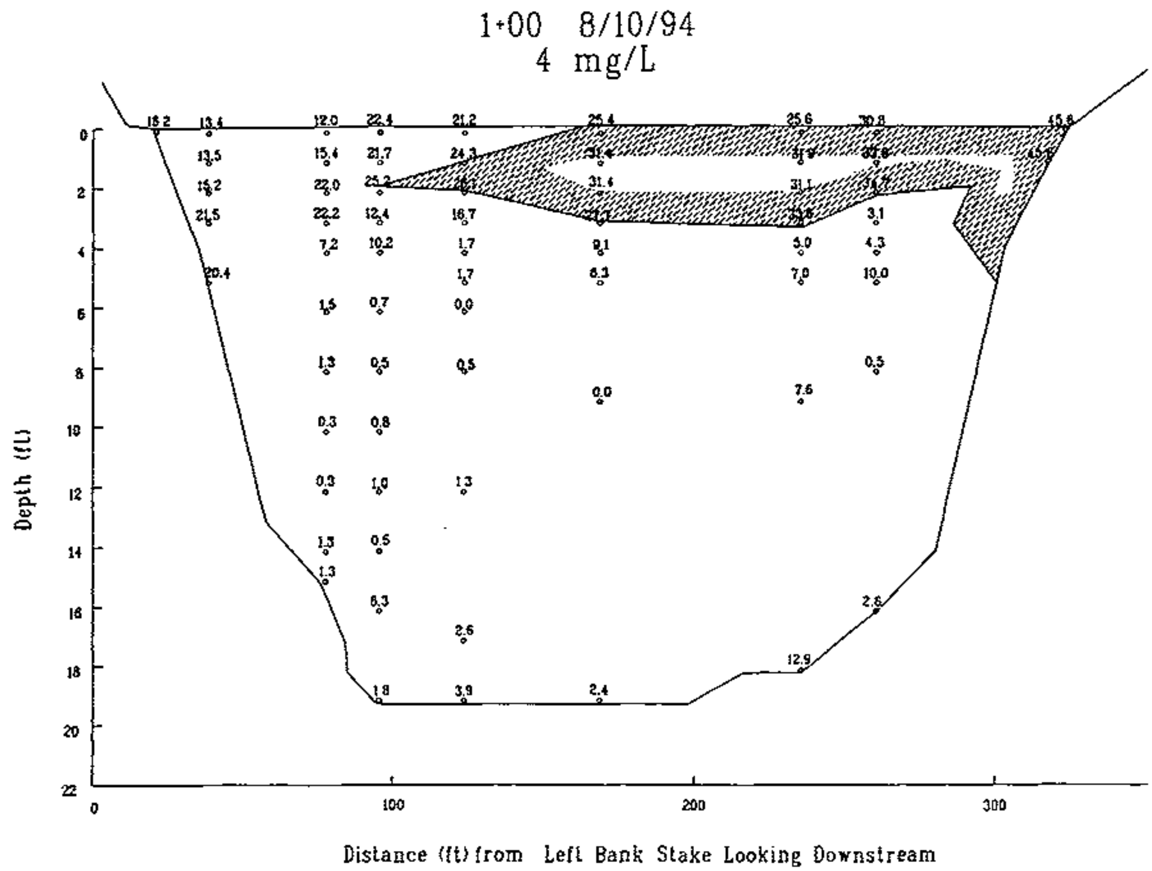
Outfall 11/02/94 Dye
7 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

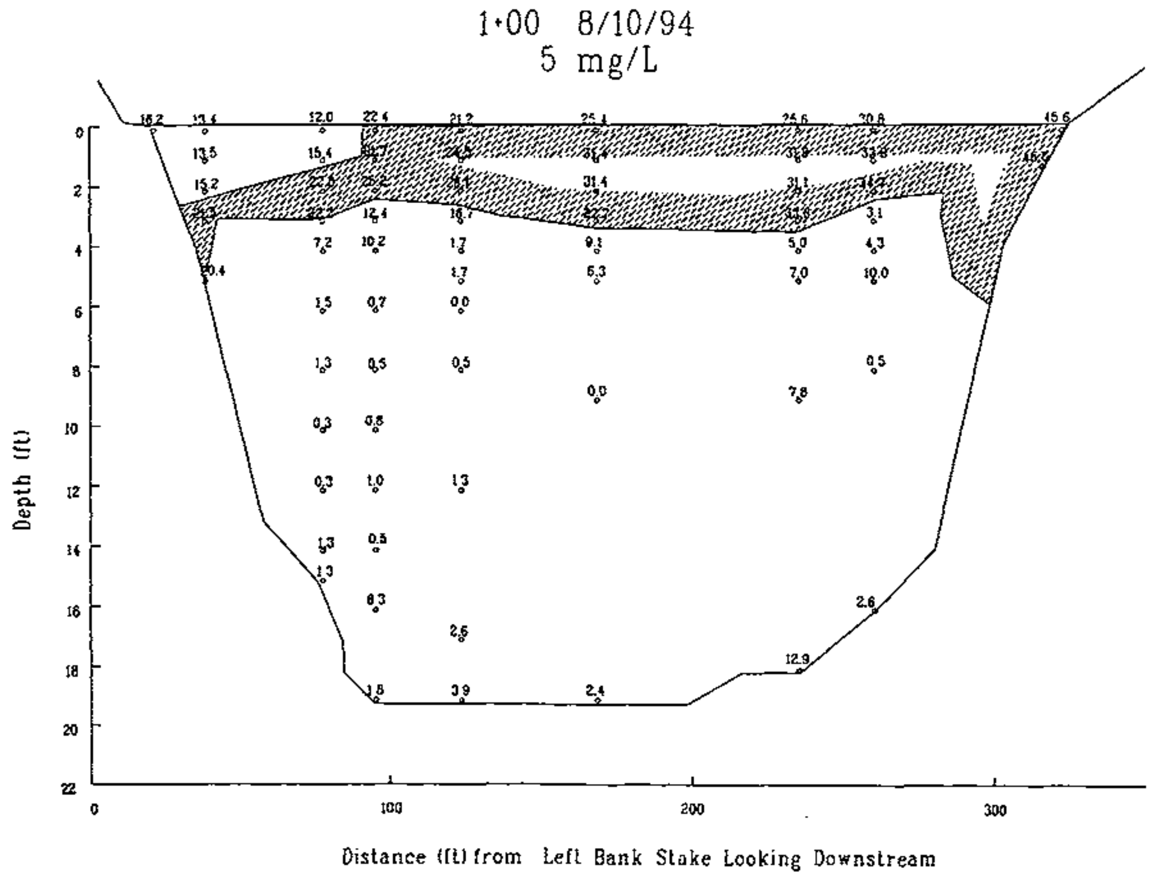


Outfall 11/02/94 Dye
8 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

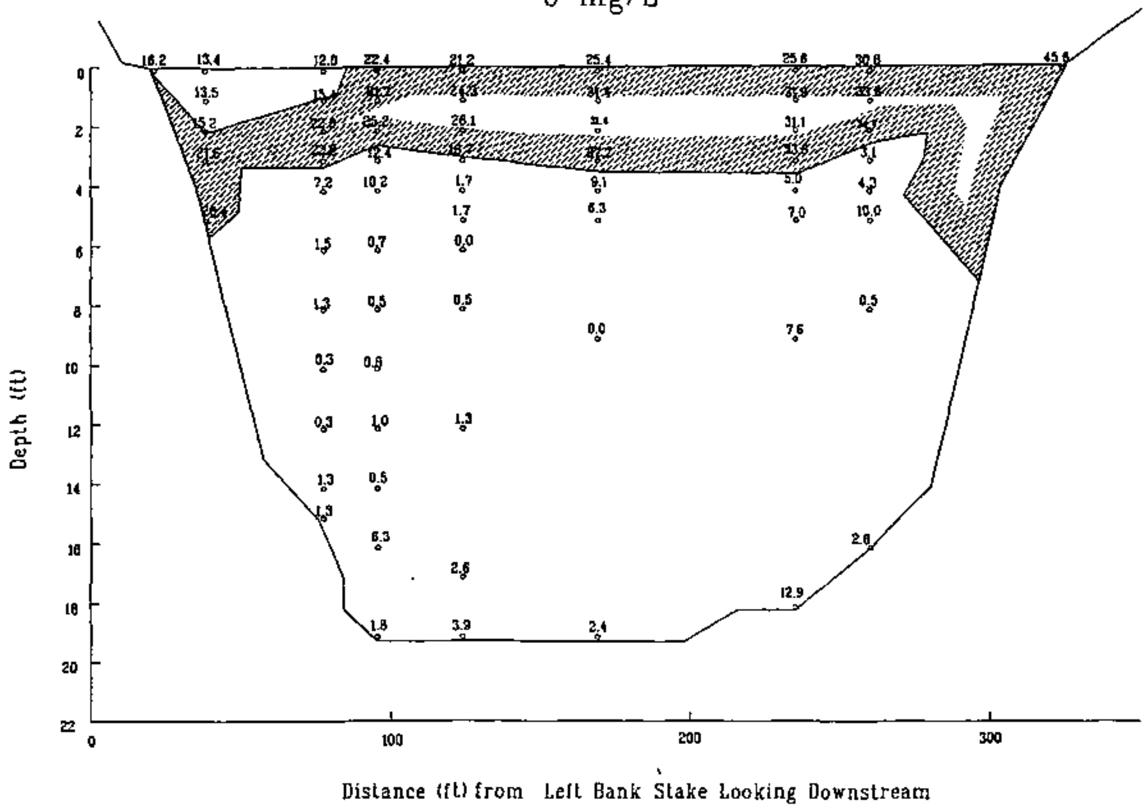
APPENDIX C3

Isoplethic Cross Sections for Station 1+00

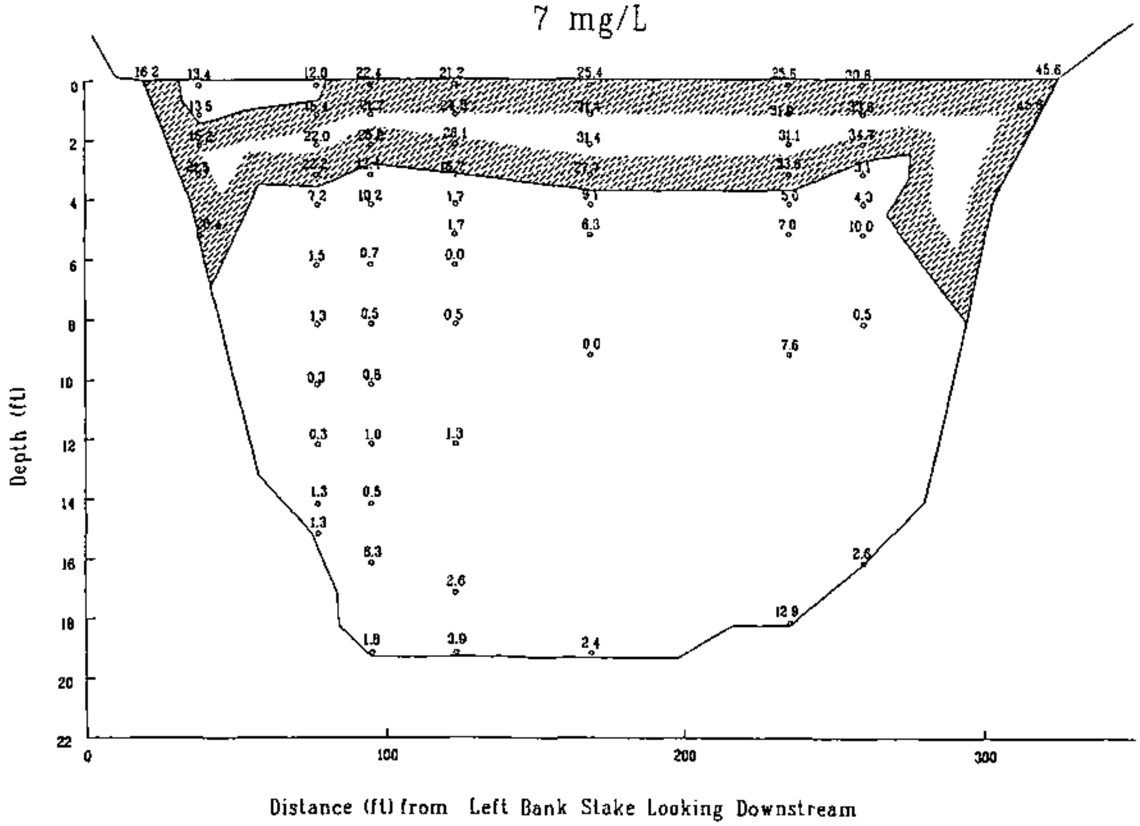

1+00 8/10/94
4 mg/L
Depth (ft)
Distance (ft) from Left Bank Stake Looking Downstream


1+00 8/10/94
5 mg/L
Depth (ft)
Distance (ft) from Left Bank Stake Looking Downstream

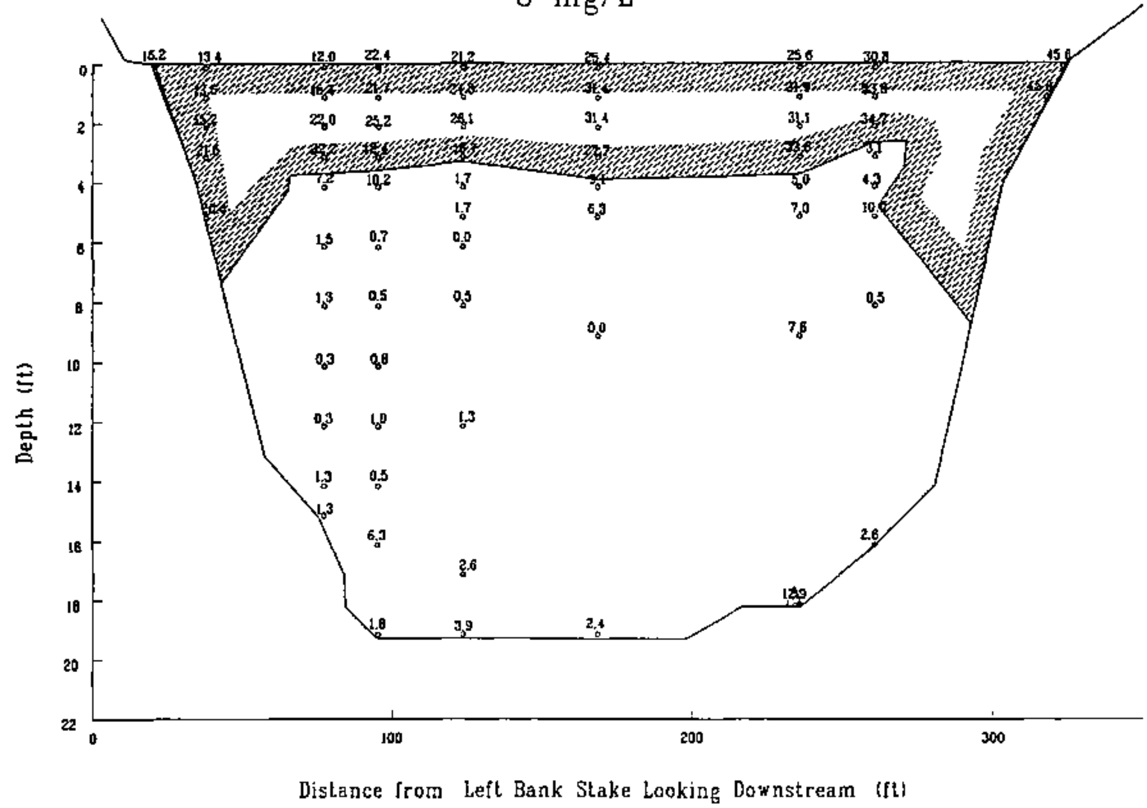
1+00 8/10/94
6 mg/L



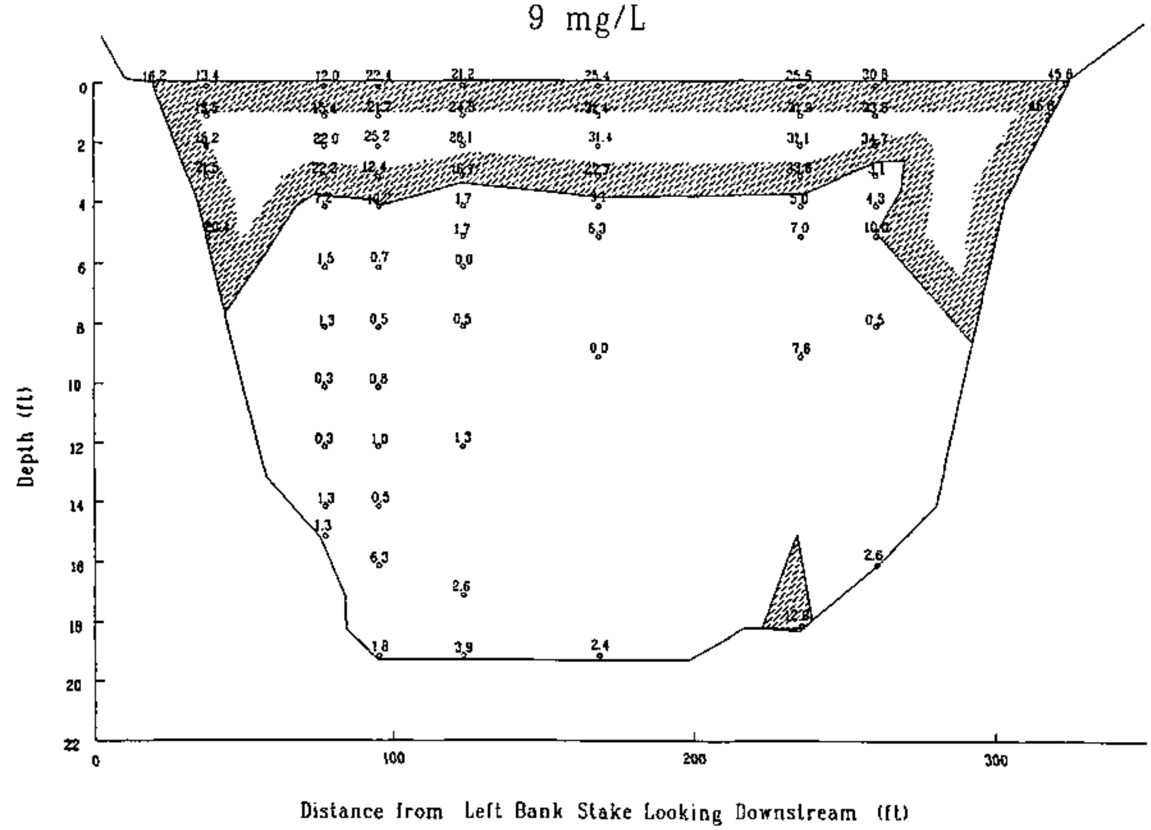
1+00 8/10/94
7 mg/L

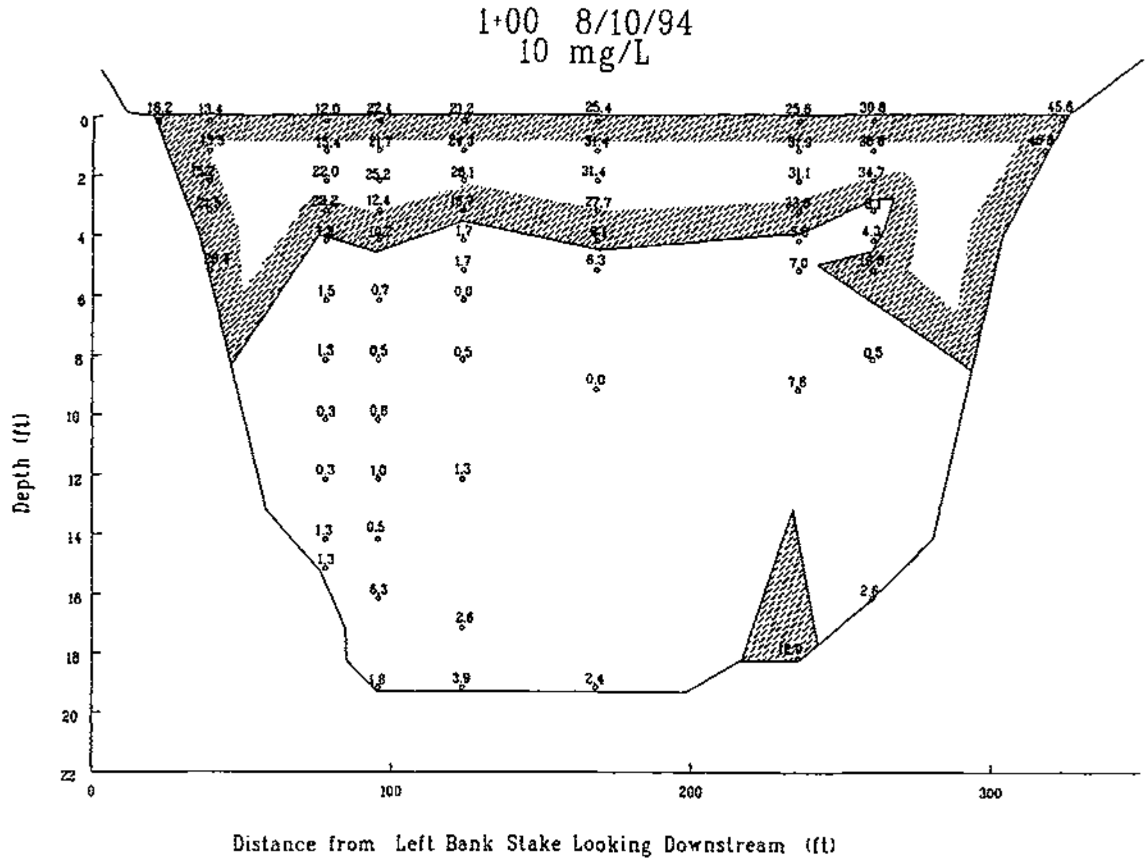


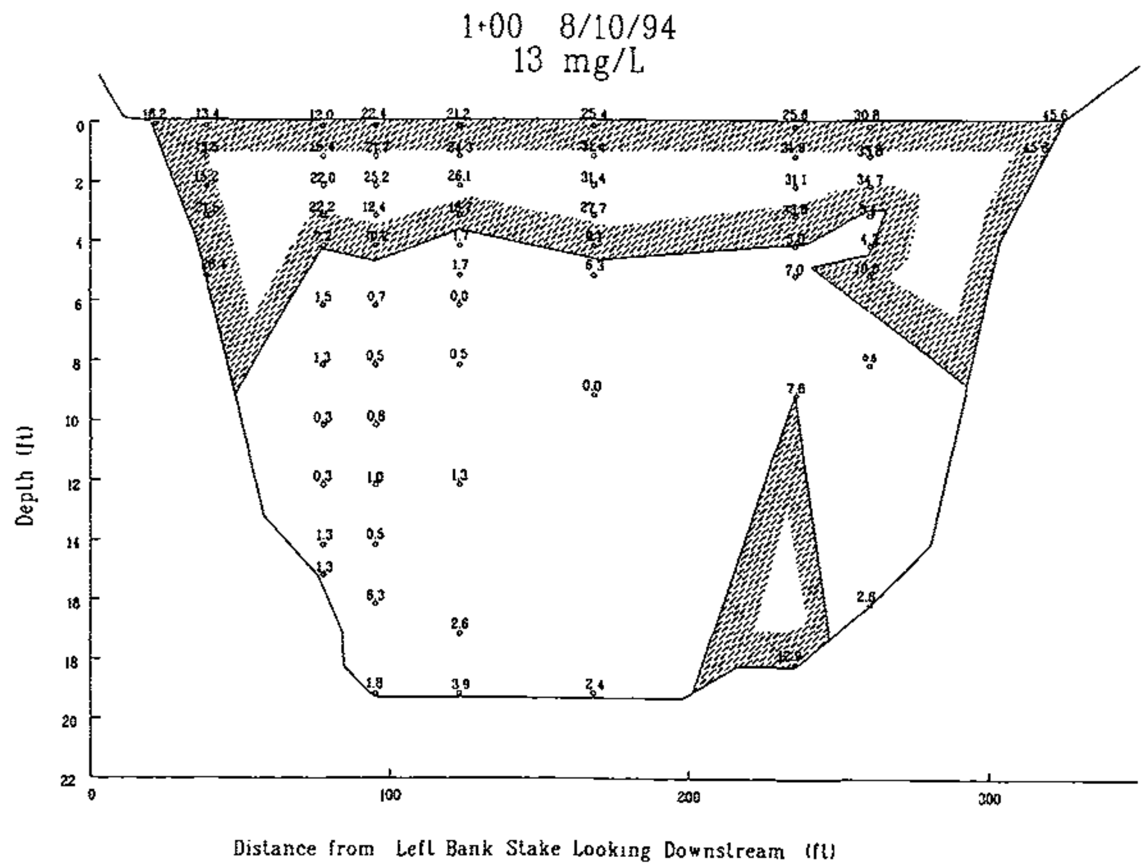
1+00 8/10/94
8 mg/L



1+00 8/10/94
9 mg/L

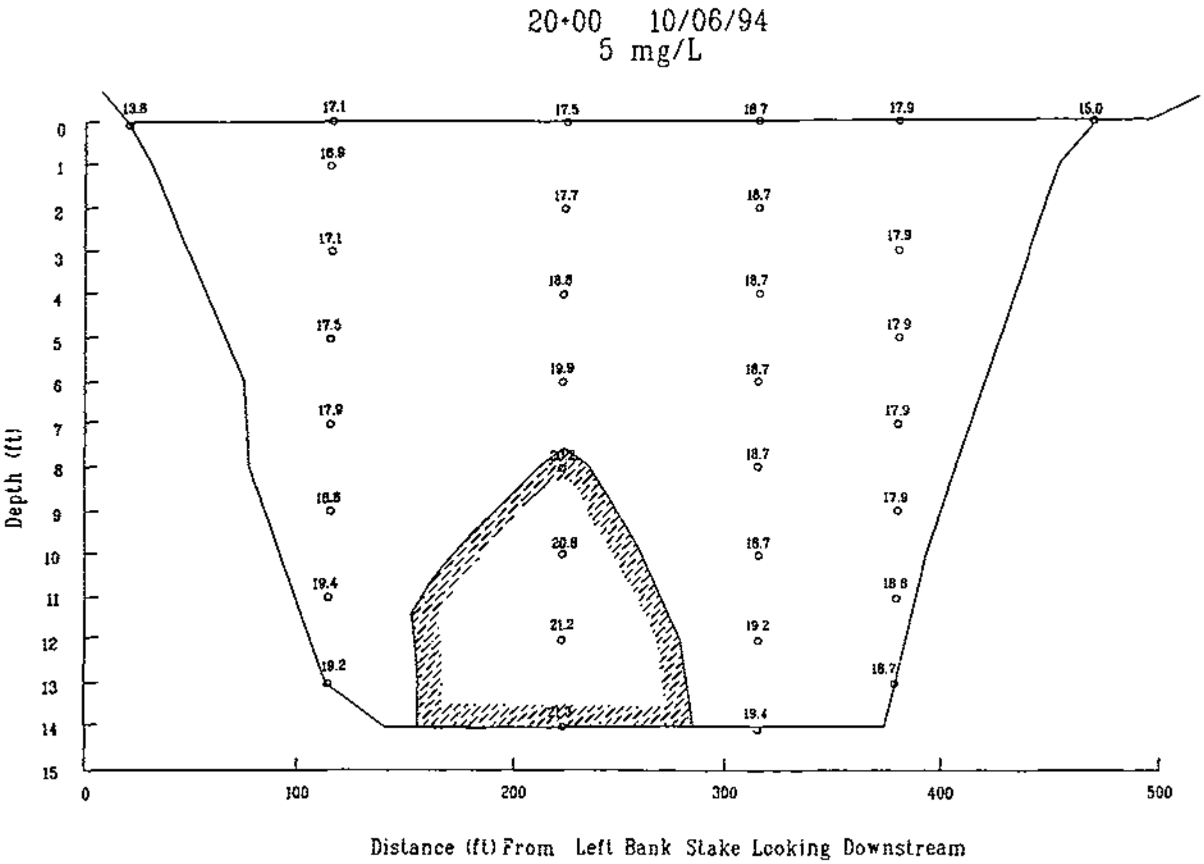


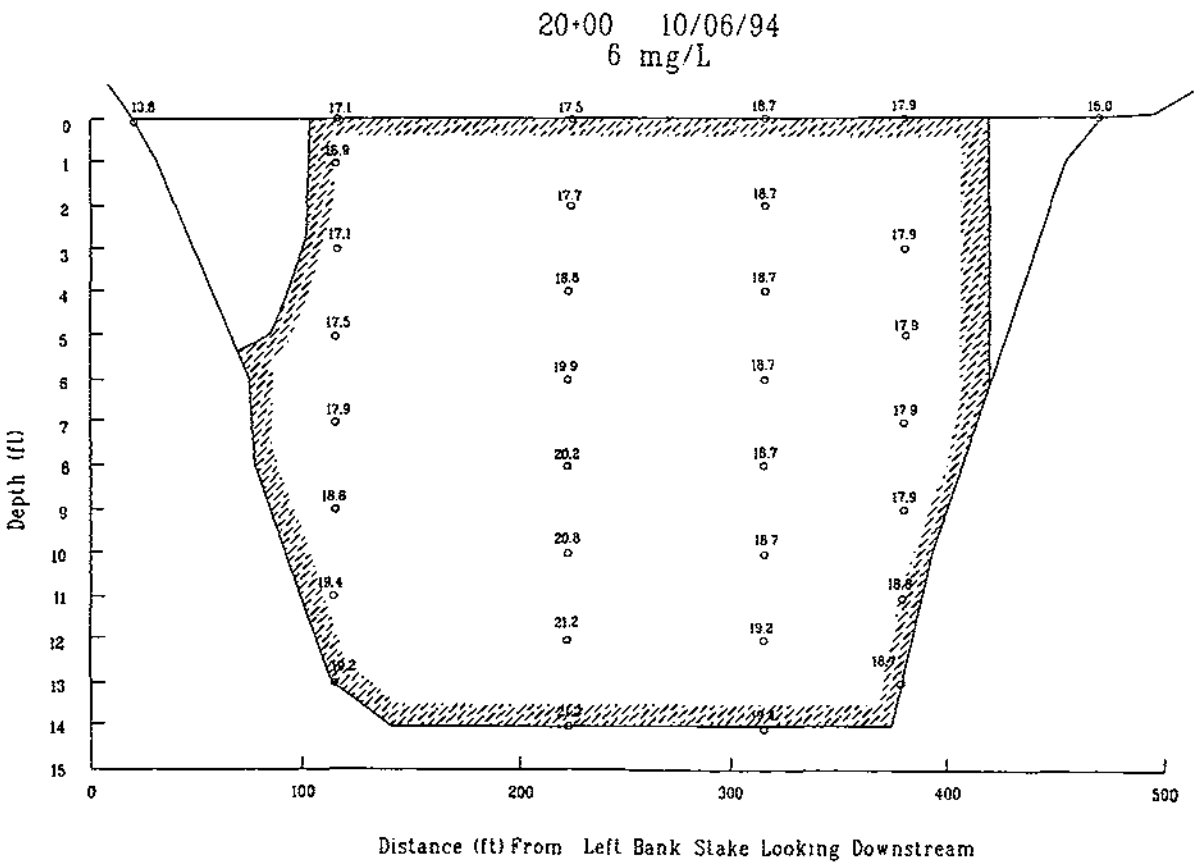

1+00 8/10/94
10 mg/L
Depth (ft)
Distance from Left Bank Stake Looking Downstream (ft)

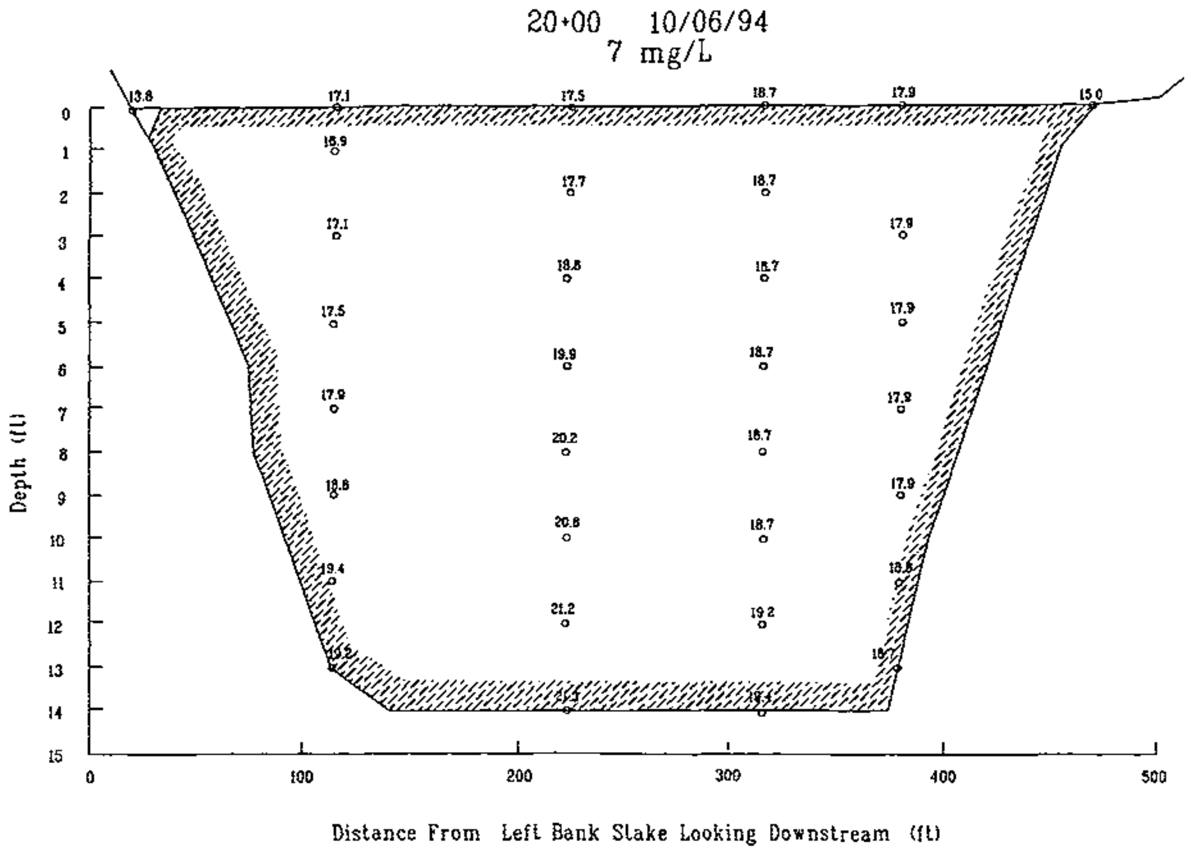

1+00 8/10/94
13 mg/L
Depth (ft)
Distance from Left Bank Stake Looking Downstream (ft)

APPENDIX C4

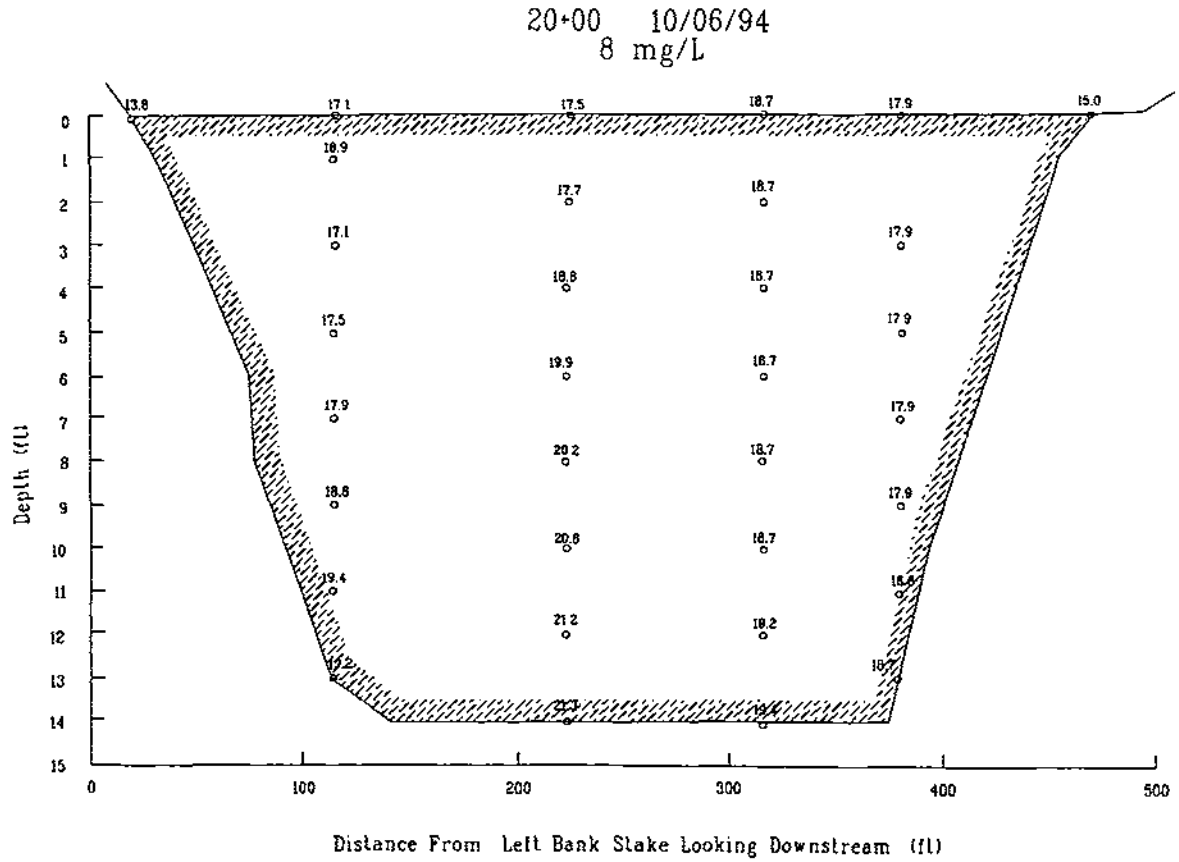
Isoplethic Cross Sections for Station 20+00


20+00 10/06/94
5 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream


20+00 10/06/94
6 mg/L
Depth (ft)
Distance (ft) From Left Bank Stake Looking Downstream

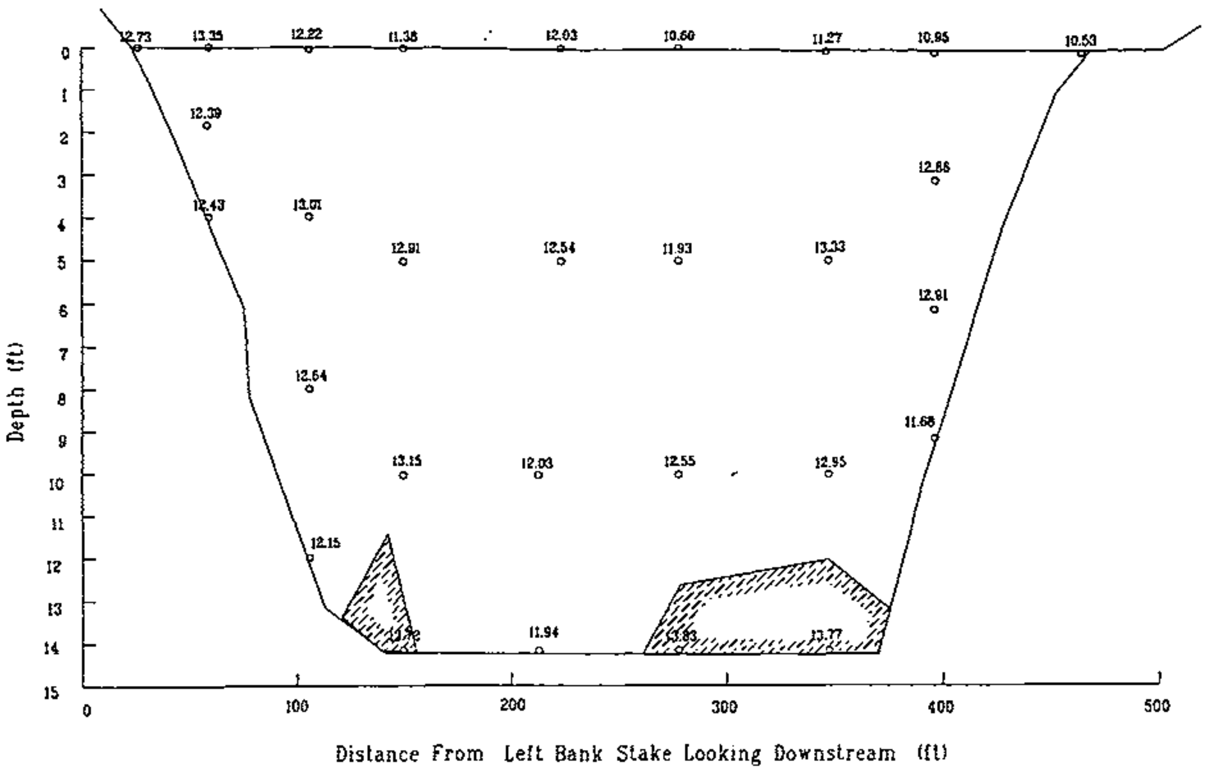


20+00 10/06/94
7 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

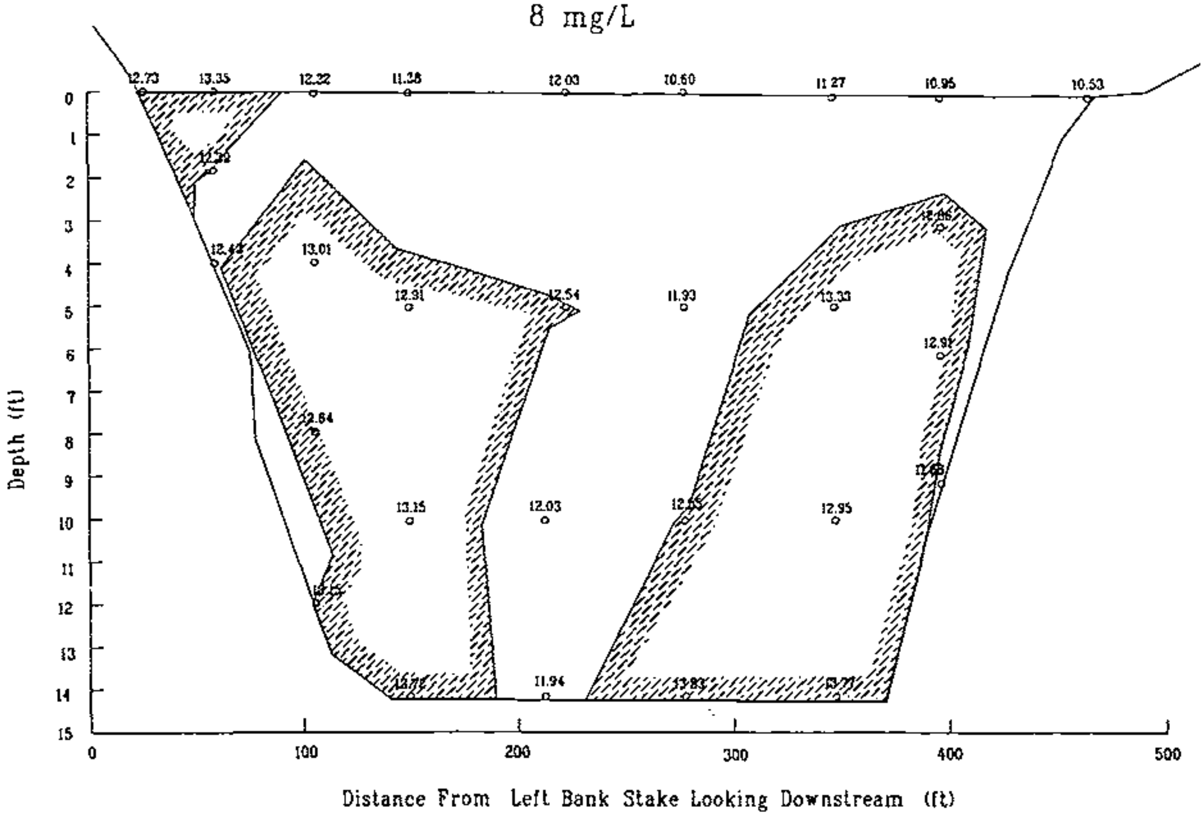


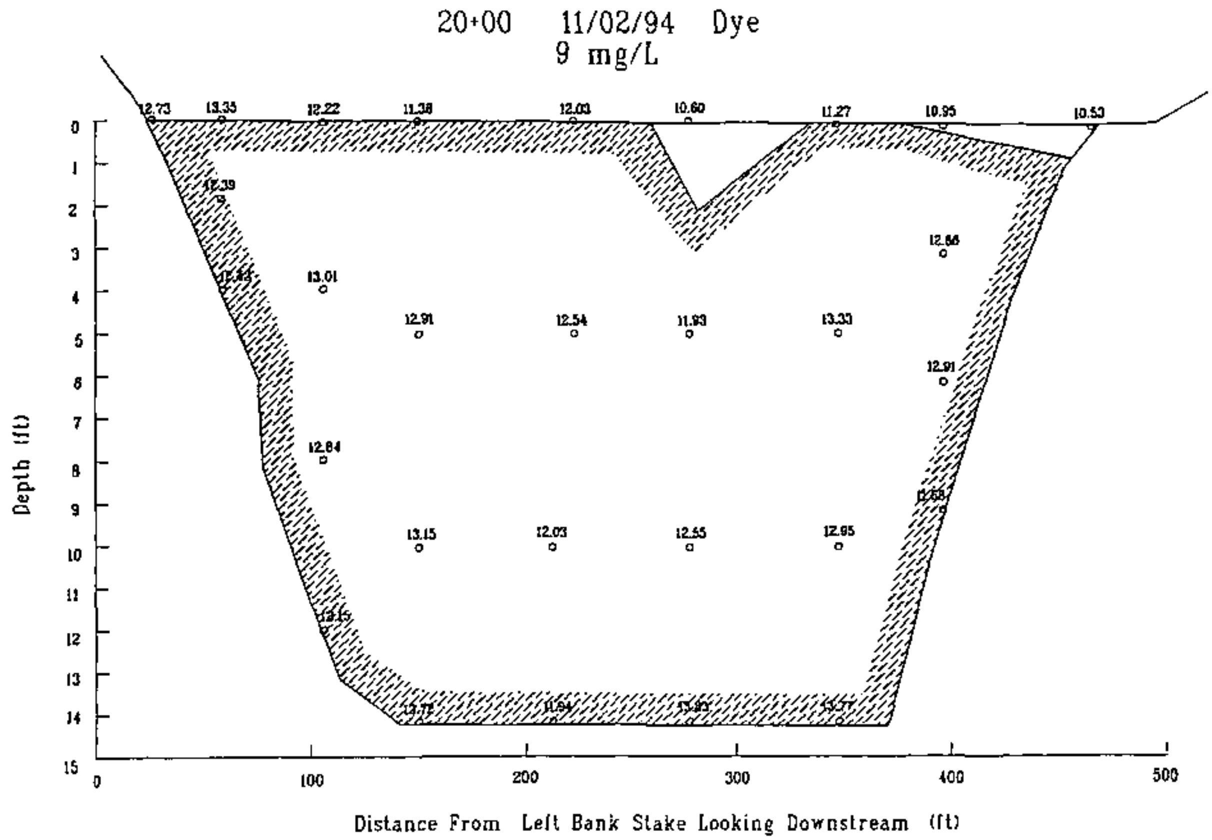
20+00 10/06/94
8 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

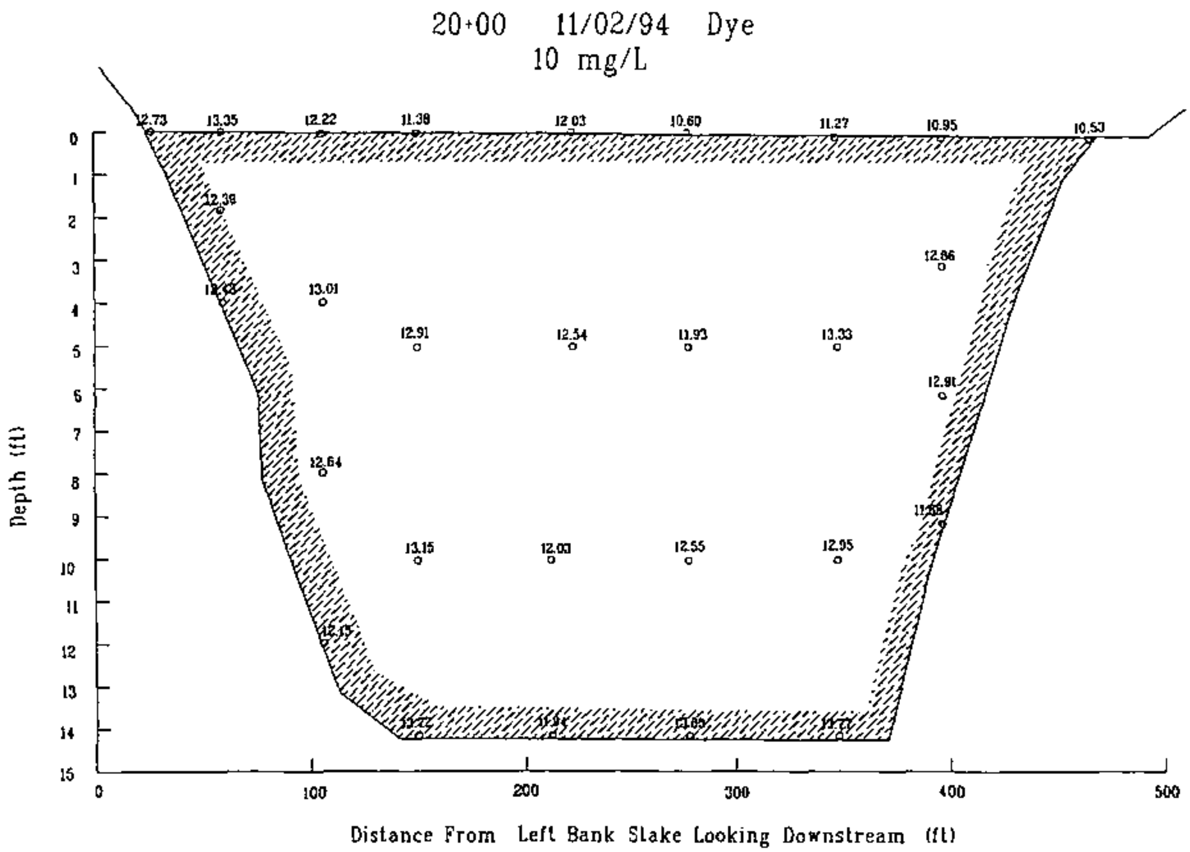
20+00 11/02/94 Dye
7.5 mg/L



20+00 11/02/94 Dye
8 mg/L




20+00 11/02/94 Dye
9 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)


20+00 11/02/94 Dye
10 mg/L
Depth (ft)
Distance From Left Bank Stake Looking Downstream (ft)

APPENDIX D

Baldwin Power Station

Computed, completely mixed downstream Kaskaskia River
boron concentrations in mg/L for an upstream
background B concentration of 0.2 mg/L

By Tom Davis, Illinois Power Company

B-conc (mg/L)	Effluent Flow cfs	Effluent Flow mgd	Upstream Kaskaskia River Flows (cfs) 80.0	85.0	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
4.0	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.55	1.00	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25	0.25	0.25	0.24
	3.09	2.00	0.34	0.33	0.33	0.32	0.31	0.31	0.30	0.30	0.30	0.29	0.29
	4.64	3.00	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.35	0.34	0.34	0.33
	6.19	4.00	0.47	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.39	0.38	0.37
	7.74	5.00	0.54	0.52	0.50	0.49	0.47	0.46	0.45	0.44	0.43	0.42	0.41
	9.28	6.00	0.60	0.57	0.56	0.54	0.52	0.51	0.50	0.48	0.47	0.46	0.45
	10.83	7.00	0.65	0.63	0.61	0.59	0.57	0.56	0.54	0.53	0.51	0.50	0.49
	12.38	8.00	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.57	0.56	0.54	0.53
	13.93	9.00	0.76	0.73	0.71	0.69	0.66	0.64	0.63	0.61	0.60	0.58	0.57
	15.47	10.00	0.82	0.79	0.76	0.73	0.71	0.69	0.67	0.65	0.63	0.62	0.60
	17.02	11.00	0.87	0.83	0.80	0.78	0.75	0.73	0.71	0.69	0.67	0.66	0.64
	18.57	12.00	0.92	0.88	0.85	0.82	0.80	0.77	0.75	0.73	0.71	0.69	0.67
	20.11	13.00	0.96	0.93	0.89	0.86	0.84	0.81	0.79	0.77	0.75	0.73	0.71
	21.66	14.00	1.01	0.97	0.94	0.91	0.88	0.85	0.83	0.80	0.78	0.76	0.74
	23.21	15.00	1.05	1.02	0.98	0.95	0.92	0.89	0.86	0.84	0.82	0.80	0.78
	24.76	16.00	1.10	1.06	1.02	0.99	0.95	0.92	0.90	0.87	0.85	0.83	0.81
	26.30	17.00	1.14	1.10	1.06	1.02	0.99	0.96	0.93	0.91	0.88	0.86	0.84
	27.85	18.00	1.18	1.14	1.10	1.06	1.03	1.00	0.97	0.94	0.92	0.89	0.87
	29.40	19.00	1.22	1.18	1.14	1.10	1.06	1.03	1.00	0.97	0.95	0.92	0.90
	30.95	20.00	1.26	1.21	1.17	1.13	1.10	1.06	1.03	1.01	0.98	0.95	0.93
	32.49	21.00	1.30	1.25	1.21	1.17	1.13	1.10	1.07	1.04	1.01	0.98	0.96
	34.04	22.00	1.33	1.29	1.24	1.20	1.17	1.13	1.10	1.07	1.04	1.01	0.99
	35.59	23.00	1.37	1.32	1.28	1.24	1.20	1.16	1.13	1.10	1.07	1.04	1.02
	37.13	24.00	1.40	1.36	1.31	1.27	1.23	1.19	1.16	1.13	1.10	1.07	1.04
	38.68	25.00	1.44	1.39	1.34	1.30	1.26	1.22	1.19	1.16	1.13	1.10	1.07
6.0	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.55	1.00	0.31	0.30	0.30	0.29	0.29	0.28	0.28	0.28	0.27	0.27	0.27
	3.09	2.00	0.42	0.40	0.39	0.38	0.37	0.37	0.36	0.35	0.35	0.34	0.33
	4.64	3.00	0.52	0.50	0.48	0.47	0.46	0.45	0.43	0.43	0.42	0.41	0.40
	6.19	4.00	0.62	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.48	0.47	0.46
	7.74	5.00	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.57	0.55	0.54	0.53
	9.28	6.00	0.80	0.77	0.74	0.72	0.69	0.67	0.65	0.63	0.62	0.60	0.59
	10.83	7.00	0.89	0.86	0.82	0.79	0.77	0.74	0.72	0.70	0.68	0.66	0.65
	12.38	8.00	0.98	0.94	0.90	0.87	0.84	0.81	0.79	0.76	0.74	0.72	0.70
	13.93	9.00	1.06	1.02	0.98	0.94	0.91	0.88	0.85	0.83	0.80	0.78	0.76
	15.47	10.00	1.14	1.09	1.05	1.01	0.98	0.94	0.92	0.89	0.86	0.84	0.82
	17.02	11.00	1.22	1.17	1.12	1.08	1.04	1.01	0.98	0.95	0.92	0.90	0.87
	18.57	12.00	1.29	1.24	1.19	1.15	1.11	1.07	1.04	1.01	0.98	0.95	0.92
	20.11	13.00	1.37	1.31	1.26	1.21	1.17	1.13	1.10	1.06	1.03	1.00	0.98
	21.66	14.00	1.44	1.38	1.33	1.28	1.23	1.19	1.15	1.12	1.09	1.06	1.03
	23.21	15.00	1.50	1.44	1.39	1.34	1.29	1.25	1.21	1.17	1.14	1.11	1.08
	24.76	16.00	1.57	1.51	1.45	1.40	1.35	1.31	1.27	1.23	1.19	1.16	1.13
	26.30	17.00	1.64	1.57	1.51	1.46	1.41	1.36	1.32	1.28	1.24	1.21	1.18
	27.85	18.00	1.70	1.63	1.57	1.51	1.46	1.42	1.37	1.33	1.29	1.26	1.22
	29.40	19.00	1.76	1.69	1.63	1.57	1.52	1.47	1.42	1.38	1.34	1.30	1.27
	30.95	20.00	1.82	1.75	1.68	1.63	1.57	1.52	1.47	1.43	1.39	1.35	1.32
	32.49	21.00	1.88	1.80	1.74	1.68	1.62	1.57	1.52	1.48	1.44	1.40	1.36
	34.04	22.00	1.93	1.86	1.79	1.73	1.67	1.62	1.57	1.52	1.48	1.44	1.40
	35.59	23.00	1.99	1.91	1.84	1.78	1.72	1.67	1.62	1.57	1.53	1.49	1.45
	37.13	24.00	2.04	1.96	1.89	1.83	1.77	1.72	1.66	1.62	1.57	1.53	1.49
	38.68	25.00	2.09	2.01	1.94	1.88	1.82	1.76	1.71	1.66	1.61	1.57	1.53

B-conc (mg/L)	Effluent Flow cfs	Effluent Flow mgd	Upstream Kaskaskia River Flows (cfs) 80.0	85.0	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0
8.0	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.55	1.00	0.35	0.34	0.33	0.32	0.32	0.31	0.31	0.30	0.30	0.30	0.29
	3.09	2.00	0.49	0.47	0.46	0.45	0.43	0.42	0.41	0.40	0.40	0.39	0.38
	4.64	3.00	0.63	0.60	0.58	0.56	0.55	0.53	0.52	0.50	0.49	0.48	0.47
	6.19	4.00	0.76	0.73	0.70	0.68	0.65	0.63	0.62	0.60	0.58	0.57	0.55
	7.74	5.00	0.89	0.85	0.82	0.79	0.76	0.74	0.71	0.69	0.67	0.65	0.64
	9.28	6.00	1.01	0.97	0.93	0.89	0.86	0.83	0.81	0.78	0.76	0.74	0.72
	10.83	7.00	1.13	1.08	1.04	1.00	0.96	0.93	0.90	0.87	0.85	0.82	0.80
	12.38	8.00	1.25	1.19	1.14	1.10	1.06	1.02	0.99	0.96	0.93	0.90	0.88
	13.93	9.00	1.36	1.30	1.25	1.20	1.15	1.11	1.08	1.04	1.01	0.98	0.95
	15.47	10.00	1.46	1.40	1.34	1.29	1.25	"1.20	1.16	1.12	1.09	1.06	1.03
	17.02	11.00	1.57	1.50	1.44	1.39	1.33	1.29	1.25	1.21	1.17	1.13	1.10
	18.57	12.00	1.67	1.60	1.53	1.48	1.42	1.37	1.33	1.28	1.25	1.21	1.17
	20.11	13.00	1.77	1.69	1.62	1.56	1.51	1.45	1.41	1.36	1.32	1.28	1.25
	21.66	14.00	1.86	1.78	1.71	1.65	1.59	1.53	1.48	1.44	1.39	1.35	1.31
	23.21	15.00	1.95	1.87	1.80	1.73	1.67	1.61	1.56	1.51	1.46	1.42	1.38
	24.76	16.00	2.04	1.96	1.88	1.81	1.75	1.69	1.63	1.58	1.53	1.49	1.45
	26.30	17.00	2.13	2.04	1.96	1.89	1.82	1.76	1.71	1.65	1.60	1.56	1.51
	27.85	18.00	2.21	2.12	2.04	1.97	1.90	1.84	1.78	1.72	1.67	1.62	1.58
	29.40	19.00	2.30	2.20	2.12	2.04	1.97	1.91	1.84	1.79	1.73	1.69	1.64
	30.95	20.00	2.38	2.28	2.20	2.12	2.04	1.98	1.91	1.85	1.80	1.75	1.70
	32.49	21.00	2.45	2.36	2.27	2.19	2.11	2.04	1.98	1.92	1.86	1.81	1.76
	34.04	22.00	2.53	2.43	2.34	2.26	2.18	2.11	2.04	1.98	1.92	1.87	1.82
	35.59	23.00	2.60	2.50	2.41	2.33	2.25	2.17	2.11	2.04	1.98	1.93	1.88
	37.13	24.00	2.67	2.57	2.48	2.39	2.31	2.24	2.17	2.10	2.04	1.99	1.93
	38.68	25.00	2.74	2.64	2.54	2.46	2.38	2.30	2.23	2.16	2.10	2.04	1.99
10.0	0.00	0.00	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.55	1.00	0.39	0.38	0.37	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.32
	3.09	2.00	0.56	0.54	0.53	0.51	0.49	0.48	0.47	0.46	0.45	0.44	0.43
	4.64	3.00	0.74	0.71	0.68	0.66	0.63	0.61	0.60	0.58	0.56	0.55	0.54
	6.19	4.00	0.90	0.87	0.83	0.80	0.77	0.75	0.72	0.70	0.68	0.66	0.65
	7.74	5.00	1.06	1.02	0.98	0.94	0.90	0.87	0.84	0.82	0.79	0.77	0.75
	9.28	6.00	1.22	1.16	1.12	1.07	1.03	1.00	0.96	0.93	0.90	0.88	0.85
	10.83	7.00	1.37	1.31	1.25	1.20	1.16	1.12	1.08	1.04	1.01	0.98	0.95
	12.38	8.00	1.51	1.45	1.38	1.33	1.28	1.23	1.19	1.15	1.12	1.08	1.05
	13.93	9.00	1.65	1.58	1.51	1.45	1.40	1.35	1.30	1.26	1.22	1.18	1.15
	15.47	10.00	1.79	1.71	1.64	1.57	1.51	1.46	1.41	1.36	1.32	1.28	1.24
	17.02	11.00	1.92	1.83	1.76	1.69	1.63	1.57	1.51	1.46	1.42	1.37	1.33
	18.57	12.00	2.05	1.96	1.88	1.80	1.73	1.67	1.62	1.56	1.51	1.47	1.42
	20.11	13.00	2.17	2.08	1.99	1.91	1.84	1.78	1.71	1.66	1.61	1.56	1.51
	21.66	14.00	2.29	2.19	2.10	2.02	1.94	1.88	1.81	1.75	1.70	1.65	1.60
	23.21	15.00	2.40	2.30	2.21	2.12	2.05	1.97	1.91	1.85	1.79	1.73	1.68
	24.76	16.00	2.52	2.41	2.31	2.23	2.14	2.07	2.00	1.94	1.88	1.82	1.77
	26.30	17.00	2.62	2.52	2.42	2.32	2.24	2.16	2.09	2.02	1.96	1.90	1.85
	27.85	18.00	2.73	2.62	2.52	2.42	2.33	2.25	2.18	2.11	2.05	1.99	1.93
	29.40	19.00	2.83	2.72	2.61	2.52	2.43	2.34	2.27	2.20	2.13	2.07	2.01
	30.95	20.00	2.93	2.82	2.71	2.61	2.52	2.43	2.35	2.28	2.21	2.14	2.08
	32.49	21.00	3.03	2.91	2.80	2.70	2.60	2.52	2.43	2.36	2.29	2.22	2.16
	34.04	22.00	3.13	3.00	2.89	2.79	2.69	2.60	2.52	2.44	2.37	2.30	2.23
	35.59	23.00	3.22	3.09	2.98	2.87	2.77	2.68	2.60	2.52	2.44	2.37	2.31
	37.13	24.00	3.31	3.18	3.06	2.95	2.85	2.76	2.67	2.59	2.52	2.44	2.38
	38.68	25.00	3.39	3.26	3.15	3.04	2.93	2.84	2.75	2.67	2.59	2.52	2.45