Environmental Sensitivities of Chemical Spills in the North Thompson River: Development of a Water Quality Model and Scenario Analysis

Hatfield Consultants Limited

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FOREWORD

This report was prepared under contract to the Department of Supply and Services Additional support has come from Environment Canada (Environmental Protection and Federal Environmental Assessment Review Office) and Department of Fisheries and Oceans.

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V7T lA2

A floppy diskette containing the water quality model is available with this report. If your report does not contain this diskette, please write to Mr. Fred Beech at the above address, and enclose a self-addressed envelope plus an unformatted, 5-1/4" IBM PC floppy diskette.

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1.0 EXECUTIVE SUMMARY

The fate and effects of chemical spills in rivers was investigated using a variety of techniques including mathematical modelling. The North Thompson River was chosen as the study river, but techniques developed for this particular river are intended to be easily adaptable to other river systems Another element in the choice of the North Thompson River was its value as a producer of Pacific salmon, and its great range in river discharge during the course of the year.

Four chemicals were the focus of this study: ammonia, sodium hydroxide (caustic soda), ethylene dichloride, and styrene monomer. All are transported in bulk adjacent to the North Thompson River. Their varied physical, chemical and toxicity properties were the important elements in the study.

A chemical spill transport model was developed which incorporated hydrological data on the North Thompson River. The model utilized advanced micro-computer technology to estimate downstream pollutant concentrations following a spill. The model divided the river cross-section into separate panels, and using turbulent diffusion coefficients in the three directions (longitudinal, lateral and vertical) estimated the concentration of spilled chemicals at one kilometer increments downstream. Calibration utilized results from joint EPS-study team dye tests conducted in the field in April, 1986.

The potential for containment and removal after a spill was examined for each of the four chemicals. Once the product was entrained in the river, there were possible but limited opportunities to remove ethylene dichloride, a heavier-than-water liquid, and styrene, which floats. The study judged anhydrous ammonia and sodium hydroxide could not be recovered. A variety of techniques are available to recover all four chemicals while still on land.

The fishery resource of the study area was described. Emphasis was put on Pacific salmon species, particularly chinook, coho and sockeye which spawn in substantial numbers in the study area, primarily in adjacent tributaries. The description emphasized habitat use in the mainstem of the river, where chemical contamination from a railroad accident would occur.

Toxicity studies were conducted in the laboratory, using North Thompson River water, and from a comprehensive search of the available literature. This work concluded with the establishment of critical lethal and sublethal levels for the four chemicals with respect to salmonids.

Hypothetical accident scenarios were run using the steady state model. The scenarios described in this study represent only a small sampling of the potental accident situations interested investigators might wish to run. The volume spilled in each scenario approximated 900 tons, or 10 car loads,

Scenario #1 was an exception in that it represented an actual occurrence, a derailment on March 3, 1982 and subsequent spill of ethylene dichloride. Model results were comparable to simulations conducted at the time and reported in the literature, but the estimated concentrations were four to five times greater than measured levels. Based on resource data, the entire cohort of 1+ chinook juveniles was exposed to critical lethal levels,

Scenario #2 delayed the original accident to May 15, in order to investigate fate and effects during freshet, and with downstream salmon migration underway.

Scenario #3 was an accidental spill of styrene monomer on April 20, which coincided with low flows and recently emerged fry salmon.

Scenario #4 examined a September 15 spill of caustic soda. This coincided with relatively high flows, but substantial concentrations of 0+ chinook and coho upstream of the Clearwater River were exposed to critical lethal levels in mainstem habitats.

Scenario #5 examined an August 10 spill of caustic soda. The discharge was double that of September 15, thereby diluting the pollutant so that only intermittent sections of the river downstream of the spill exceeded critical sublethal levels.

Scenario #6 was a November 9 spill of anhydrous ammonia. The model estimated that the entire North Thompson River downstream of the spill exceeded critical lethal levels, causing substantial mortalities to 0+ coho and chinook juveniles, and possibly interrupting the late stages of the adult coho migration.

Scenario #7 examined a May 20 spill of anhydrous ammonia. Discharge was high, and critical lethal levels extended downstream 70 km. Significant mortalities to juvenile chinook, coho and sockeye salmon were predicted.

In discussing the scenarios, it was concluded that for salmon there were several vulnerable periods. The first was immediately prior to freshet, when low flows coincide with large numbers of emerging and yearling salmon, and second, late summer and fall when a severe spill could delay, damage or disorient adult salmon.

2.0 INTRODUCTION

The management and control of chemical spills into rivers is influenced strongly by the dynamics of the medium. Rivers flow quickly, contaminants rapidly dilute, countermeasures and monitoring programs are established only after peak events have taken place. Moreover, the environmental consequences are difficult to assess unless there are conspicuous kills of fish or other aquatic life.

In the mountainous topography of an area, such as British Columbia, these limitations are magnified by the concentration of rivers and their aquatic resources, human settlement and transport-related activities in narrow corridors. In the specific case of the Thompson and Fraser Rivers, the salmonid resource is great and is the target of considerable investment in enhancement measures. Immediately adjacent are the mainlines of the Canadian National Railway (CN) and the Canadian Pacific Railway (CP) over which travel an estimated 75% of all hazardous materials shipped in B.C., exclusive of pipelines (S.T. Clarke, Transport Canada, personal communication). Sharing much of the same corridor is the oil pipeline operated by Trans Mountain Pipe Line.

The transportation of hazardous materials presents a number of risks, which can be categorized in terms of:

- public health and safety;
- railway personnel safety;
- property damage; and
- environmental risk.

Public health and safety represents a high priority, and as a consequence, many investigations have focussed on the populated areas of the lower mainland. Beak Consultants Ltd. (1978) identified the local risks associated with chemical production and shipment of dangerous goods in North Vancouver. The Canadian Transport Corn mission (1982) conducted a detailed analysis of dangerous goods shipments in the lower mainland, and recommended the termination of dangerous goods transhipments through the CP and

Burlington Northern Railway ferry slips in downtown Vancouver. Using the information base provided by these studies, the Environmental Protection Service (EPS) recently commissioned a follow-up study to identify key risk areas and situations (TERA, 1984b).

The assessment of environmental risk in various corridors adjacent to major salmon-producing rivers was first examined by Sherwood and Chorney (1980). They examined the accident record, outlined the characteristics of the salmon resource, and ranked the dangerous goods in terms of severity criteria. A number of recommendations were made to reduce accident frequency. Many of these are being implemented as part of the CN twin tracking project. While the focus on chemical spills appears to have improved response preparedness, the concern for spills of bulk chemicals in transit remains (EARP, 1984).

2.1 OBJECTIVES

The approach of the study team was to continue the process of better defining the risks associated with chemical spills. This was done by concentrating on water quality modelling, countermeasures, and potential environmental impact from spills of four selected bulk chemicals: ammonia, ethylene dichloride (1,2- dichloroethane), caustic soda, and styrene monomer. These are commonly transported by rail through B.C. corridors.

The main objectives of the study were to:

1. Develop a water quality model which would calculate downstream pollutant concentrations, specifically highlighting the distribution and duration of concentrations in excess of critical levels for salmonid fish (see item 3 below).

2. Present the water quality model on microcomputer accompanied by a user manual.

3. To review chemical spill countermeasures and develop response strategies appropriate for the North Thompson River.

4. Determine the toxicity of ammonia, caustic soda, ethylene dichloride, and styrene monomer to salmonid fish, based on a combination of literature search and laboratory studies.

5. Outline the salmonid resource of the North Thompson River.

6. Run specific scenarios on the water quality model as a basis for discussing the main physical, chemical and biological implications of chemical spills, and the countermeasures available to mitigate such events.

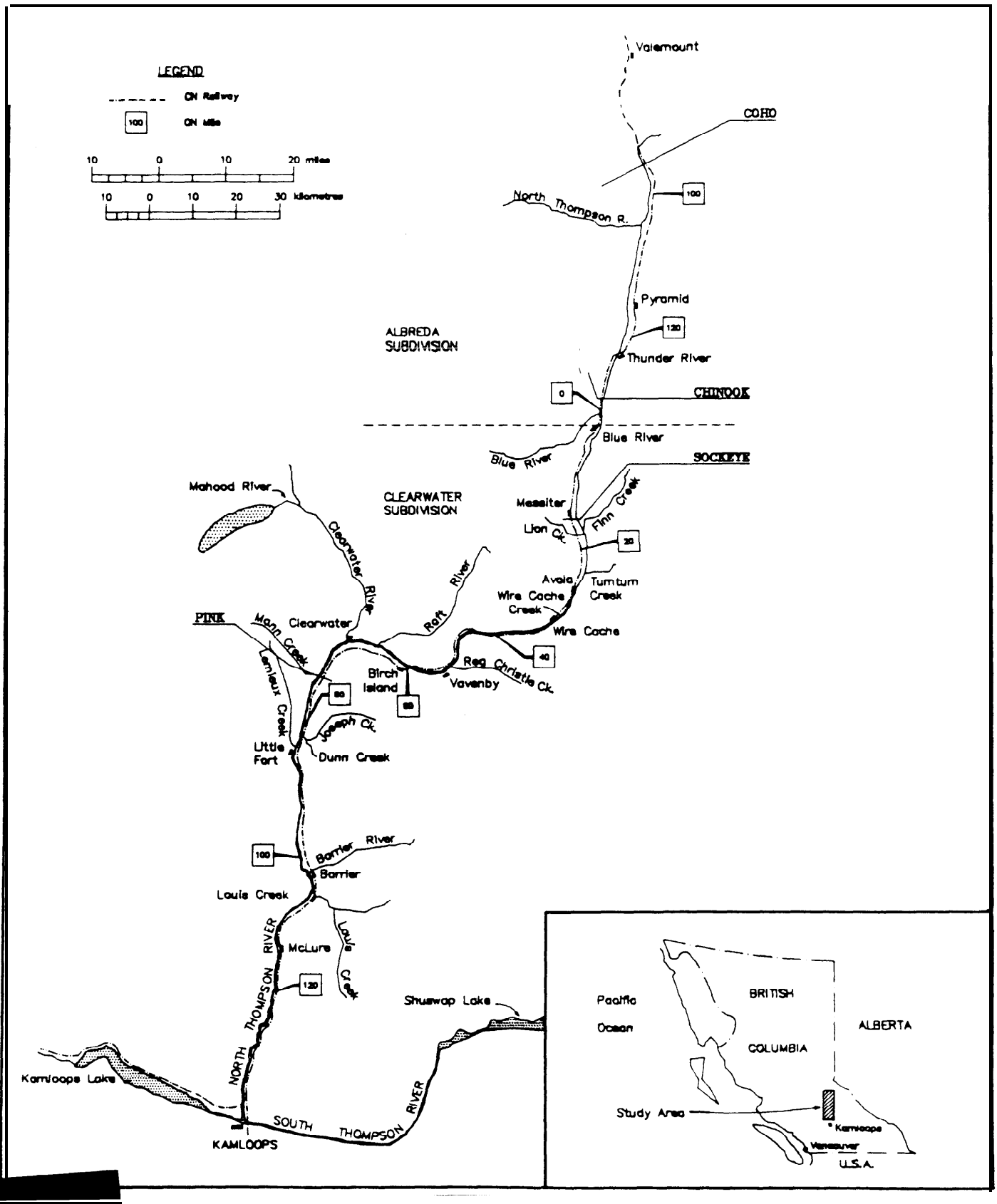
2.2 SCOPE

In choosing the North Thompson River as a focus for this study, it was originally intended that methods developed here could be applied to other similar river systems. This remains the intent. Hydrological data from the entire North Thompson system have been employed in model development, but the intensive work and all scenario studies have been concentrated between Blue River and McLure (Figure 2.1).

Objectives 1 and 2 provide a rapid ability for the user, particularly regulatory agencies and response staffs of private industry, to estimate approximate downstream concentrations and time of passage for a spilled chemical. Objectives 3 to 6 allow the user to assess the potential for effective countermeasures and ecological damage from a specific incident.

The potential scope of chemical spills is extensive. The project focussed primarily on fate, effects, and countermeasures, which cover a considerable array of subjects (Figure 2.2). Chemical production, material handling and transportation, or human health were not addressed. These topics have been covered by a series of manuals on specific chemicals, the EnviroTIPS manuals, prepared and published by the Environmental Protection Service. Data from these manuals were an important information source on physical and chemical properties.

FIGURE 2.1: **NORTH** THOMPSON RIVER STUDY AREA, INDICATING RAIL LINES AND UPSTREAM LIMITS OF SALMON SPECIES.
Map adapted from **Whelen** and **Lister** 1985 **(a)**



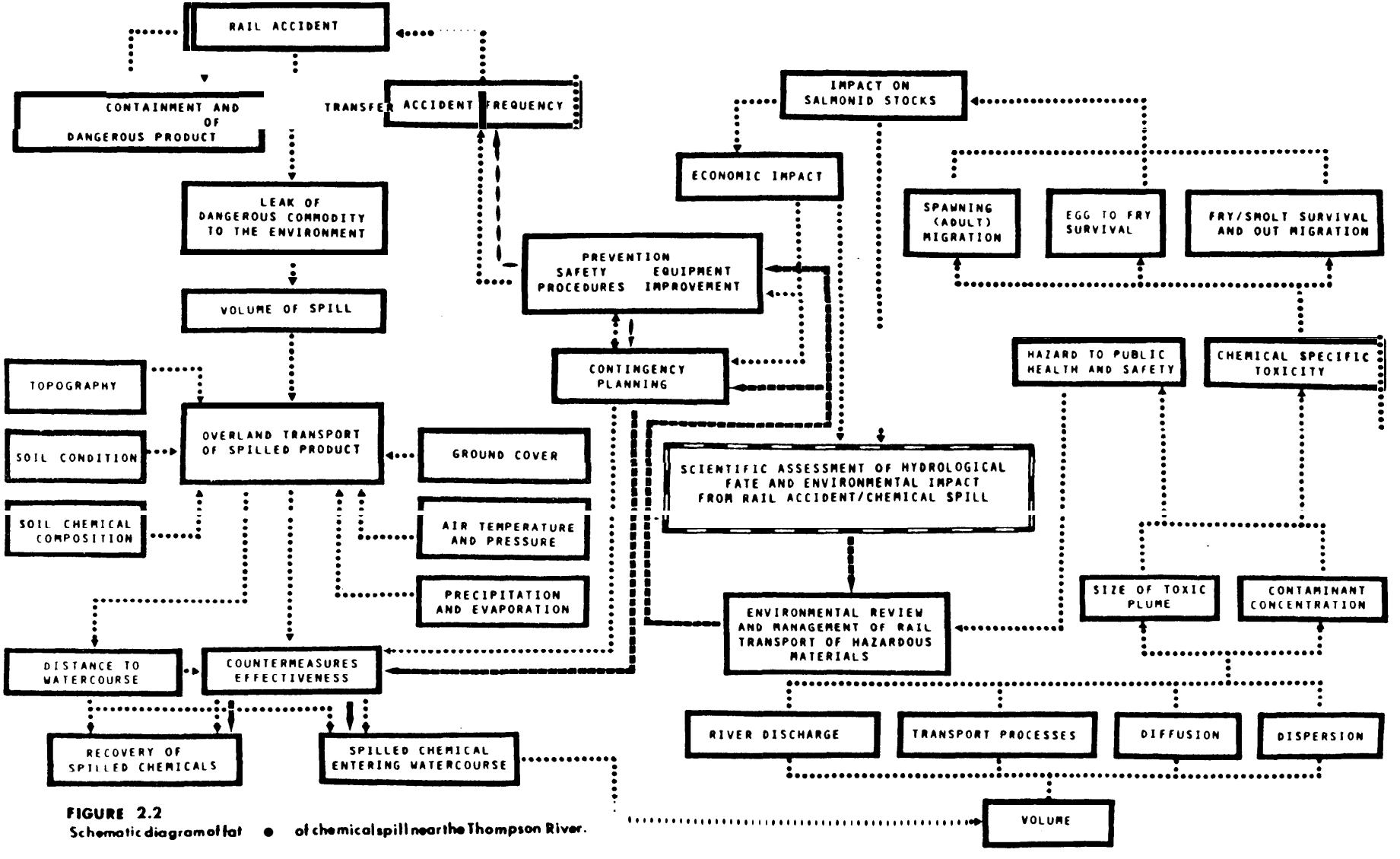


FIGURE 2.2
Schematic diagram of fat ● of chemical spill near the Thompson River.

Detailed study was limited to four chemicals (Table 2.1). In consultation with the Scientific Authority, these were chosen to cover a practical range of physical and chemical properties from among a larger list of chemicals shipped in bulk adjacent to the North Thompson River. The selection criteria were toxicity - a chemical had to be of sufficient toxicity to warrant examination here, specific gravity and solubility. Together the last two characteristics determined the potential for effective countermeasures. Therefore, this choice included a range of properties in terms of specific gravity and solubility. It included a 'sinker' (ethylene dichloride), a 'floater' (styrene monomer), a highly toxic liquid shipped under pressure (anhydrous ammonia) and a highly corrosive soluble liquid (sodium hydroxide). There were important additional characteristics relevant to countermeasures: ethylene dicholoride and styrene monomer are flammable; ammonia is a poisonous gas; sodium hydroxide dissolves with significant heat evolution; ammonia solubilizes without reaction; and neither ethylene dichloride nor styrene monomer react with water.

Chemical spills can affect virtually every kind of terrestial and aquatic organism. In the North Thompson system we decided to restrict the ecological focus to salmonid fish This reflects their pre-eminent position as a commercial and recreational resource and the fact that the few systematic toxicological studies relating to chemicals have focussed on fish

TABLE 2.1 MAIN CHARACTERISTICS OF STUDY CHEMICAL.

CHEMICAL	SPECIFIC GRAVITY	SOLUBILITY @ 20°C (g/100 ml)	TOXICITY
Anhydrous Ammonia	0.68 @ - 33.7°C	36.4	High
Ethylene Dichloride	1.26 @ 20°C	0.869	Moderate
Styrene Monomer	0.91 @ 25°C	0.03	Moderate
Sodium Hydroxide	1.53	111.	Moderate

Project details are presented in the chapters and appendices that follow. These include detailed coverage of study methodologies

3.0 PHYSICAL AND CHEMICAL PROPERTIES

3.1 AMMONIA: RELEVANT PHYSICAL AND CHEMICAL CHARACTERISTICS

Ammonia is shipped in both anhydrous (liquefied gas) and aqueous forms. Properties are noted for both gas and liquid formats that are of most significance to spill response (Environment Canada, 1984 a, b, and Association of American Railroads, 1984):

PHYSICAL STATE (20°C, 1 atm):

Gas (NH_3) and liquid (NH_4OH).

CLASSIFICATION:

Poisonous gas and corrosive liquid.

TOXICOLOGY:

Gas is toxic by inhalation and liquid is toxic by inhalation, ingestion.

FLAMMABILITY:

Liquid is non-flammable but combustible as NH_3 (gas).

EXPLOSIVE LIMITS (GAS):

16 to 25% by volume with air, in enclosures.

BEHAVIOUR IN AIR (GAS):

Disperses initially like heavy gas due to aerosols.

BEHAVIOUR IN WATER:

Liquefied gas floats, boils, mixes; liquid floats, mixes.

SOLUBILITY (0°C):

89.9 g/100 ml.

COLOUR:

Gas is colourless and liquid is clear to white solutions.

REACTIVITY:

Dissolves with mild heat release; otherwise stable.

Gas corrodes aluminum, copper, tin, lead, brass, bronze and galvanized steel; also forms explosive compounds with silver acetaldehyde, acrolein, halogens, chlorates, chlorites, chromates, ethylene oxide, nitric acid, nitrogen tetroxide and silver chloride; attacks some plastics and rubber.

Liquid corrodes aluminum, copper, tin, zinc and alloys; reacts with acrolein, acrylic acid, chlorosulfonic acid, dimethyl sulfate, halogens, hydrochloric acid, hydrofluoric acid, nitric acid, sulfuric acid, oleum, propylene oxide and silver nitrate.

Both forms are corrosive to body tissues

When released into air, anhydrous ammonia generally forms aerosols which cause the resulting vapour cloud to travel close to the ground particularly when the spill is large, the temperature is low and/or atmospheric conditions are stable. Smaller spills at higher temperatures and in unstable conditions are more likely to result in light gas behaviour. Although classified as a non-flammable gas, when partially enclosed and under certain circumstances, combustible or explosive mixtures of gaseous ammonia and air can occur (Bennett, Feates and Wilder, 1982).

On land, anhydrous ammonia vapourizes extensively at a rate dependent upon the ambient temperature and then dissipates as described above. It will penetrate soil not saturated with water but run off or evaporate from land surfaces at or near saturation. Once ammonia reaches the water table, it will move in the direction of water flow and gradually dilute through diffusion. Ammonia can also absorb into soils containing clay minerals but can then be desorbed by water infiltration (Environment Canada, 1984a).

Environment Canada (1984b) notes that generally about 70% or less of anydrous ammonia spilled into a waterway enters the water phase. The remainder boils violently

and vaporizes. A large volume release of anydrous ammonia spilled directly into the Thompson River could result in toxic concentrations several kilometers or more downstream. Aqueous ammonia would also mix relatively quickly if spilled into a river and could similarly have pronounced adverse effects since concentrations as low as 0.1 mg/l (un-ionized) cause mortalities to aquatic life.

Whet her in liquefied gas or solution format, ammonia forms toxic, unstable compounds with many chemicals, a characteristic which must be borne in mind when formulating countermeasures. Protective clothing should be considered for eyes, skin and respiratory tract (consult emergency guides for more detailed information), depending upon the size and circumstances of the spill and the response it warrants.

3.2 ETHYLENE DICHLORIDE: RELEVANT PHYSICAL AND CHEMICAL CHARACTERISTICS

PHYSICAL STATE (20°C, 1 atm):

Liquid.

CLASSIFICATION:

Flammable liquid.

TOXICOLOGY:

Moderately to highly toxic by inhalation, ingestion, contact.

FLAMMABILITY:

Very flammable, produces toxins.

EXPLOSIVE LIMITS:

6.2 to 16%.

BEHAVIOUR IN AIR:

Moderately volatile, liquid pool may present downwind hazard.

BEHAVIOUR IN WATER:

Sinks, dissolves very slowly.

SOLUBILITY (0°C):

0.92 g/100 ml.

COLOUR:

Clear, colourless liquid.

REACTIVITY:

Stable, no reaction with water.

Reacts violently with aluminum, ammonia and dimethylaminopropylamine.

Can react vigorously with oxidizers.

HCl, CO, CO_2, phosgene, vinyl chloride are produced in fire,

Corrodes other metals at high temperatures when in contact with water.

Ethylene dichloride is a very flammable liquid that can form explosive mixtures with ammonia and air and flashback along vapour trails. It evaporates in air and dissolves in water at slow rates, It can be transported many kilometers downstream in a river and still be present at concentrations lethal to aquatic organisms (derived from Neely and Lutz, 1985 and Environment Canada, 1984a). On land, it can penetrate downward through the water table. It quickly moves and penetrates clay at a rate of 1-2 cm per two week period (Environment Canada, 1984c). In some situations, self-contained breathing apparatus and totally encapsulated suits will be required. Consult emergency guides in this regard.

3.3 SODIUM HYDROXIDE: RELEVANT PHYSICAL AND CHEMICAL CHARACTERISTICS

PHYSICAL STATE (20°C, 1 atm):

Solid; also shipped as liquid in aqueous solution.

CLASSIFICATION:

Corrosive.

TOXICOLOGY:

Highly toxic by contact , ingest ion.

FLAMMABILITY:

Non-flammable.

EXPLOSIVE LIMITS, BEHAVIOUR IN AIR:

Non-applicable.

BEHAVIOUR IN WATER:

Anhydrous NaOH dissolves with great heat evolution; boils, splatters, and sinks.

SOLUBILITY:

(anhydrous form @ 0°C) 42 g/100 ml

COLOUR:

White flakes, powder; clear aqueous solution.

REACTIVITY:

Liberates significant heat when dissolving in water.

Reacts violently with acetaldelyde, acetic acid, acetic anhydride, acrolein, acrylonit rile, ally1 alcohol, ally1 chloride, aluminum, chlorohydrin, chloronitrotoluenes, chlorosulfonic acid, 1-2 dichloroet hylene, ethylene cyanohydrin, gloxyl, hydrochloric acid, hydrofluoric acid, hydroquinone, maleic anhydride, nitric acid, nitroparaffins, oleum, phosphorus, phosphorus pentoxide, sulfuric acid, tet rahydrofuran, t ric hloroet hylene.

Stable, except in contact with nitromethane, other nitro compounds to possibly form shock-sensitive explosive salts.

Sodium hydroxide will dissolve rapidly in water, with the evolution of heat and mix until diluted. It is highly corrosive, slightly toxic, and reactive, but it neither burns nor supports combustion. At temperatures above 40°C, a 50% solution can produce corrosive effects on iron and steel handling equipment.

Both 50% and 73% solutions are shipped by railway tank car and generally represent a greater concern with respect to potential spills than the anhydrous form, which is shipped in hopper type cars. The liquid form could obviously flow and ultimately reach a water course removed from the original release point. Accidents involving the entry of the solid form into a waterway could also pose a significant hazard. Downstream dilution to sub-toxic levels should be expected although some contaminated bottom sediment might result.

The 50% solution of sodium hydroxide quickly penetrates coarse sand, moves 1.0 meters downward through silty sand in less than 60 days and is transported very slowly through clays while exchanging some calcium and magnesium ions with sodium. Much of the sodium and most hydroxide will enter groundwater. The 73% solution, which is gelatinous at ambient temperature, and anhydrous form will behave in a similar manner if precipitation occurs prior to clean-up (adapted from Environment Canada, 1984d).

3.4 STYRENE: RELEVANT PHYSICAL AND CHEMICAL CHARACTERISTICS

PHYSICAL STATE (20°C, 1 atm):

Liquid.

CLASSIFICATION:

Flammable liqud.

TOXICOLOGY:

Moderately toxic by inhalation, ingestion.

FLAMMABILITY:

Flam ma ble, polymerization may occur at high temperatures.

EXPLOSIVE LIMITS:

1.1 to 6.1%.

BEHAVIOUR IN AIR:

Moderately volatile, liquid pool could produce downwind flammability hazard, vapour denser than air.

BEHAVIOUR IN WATER:

Spreads, evaporates and dissolves to limited extent.

SOL U BILITY (0°C):

0.028 g/100 ml.

COLOUR:

Colourless to yellowish liquid.

REACTIVITY:

No reaction with water.

- Reacts vigorously with oxidizers, metallic halides
- Reacts violently with chlorosulfonic acid, oleum and sulfuric acid.
- Polymerizes with significant heat release particularly at elevated temperatures and as inhibitor depletes; also in presence of acid, base catalysts including some soils.
- Stable, does not react with water.

Styrene is a flammable liquid that polymerizes rapidly with significant heat release at elevated temperatures even in the presence of the inhibitor p-t-butycatechol (TBC) (Environment Canada, 1984e). In a spill, it is significant to note that styrene is very slightly soluble in water but might be ultimately present at toxic levels. Its heavier-than-air vapours could travel considerable distances to ignition sources and flashback Violent container rupture may also result in the presence of heat (above 66°C) or due to reaction with various chemicals (Association of American Railroads, 1984).

Styrene in the water column is toxic to aquatic organisms while its vapours pose a significant hazard if inhaled. A specific gravity of 0.9, non-reactivity with water, and liquid state render releases of styrene amenable to clean-up using conventional oil spill clean-up equipment when circumstances allow and when materials compatibility criteria are met.

Styrene spilled onto land can penetrate through it at a rate dependent on the soil type and its degree of water saturation. Once on water (whether subterranean or surficial), styrene will spread and move in the direction of flow.

4.0 HYDROLOGICAL MODELLING (Author: C.D.D. Howard)

4.1 BACKGROUND

The purpose of the chemical spill transport model described herein is to provide insight into the transport of four different types of pollutant:

1. pollutants that mix completely during transport (e.g., sodium hydroxide);

2. pollutants that primarily float on the surface (e.g., styrene);

3. pollutants which are primarily transported near the bottom (e.g., ethylene dichloride); and

4. pollutants which are subject to significant decay or transformation during transport (e.g., anhydrous ammonia).

Specifically, the objective was to develop a model which utilized microcomputers to calculate downstream pollutant concentrations from accidental spill events. For example, the model was to be capable of differentiating between a chemical spill taking place near the bank of the river (the common situation) from one which takes place in mid-stream. This type of consideration would indicate the need to account for the dimensionality of the mechanisms of dispersion of the pollutant. Thus, a primary requirement was to model the velocity field in a natural, irregular river channel,

The scope of the research was limited to the North Thompson River, covering a distance of approximately 300 km. The modelling methodology and the computer code were developed specifically for this river after a field reconnaissance and review of available data, but they may be applicable to other rivers. Calibration efforts were assisted by a series of dye tests conducted along the North Thompson River, April 8 - 10, 1986. Details relating to methods and results of these tests are found in Appendix 1.

Two seperate models were developed. The first model provides for a steady-state analysis suitable for spills of a very long duration. This model provides an estimate of the time required to reach each downstream kilometer on the river but it does not describe the time varying shape of the pollutant plume. The second model does describe the transient, time varying details and is described in this section of the report because it was used for calibration. Details of both models are contained in Appendices 2 to 4. Definitions of certain terminology are provided in Section 4.7.

4.2 ANNUAL DYNAMICS OF THE NORTH THOMPSON RIVER

The North Thompson watershed responds to two major climatic regimes. At the lower elevations, in the vicinity of 700 meters, snowmelt occurs earlier in the spring and the volumes are much less than they are at the higher levels which reach up to 2,000 meters or more. Table 4.1 summarizes normal hydrological conditions in the area.

At the higher elevations in the surrounding mountains, the temperature will be approximately 8 degrees lower than those indicated in Table 4.1 for Blue River. Precipitation, on the other hand, will average 2 to 2.5 times more at the higher elevations. Thus, the runoff from the higher elevations will be delayed in the spring because of lower temperatures, but when it does come it will be much greater on a unit area basis than runoff from the valley bottom. These considerations are reflected in the streamflow records.

The Clearwater River drains higher elevation areas to the west and its average behaviour is illustrated in Table 4.1. At first glance, it appears that the two rivers behave very similarly. For the most part, this is true, but in the month of April, there may be a discrepancy of 25% or more in the fraction of the annual runoff which is expected from each source. In December, January and February, this discrepancy is 10% to 15%. This provides a crude idea of the extent of the errors which are contained in the runoff model, which assumes uniform hydrological behaviour over the entire watershed. In the other months, flows in the Clearwater River track those recorded at Birch Island in the North Thompson River more closely.

TABLE 4.1: HYDROLOGIC DATA SUMMARIES, TOWN OF BLUE RIVER, NORTH THOMPSON RIVER DISCHARGE AT BIRCH ISLAND AND CLEARWATER RIVER AT MOUTH.

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.	MEAN
MEAN RAIN	.45	.64	1.23	2.05	2.54	3.07	3.29	3.90	3.24	3.86	2.03	0.74	2.25
MEAN TEMPERATURE	-10.3	-4.8	-1.3	3.5	9.6	13.8	16.4	15.2	10.7	4.5	-1.9	-6.8	4.1
MAXIMUM TEMPERATURE	-6.7	-0.6	4.0	9.2	17.2	21.2	24.2	22.3	17.2	7.8	0.6	-3.9	9.4
MINIMUM TEMPERATURE	-13.9	-8.9	-6.6	-2.2	1.9	6.4	8.6	8.1	3.7	0.6	-4.6	-9.6	-1.3
NORTH THOMPSON FLOW	35	31	35	70	156	466	415	230	143	100	49	28	147
CLEARWATER FLOW	51	45	44	87	425	717	518	295	196	145	102	65	226

NOTES :

Rainfall - Inches
Temperature - Degrees Celsius
Flow - cms

The spill transport model requires an estimate of the streamflow at Birch Island and uses this to estimate flows at all other locations on the river. During the day, the Bitch bland discharge can be obtained by telephone to the Water Survey of Canada office in Vancouver. At night, on holidays, or on the weekend, this is not possible and it is necessary to estimate the discharge of Birch Island from some other source of data. As a fint estimate, the mean values shown in Table 4.1 may be used but if this is done the spill model should be run over a range of estimated flows to establish the importance of an accurate flow estimate. For example, in the month of January, which has a mean flow of 28.9 cmq the recorded average discharge has varied from a low of 14.1 cm in 1975 to a high of 74.8 cm in 1981. Thus, the actual discharge during an accident at this time of year could vary from about half to three times the long-term seasoned average.

4.3 MODELLING APPROACH

4.3.1 Basis of the Dispersion Model

For a conservative pollutant where there are no biochemical changes taking place, and flow occurs only in the longitudinal direction, the governing equation is:

$$\frac{\partial c}{\partial t} + \frac{\partial (uc)}{\partial x} = \frac{\partial}{\partial x}\left(D_x \frac{\partial c}{\partial x}\right) + \frac{\partial}{\partial y}\left(D_y \frac{\partial c}{\partial y}\right) + \frac{\partial}{\partial z}\left(D_z \frac{\partial c}{\partial z}\right)$$

in which c	=	the local mean concentration;
x, y, z	=	spatial coordinates in longitudinal, lateral, and vertical directions;
u	=	the mean velocity in the longitudinal direction;
D_x, D_y, D_z	=	turbulent diffusion coefficients in the three directions;
and t	=	the time elapsed since injection of the pollutant.

The second term on the left-hand side accounts for convective transport at the velocity u. On the right-hand side, the terms in parentheses are mass fluxes, caused by dispersive transport in the three directions. The present study does not deal with flux in the z-direction.

A standard approach for integrating this equation involves assuming that the velocity, u, is uniform throughout. In the present study, u is assumed to vary across the stream but to be constant within individual panels of the cross-section.

The longitudinal, x-direction, dispersive coefficient D_x can be estimated by examining the time axis of dye test results. The corresponding coefficient in the y-direction can be estimated from the appearance of the lateral distribution of dye concentration at a particular time.

A solution to a one-dimensional dispersion version of the above differential equation is:

$$c(x,t) = \frac{1}{K} \frac{M}{A(4\Pi D_x t)^{\frac{1}{2}}} \exp - \left[\frac{(x-ut)^2}{4D_x t} \right]$$

in which M is the amount of the conservative constituent injected at the spill site. D_x is the longitudinal dispersion coefficient, K is a regional adjustment coefficient determined by dye studies and A is the cross-sectional area of the river. This equation is symmetrical on the time axis. It does not resemble the dye test results obtained in the North Thompson River for which a rapid rise in the pollutograph is followed by an extended recession as time passes The form of this equation was modified to reflect a more realistic shape. The resulting expression, which happens to be the unit impulse response for wave propogation in a canal, is given by:

$$h(x,t) = \frac{x}{t\ (4\Pi D_x t)^{\frac{1}{2}}} \exp - \left[\frac{(x-ut)^2}{4D_x t} \right]$$

The transient (time varying) concentration downstream at distance x was computed by convolution of this impulse response function with the time varying source at the upstream transect.

Graphical comparisons between this equation and dye test results showed **that a good fit could be achieved for the rising limb and the peak.** It was concluded that the extended tail could be modelled by accounting for dispersion in the y-direction separately. Integration of the basic differential equation with a constant longitudinal velocity would not account for the lateral variation in velocity across a transect. Since the lateral velocity variation cannot be expressed functionally, because real river cross-sections are involved, a numerical integration would be required. While this approach is possible it was not adopted here. Instead, it was assumed that a normal distribution would describe the lateral concentration variation. Thus, in the y-direction, the concentration is given by:

$$c_2(y) = \frac{\bar{c}_1 \, b_1 \exp\left[- \dfrac{8y^2}{\dfrac{32xD_y}{u} + b_1^2} \right]}{0.6 \left[\dfrac{32xD_y}{u} + b_1^2 \right]^{\frac{1}{2}}}$$

In this equation, bi is the width of the upstream source (one panel wide in the computer program), y is the distance laterally from the source, and D_y is the effective lateral dispersion coefficient. At transects downstream from the original source, the infected width of river will encompass more than one transect. The overall effect further downstream is modelled by **superposition** of the lateral spreading from each such **"source".**

In developing a model to simulate a transient phenomenon, the concentration predicted at the downstream transect of the panel is distributed laterally to adjacent panels assuming that the distribution follows the above equation. Lateral concentration distributions from all panels are computed in this way and superposed to give the overall concentration across the river at each time step.

In developing a model to simulate a steady state phenomenon, the same normal distribution is used and since time is not a variable, it can be applied directly between adjacent transects.

Since the normal distribution extends to infinity towards the stream banks, an approximation is necessary to truncate it without losing pollutant mass. For this study, it was assumed that the truncation at two standard deviations on either side of the mean would provide sufficient accuracy. To ensure that no mass is lost, the resulting area under the distribution was summed and normalized back to the original mass at the upstream source. If the truncated distribution extended past the stream bank to the adjacent land, the mass in this imaginary area was folded back without distortion and added into the matching panels adjacent to the bank.

The reduction in mass through loss to the environment or transformation to other forms was approximated by incorporating an exponential first order decay function in the program. The appropriate elapsed time was computed for each panel from the distance between adjacent transects at x_i and x_o and the upstream panel velocity, u_i. Thus, before superposition of lateral concentration distributions originating from each panel, the results were multiplied by the decay function given by:

$$c(x_i) = c(x_o) \exp \left[- k \frac{(x_i - x_o)}{u_i} \right], \text{ all } i \text{ panels}$$

It was assumed that the coefficient for decay would be determined from physical-chemical properties of the pollutant or from field experience with the loss of pollutant to the environment.

Additional details describing the modelling process are provided in Appendices 2 and 3.

4.3.2 Basis of the Hydraulic Model

The program approximates the velocity distribution laterally across a transect. This is done for each transect by dividing the measured cross-sectional data into eleven panels of equal width at the stage corresponding to the highest discharge of the stage discharge rating curves If the cross-sectional data are inadequate, the program will extrapolate to the highest stage of the rating curve.

For a given discharge, the rating curve establishes the water level. With this and the cross-sectional information, the program computes the area, wetted perimeter, and hydraulic radius within each panel at that discharge. This computation is accomplished using a constant computed from the corresponding point on the rating curve and the overall wetted perimeter, cross-sectional area, and hydraulic radius of the transect at the given discharge. The basic assumption is that individual panels behave in a hydraulically similar manner to the overall cross-section according to their individual hydraulic radii. For a well mixed pollutant, the mean panel velocity is used to calculate the transport; for pollutants that tend to float or sink, the transport calculations are based on the velocity of 0.8 or 0.2 of the panel depth, respectively. These are computed from the vertical velocity distribution in the panel.

The Universal velocity distribution low is used by the program to estimate near-surface and near-bottom velocities within each panel. In principle, it is possible to compute all points on the vertical velocity distribution within the panel. The friction coefficient in the Universal velocity distribution law is approximated using Manning's n.

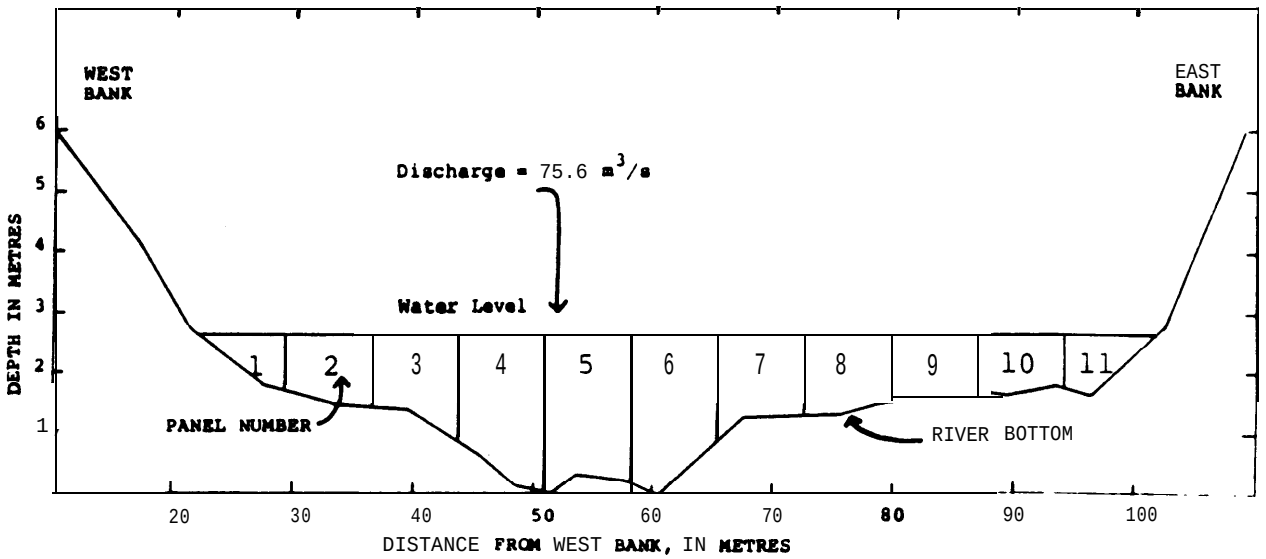
The value of n can, in principle, be different at each transect as well as at each panel across a given transect, but for this water quality model, it was assumed to be a constant (0.035). Appendix 2 provides more detail on the procedures used by the program.

Figure 4.1 compares measured and computed values of velocity across the channel. The measured values are the means in the panels derived from the hydrometric survey notes of the Water Survey of Canada. Near the bridge piers, which are not included in the model, the agreement is not close; elsewhere, particularly in mid-channel, it is quite good.

4.3.2.1 River Profile

Figure 4.2 shows the North Thompson River profile from Albreda Lake at el. 2,850 feet approximately to the swing bridge at Kamloops at about el. 1,150 feet. River slopes are steeper near the upper and dropping to approximately 0.04% in the reaches below Little Fort. This information, summarized in Table 4.2, was extracted from t opograp hic maps.

Measured cross-sections were not available for all locations on the river. Some of the missing data were approximated by trapezoidal shaped sections having a maximum width (flood stage) estimated from air photos. At other locations, between those for which transect data are available, the model uses the cross-sectional shape and rating curve of the upstream transect. In these cases, the hydraulic radius is adjusted by the model to compensate for differences in local slope which was identified from 1:50,000 scale topographic maps. The adjustment is to multiply the upstream value by the inverse ratio of slopes at the two transects to the 0.3 power.



NOTES:

1. Bridge pier located in panels 1 and 11

2. Comparison of velocities interpolated from Water Survey of Canada field notes (WSC measured) and velocities computed by the model are summarized in the following table:

Panel Number	Mean Velocities in Metres/second	
	WSC Measured	Model Results
1	0.00 (pier)	0.37
2	0.18	0.65
3	0.49	0.83
4	1.00	1.09
5	1.18	1.20
6	1.19	1.05
7	0.90	0.83
8	0.73	0.70
9	0.37	0.63
10	0.21	0.58
11	0.15 (pier)	0.35

Figure 4.1: Comparison of Measured and Modelled Lateral Velocity Distribution, North Thompson River, Birch Island, April 12th, 1977.

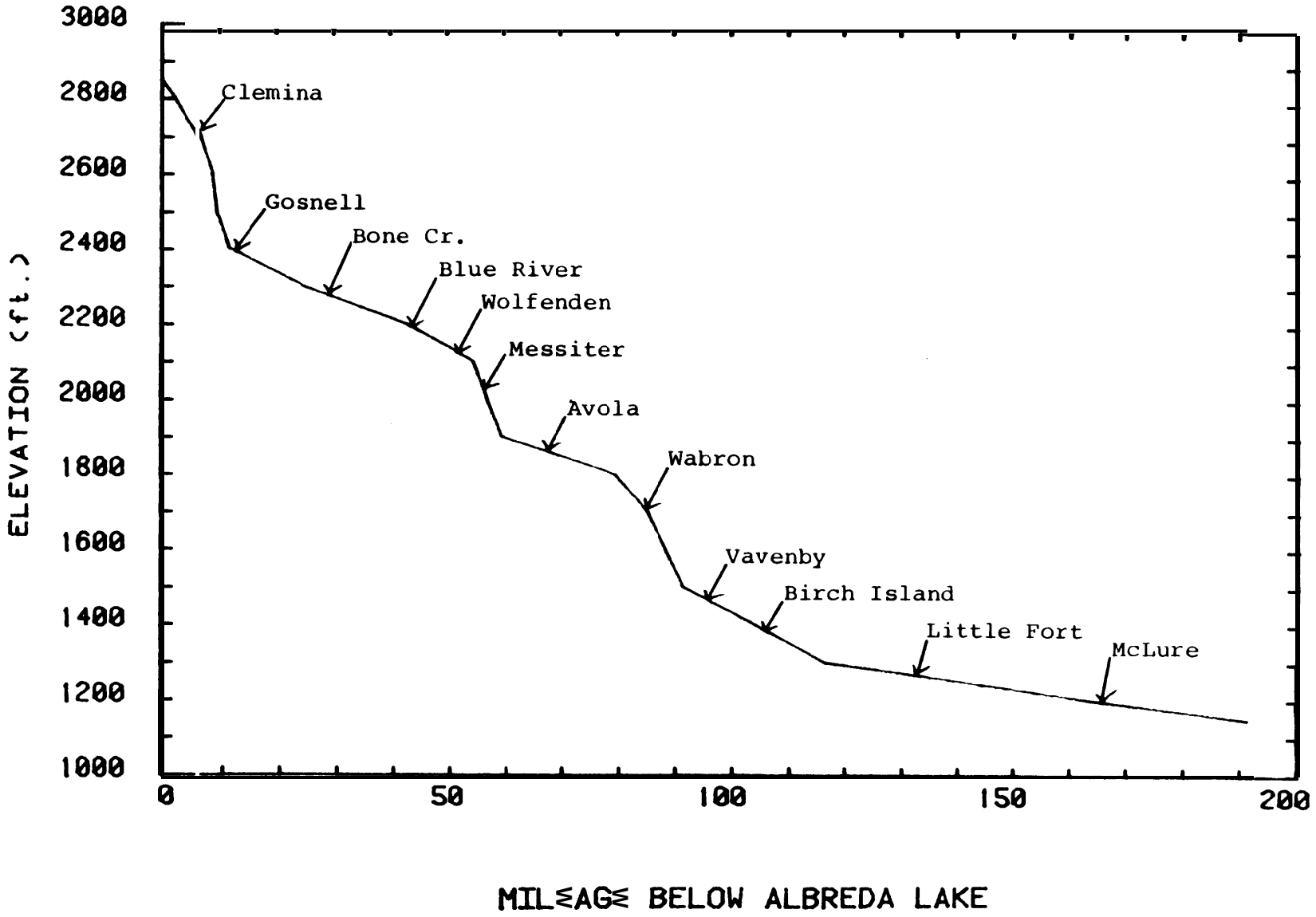


FIG 4.2 NORTH HOMPSON RIVER PROFILE

TABLE 4.2: NORTH THOMPSON RIVER PROFILE

RIVER MILEAGE	ELEVATION (FEET)	SLOPE %	STATION NUMBER	DESCRIPTION
0.0	2,850		0	Albreda Lake
		0.43		
5.0	2,727	0.50	1	Highway and Railway Bridge
6.0	2,700			
		0.95		
8.0	2,600			
		2.40		
8.8	2,500			
10.3	2,428	0.91		52 30'
10.9	2,400			
11.6	2,394	0.14	2	Highway Bridge
14.8	2,370	0.14	3	Highway Bridge
24.1	2,300			
28.6	2,276	0.10	4	Road Bridge
30.0	2,268	0.10		52 15'
32.0	2,257	0.10	5	Railway Bridge
41.8	2,204	0.10	6	Bridge
42.6	2,200			Blue River
49.7	2,138	0.17	7	Highway Bridge
50.9	2,128	0.17		52 00'
51.7	2,121	0.17	8	Wolfenden
54.1	2,100			
		0.80		
56.4	2,000			Messiter
		0.73		
59.0	1,900			
67.3	1,859	0.09	9	Avola
69.8	1,847	0.09		51 45'
74.0	1,826	0.09	10	Road Bridge
79.3	1,800			

TABLE 4.2: NORTH THOMPSON RIVER PROFILE (Cont'd.)

RIVER MILEAGE	ELEVATION (FEET)	SLOPE %	STATION NUMBER	DESCRIPTION
79.9	1,790	0.33		119 30' McMurphy
84.0	1,717	0.33	11	Wabron
85.0	1,700			
86.7	1,648	0.60	12	Railway Bridge
88.2	1,600			
		0.60		
91.3	1,500			
96.5	1,459	0.15	13	Vavenby
103.8	1,400			
106.1	1,381	0.15	14	Birch Island
111.5	1,339	0.15		120 00'
112.6	1,330	0.15	15	Clearwater
114.9	1,312	0.15	16	Clearwater River
116.4	1,300			
120.5	1,291	0.04	17	Mann Creek
126.5	1,279	0.04		51 30'
129.1	1,273	0.04	18	Boulder
132.4	1,266	0.04	19	Little Fort
138.1	1,254	0.04	20	Chu Chua
146.3	1,237	0.04		51 15'
151.1	1,227	0.04	21	Highway Bridge Barriere
155.6	1,217	0.04	22	Louis Creek
163.7	1,200			
165.9	1,196	0.03	23	McLure
168.0	1,192	0.03		51 00'
172.8	1,184	0.03	24	Black Pines
178.3	1,174	0.03	25	Heffley Creek
183.4	1,164	0.03	26	Rayleigh
189.0	1,154	0.03		50 45'
191.3	1,150		27	Swing Bridge at Kamloops

This provides some compensation for the missing rating curves by explicitly incorporating the effect of local changes in slope. The model uses use all of the data provided in the data files; future studies can extend these files with new data and consequently reduce the number of transects at which the model must make these assumptions However, since the computations are normally carried out at transects which are only 100-200 meters apart, it is unlikely that a complete set of measured transects will ever be available.

4.3.2.2 Local Inflow

The river has been gauged at four locations. Near Barriere, a station was operated from 1915 to 1959, measuring the runoff from approximately 7,700 sq.km. of drainage. In 1958, the station at McLure opened and it has since been measuring runoff from the 19,600 sq.km. above. Further upstream at Birch Island, the 4,450 sq.km. drainage area has been gauged since 1960. Measurements were also obtained at Black Pines during 1912 and 1913; this location is about 40 km north of Kamloops.

In addition to these data from the North Thompson River itself, there are a number of creeks and smaller rivers which have been gauged (refer to Table 4.3). These data could be used to calibrate a hydrological simulation model. However, because of the objective of simplicity in input data and the limited scope, it was decided to prorate the Birch Island measured discharge, which must be specified during a model run, to other river locations on the basis of drainage area above each river kilometer.

An adjustment factor is incorporated in the program to account for the difference in runoff per unit area between the North 'Thompson River at Birch Island and the river below its confluence with the Clearwater River. This factor, which is read from a data file along with the drainage area above each kilometer, accounts for some of the differences in climate, but the program has no mechanisms for recognizing variations in local runoff at a particular time of year. A keyboard input statement allows the user to adjust the discharge estimated by the model at the spill site when the program is run. If this is done, the model will prorate the value input at the spill site to downstream locations instead of working with the Birch Island discharge.

TABLE 4.3: STREAM GAUGING STATIONS

STATION NO.	LOCATION (AND RECORD PERIOD)		DRAINAGE AREA (km^2)
08LB047	North Thompson at Birch Island	(1960 - 1985)	4,450
08LB064	North Thompson at McLure	(1958 - 1985)	19,600
08LB022	North Thompson near Barriere	(1915 - 1959)	17,700
08LB015	North Thompson near Black Pines	(1912 - 1913)	
08LB077	Bone Creek near Blue River	(1977 - 1985)	267
08NG013	Mud Creek near Elko	(1914)	
08LB038	Blue River near Blue River	(1926 - 1929, 1984 - 1985)	
08LB017	Raft River near Clearwater	(1914 - 1919, 1952 - 1958)	764
08LA001	Clearwater River near Clearwater Station	(1914 - 1928, 1950 - 1985)	10,200
08LB050	Mann Creek near Blackpool	(1960 - 1981)	295
08LB078	Lemieux Creek near the mouth	(1977 - 1985)	195
08LB052	Barriere River at the mouth	(1915 - 1930, 1952 - 1985)	1,140
08LB072	Louis Creek at the mouth	(1971 - 1985)	515
08LB037	Thunder River near Blue River	(1926 - 1929)	175

4.4 CALIBRATION

The computer program which embodies the modelling approach developed here is not particularly complex mathematically, yet for proper calibration a great deal of data is required. This is not an unusual situation as noted by Beck (Mathematical Modelling of Water Quality, by Gerald T. Orlob, John Wiley & Sons, 1983, Chapter 2, p.24).

> "One does not have to search far for an answer to why it is not possible to verify many of the larger water quality models currently available, e.g., those of Chen and Orlob (1975); we simply do not have the facilities to gather all the field data that would ideally be required for model calibration. Yet the answer to the question is also partly bound to the fact that the behaviour of water quality in streams and lakes is rarely well defined and is often quite uncertain. We cannot therefore expect to place as much confidence in large water quality models as we might have in a model of a petro-chemical plant."

Later, in discussing validation (p. 36):

> "It is clear that calibration and verification represent the bulk of the procedure for model development and testing, once an experimental data set has been obtained. There is, however, no guarantee that the validity of the model extends beyond the sample data set against which it has been calibrated. Validation is, then, the testing of the adequacy of the model against a second, independent set of field data. Because validation thus entails the design and implementation of new experiments, it is unfortunately a step in the analysis that is all too rarely attempted. We may further observe that ..... a model can never be completely validated; we can never prove that its results conform to reality in all respects; it can only be invalidated?

He offers the following advice:

> "Let us dismiss the question, 'Have you proven that your model is valid?' with a quick 'NO'. Then let us take up the more rewarding and far more challenging question: 'Have you proven that your model is useful for learning more about the ecosystem?'"

4.4.1 Calibration Parameters

Of the several dye test locations, only the one near Little Fort was used for the calibration. This leaves data from the other locations available for judging the adequacy of the model and the data.

At Little Fort, there were cross-sectional measurements available at 1 km intervals along the channel and for each of these transects, the water surface elevation for the day of the field survey was recorded. The hydraulic modelling routines of the model were used to develop rating curves for these transects During the process of calibration, the rating curves' were adjusted to improve the match between the observed and calculated time base of the transient dye plume. However, the major factor influencing the calculated travel time was found to be the channel shape.

Initially, attempts were made to calibrate the model by adjusting only the rating curve and dispersion coefficients. Better results were obtained after all of the available cross-section survey data were used. This provided a measured transect at each kilometer of the three kilometer distance between the dye injection and the dye pickup points. It appeared that the most important factor in the calibration was a good knowledge of the channel shape. Even so, the surveyed cross-sections do not fully describe the variety of channel shapes over the dye test reach at Little Fort (Table 4.4).

Another concern in the calibration relates to differences in the way the tests were conducted and the way in which the model works, The model results show that the downstream concentrations are sensitive to the time elapsed while the dye was injected into the river. Since the volume of dye is small (only five liters), and the river flow is relatively large (about 200,000 liters per second) a difference of only a few seconds in the time taken during dye injection influences the initial concentration in the river and the resulting concentrations computed downstream.

Another related consideration is the width of the area initially contaminated at the dye injection point. The model assumes that this width is approximately 1/11 of the channel width, in this case about 15.7 m. The dye was actually injected over a more limited width of the channel, probably in the order of 1 m.

TABLE 4.4: CALIBRATION ASSUMPTIONS AND RESULTS, LITTLE FORT

FACTOR	VALUE
Source volume	30 liters
Source concent rat ion	20 percent
River discharge	200,000 liters/second
Injection location (river km)	209 km
Pickup location (river km)	212 km
Injection time	45 seconds
Longitudinal dispersion coefficient	0.5 $meters^2/second$
Lateral dispersion coefficient	15 $meters^2/second$

An additional consideration stems from the difference between the lateral and longitudinal dispersion as it is modelled (Appendix 4). During the tests in the field, a small quantity was injected at a point over a small period of time. The resulting plume observed downstream varies with time (i.e., it is a transient plume). As such, it is adequate for estimating the longitudinal dispersion coefficient. The best way to estimate lateral dispersion is to conduct a steady-state test in which the downstream concentration rises to a pleateau which is maintained long enough to permit reliable measurements of concentration across the channel at the downstream station. During dye tests, measurements were taken at almost the same time across the channel and these do provide some basis for estimating the lateral dispersion coefficient. However, the plume may follow a different transient behaviour below each such location because of differences in the local velocity as well as in the rate of longitudinal dispersion.

The river discharge was not gauged directly at the test site but was estimated from the WSC measurements about 30 km downstream at McLure where a flow of 204 cms was recorded (April 9, 1986) on the day of the dye tests at Little Fort. On this day, the WSC data showed that the flow upstream at Birch Island was 85 cms and using this value the model suggested that the flow at Little Fort would be 240 cms. Coincidentally for the next day, April 10, the WSC gauge at Birch Island recorded 85 cms again while the WSC gauge at McLure showed 240 cms, about the same value suggested by the model for Little Fort. There are a few small tributaries between McLure and Little Fort, but it is expected that the discharges at these locations would be similar.

The parameters adjusted during calibration were:

1. The volume of dye injected provided flexibility in estimating the concentration in the initial contaminated panel considered in the model.

2. The longitudinal dispersion coefficient affected the timing (slightly) and magnitude of the transient pollution peak observed downstream.

3. The lateral dispersion coefficient influenced the time at which a measureable concentration was computed downstream and the rate at which it diffused laterally.

4. The rating curve (stage vs. discharge) for each of the cross-sections in the test reach was adjusted to correct the timing of the downstream pollution peak,

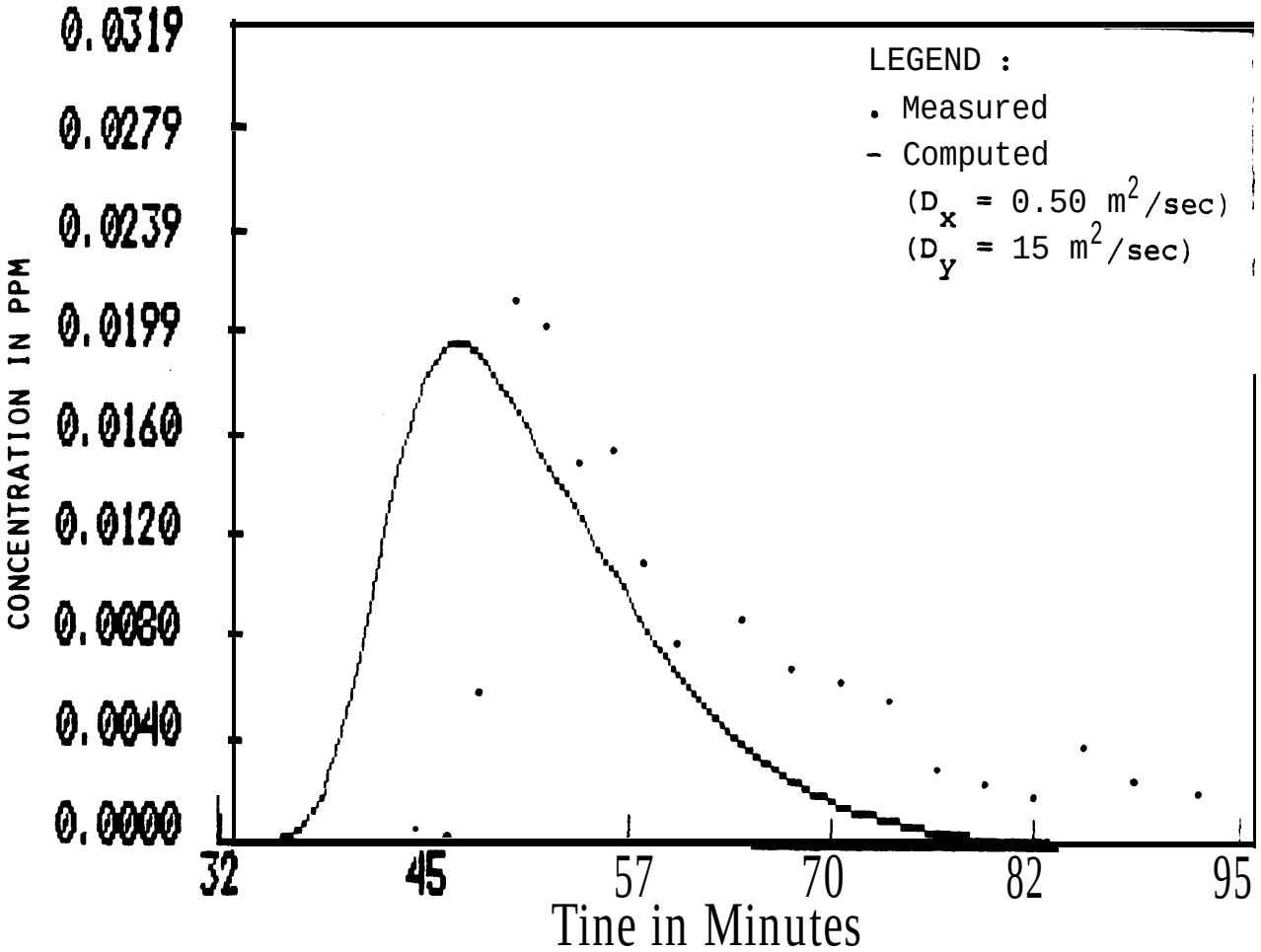
5. The discharge at the test site was not varied although results were quite sensitive to it. Lower discharges increased the concentration close to the injection point but reduced the concentration in the transient plume downstream because the lower velocities provide more time for dispersion.

A comparison between the computed results after calibration with the dye test results for three locations across the river at the pickup point is shown in Figures 4.3 to 4.5. The maximum computed and measured concentrations were about the same but the timing of the peak was off by about five percent. The general shape of the computed hydrograph (steeper on the rising limb) was similar to the observed behaviour but the fit was not precise. Near the west bank, the observed values are above the computed values, near the east bank they are below, and at mid-channel there is a cross-over. We did not minimize these discrepancies by further adjustment of the dispersion coefficients in view of the uncertainty surrounding the data. In future, the test data from the field could be specifically geared to the calibration and validation of this model over a range of flow conditions

Application of the calibrated model to spill scenarios is described in Section 7.0. Appendices 5 and 6 are, in essence, manuals to assist the user and they cover in detail the steps necessary to generate the required output.

4.5 APPLICATION OF CALIBRATION RESULTS TO OTHER LOCATIONS

At the other dye test sites, neither the discharge, the rating curve, or in some cases, the channel cross-section itself was measured. The dye tests in these reaches of

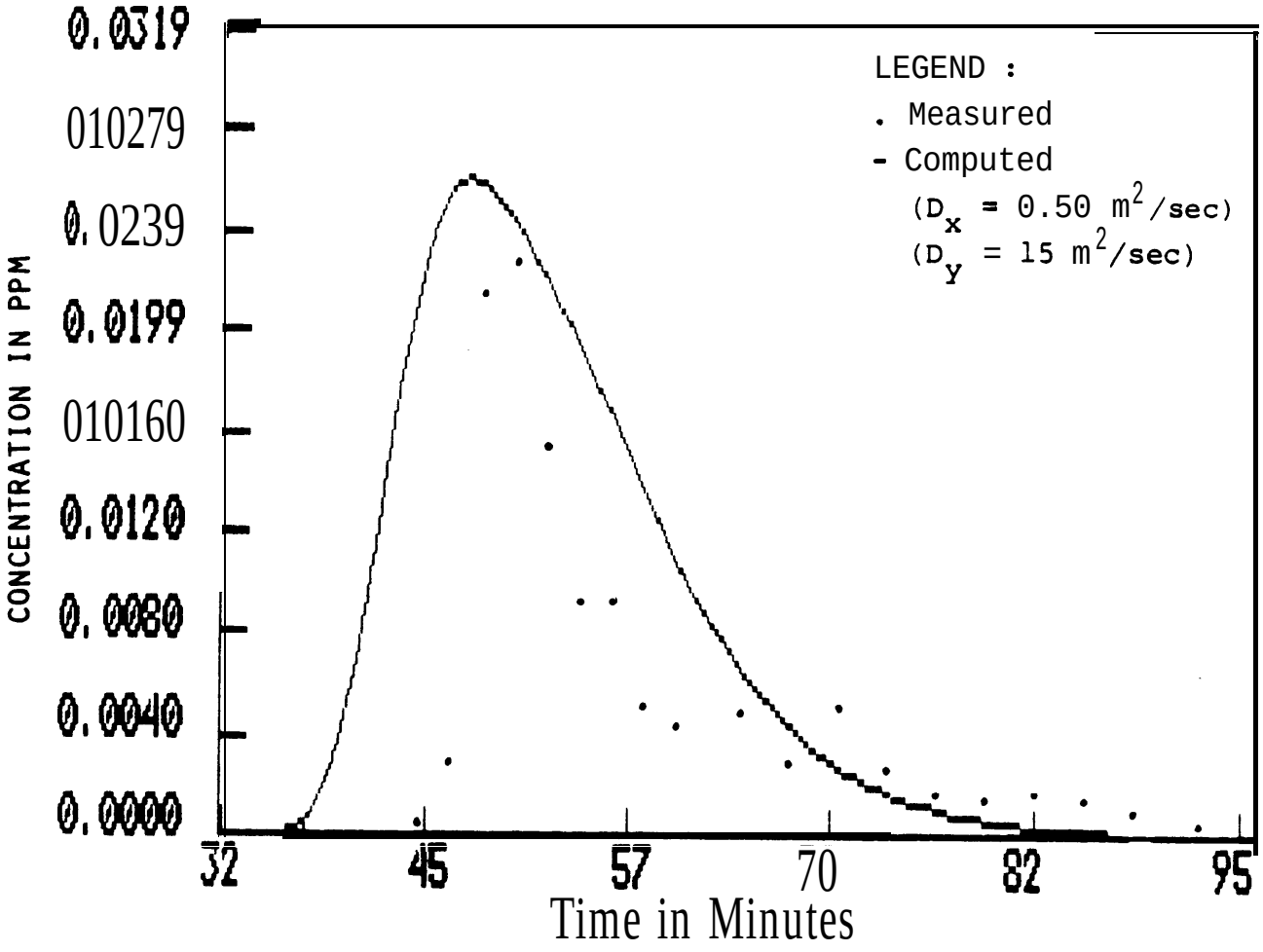


NOTES:

1. Dye injected at mid-channel at river kilometre 209, approximately.

2. Plume measured near west bank at river kilometre 212, approximately.

Figure 4.3 Little Fort Calibration Results, West Bank.

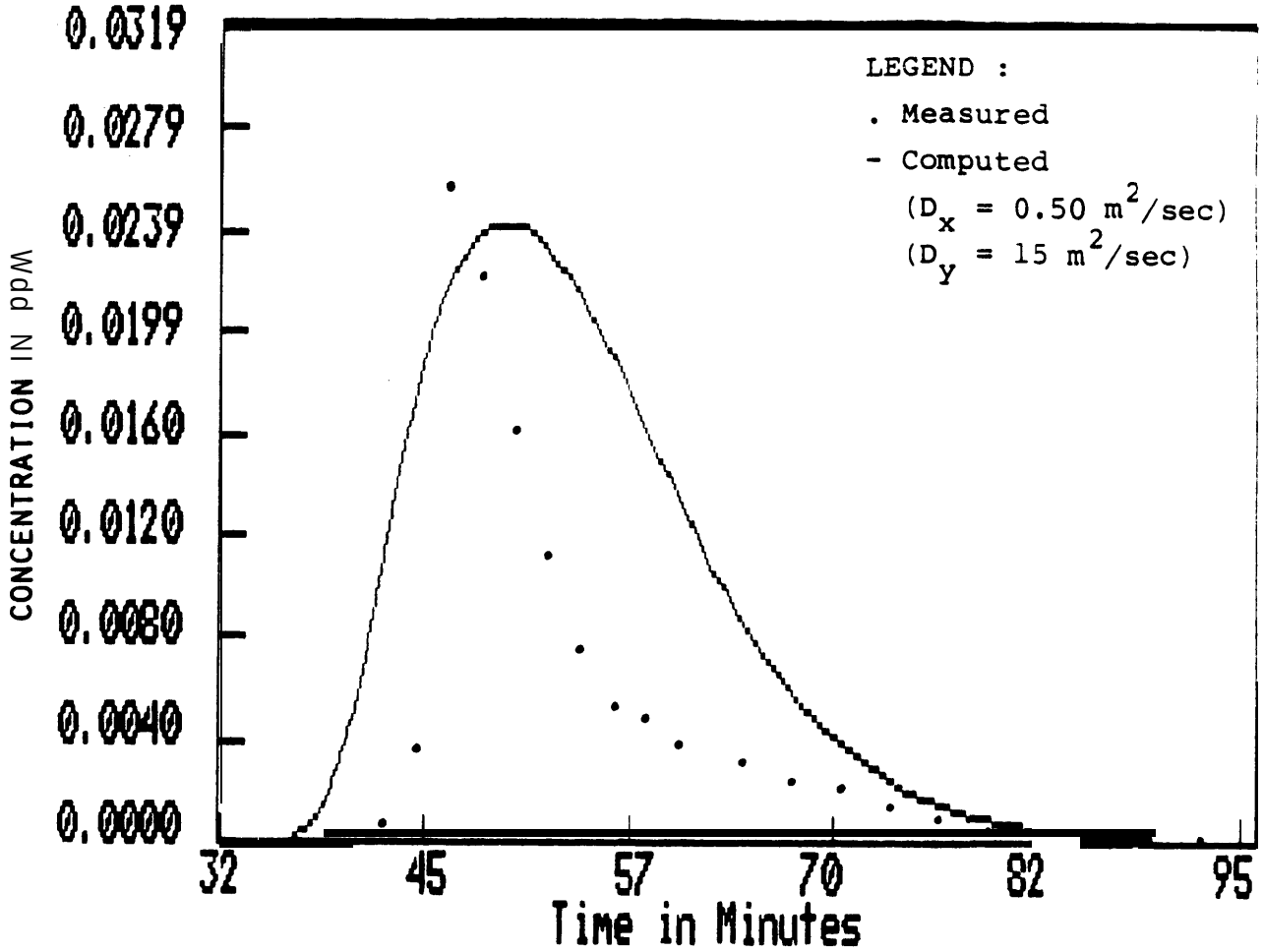


NOTES:

1. Dye injected at mid-channel at river kilometre 209, approximately.

2. Plume measured near mid-channel at river kilometre 212, approximately.

Figure 4.1 Little Fort Calibration Results, Mid-Channel.



NOTES:

1. Dye injected at mid-channel at river kilometre 209, approximately.

2. Plume measured near east bank at river kilometre 212, approximately.

Figure 4.5 Little Fort Calibration Results, East Bank.

the liver do not provide enough data for calibration, but they can be used for determining if the model results seem reasonable. To do this, it would be necessary to adjust the dispersion coefficients obtained during calibration to these other locations

The model already contains the method for making local adjustments to the dispersion coefficients At any given transect, it modifies the dispersion coefficient based on differences between average values for the transect as a whole and velocity and hydraulic radius in the various panels across the width of the channel. For this purpose, the following relationship is used by the model:

$$D_2 = D_1 \left[\frac{U_2 S_2}{U_1 S_1}\right]^{0.33} \left[\frac{R_2}{R_1}\right]^{1.33}$$

in which, for the channel as a whole, Dl is the dispersion coefficient (lateral or longitudinal), Ul is the mean velocity, Rl is the hydraulic radius and Sl is the hydraulic gradient. For each panel on the transect, D_2 is the dispersion coefficient, U_2 is the mean velocity, and R_2 is the hydraulic radius The ratio of slopes was assumed to be unity for the panels on a transect.

The calibration results themselves could be adjusted for discharge variations using the same procedure. Thus, at Little Fort, as elsewhere, the lateral and longitudinal dispersion coefficients would be increased at higher flows according to the increase in velocity, hydraulic radius, and hydraulic gradient. The result would be a tendency to reduce concentrations below the site of a spill at high river flows. It is probably conservative to omit this adjustment from the model. Nevertheless, future improvements to the model should consider incorporating automatic adjustments to the dispersion coefficients to account for river discharge variations as well as transect location.

4.6 LAND SURFACE AND SUBSURFACE TRANSPORT

Transport of chemical pollutants on the land surface involves solution of unsteady, non-uniform flow equations on a surface and is as complex as stream-entrained or subsurface transport. Appendices 2C and 2D provide approximate mathematical solutions for some of the conditions likely to be of interest. Additional work would be necessary to extend the range of applicability of these results and to implement the equations into an easily usable computer program. The important parameters defining the surface movement include the viscosity and surface tension of the pollutants, the infiltration rate of the pollutant into the soil, the land surface slope, the loading rate from the source, and the evaporation rate of the pollutant.

Surface transport of hazardous chemicals is accompanied by infiltration into the soil profile. Infiltration will reduce the net loading to the stream since some soils will retain a large quantity of non-wetting liquid. Infiltration will also delay the movement of chemicals into the stream channel as some of the spilled volume may follow the groundwater flow into the stream. Subsurface transport is closely tied to the hydraulic conductivity of the soil profile, the degree of saturation of the profile, the soil moisture characteristic and the depth to the water table.

The governing unsaturated flow equation must be solved numerically for a particular soil profile due to the complexities of the diffusivity and the unsaturated hydraulic conductivity. An assumption of saturated conductivity leads to order of magnitude errors in travel time and ignores the ultimately limited extent of the subsurface contaminated volume which is permanently retained by the soil.

Vertical infiltration from the surface of non-wetting liquids is closely related to the water content in the upper layer of the soil, which is determined primarily by recent (i.e., immediate pre-spill) hydrometeorological events. When the soil at the surface is practically dry, the immobile water content reduces somewhat the effective porosity for the pollutant movement, and the displacement will be essentially two-phase: pollutant and air. When water saturation is higher, the water is partially mobile, and the displacement process is three-phase: air-pollutant-water.

Computer programs developed by Charles Howard and Associates Ltd. (unpublished data) and an extensive compilation of unsaturated conductivity factors were used to **illustrate** the rate at which an oil front penetrates two types of soil, silt and sand. Figure 4.6 shows that in sand it will take several days to reach a depth of 0.3 m and in silt the time required would be longer. These results **are** quite different from an analysis (incorrectly) based on fully saturated permeability coefficients which would indicate penetration in the same soils at rates up to ten times faster.

The practical implications for spills on land are:

The soil profile will permanently retain a significant quantity of pollutant.

Overland movement can be effectively retarded by providing a permeable surface gravel pad.

The rate of penetration of pollutant into the ground is an order of magnitude slower than suggested by calculations based on saturated coefficients of permeability.

4.7 DRPINITION OF HYDROLOGICAL TERMINOLOGY

4.7.1 Initial conditions

Prior to the spill accident, the river flow and stage throughout its length is assumed to be known. The initial conditions upon which the spill takes place are described by the velocity **and** depth at all points across and down the river. These are calculated from the river discharge, which increases in a downstream direction, and the surveyed, or assumed, cross-sections at each kilometer. The computer program assumes that these initial conditions do not change with time. The transport and dispersion of the spill is superimposed upon these steady hydraulic conditions in the river.

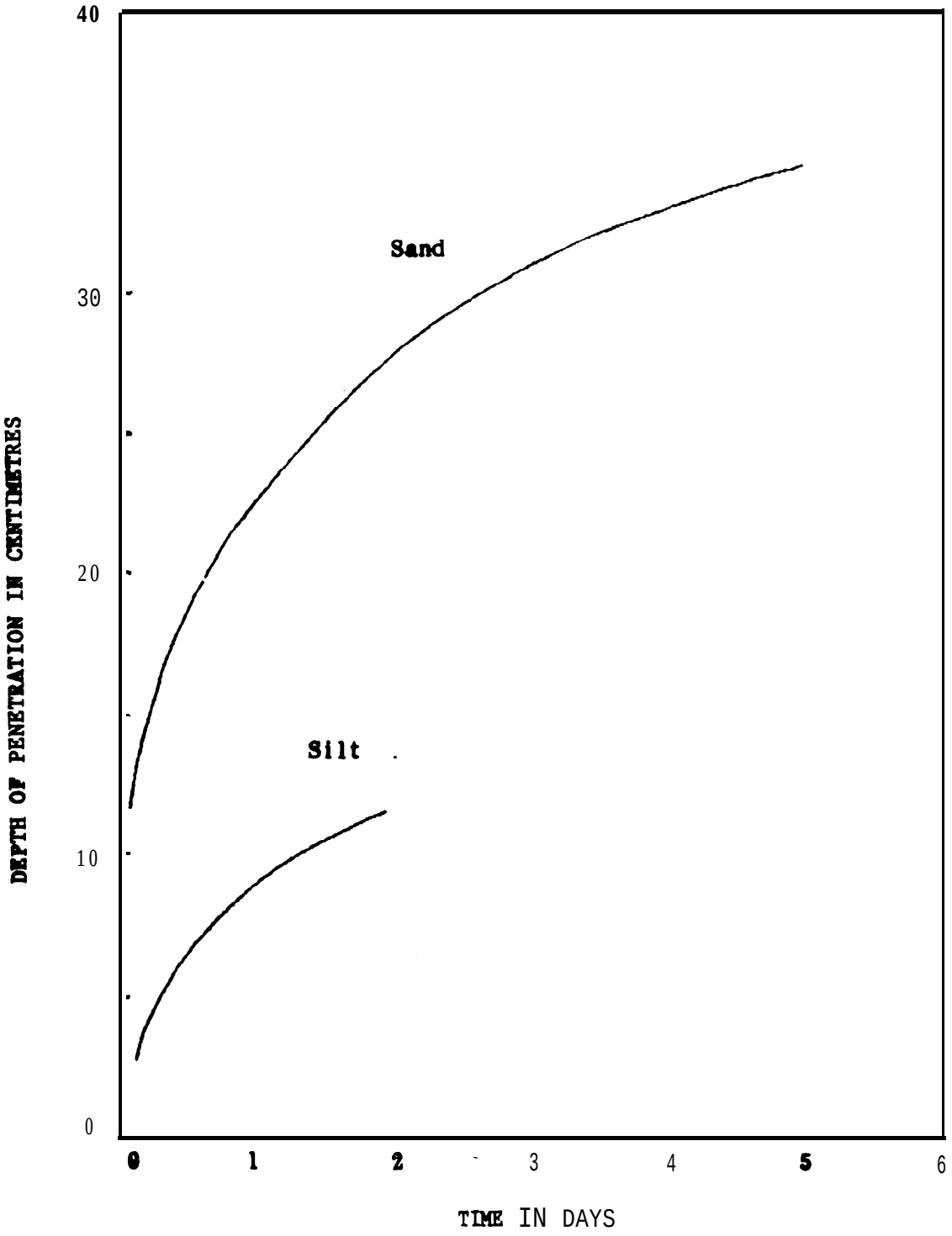


FIGURE 4.6: PENETRATION OF AN OIL FRONT
(UNSATURATED NUMERICAL SOLUTION)

4.7.2 Steady-State Solution

This is the case when the source of pollution is at a steady, non-varying rate, and continues to discharge into the river for an indefinitely long period of time. At start-up or shut-down of such a source, the downstream concentration will increase, or decrease, respectively with time and this temporal variation will not be detected by the steady-state solution.

4.7.3 Transient Solution

This is the case when the source of pollution discharges to the river at a time varying rate, or is limited in total volume. Downstream concentrations will vary with both time and location and the transient solution will fully describe these variations. In the limiting case, when the pollutant discharges constantly, the transient solution will give the same result as the steady-state solution. Conversely, at a large distance downstream from the pollution source, the concentration given by the steady-state solution will approximate the maximum concentration reached in the pollution plume calculated by the transient solution. This observation suggests that the steady-state solution can be used to identify the maximum concentrations which might be reached downstream. The transient pollution plume cannot have concentration higher than that reached by a steady-state pollutant discharge at the highest rate experienced during an accident.

4.7.4 Rating Curve

The relationship between the river water level (stage) and the discharge at a particular location is called the rating curve.

4.7.5 Hydraulic Radius

This is the ratio of the cross-sectional flow area to the wetted perimeter of the river at a particular location. Hydraulic radius varies with discharge and channel shape and it may be affected by downstream configurations which cause backwater at high flow rates,

5.0 COUNTERMEASURES (Author: L.B. Solsberg)

5.1 BACKGROUND

Countermeasures were examined to control releases resulting from railway car accidents of ammonia, ethylene dichloride, sodium hydroxide and styrene. For each substance, smaller spills involving several hundred litres were considered as well as larger spills of several thousand litres entering air, land and water regimes associated with the North Thompson River.

The approach taken was first to review the properties of the four chemicals of most relevance to spill response and then to identify and assess the most promising clean-up approaches and techniques according to a synthesis of the current literature. It should be noted that the control strategies discussed are based on predictions of what might occur and these might not ever apply to actual events. Furthermore, reference sources offer conflicting data which were not always resolved. Therefore, each accidental release would have to be investigated, as it occurred, on a case-by-case basis. Experts would have to be consulted on the advisability of employing suggested clean-up technologies and techniques for a specific set of circumstances to ensure safe and efficient operations.

Nonetheless, an ordered sequence of control steps has been studied inclusive of countermeasures systems that will likely be of relevance to some spill eventualities This information has been organized as follows:

CONTAINMENT:

- Leak mitigation and vapour control
- Containment on land
- Containment in water

REMOVAL:

- Removal from land
- Removal from water

TEMPORARY STORAGE

TRANSFER

ULTIMATE DISPOSAL

WINTER OPERATIONS

The above format avoids the unnecessary repetition of data pertaining to the storage, transfer and disposal of collected material for each spill into air, on land and into water. Where treatment methods apply to discharges on land as well as into water, and where such methods could be viewed either as removal or disposal, then such distinctions are noted and/or repetition avoided. For similar reasons, clean-up operations under winter conditions have been accorded a brief examination. The treatment of contaminated groundwater is discussed in conjunction with removal operations for dealing with spills on land.

Specific sites suitable for implementing countermeasures are not reviewed in subsequent sections. Again, each spill situation would have to be assessed individually according to the volume and nature of the release, its location, seasonal concerns (including water level and flow, snow cover, precipitation, etc.) and other response considerations. It is likely that clean-up will proceed directly relating to the Thompson River where access exists, time allows for the initiation of a response and the containment plume is amenable to treatment. Clean-up procedures might be possible at such sites as the Little Fort ferry crossing, Birch Island Bridge, Avola Bridge and river reach immediately to the north, and in proximity to the bridge adjacent to the Blue River landing strip. These locations are noted as possible examples only and countermeasures should not be restricted to them alone, if indeed they are determined to be acceptable in the first instance.

5.2 AMMONIA

5.2.1 Containment

5.2.1.1 Leak Mitigation and Vapour Control

Fire and vapour control will likely be first priorities for discharges of anhydrous ammonia. Dry chemical or carbon dioxide can be used to extinguish small fires Railcars damaged and/or exposed to fire can be cooled with water but only if this does not result in the heating of tank contents, which could be the case for the liquefied gas Vapours can be sprayed and knocked down with water with all contaminated water being contained.

Foam can also be used for vapour control under some circumstances, if this is deemed to be practical, National Foams Hazmat NF Number 1 Foam could be tried as a vapour suppressant to treat pools accumulating in land depressions Otherwise, and more generally, high expansion, alkaline-resistant, surfactant (synthetic detergent base) foams should reduce downwind concentrations. These minimize the reaction of ammonia with water unlike low expansion foams, which add water more quickly. Hiltz and Gross (1980) indicate, in fact, that medium to high expansion foams should reduce downwind concentrations. Extended foam application, they contend, can ultimately induce gas warming and buoyancy to dissipate clouds and in this way restrict downwind travel Foam applications in high winds and aqueous film-forming foams (AFFF) are not recommended. Whiting and Shaffer (1978) review an opposite approach which utilizes helicopter downwash to more directly disperse hazardous vapours without first confining evaporating liquid pools

Smaller punctures of railcars might be amenable to plugging and patching techniques to *effect* temporary repairs. The feasibility of this approach for halting the release of anhydrous ammonia would have to be assessed in the field and is conceivably out of the realm of possibility. The control of leaking ammonia solutions is, on the other hand, possible when disc&e openings are involved and response can be quic kly and safely accomplished by highly trained crews. The following devices might then apply:

Edwards & Cromwell Emergency Package
Plug N'Dike
Rockwell's External Leak Plugging System (for holes to 20cm)
Polyester (Glad Bag) and Imid polyester (Environment Canada, 1984b)

The Tantalum Patch Kit is not recommended because of materials incompatibility. The use of mechanical covers (membranes) to suppress vapours is also not favourably viewed because of the impracticality of their application and the chance of introducing an explosion hazard. Similarly, the Vetter Sealing Bag may not always be practical to apply, depending upon the nature of the damage to the tank car, but may afford leak stoppage in some instances

5.2.1.2 Containment on Land

It is not very likely that spills of anhydrous ammonia released onto land will be amenable to containment. Evaporization will have occurred before a response can be mobilized and clean-up begun. Still, vapour control methods which utilize water spray or foams could be applicable, as discussed above, for some situations Where vapours have been knocked down by water or where discharges of aqueous ammonia solutions are involved, containment will be more feasible.

Earthen dykes, particularly those that are compacted and composed of high clay content soil (bentonite, etc.) will provide more effective containment than the use of coarse grain or sandy materials In addition, most synthetic liner materials could be used to render a dyke impervious. Butyl rubber offers less resistance to ammonia in this regard (see also Storage). In a similar fashion, ammonia solutions could be halted, in theory, by the construction of a barrier made of synthetic foam. Such products include:

Foamed Concrete Barrier System (MSA Research Corp.)
Froth-Pak Portable Foam System (Lusta-Foam Products, Inc.)
MSAR Dike-Pak

The opportunities to instantaneously fabricate a foam barrier to intercept flowing, released ammonia solution during a spill may be limited; however, it is significant to note that the foam can be quickly applied, if needed, to form a lightweight impervious structure, perhaps in conjunction with other means of containment, storage or other clean-up work,

In the rural area through which railroad lines parallel the Thompson River, there would also be little or no reason to procure the Clark Spilstopper Mat or equivalent form of smaller sized barrier. Such devices are useful to stop entry of spilled chemical into an opening such as a sewer, but impractical in the anticipated situations associated with the study area. Soil surface sealing methods are also not recommended because of various impracticalities ranging from their theoretical nature to expected interferences from vegetation and other ground cover.

Sorbents, which both contain and remove spilled materials, are primarily considered under Removal and in the next section immediately below, Containment in Water.

5.2.1.3 Containment in Water

Containment of ammonia spills in both small and large watercourses will not usually be feasible because of ammonia's high water solubility. The interception and concomitant removal of lesser volumes of ammonium hydroxide might, in some circumstances, be attempted. Blocking or diverting even smaller streams, however, is not widely reported in the literature so that hardware such as the Portadam or the U.S. Environmental Protection Agency's Mobile Stream Diversion system do not generally offer effective spill control potential, The latter is not commercially available and the approach, in any case, would not readily lend itself to the Thompson River since unreasonably large volumes of contaminated water would have to be processed at some downstream point. Sorbents might have application and are considered under Removal.

It is likely that innovative steps will have to be devised at the spill site itself, if a creek or smaller watercourse is involved. This could entail the construction of chicken wire/posts/straw bale dams backed by peat moss to form water-permeable barriers (Harsh, 1978). Other sorbent products could substitute for the straw and/or peat moss as is subsequently suggested. Note that most commercially available sorbent booms would not be applicable to ammonia spills although individual manufacturers should be consulted in this regard.

Containment of ammonia spills in the Thompson River itself will not likely prove to be realistic based on the technology examined in this study. Treatment methods could be considered and are reviewed in Removal.

5.2.2 Removal

5.2.2.1 Removal from Land

Subject to safety constraints, the method of choice for removing aqueous solutions of ammonia pooling in significant quantities is direct pumping. Both smaller transfer units (see also subsequent section) and larger vacuum systems could remove ammonia that has not penetrated the ground. Jabsco Products (undated) recommends against the utilization of pumps with bronze shafts and bodies for processing ammonia liquors as well as against PVC for anhydrous ammonia; Viton seals and impellers are similarly inappropriate while Neoprene is judged to be satisfactory in this regard. Cast, stainless 316, phenolic and epoxy pump construction are viewed favourably. Examples of equipment that could be applied to recover ammonia, other than standard available pumps, include:

SMALLER UNITS:

- Harris Hi-Vat Vacuum
- Spillvac Vacuum

LARGER UNITS:

- Peabody Myers Vactor
- Super Products Supersucker
- Standard vacuum truck

Pumping operations could also consist of drawn-down wells, and interceptor trench, submersible pump, holding tank, secured area, etc., down-gradient from the surface zone of contamination.

A range of sorbent materials could also be directly applied to spills of aqueous solutions of ammonia to contain and remove minor amounts The final stages of a larger scale release could also benefit by the use of sorbents. Some vapour control could also be simultaneously achieved although this should not be expected to be significant and would not have a bearing on determining personnel protection needs. The following sorbents warrant consideration :

Cellosize W P3H (hydroxyethylcellulose)
Conwed
Absol Absorbent
Hazorb
Safestep Sorbent
Spill Control Pillows

In a similar fashion, gelling agents could be used to immobilize aqueous solutions of ammonia lying in depressions . This approach is not seen to be one that would be routinely weighed as an option because of its expense, the more direct approach afforded by pumping and the secondary clean-up phase which must still be conducted subsequent to gelling. Interference from vegetation, dilution by water and the introduction of other contaminants also render this method somewhat questionable. Still, Industrial Services International Inc.'s Chem-Gel and the U.S. EPA's Multipurpose Gelling Agent as well as U.S. Testing Co. Inc.'s Spill/Clean Gelling Agent can all theoretically treat ammonium hydroxide (Environment Canada, 1984b) in smaller amounts. A decision would have to be made on whether procurement of a gelling agent on a prespill basis were desirable. Prior field testing is recommended to determine if gelling is feasible in terms of its practicality and efficiency of reaction (i.e., achieving intimate contact between agent and solution, effect of temperature, mixing requirements, etc.).

Smectite clay in the form of Mg-montmorillonite to treat ammonia spills falls in between the physical sorptive processing of sorbents and the chemical immobilization of gelling agents It has been suggested as a possible approach, subject to verification, by C. Van Netten (Solsberg and Maynard, 1986).

Insofar as treatment is concerned, water has already been indicated as a means which can be used to suppress vapours and otherwise dilute aqueous solutions Containment and transfer procedures must still follow. Similarly, simple neut ralization with dilute hydrochloric acid could also be considered either for larger spills on land or releases into water (Harsh, 1978). Environment Canada (1984b) cites the following more complex treatment scheme for ammonia-contaminated water:

water dilution, neutralization with HCl (pH 7.0)
gravity separation of solids
neutralization with H_2SO_4 (pH 6.0 - 7.0)
dual media filtration, backwash to separator
ion exchange of filtrate
neutralization with NaOH (pH 7.0)

The above wastewater treatment type of approach is obviously a more complicated processing method that would not readily lend itself to a quick, mobile field response. Over a longer term clean-up, such treatment would be possible but it is difficult to envisage a situation where other less complex methods would not first be considered to remove spilled ammonia remaining in the environment. Air stripping and, to a lesser extent, chemical oxidation are two such approaches that could offer some remedial benefit in dealing with ammonia that had entered groundwater, particularly along the Thompson River. Steam stripping offers similar potential.

The solvent extraction system developed by Rexnord Inc. for the U.S. EPA (Solsberg and Parent, 1985) is a mobile, prototype package that virtually accomplishes the treatment prescribed by Environment Canada described above and also includes a soil extraction step. However, the system is not in use in Canada, and, moreover, the

complete unit requires the U.S. EPA-ORD physical/chemical treatment trailer for processing and recycling waste water. Again, its utilization is not likely not only because of the unavailability of the U.S. system, but the stronger likelihood of selecting a more simple solution to recover ammonia.

One possible means of concentrating either aqueous ammonia solutions that have been diluted or vapours knocked down by water spray is the reverse osmosis (RO) unit which Environment Canada has helped to develop (Whittaker and Norwakiwsky, 1983). The concentration of NH_3 remaining in the permeate may still be at levels unsuitable for direct discharge to a watercourse; however, use of the RO unit perhaps in combination with other treatment could greatly reduce the volume of liquid required to be removed from the spill site.

Alternative techniques that might prove to be feasible to ameliorate the effects of both large and small ammonia spills relate to the behaviour of ammonia in soil. Potassium chloride solution can remove chemically-bound ammonia and can then be treated by aeration (Environment Canada, 1984b). Soil constituents such as illite and vermiculite (i.e., clay minerals) can also undergo fixation reactions with ammonia to reduce its availability. Note that excess ammonium ions can still be leached and transported by groundwater. In some soils, nitrification could occur to the point where plant uptake proceeds, Generally, however, it is preferable to remove spilled ammonia to the extent possible since it could have damaging effects despite its natural occurrence in the atmosphere and role in the production of fertilizers. Typical of the latter is the large-scale production of urea through contact with carbon dioxide. Such in-situ treatment cannot be considered since the reaction must proceed at a temperature of 150°C under pressure (Muldoon and Blake, 1957).

5.2.2.2 Removal from Water

For smaller water courses, several of the methods previously discussed to control spills on land could be implemented:

Reverse osmosis
Semi-permeable peat/straw barrier
Sorbents

Neutralization with HCl, NaH_2PO_4 (also try J.T. Baker neutralizing mixture Solusoc b)
Mobile t reat ment system

Each would have to be considered in relation to the type of stream involved, effect on un-ionized ammonia, volume of spill and other circumstances Treatment is a less likely approach as compared to the use of physical barriers and sorbents.

Once into the Thompson River, ammonia will quickly mix into the water column but still might reach and maintain concentrations at levels toxic to aquatic organisms for several kilometers or more downstream. Application of sodium dihydrogen phosphate could be attempted; however, interception of the spill and determination of precise volumes to inject into the river may prove to be difficult to ascertain. Containment using physical barriers or deflection/diversion of contaminated water will not be possible.

Clinoptilolite and other natural zeolites are ammonium-selective and have been cited by Environment Canada (1984b) as a possible means of treating ammonia spills into water although their use in the Thompson River is very likely impractical. The Nold De-Aerator is also noted as a possible approach, but, again, it is probably not feasible to use once ammonia has entered the river. Air sparging and aeration could be accomplished if concentrations of ammonia in the Thompson River were amenable to such treatment. Portable air compressors and perforated piping could be tried such as the air bubbler systems used by Alberta oil spill cooperatives. The quick response time needed to strategically locate bubblers all but eliminates this approach as a practical one.

5.2.3 Temporary Storage

Storage of collected aqueous ammonia solutions should not pose a problem. Road access should be planned for so that tank trucks can be used to hold and transfer liquid. A range of flexible tanks can also be considered, if needed, including bladders, pillow tanks, port-a-tanks, and other non-rigid containerization. These would be more practical for areas of restricted access and where limited volumes of contaminant are involved.

Many synthetic materials are likely to be applicable to ammonia although the literature is somewat confusing in this regard because temperature, concentration and hardware application all must be considered. Fisher Scientific (1986) only lists polycarbonates to be avoided, with polystyrene and polysulfones offering less, but adequate chemical resistance. Jabsco Products (updated) notes that Viton and PVC should not be pump components with anhydrous ammonia while Butz (1984) specifies chloroprene rubber (Neoprene) to exhibit good chemical resistance to aqueous ammonia. Both Butz and Environment Canada (1984b) indicate a wide range of other synthetic rubbers and polymerics to be applicable to ammonium hydroxide. Consultation on this aspect is advised. The literature sources cited above and the American Association of Railroads (1984) are unaminous in pointing out metals should be avoided inclusive of galvanized steel, copper and its alloys (bronze is usually specified), aluminum, and zinc alloys. Insofar as the transfer and storage of liquefied ammonia is concerned, experts would have to be called upon to manage'this more complicated procedure (see also Section 5.2.4, Transfe r).

Other rigid wall systems might be effectively used under circumstances where initial set-up and subsequent transfer of contents is possible:

Bulkdrum, Hoover Universal Inc.
Modular Holding Tanks, Modutank
Portable Reservoirs, Columbia Reservoir Systems (1977) Ltd.

Trenches with liners comprise a fourth approach for the temporary storage of ammonia solutions. The materials selected for such use would be identical to those comprising the non-rigid tanks. This approach would be more likely to be used in a large spi ll.

5.2.4 Transfer

As was pointed out in Section 2.3.1, care should be taken in selecting suitable pumps so that transfer operations of ammonia solutions can proceed smoothly and damage to both casing and internal components is avoided. Centrifugal pumps constructed of iron

or stainless steel 316 are resistant to aqueous solutions of ammonia. On the other hand, copper alloys including both bronze and brass should be avoided in pump bodies, shafts and fittings Anhydrous ammonia requires similar processing equipment with PVC to also be avoided as well as Viton seals. Examples of suitable pumps include those from:

Bell & Gossett
Chemtrol
Flygt (submersible)
Fybroc Fiberglass
Gilkes
Kantro
Multiquis Inc.
Warren Rupp
Etc.

Note that the selection process should still ensure that a suitable design is used so that, for example, the Bell & Gossett centrifugal unit should not be chosen that features bronze fittings. The Busch vacuum pump or other such pump may have to be utilized when ammonia vapours are involved. Experts should supervise the selection of pumps, hoses and movement of all forms of ammonia.

Transfer hoses are manufactured specifically for ammonia service and materials such as PVC, polyethylene, and other synthetics are sometimes used. Stainless steel fittings are recommended whereas aluminum is subject to corrosive action (Association of American Railroads, 1984) and should be avoided. More specifically, B.F. Goodrich Industrial Hose (3600) composed of black rubber can be used to move anhydrous ammonia. Gates 73B-HB hose can also be used for the anhydrous form with a range of other hoses suitable for aqueous am moniacal solutions Goodall also manufactures ammonia compatible hoses (Solsberg and Parent, 1985).

5.2.5 Ultimate Disposal

Ideally all ammonia-contaminated water should be collected and forwarded to a waste management facility. Concent rating solutions using reverse osmosis might facilitate such disposal if the waste stream produced complies with applicable regulations.

In-situ treatment of spilled ammonia might also result in its ultimate disposal. The multi-step processing scheme previously indicated in Section 2.3.1, is only likely to be attempted at a fixed facility removed from the spill site and could be effectively used to provide disposal. It is not, however, recommended as an in-situ method. Other approaches that might be tried insitu include air stripping and wet air oxidation (see also Ethylene Dichloride). Such methods should first be tried on a smaller scale to determine their feasibility. UV/ozone is another oxidation approach that might be considered although it is still being researched mainly as it might apply to chlorinated hydrocarbons.

Ammonia can often be effectively disposed of in landfills, particularly those characterized by clay soils. There is still the possibility that leaching could eventually occur with the intrusion of water. Bentonite/cement fixation or other similar treatment such as the Chemfix process would allow the disposal of concentrated ammonia into a landfill to render it more secure but the expense may not be warranted if the site is well designed. Cementation should be avoided, since its alkalinity would drive off ammonia gas Otherwise, a properly managed landfarming operation could provide an effective means of introducing ammonia into the naturally occuring nitrogen cycle if mixing with soil, pH control, water content, etc., were all appropriately controlled.

5.2.6 Winter Operations

In winter, the snow cover should assist more than hinder clean-up operations if access is not unduly restricted. Vapour suppression could be attempted using a snow blower, safety permitting. Snow could similarly be used as a sorbent with contaminated

materials being handled by front-end loaders and dump trucks to facilitate clean-up. Dikes, lined storage areas and other systems could be improvised in the field depending upon the temperature and circumstances of the spill event. It is unrealistic not to expect a range of difficulties presented by cold weather including engine start-up problems, freezing of water solutions, etc. Where entry of ammonia into water courses is prevented by ice cover, an obvious advantage would be gained.

5.3 ETHYLENE DICHLORIDE

5.3.1 Containment

5.3.1.1 Leak Mitigation and Vapour Control

Fire prevention and/or control are priority actions which must be addressed when warranted following a spill of ethylene dichloride. For small fires, foams appropriate for halogenated, flammable hydrocarbons might be used such as AFFF/alcohol surfactant-based products Consultation with experts is first advised to ensure proper selection so that quick extinguishing of fire results and vapour control is satisfactory. Dry chemical, CO_2 or water spray can also be used. Containers should be cooled with water and all contaminated water contained. Note that toxins are produced as the result of combustion.

For larger fires, water spray/fog and foams are both recommended (Environment Canada, 1984c) along with the cooling of containers.

When safe and practical to do so, the plugging and patching of tank cars might be feasible to attempt by expert crews. For smaller, well-defined punctures, the following devices could be considered:

Edwards and Cromwell Emergency Package
NRC Tantalum Patch Kit
Plug N' Dike
Rockwell External Leak Plugging System
Vetter Sealing Bag

Note that the Rockwell system must be used with an appropriate applicator tip that replaces the standard PVC material. Also, the Vetter Sealing Bag should only be used when it can effect the type of temporary repair that is required.

5.3.1.2 Containment on Land

Earthen barriers could be constructed when this action will halt the flow of ethylene dichloride. Soils high in clay content are preferrable that have been compacted. Additionally, liners should be used particularly if coarse grain materials are involved. Chlorinated and unchlorinated PVC membranes should be avoided (derived from Environment Canada, 1984c) while butyl rubber will also likely undergo failure upon prolonged exposure (But z, 1984). In a similar manner, smaller spills might be controlled on land through the use of synthetic foams when applied to construct temporary barriers although polyurethane foam is not generally compatible with hologenated hydrocarbons (Fisher Scientific, 1986). Such devices include:

Foamed Concrete Barrier System (MSA Research Corp.)
Froth-Pak (Lusta-Foam Products, Inc.)
MSAR Dike Pack

Due to the quick response required for foam barriers to be strategically placed, their lack of spill-documented usage, and the nature of the geographical area of concern, their application is questionable. The approach, however, remains intriguing as a means to instantly erect a barrier impervious to ethylene dichloride. As was also discussed with regard to ammonia, the utilization of the Clark Spilstopper Mat, Sanimat or other covers is not likely to contribute to spill control in the Thompson River area. Sorbents are reviewed under Removal.

5.3.1.3 Containment in Water

Containment of ethylene dichloride in water presents difficulties and it is probable that improvisational met hods in the field will be required. Although only slightly water soluble, ethylene dichloride sinks and dissipates according to localized hydrological

conditions to possibly contaminate bottom sediments over an extended area. Therefore, containment techniques must consider halting migrations toward or at the bottom of water courses. The efficiency of such attempts will vary according to the circumstances of the spill and its size.

In smaller water courses, mechanical containment might be achievable where a weir and overflow device can be devised so that materials transported at or toward the stream bed are trapped. Wider, more quiescent pool areas should provide locations where this is possible to do so and where undisturbed bottom accumulation and subsequent removal is possible. Environment Canada (1984c) suggests the use of sand bags to accomplish this

An improvised barrier could also be constructed such as that discussed under Ammonia comprised of chicken wire/posts/straw bales and backed by sorbent, peat moss or other material. Activated carbon contained in mesh bags and sorbents that have been weighted and positioned at the stream bottom may also achieve the same result; however, such approaches require continuous renewal of the barrier which might result in the substantial release of contaminant (see also Removal).

In the Thompson River, containment is likely to be less feasible although not entirely out of the realm of possibility. Certainly, suitable sites would have to be more selectively chosen based on seasonal flow, access, and distance from the release point. It is conceivable that a sand bag barrier could be constructed across the width of the river at a point where spilled material hugging the bottom would tend to deposit. Wider, shallow dver reaches would be most suitable. A variation of this approach would be the use of sand bags positioned in an angled line so as to deflect ethylene dichloride toward an embayment where accumulation and removal will follow. This technique emulates surface booming practices and takes into account the tendency of the contaminant to continue to move along the bottom in a current in spite of a vertical plane built to impede its progress Like conventional spill barriers, an angled configuration should reduce the relative velocity while increasing the containment efficiency. Overflow, entrainment, underflow, etc., might still occur if stream velocities are too high. The approach is most suitable to try in the event of a major spill.

5.3.2 Removal

5.3.2.1 Removal from Land

A wide variety of techniques might have application to the removal of spilled ethylene dichloride that is confined on land or in groundwater. Simply pumping spilled product using standard pumps and vacuum systems is an obvious approach when this is practical and safe to do so and is a direct, uncomplicated procedure. The choice of transfer equipment is discussed more fully in Section 3.6 with respect to materials compatibility.

For smaller spills, or the final clean-up stages of a larger spill, a range of sorbent products could be used:

Sand, earth, other such materials
Absol
Conwed D
Hazorb
Imbiber Beads
Safestep
Spill Control Pillows
Activated Carbon Sorbents

These would immobilize the contaminant and facilitate mechanical removal, Similarly, gelling agents could theoretically achieve the same effect; their use with undiluted product should comprise a more efficient operation vis-a-vis the clean-up of aqueous ammonia solutions Nonetheless, cost, effectiveness, and secondary clean-up requirements would first have to be assessed. The following gelling agents might be considered for use:

Chem-Gel, Industrial Services International, Inc.
EPA Multipurpose Gelling Agent
Muck-Up Absorbent
Spill/Clean Gelling Agent

Oxidation of spilled contaminants is widely considered in the literature although little reference to ethylene dichloride was found. There are several such approaches, however, that are known to have been or are being considered for the removal of ethylene dichloride when a longer term clean-up operation of groundwater is required of moderate to large volume. Air stripping was tried at a recent spill in Fort Langley, B.C. but was determined to be ineffective at concentrations above 1000 ppm. Air quality guidelines could not be met and foaming was found to be a problem in the stripper although a final burning step might be considered in future spills (Whittaker, 1986).

Ozone was also investigated on a laboratory scale as an in-situ oxidation approach but was also found to have no significant effect on reducing groundwater concentrations (Solsberg and Maynard, 1986). Similar results would be expected for air sparging or injection to treat affected groundwater or soil.

A primary problem in dealing with ethylene dichloride is its tendency to penetrate downward into groundwater rather than to float on the water table as hydrocarbon fuels would. This property makes it less available to treatment, leave alone the construction of interceptor wells down gradient from the initial entry point. For this reason, any prescribed physical/chemical treatment including oxidation might be difficult to implement.

Surfactant injection such as the subsurface system developed by JRB Associates on behalf of the U.S. EPA (Environment Canada, 1984a) would also likely be of limited use. Similarly restricted in usage would be the solvent extraction system developed by Rexnord, Inc. and the U.S. EPA (Environment Canada, 1984a) which uses a vegetable oil or other suitable solvent of relatively low toxicity to treat contaminated soils It involves a relatively complex process that has recently been available <u>only</u> in the U.S. as a prototype requiring the EPA-ORD treatment trailer. It is worth mentioning, however, since it has been shown to be capable of extracting spilled chemicals from excavated soils and the recovery approach might be appropriate for some spills involving ethylene dichloride.

Steam stripping also holds some promise and investigations into its use to clean-up ethylene dichloride spills have been initiated by Environment Canada (Whittaker, 1986). Wet air oxidation could also potentially treat contaminated groundwater although thorough evaluation of its performance would first be required. The Wetox Process has been extensively studied by the Ontario Research Foundation while a similar unit is commercially available through Zimpro, Inc. (Solsberg and Parent, 1985). The Light Activated Reduction of Chemicals (LARC) process and other UV-oxidizing units such as the Westgate Ultrox process are not likely to prove to be effective (Whittaker, 1986) although these methods are generally indicated in the literature to be able to chemically convert ethylene dichloride to basic chemical constituents.

Both single-stage powdered carbon contactor systems and granular carbon column systems can achieve ethylene dichloride removal from contaminated groundwater. Environment Canada (1984c) notes an 81% removal efficiency for carbon adsorption of ethylene dic hloride. A system such as Calgon's Mobile Water Treatment Unit comes to mind; however, such units are known to function more effectively with longer chain, non-polar compounds (Nyer, 1985). The literature typically reports on concentrations of 0.1 to 10 ppm for similar compounds being treated and it would likely be such amounts that would be considered for carbon treatment.

Insofar as reverse osmosis is concerned, research is required to investigate the fabrication of a new ethylene dichloride-compatible membrane (W hittaker, 1986). A polyethylene material is likely to be used that incorporates heat sealing rather than glued construction because of the solvent action of ethylene dichloride. Concentrations in the 100 to 1000 ppm are most likely to be amenable to such treatment rather than higher (or lower) amounts. Viton seals and stainless steel fittings must be utilized. There is also the possibility of an isopropyl alcohol extraction step being tried in combination with reverse osmosis with a recycling step added, although complex processing might suffer from the drawbacks previously discussed.

In this latter regard, the treatment of groundwater contaminated with ethylene dichloride could ultimately involve the development of a multi-step mobile processing unit. Reverse osmosis, steam stripping and carbon adsorption could comprise the basic

unit operations involved. The research of mobile treatment units by the U.S. EPA has been a relatively expensive, lengthy process, however, and it is uncertain to what extent such work would proceed in Canada.

5.3.2.2 Removal from Water

For smaller water courses involving smaller spill volumes, sorbents are likely to be of benefit (as previously listed). Dredging, pumping and suction devices would also be effective where containment had been previously achieved or where a quiescent or slow moving body of water allowed substantial concentrations of contaminant to accumulate. Such equipment would also apply to larger spills. The recovery of sediment containing ethylene dichloride might have to be undertaken when warranted and should be borne in mind.

Physical/chemical treatment systems might also be of use under some circumstances to recover minor amounts of ethylene dichloride from smaller streams, as well as from groundwater (as previously described), Reverse osmosis, steam stripping, wet air oxidation, carbon adsorption, solvent extraction and combinations thereof appear to be most promising although all such approaches require further research, development and/or investigation before they can be considered for use on a spill. Air stripping, ozonation and air sparging are less likely candidate treatment methods. Molecular sieves could hold some promise (Whittaker, 1986).

In the Thompson River, a smaller spill will generally dissipate to concentrations that would render recovery operations impractical. This would depend upon the flow conditions at the point of entry. Where larger volumes are involved or a localized, more confined smaller spill occurs, retrieval of ethylene dichloride might be possible. Mechanical means including sludge handling and dredging systems could be applied to deal with concentrations and accumulations warranting such procedures Bottom containment/ entrapment as was previously reviewed might contribute to the build-up of recoverable quantities to enhance clean-up potential. A conductivity meter or other means of locating the ethylene dichloride would likely be needed. Larger recovery systems such as the Crisafulli Sludge Handling System and the Mudcat Auger Dreding Unit are not applicable to many reaches of the Thompson River and would not likely be used as compared to smaller, more portable hardware.

Weighted sorbent has been previously pointed out as a possible means to intercept ethylene dichloride moving along the river bottom. Several problems are anticipated with this approach including fouling due to sediment loading, bypassing of contaminant, other hydrological and contact inefficiencies associated with this underwater technique, and the batch-process nature of sorption Still, a strategically located sorptive barrier that is well configured and incorporates a selective sorbent material might function under some circumstances to mitigate the effects of a spill. The concept would have to be reviewed and tested before it could be recommended as a means of spill control.

Physical/chemical treatment will not generally prove to be practical for use on spills into the Thompson River. Only in situations where the lengthier set-up time required would still allow for processing of significant quantities of ethylene dichloride would the approach be warranted, In any case, it is envisaged that the main purpose of any treatment unit would likely be as a concentrating or disposal step as used in conjunction with a containment device and/or a mechanical removal procedure. There still remains the problem of selecting and engineering such a system to suit the needs according to local conditions (concentrations, pH, organics, temperature, etc.)

5.3.3 Temporary Storage

The storage of collected ethylene dichloride and contaminated materials can be readily accomplished using a wide variety of devices. Tank truc ks, trenches, flexible containers and rigid-wall units could all be applied under appropriate circumstances to hold recoverables Closed containers are preferable where vaporization will occur. Since sediments are likely to be involved, however, storage must be planned for that still allows the transfer of abrasives or their subsequent removal once held on an interim basis

Consultation of several reference sources (Environment Canada, 1984c; Butz, 1984; Environment Canada, 1984a; and BDH Chemicals Canada Limited 185) reveals the following information on materials compatibility:

Generally, natural rubbers should be avoided as well as some synthetic materials including Neoprene, nitrile and butyl rubbers, Hypalon (chlorosulfonated polyethylene), CPE (chlorinated polyethylene), EDPM (ethylene propylenediene monomer), and PVC. Rigid steel and flexible polypropylene containers (or liners) would be suitable for use.

5.3.4 Transfer

Many standard pumps can be utilized to transfer a halogenated hydrocarbon such as et hylene dic hlo ride. These should be designed to move a flammable liquid and/or a liquid containing suspended solids. Environment Canada (1984c) recommends single-suction, magnetic drive pumps incorporating a centrifugal-type of impeller with "wet-end" construction in steel or stainless steel. Teflon and polypropylene units such as those from American Pump Co., Inc. would also be suitable. Other appropriate pumps are manufactured by (Solsberg and Parent, 1985):

Bell & Gossett, centrifugal units
Chemtrol, in polypropylene
Corcoran, with Teflon gaskets
Crisafulli
Flygt Submersible
Fybroc
Warren Rupp, Sandpiper

Generally, pumps should be avoided that feature synthetic rubber components such as the sliding shoe systems manufactured by Megator Corp. Jabsco Products (undated) recommends against the use of pump bodies and shafts fabricated from phenolics and PVC as well as impellers made of either nitrile or Neoprene. At normal ambient temperatures, Viton, asbestos and Teflon gaskets can be used.

It should also be pointed out that other safety factors can contribute to minimize dangers:

Avoid screw connections since these might be subject to leakage.
Use flanges at both suction and discharge ends.
Self-priming, provisions for drainage assist in safe operation and repairs, respectively.

Transfer hoses must also be carefully selected and knowledgeable clean-up personnel or the manufacturer should be consulted in this regard. Suitable hoses are generally available from B.F. Goodrich, Gates and other companies. PVC, natural and synthetic rubbers should be avoided. Environment Canada (1984a) recommends the use of flexible stainless steel and Teflon hose types.

5.3.5 Ultimate Disposal

The disposal of minor amounts of ethylene dichloride and contaminated materials can be safely accomplished by direct ignition on sandy soils (Manufacturing Chemists Association, 1971). Because toxic products of combustion are produced and ethylene dichloride is, in the first instance, very flammable, such procedures are not generally recommended. Certainly, significant quantities of collected materials should be disposed of in regulated facilities. Atomizing liquid in an approved type of combustion chamber equipped with vent control should be undertaken or disposal by similarly controlled incineration (see also Styrene). Otherwise, treatment systems that result in the chemical conversion of ethylene dichloride should be considered such as certain oxidation procedures, perhaps in a fixed facility removed from the original spill site. Rockwell International% bromination process, Modar Inc.3 supercritical water oxidation technique, and Zimpro Inc.3 wet air oxidation unit may prove to be useful in such disposal operations

Reprocessing of recovered liquids may also be possible while contaminated soil and sorbents should be shipped to a waste management facility. Liquid mixtures of ethylene dichloride should not be allowed to enter drains or sewers because of possible vapour ignition although the pure chemical has a low oxygen demand and will not interfere with biological treatment (Manufacturing Chemists Association, 1971). Fixation

and subsequent placement of a stabilized mass in a secure disposal might be possible with contaminated sediments but this approach would have to be comprehensively assessed to ensure solidification/stabilization were possible and the release of contaminant did not occur.

5.3.6 Winter Operations

The main advantage gained in the winter clean-up of an ethylene dichloride spill relates to colder temperatures This would lower the rate at which evaporization occurs while reducing the likelihood of ignition. It is a significant criterion particularly with regard to the potential fire hazard in view of ethylene dichloride's flash point of 16°C (open cup method). The -35.8°C freezing point will seldom be a factor, but if reached would necessitate the use of solids handling equipment.

As with ammonia spills, machine-blown snow could be used to knock down vapours, however, a low water solubility means that snow would not be an effective sorbent. Snow and ice barriers might be constructed in situations where response time and the circumstances permit the interception or containment of released material.

Otherwise, winter clean-up will require normal practices common to any field operations which assist personnel and-equipment to function well. Storage, transfer and removal of ethylene dichloride should usually be possible. Further advantages include the lower probability of contaminant entering either surface or groundwaters at subfreezing temperatures although snow could restrict the use of some vehicles such as vacuum trucks.

5.4 SODIUM HYDROXIDE

5.4.1 Containment

5.4.1.1 Leak Mitigation and Vapour Control

No fire hazard is presented directly by sodium hydroxide but water contacting solid could produce sufficient heat to ignite corn bustibles (Association of American Railroads, 1984).

Vapours should not pose a hazard although inhalation of particulates must be a voided. Respiratory protection, goggles and rubber boots, gloves and outerwear might all be required depending upon the conditions of the spill (see emergency guides). Wetted sodium hydroxide might also generate hydrogen gas with some metals including chromium, magnesium, bronze, brass, zinc, aluminum, tin, lead, etc. and this should be borne in mind because of the potential explosion hazard.

For smaller punctures, temporary repair could possibly be effected by a variety of devices when aqueous solutions can be so contained:

Edwards & Cromwell Emergency Package
Plug N' Dike
Vetter Sealing Bag
Rockwell External Leak Plugging System (Hypalon rubber coating must be part of applicator tip)

The NRC Tantalum Patch and other devices susceptible to strong caustic solutions must be avoided.

5.4.1.2 Containment on Land

A 50% sodium hydroxide solution spilled into coarse grain soils will likely penetrate too quickly for any containment action to be initiated for short-term control. In other situations, when quick response allows, earthen barriers could be constructed to effectively contain liquid contaminant. These should be formed from soil with a high clay content and compacted. Most synthetic membranes could be used as liners although PVC will likely deteriorate upon prolonged exposure to sodium hydroxide (Jabsco Products, undated; Fisher Scientific, 1986). Water saturation of any earthen dikes used should be avoided. Foamed concrete barriers relying on polyurethane foam are also not likely to prove effective (derived from Fisher Scientific, 1986) although the likelihood of utilizing such a temporary barrier system is, at best, a remote possibility.

For the longer-term control of a liquid sodium hydroxide spill, the Bentonite soil sealing system manufactured by Avonlea Mineral Industries Ltd. could theoretically provide sub-surface containment. Its implementation along the Thompson River is not probable in view of other more feasible countermeasures alteratives. Similarly, smaller containment devices conceived to block small openings such as the Clark Spilstopper Mat and Sanimat should be inert to sodium hydroxide, but are not likely to prove to be generally useful. A range of sorbents could be used to contain and remove spilled solution and these are discussed under Removal. Interceptor trenches and wells might also assist in containing spillages of liquid solutions of sodium hydroxide. Gelatinous 73% solution and the NaOH solid format do not generally present containment problems when spilled on land.

5.4.1.3 Containment in Water

Once sodium hydroxide has entered a waterway, its containment will be unlikely because of its propensity to rapidly dissolve, sink and mix. Damming or water diversion could be attempted for smaller water courses although problems in implementing such methods are foreseen for most situations Semi-permeable barriers, which allow the flow-through of water, will likely be of very limited use. In this regard, sorbents could have some application to remove small amounts of contaminant, but a very inefficient operation is expected (see also Removal).

Water dilution could be tried or neutralization methods and these approaches are more fully reviewed under Removal.

In most reaches of the Thompson River, once sodium hydroxide has contacted the water, mixing, neutralization, and dispersion should probably be encouraged rather than containment methods.

5.4.2 Removal

5.4.2.1 Removal from Land

For many spills on land, of both small and large proportions, pumping aqueous solutions of sodium hydroxide should be possible using equipment suitable for caustic service. Basically, bronze, phenolic and PVC pump bodies and shafts should be avoided as well as nitrile and Viton impellers and seals (Jabsco Products, undated) although different solution strengths and temperatures dictate materials compatibility (see also Transfer). Vacuum trucks and/or small, portable pumps could be used for product recovery.

Solid forms of sodium hydroxide and gelatinous 73% solution should be promptly recovered using mechanical removal techniques prior to precipitation occurring. Access, terrain, spill volume, etc., will determine whether or not front-end loaders, graders, scrapers, shovels, and other means can be used in the clean-up. Note that corrosion of steel will occur to some extent and should be expected or avoided as warranted.

For smaller releases on land or the final clean-up stages of a larger spill, various sorbent materials could be applied to contain and remove liquid sodium hydroxide. Naturally occurring or other available substances could be utilized including sand, earth, smectite, clay, fly ash, cement powder and vermiculite (Association of American Railroads, 1984d). Commercially available sorbents which will take up hydroxice include Absol, Hazorb, Safestop, Spill Control Pillows and Spill Clean (derived from Solsberg and Parent, 1985). The spent sorbent must then be mechanically retrieved with due attention paid to the safety of the operation. See also Section 4.3.2, Removal from Water.

Chem-Gel and other gelling agents might have application to agglomerate and control the spreading of hydroxide solution and thus assist in its subsequent mechanical removal. This approach requires research as concerns the volumes involved, temperature effects, expense, broadcasting method, mixing requirements and efficiency. Moreover, it is somehwhat difficult to envisage the gelling approach taking precedence over more simple, one-step pumping procedures which rely on practical, available hardware such as pumps and vacuum trucks.

In instances where sodium hydroxide has penetrated soils, removal will be more difficult. Excavation of contaminated material can be tried if a limited release plume has developed. Where the migration of hydroxide through soil has been greater, neutralization could be attempted using sodium dihydrogen phosphate, acetic acid or dilute hydrochloric acid. This procedure should only be implemented if the potential hazard can be lessened through the addition of chemical agents that, by themselves, are toxic unless consumed in a neutralization reaction.

Interception trenches and wells can also be constructed to remove contaminated groundwater by pumping methods; however, the efficiency of this approach will vary considerably because of the miscibility of sodium hydroxide with water. Reverse osmosis could be tried in lieu of pumping groundwater but with similar reservations.

Use of the U.S. EPA soil extraction and treatment trailer is unlikely for reasons discussed previously.

5.4.2.2 Removal from Water

In smaller water courses, many of the same techniques that have been discussed for controlling spills on land, could be attempted to deal with varying volumes of contaminant. Damming and retaining contaminated water is one approach that might not always be possible, but that might, in certain situations, allow the pumping of caustic solutions using vacuum trucks and smaller, portable systems Reverse osmosis could also be considered as an alternate means of removing previously contained contaminant.

Sorbents could also see application to remove minor amounts of sodium hydroxide although even a smaller, flowing water course is likely to transport spilled material quickly downstream as it mixes and distributes throughout the water column. Treatment, therefore, might have to be considered to ameliorate the effects of a sodium hydroxide spill even in smaller water bodies. Environment Canada (1984d) and Robinson (1979) both note the potential of applying sodium dihydrogen phosphate as an in-situ neutralizing agent that avoids the possible pH effects of overdosing with acetic and

hydrochloric acids but could possibly lead to increased algal growth. The addition of acids as neutralizing agents is commonly recommended, however, in many handbooks.

Environment Canada (1984d) also points out that carbon dioxide and sodium carbonate (presumably through the addition of carbonate ions) avoid problems associated with overdosing. However, more limited usage is foreseen for both agents: carbon dioxide - because a more complicated procurement transportation and application effort is required, and sodium bicarbonate - due to the large quantities needed (Robinson, 1979).

J.T. Baker Chemical Company formulates a treating agent that can be applied in paste or liquid format to neutralize an alkali spill. A pH indicator exhibits the appropriate colour change once neutalization has been attained. Braley (1980) briefly discusses the addition of BP Chemical's Cellosize WP3H (i.e., hydroxyethyl cellulose) to 50% sodium hydroxide to result in a solid rubbery residue, and perlite which can be similarly applied to give a very stiff slurry. The latter approaches still require the mechanical removal of the treated sodium hydroxide material and, moreover, requite large volumes of agent.

Most other treatment approaches are usually reviewed in terms of their potential to process more toxic organic compounds Thus, discussions of the EPA type of mobile trailers (Met-Pro, Dynactor, etc.) and other systems often do not make reference to sodium hydroxide since a more simple neutralization procedure is generally involved. In some instances, this will not be the case (i.e., more complex processing will be needed). For example, several treatment phases might be required including the gravity separation of solids, filtration, neutralization, followed by filtration and pH adjustment. The processing of contaminated water would have to be carefully reviewed for each spill.

Ion exchange could be investigated although its use in the treatment of dissolved solids could be prohibitively expensive on a per volume basis, especially if a cation exchange resin is utilized to produce water of high purity (Nyler, 1985). Overall, treatment, if devised, would have to be selected based on reasons of economy, practicality and the quick provision of environmental protection.

In the Thompson River, physical removal Of spilled sodium hydroxide will not likely be feasible by any means. Mixing and dilution will likely occur too rapidly at most locations. In some circumstances, where a localized spill has occurred in a swampy area or other quiescent zone, pumping or utilization of reverse osmosis might be possible.

Neutralization with sodium di hydrogen phosphate constitutes a possible approach if interception can be planned and intimate contact of the treating agent and released substance is made. Generally, precise amounts of the agent to be added might be difficult to ascertain. Still, a liquid solution of agent could be added using mixing and pumping equipment as opposed to the more manpower-intensive and slower broadcasting of powder (Robinson, 1979). Any increase in nutrient concentration is less likely to be problematic in the Thompson River because of its significant flow. Boric acid is not recommended for use because of potential pH problems (Robinson, 1979).

5.4.3 Temporary Storage

Commonly used steel containers can be used to store collected caustic solutions although potential corrosion problems should not be overlooked. Rigid mild steel containers, tank trucks, etc., can therefore be employed in a clean-up but even 50 % sodium hydroxide can be expected to result in some consumption of metal. For 73% solutions, stainless steel 316 and Monel alloys are useful (Environment Canada, 1984d). Caustic embrittlement of stainless steel is still possible with 50% solutions if elevated temperatures are reached (La, above 49°C).

Many metals should be avoided including aluminum, brass, bronze, copper, tin and zinc (Association of American Railroads, 1984). Nickel would theoretically be the preferred metal for handling caustic solutions to 480°C but its high cost and lack of availability limits its use. Similarly, chrome-nickel stainless would provide more resistance, but is not always practical. Polycarbonate, cast iron, fibreglass-reinforced epoxy and PVC containers are not recommended for use (Jabsco Products, undated; Fisher Scientific, 1986; and Environment Canada, 1984d).

There is a wide range of synthetic materials that could be utilized either as flexible containers or as liners in rigid containers exhibiting appreciable but not absolute resistance to sodium hydroxide. Both high and low density polyethylene, ploypropylene, polyvinylidene fluoride, Teflon products and polystyrene can all be used for such purposes. Nitrile rubber, Neoprene and Viton tend to deteriorate in some caustic solution strengths at various temperatures PVC should similarly be avoided particularly for higher concentrations of caustic (Environment Canada, 1984d). Tanks with liners and flexible membranes suitable for holding sodium hydroxide including Port-a-Tank, Bulkdrum (Hoover Universal Inc.), ModuTank Inc. tanks and Columbia Reservoir Systems portable units. Note that trenches with appropriate liners could also be employed, if necessary, to store collected solution on an interim basis.

5.4.4 Transfer

Pumps are commercially available that have been designed exclusively to process caustic solutions Environment Canada (1984a and 1984d) specifically discuss the use of steel or cast-iron, non-airbinding centriful pumps as having high maintenance costs and short service life. Pumps in Alloy 20 or stainless are recommended either as gear pumps for specific situations or centrifugal models having an open impeller, a Monel shaft and extra deep stuffing box. Connections for steam cleaning and draining should be provided even in portable units while clase-coupled transfer units should not be used. Graphitized asbestos, Teflon and rubber can be employed as gasket materials Jabsco Products (undated) recommends against bronze, phenolic and PVC pump casings and Nitrile and Viton impellers with Neoprene also unsuitable for some conditions The manufacturer, or other expert advice, should be consulted prior to the selection of pumps for spill clean-up. In this regard, the following companies make pumps that can process caustics:

American Pump Co. Inc.
Bell & Gossett
Chemtrol
Corcoran
Crisafulli

Fybroc
Kontro
March
Megator

A variety of hoses are also fabricated for moving sodium hydroxide. Environment Canada (1984a) specifies suitable hose types inclusive of natural rubber, Hypalon, polyethylene, polypropylene and flexible stainless steel. These are available from B.F. Goodrich (Atlas, Multi-Chem 100 models, Gates (400 SB, etc., chemical hoses), Goodall (Superlite 200/300 and other types) as well as from other manufacturers (Solsberg and Parent, 1985).

5.4.5 Ultimate Disposal

The manufacturer or supplier should be consulted for advice on the disposal of sodium hydroxide including its return for reprocessing. It is likely that for many spill events, neutralization procedures will be undertaken using acetic or dilute sulfuric or hydrochloric acid. Gravity separation of solids might also be required before and/or after acid addition. Treatment of collected material could take place either at the spill site, if practical to do so, or under the more controlled conditions of a waste management facility. Resultant sludge could be placed in a secure landfill (Environment Canada, 1984d).

Fixation technology could also be applied to yield a more isolated waste material through the use of cement and lime-based techniques Upon placement of the waste in a landfill, there is the possibility of leaching ultimately occurring since the material could be vulnerable to acidic solutions This should be avoidable through proper long-term management of the disposal site.

5.4.6 Winter Operations

Although not found in the literature, it is conjectured that colder temperatures and snow will influence the clean-up of sodium hydroxide spills in several ways There

will still be an exothermic reaction as the hydroxide solubilizes in the snow; however, heat evolution should be less violent than in water as local melting occurs. The resultant release should therefore be more confined because of the snow cover, but penetration through it into the ground might occur depending upon the volume of spill, its release point, temperature, topography and format of substance discharged. Ambient cooling effects are likely to result in eventual solidification of released material exposed to atmosphere. Pumping might not than be possible to recover the hydroxide but mechanical means including scrapers and front-end loaders could be used for this purpose if appropriate access is available.

Penetration of sodium hydroxide through ice cover on the Thompson River might occur if a sudden, large volume discharge results from a derailment immediately adjacent to the river. Once into the waterway, little could be done to remove the hydroxide although neutralization might be considered for some spill situations The lateral spreading of solution and atmospheric/snow cooling could combine to prevent entry of contaminant through ice into the river, particularly in the case of smaller volume discharges Mechanical recovery could then be attempted.

5.5 STYRENE

5.5.1 Containment

5.5.1.1 Leak Mitigation and Vapour Control

Fire polymerization and tank rupture will be primary concerns following an accidental styrene release. Vapours may also pose a health and safety hazard particularly those generated from liquid pools. Flashback can occur. For smaller fires, dry chemical, CO_2, water fog or foam can be used as the extinguishing agent. In large fires, water spray, fog or foam are recommended (Environment Canada, 1984e) although water might be ineffective for fire control and of greater utility to cool containers and to disperse vapours (Association of American Railroads, 1984).

Both satisfactory vapour and fire control should be possible using a range of foams. Expert advice should be sought on selecting either protein-based or surfactant-based foams The latter are available as high expansion types which result in better vapour suppression if wind speed is below 4.5 m/s (Solsberg and Parent, 1985; Szluha et al, 1986). The protein foams are generally low expansion and more suited to fire control. Protective clothing and gear, and respiratory apparatus should be worn as per emergency guides, but also taking into account the cautionary notes subsequently expressed.

Temporary repairs to railcars are possible if undertaken by trained crews. Kits such as the Edwards & Cromwell Emergency Package should not be used or other emergency repair devices that rely upon a neoprene or other synthetic rubber plug or sealing bag (e.g., Vetter unit). A Teflon gasket, as per the NRC Tantalum Patch Kit, could be considered for use in halting flow from a small, discrete opening. Viton, a fluoroelastomer, would also provide some chemical resistance to styrene monomer in certain cases Jabsco Products (undated) recommends seeking engineering assistance with regard to clarification of the latter.

The literature is generally confusing since rubber protective clothing is widely recommended yet breakthrough times are listed by Environment Canada (1984e) of one hour for polyethylene and Viton and less than one hour for butyl and natural rubbers, Neoprene and PVC. Polyvinyl alcohol and fluoroelastomers seem to be the most impervious of the synthetic materials to styrene.

The Rockwell External Leak Plugging system is available with an applicator tip fabricated from a fluoroelastomer and therefore could be considered to control small leakages The Plug N' Dike relies upon polyacrylonitrile material and might not be appropriate for use pending further investigation.

5.5.1.2 Containment on Land

The containment of styrene spills on land should be readily accomplished if response time allows, if its penetration of soil does not occur to a significant extent, and

if it is determined that confining it will not result in an increased threat to safety because of vapour or flammabilty problems. Earthen dikes comprised of compacted soil or sand should provide effective containment. Coarse grain materials should be avoided for such use due to their permeability. Liners, such as polyethylene, might be effective for only limited durations, as discussed previously, and their use is therefore not generally recommended. It is of further interest to note that some soil types could initiate a polymerization reaction (Association of American Railroads, 1984).

Trenching could also be tried as a means to intercept either surface or sub-surface flow of styrene if this were done so as not to exacerbate groundwater problems. Bentonite soil sealing would produce an impermeable barrier and could be considered where longer term spill control is necessary and the circumstances allow. The Clark Spilstopper Mat is noted to be resistant to styrene whereas the Sanitrip cover is not (Solsberg and Parent, 1985). In any case, the closure of smaller surface openings is most likely unnecessary in the geographical area of concern.

Where temporary barrier construction is appropriate, the synthetic foam barriers including foamed concrete, Froth-Pak, MSAR Dike-Pak, etc., are known to be compatible with styrene because of their polyurethane composition. The opportunity to use such systems would have to be assessed for each spill situation. The use of sorbents might also be of use in some circumstances (see Removal).

5.5.1.3 Containment in Water

Since styrene is slightly soluble in water and floats, efforts should be made to contain, intercept and/or deflect slicks for subsequent removal. Both improvised and commercial devices could be used to accomplish containment.

In smaller streams, smaller volumes of contaminant could be retained through the use of fencing, mesh or nets that were backed by sorbent materials including peat, straw and polyurethane foam.

A dam could also be quickly constructed using clay or compacted earth with a sub-surface culvert, piping or similar means to allow water to pass through while the flow of floating styrene is obstructed at the surface.

Sorbent boom could also be used to both retain and remove styrene including products from Conwed, Drizit, American Boom & Barrier Corp., SPC, 3M, etc. although Environment Canada (1984e) recommends against the use of combustibles.

For larger volumes of spilled styrene in the Thompson River, or in smaller water courses where appropriate, conventional oil containment barriers could be deployed to retain spilled styrene. These should not employ PVC coatings or Neoprene external construction, which eliminates many standard commercial products. In Canada, suitable booms could be procured by special order through Versatech Products Inc., Navenco and Hurum Engineering Ltd. These should feature both polyurethane boom fabric and flotation,

Flotation is a particularly important consideration since many spill containment barriers utilize polyethylene foam which could be subject to eventual degradation upon prolonged exposure to styrene as it concentrates against the boom. Polyamide materials (i.e., nylon and related polymers) might also be subject to damage as implied by the existence of amino-type polystyrene resins, although this would have to be investigated further. It is therefore recommended that metal chain/cable tension members and connectors be selected over synthetics to avoid potential damage to these components. The manufacturer should be consulted as regards the chemical resistance to styrene of materials such as Shelterite XR5, UniRoyal's Paracil-0Z0 and Ensolite, Jaton, polyesters, etc.

Once booms are properly selected, they should be deployed so as to avoid the loss of contaminant originating from entrainment, drainage, and boom submergence and planing. Current will likely be the dictating factor in this regard, assuming sufficient water depth and access are available, and stream velocities of approximately 1-1/2 knots (0.8 m/s) are not exceeded.

5.5.2 Removal

5.5.2.1 Removal from Land

Directly pumping styrene could be considered when significant volumes have

been previously retained and a safe operation is possible. Precautions must be taken to prevent health and fire problems. Centrifugal and gear pumps can be used constructed of most materials other than copper alloys and phenolics (Environment Canada, 1984e; Jabsco Products, undated). Also refer to section on Transfer. Vacuum trucks and smaller portable transfer systems could be brought to bear on a styrene recovery operation.

Natural and synthetic sorbent materials could also be effectively applied to immobilize and take-up sorbent for subsequent mechanical pick-up. Environment Canada (1984e) and the Association of American Railroads (1984) specify soil, sand, clay, fly-ash, cement powder, peat moss, saw dust and straw to be of use. Synthetic materials could also be used including polymerics (polypropylene and polyurethane) and cellulosic fibres (Conwed). Due to the solvent action of styrene and its combustibility, the application of petroleum-based solvents might not always be advisable and requires further examination. Imbiber beads, or similar sorbent product, would be an effective agent but might be overly expensive when used on spills. Generally, sorbents should be considered to remove minor amounts of material unless a broader-scale usage of soil or other cheaper, more generally available substance can ameliorate the effects of styrene spilled in a greater amount.

In a similar manner, gelling agents would combine with styrene and could be used on land if this approach facilitates safe clean-up. Their expense, coupled with alternative, more practical, direct techniques, makes their use questionable. However, the amine carbamate gelling agent and application system developed by Lowell University has been shown to be effective on styrene (Solsberg and Parent, 1985). Chem-Gel, the U.S. EPA's Multipurpose Gelling Agent, Muck-Up Adsorbent/Solidifying Agent and the U.S. Testing Co. Inc. Spill/Clean Gelling Agent could also, theoretically, be used.

A wide variety of treatment systems could also be tried to recover styrene that had penetrated soil and entered groundwater.

Carbon adsorption is noted by Environment Canada (1984e) to be capable of 55 to 97% removal rates of styrene and could be utilized in the form of the Calgon mobile treatment system. It could also be applied to deal with smaller spills in water. Various available means could also be implemented to regenerate the spent carbon on site.

Air stripping, using a vertical packed column, is another possible approach. It would require on-site engineering to ensure that an efficient styrene removal operation results, There is still the likelihood of air quality standards not being met (Whittaker, 1986). Air stripping is more effective for removing chemicals that are highly volatile (and that display low water solubility) (Solsberg and Parent, 1985). However, a combination of carbon adsorption and air stripping equipment could provide significant styrene recovery as marketed by Oil Recovery Systems, Inc. (Solsberg and Parent, 1985). It is very likely that laboratory or small scale experimentation would be first required to test this approach, assuming time allows for such preliminary investigation. Nyler (1985) reviews in basic terms the design criteria and engineering details of packed towers including construction alternatives for treating groundwater. Potential removal rates of 98 - 99% (Environment Canada, 1984e) cannot be overlooked.

Devices could also be used which are capable of removing floating substances in groundwater. Materials compatibility, as previously discussed, would have to be verified so that susceptible synthetic rubbers and other polymerics as well as copper alloys were excluded from their construction. Douglas Engineering's Sentry system and Oil Recovery Systems, Inc. Filter-Probe-Scavenger Units are used to create a "cone of depression" to enhance the removal from groundwater of lighter-than-water contaminants. They provide obvious advantages over simple trenching and pumping techniques which might not be feasible to implement if deep penetration into soil had occurred.

Solvent extraction comprises another type of treatment listed by Environment Canada (1984e) to be capable of removal efficiencies of greater than 93% for styrene. The U.S. EPA's complex mobile treatment systems are designed to deal with the removal of contaminants from soil (The Rexnord, Inc. solvent extraction system) and water (Met-Pro Corp. waste treatment system). They are indicative of the more complex engineering that is required to design a portable contaminant processing unit and have been available in the U.S. largely as prototype systems Solvent extraction would therefore appear to be more costly and involve more complicated set-up then other clean-up techniques so that its use is less likely.

In this regard, Environment Canada (1984e) notes a treatment scheme for removing styrene from contaminated water. It includes the gravity separation of solids and surface skimming as well as dual-media filtration plus carbon adsorption (if necessary). Using available technologies to devise such chemical processing units could be applied to either surface or groundwaters In the case of soil, it is most likely, however, that contaminated material will be excavated, treated and taken to a secure landfill. Biodegradation of styrene bound in soil would occur over time buts its rate is unknown. Other in-situ treatment is not recommended because of styrene's polymerization reactions.

5.5.2.2 Removal from Water

For smaller courses involving smaller volume releases of styrene, many of the methods discussed for land-based spills would be applicable. Thus direct pumping, sorbents and sorbent booms, gelling, carbon adsorption and air stripping could all potentially be used, depending upon the circumstances of the spill.

Of these, the most favoured would be the physical skimming, pumping or other means to mechanically remove floating styrene. As with any clean-up operation involving a moderately volatile, flammable liquid, ensuring the safety of the operation would have to be of paramount importance.

Smaller skimmers could be used that rely on a vacuum, suction and/or weir principle of operation. The use of sorbent surface devices would have to be generally avoided because of the suspected vulnerability to damage of the pick-up mechanism (PVC, polypropylene, etc., discs, rope mop, belt, drum) even over relatively brief periods of operation. Similarly, skimmers are not recommended for use that incorporate natural or synthetic rubber components such as the Oela-III weir skimmer, with its self-levelling rubber bellows. All metal construction, except for copper alloys, is recommended. There are many such smaller units that are commercially available including the PEDCO, SLURP, Skim-Pak (in stainless steel) and Megator skimmers. These should be used with a remotely-located explosion-proof pump as discussed under Transfer. Both small and large

volume releases could be dealt with using mechanical skimmers, with operations in the Thompson River possible where deflection and containment of floating contaminant had been successfully accomplished. Use of a treatment or chemical processing unit to remove styrene from the Thompson River is not seen to be practical unless it comprises a component operation that is required following mechanical recovery and prior to ultimate disposal/release of wastewater. Air sparging has been noted as one method of removing minor amounts of styrene from water (Association of American Railroads, 1984) but styrene's low solubility would probably result in the placement of higher clean-up priorities on other contaminated sources.

5.5.3 Temporary Storage

Tank trucks, railcars, drums and other rigid containers will likely be of most practical service during the clean-up of a styrene spill. The use of flexible containers is more questionable in view of the solvent action of styrene and its chemical incompatibility with many synthetic materials. As indicated previously, polyvinyl alcohol and polyurethane display highest resistance; Viton and polyethylene offer more limited break-through prevention. The manufacturer would have to be consulted as to the suitability of membranes, liners or fabrics used in the construction or make-up of interim storage facilities including portable tanks, bladders and rigid-wall systems.

The urethane-coated Shelterite material should be acceptable, subject to verification, and could therefore be purchased as a Port-a-tank or as a unitized portable reservoir system (Columbia Reservoir Systems (1977) Ltd.).

Should rigid-wall units be used at the spill site, these should not incorporate components fabricated in copper and its alloys. Initial set-up must be possible as well as subsequent access, transfer and other operational needs Because styrene monomer can polymerize upon exposure to heat and light, safeguards must be taken to prevent this. A temperature alarm system might be needed in hot weather (International Technical Information Institute, 1984) because of the relatively low flashpoint of styrene of 32°C (closed cup method) (Environment Canada, 1984e). Closed containers should be used to

minimize the risk of vapour transport, ignition and other fire hazards Controlled venting might then be required. It would also be important to isolate styrene from such materials as oxidizing gases, chlorine and acids Modutank Inc. of Long Island City, New York manufactures a wide range of tanks that typify the units that might prove to be of utility in cleaning up a styrene spill (Solsberg and Parent, 1985).

5.5.4 Transfer

Many standard pumps can be utilized to transfer styrene. Environment Canada (1984e) recommends the use of double seal centrifugal pump over seal-less pumps but also points out that a single-suction, seal-less magnetic drive centrifugal pump with 316 stainless "wet end" would virtually eliminate leakage. Jabsco Products (undated) recommends against phenolic pump bodies and shafts and lists Viton as possibly being suitable under certain conditions as the impeller material. All literature consulted note that copper and its alloys should not be components of the pump. Provision for drainage and flanges at both suction and discharge ends are also desirable features screw connections should be avoided because of possible leaks.

The pumps used should also be certified to be explosion-proof and not utilize synthetic or natural rubber O-rings, gaskets, etc. The International Technical Information Institute (1984) warns against running the pump with a closed discharge line, presumably because of possible heat build-up with the resultant possibility of polymerization.

Overall, the manufacturer or supplier should be consulted and comprehensive information obtained prior to pump selection being made. Kontro, Warren Rupp, Wilden, American Pump, Bell & Gossett, Gilkes, etc., all fabricate suitable transfer units

Insofar as hoses are concerned, Environment Canada (1984a) notes that fluoroelastomers, stainless steel and Teflon can be used. There are products available from Gates (Fluoro-Prime-T), B.F. Goodrich, etc., but the hose manufacturer should be contacted (or styrene supplier/distributor) to ensure that both exterior covering and interior lining are impervious to styrene; many hose types are not.

5.5.5 Ultimate Disposal

The method of choice to dispose of liquid styrene is incineration in controlled facilities designed for the complete combustion of chemical. wastes and other materials The manufacturer or supplier should be consulted in this regard. Reprocessing of recovered styrene that has contacted soil or water is unlikely. The International Technical Information Institute (1984) refers to spraying styrene in mist-form into a furnace (Le., atomization) for its disposal. The Japanese-based institute also points out that incineration might be more readily accomplished by mixing with a more flammable solvent. Toxic gases could result if complete combustion is not attained (Association of American Railroads, 1984).

Should a mobile incineration unit be considered, a relatively sophisticated device must be selected such as the EPA-ORD mobile incineration system or the Prenco Incorporated system (Solsberg and Parent, 1985). These incinerators are capable of processing a range of feed materials and can treat off-gases so that air quality standards can be met. The devices are mentioned because the method results in the complete and immediate, on-site destruction of recovered wastes It is realized that the specific hardware referred to is not generally available in Canada as working field units; however, the approach (Le., an efficient, mobile incinerator) could be of application to deal with a variety of hazardous material spills.

No advantage is foreseen in using more exotic disposal means such as Rockwell International's bromination process or wet air oxidation techniques (Zimpro, Ontario Research Foundation3 Wetox process, etc.). Such methods are generally applied to destruct more chemically complex substances such as pesticides, PCB's and organo-metallics.

General methodologies employed in fixation technology could be applied to styrene to render waste material more suitable for landfill. Such processing should result in a waste that is a non-reactive and immobile solid matrix. In the case of styrene, solidification would have to be carefully undertaken in view of the toxicity of vapour, their flammability and the possibility of uncontrolled polymerization occurring.

The addition of a pozzolan such as fly ash or cementitious material should be possible to yield a waste product that is isolated from the environment if deposited in a secure landfill,

Landfarming, in which biodegradation is enhanced through the management of controlling factors such as mixing with soil, pH, water content, etc., could be tried in view of the 70 - 100% removal efficiencies for styrene indicated by Environment Canada (1984e) associated with its biological treatment. The length of time required, possibility of recontamination and difficulty with winter weather and site selection combine to make this approach less attractive than disposal by incineration, particularly for the Thompson River area.

5.5.6 Winter Operations

Colder weather should reduce the hazards of styrene spills as evaporation rates are lowered, flashback potential is reduced, and the chance of polymerization lessens. Mechanically blown snow could assist in the suppression of vapours. While snow would not act as a sorbent to retain styrene, in some circumstances snow/ice barriers could be constructed to retain released liquid.

Freezing of styrene can occur if the temperature falls below 30.6°C. This would necessitate the use of mechanical removal equipment and eliminate the possibility of pumping discharged material. A more efficient contaminant removal process could thus result, access and equipment operation permitting, particularly if the entry of styrene into surface or groundwater is prevented because of ice cover and frozen, impermeable ground.

6.0 FISHERIES IMPLICATIONS

In addressing the potential implications of chemical spills on fish, two groups of factors were important. The most obvious was the toxicological and behavioural response of salmonid fish. Also important was the distribution and abundance of salmonids in the North Thompson River. Until recently, very little was known about the utilization of the mainstem of the river by juvenile salmonids. Though unknowns remain, it is now possible to draw some general conclusions on presence or absence, and thus, qualitatively at least, address the topic of impact (Section 7.0).

6.1 DISTRIBUTION AND ABUNDANCE OF SALMONIDS IN THE NORTH THOMPSON RIVER (Author: M. Winsby)

This subsection provides a review of the distribution and abundance of important fish species in the North Thompson River system. The review is comprised of a general description of species present in the system, an overview of enhancement and stocking programs, and a detailed examination of the seasonal distribution and abundance of salmon and important resident species The latter concentrates principally on fish populations found in the North Thompson River mainstem and tributaries downstream from the C.N. Railway line. Tributaries important to fish are shown in Figure 6.1.

Information for this review is mainly from Knapp et al. (1982) and studies that were conducted in relation to the Salmonid Enhancement Program and in relation to the possible effects of the C.N. Railway. These studies are listed in Table 6.1.

6.1.1 Species Present

A list of species that have been identified in the North Thompson River and its tributaries is presented in Table 6.2. Species that are important for the commercial, recreational and/or native fisheries include: the four salmon species, rainbow trout, Dolly Varden char and mountain whitefish.

FIGURE 6.1: NORTH THOMPSON RIVER STUDY AREA AND THE APPROXIMATE UPSTREAM LIMITS OF SALMON SPAWNING.

Map adapted from Whelen and Lister, 1985(a).

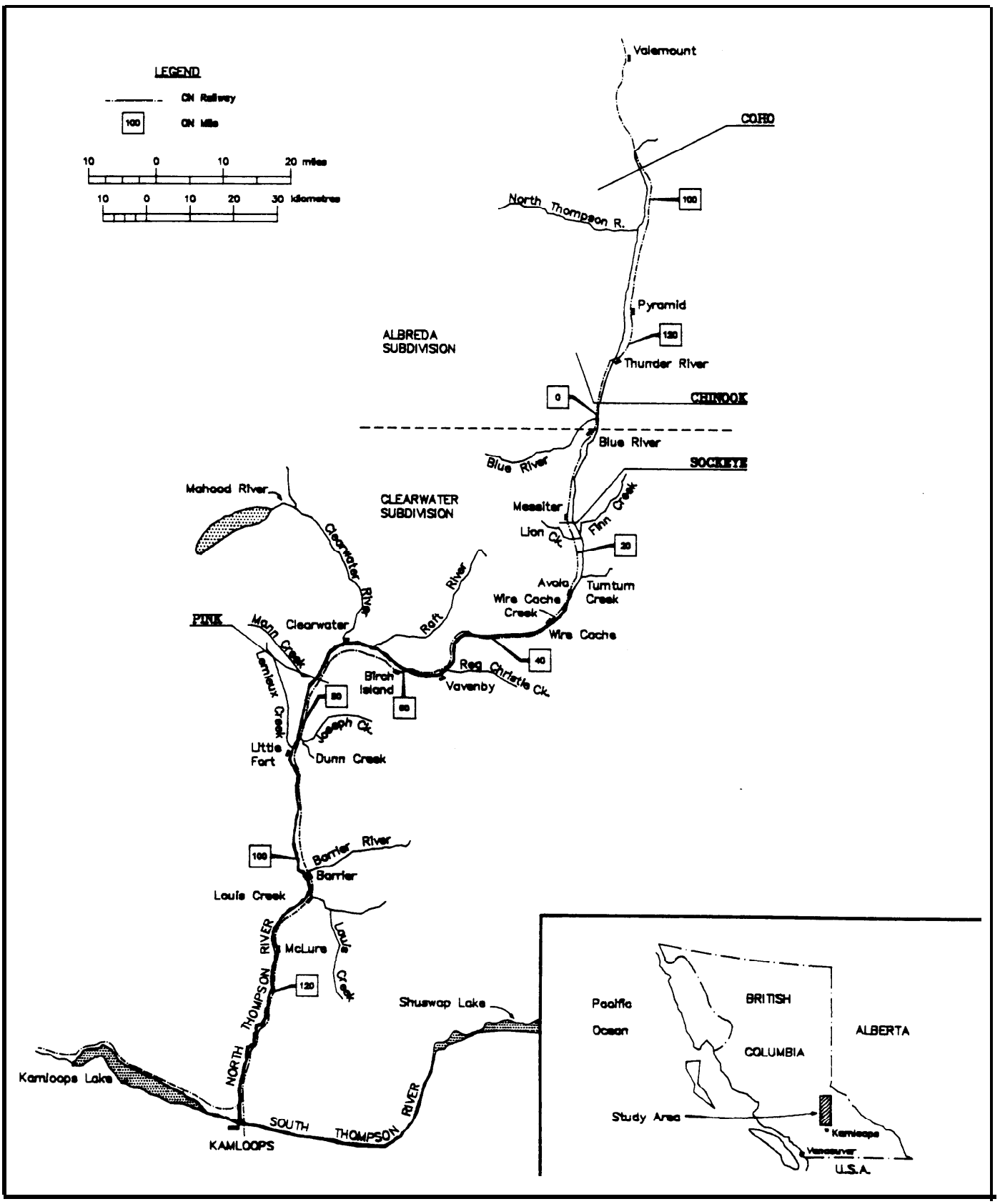


TABLE 6.1 STUDIES UNDERTAKEN TO IDENTIFY THE SALMONID ENHANCEMENT POTENTIAL OF THE NORTH THOMPSON RIVER DRAINAGE AND STUDIES UNDERTAKEN TO IDENTIFY POSSIBLE EFFECTS OF C.N. RAILWAY ACTIVITIES

1. Studies to Identify the Salmonid Enhancement Potential

Berry, and Kahl, 1982[1]

Hutton, et al., 1983

Scott, et al., 1982 (a)

Scott, et al., 1982 (b)

Stewart, et al., 1983

Stewart and Matthew, 1984[1]

2. Studies Undertaken to Identify Possible Effects of C.N. Railway Activities

Sherwood and Chorney, 1982.

Morgan and Olmsted, 1982.

Whelen and Lister, 1985(a).

Whelen and Lister, 1985(b).

C.N. Engineering, 1985.

Reid, Crowther and Partners Limited, et al., 1981.

Reid, Crowther and Partners Limited, 1982.

[1] Cited in Whelen and Lister, 1985(a).

TABLE 6.2 FISH SPECIES IDENTIFIED IN THE NORTH THOMPSON RIVER DRAINAGE

Source: Morgan and Olmsted, 1982

COMMON NAME	SCIENTIFIC NAME
Salmonids	
chinook salmon	Oncorhynchus tshawytscha (Walbaum)
coho salmon	Oncorhynchus kisutch (Walbaum)
sockeye salmon	Oncorhynchus nerka (Walbaum)
pink salmon	Oncorhynchus gorbuscha (Walbaum)
rainbow trout	Salmo gairdneri Richardson
Dolly Varden char	Salvelinus malma (Walbaum)
Non-Salmonids	
mountain whitefish	Prosopium williamsoni (Girard)
redside shiner	Richardsonius balteatus (Richardson)
northern squawfish	Ptychocheilus oregonensis (Richardson)
slimy sculpin	Cottus cognatus Richardson
prickly sculpin	Cottus asper Richardson
longnose dace	Rhinichthys cataractae (Valenciennes)
leopard dace	Rhinichthys falcatus (Eigenmann and Eigenmann)
lake chub	Conuesius plumbeus (Agassiz)
peamouth chub	Mylocheilus courinus (Richardson)
largescale sucker	Catostomus machrocheilus Girard
longnose sucker	Catostomus catostomus (Forster)
bridgelip sucker	Catostomus columbianus (Eigenmann and Eigenmann)
western brook lamprey	Lampetra richardsoni Vladykov and Follet

The four salmon species that utilize the North Thompson River drainage (chinook, coho, pink and sockeye) are anadromous; the resident form of sockeye (kokanee) occupy lakes in the drainage but have not been reported in the mainstem area (B. Chan, personal communication). The Dolly Varden char, mountain whitefish and rainbow trout reside in the system throughout their lives. Steelhead trout (the anadromous form of rainbow trout) occur in the Thompson River, but have not been recently reported in the North Thompson River (spawners were reported for the Barriere River, Louis Creek and Lemieux Creek in the late 1940's and early 1950's; Brown et al., 1979).

6.1.2 Enhancement and Stocking Programs

Tributaries in the North Thompson River basin were examined intensively during the early stages of the Salmonid Enhancement Program. A summary of opportunities for enhancement identified by the Enhancement Opportunities Subcomittee (1983) are listed in Table 6.3. In the fall of 1984, a pilot hatchery was constructed on the Clearwater River and chinook eggs were obtained from the Clearwater and Raft Rivers and coho eggs were obtained from Lion Creek. Fry and smolts were subsequently released to the original streams. In 1985, the facility was expanded. The egg capacity and fry release projections for the expanded facility are: (C. Mackinnon, personal communication)

Species	Stream	Eggs	Fry Releases
Chinook Salmon	Clearwater/N. Thompson Rivers	2 million	1.6 million
	Finn Creek	500,000	400,000
Coho Salmon	Clearwater River	300,000	240,000
	Raft River	100,000	80,000
	Lion Creek	200,000	160,000

(Note that 200,000 F'inn Creek chinook eggs are to be delivered to another hatchery (Chilliwack), which means only 240,000 fry will be released locally.)

TABLE 6.3 SALMONID ENHANCEMENT OPPORTUNITIES IDENTIFIED FOR THE NORTH THOMPSON RIVER DRAINAGE

Source: Enhancement Opportunities Subcommittee, 1983

STREAM	ENHANCEMENT OPPORTUNITIES
Clearwater	1. Expansion of SEP pilot hatchery facility.
Finn Creek	1. Central conventional hatchery. 2. Stream rehabilitation.
Lion Creek	1. Small incubation and rearing facility.
Blue River	1. Minor facility outplant.
Albreda	1. Satellite plantings. 2. Stream rehabilitation,
Avola	1. Small project.
Raft	1. Examined as possible location for major conventional facility, but rejected. 2. Satellite transplants and colonization.
Mahood	2. Central facility.
Dunn	1. Minor hatchery. 2. Satellite transplants/utilization of lake.
Lemieux	1. Placement of incubation boxes. 2. Summer flow control using lake storage upstream. 3. Examined for satellite transplant potential, but rejected on basis of low summer flows.
Barriere	1. Hatchery incubation alone or with rearing. 2. Sockeye spawning channel. 3. Fertilization of Barriere Lake.
Louis	1. Pilot hatchery, but requires groundwater. 2. Satellite transplants. 3. Stream rehabilitation: small demonstration project; fencing.
N. Thompson minor tributaries	1. General opportunities for satellite plantings and colonization.

In addition, an experimental lake-pen rearing program is being undertaken by members of the North Thompson Indian Band on Dunn Lake (near Clearwater) for coho (Salmonid Enhancement Program, 1984). Approximately 60,000 coho eggs are obtained from each of three stream systems (Barriere/Fennel, Dunn and Lemieux), and are then incubated in incubation boxes on Dunn Creek and reared in net pens on Dunn Lake (K. Berry, personal communication). Fry are released the following fall in the same donor streams.

At present, there are no stocking programs for trout, char or whitefish in the North Thompson system (B. Chan, personal communication).

6.1.3 Seasonal Distribution and Abundance of Salmon Species

The seasonal distribution and abundance for the adult and juvenile stages of chinook, coho, pink and sockeye salmon are described below. The timing of adult and juvenile migration is also described. Salmon escapements to the North Thompson River and major tributaries are presented in Table 6.4.

6.1.3.1 Chinook Salmon

1. Distribution and Migration Timing

a) Adults

The approximate upstream limit of chinook spawning in the North Thompson River is shown in Figure 6.1.

Chinook salmon spawn in the North Thompson mainstem and in ten tributaries (Table 6.4). Apart from the mainstem, the Clearwater River and Finn Creek support relatively large escapaments. However, neither of these tributaries is crossed by the C.N. Railway. Five tributaries that support chinook salmon are crossed by the railway (Blue River, Lion Creek, Dunn Creek, Barriere River and Louis Creek).

TABLE 6.4 RECENT SALMON ESCAPEMENTS TO THE NORTH THOMPSON RIVER AND MAJOR TRIBUTARIES (1969-1978; 1979-1983)

Source: Knapp, et al., 1982; Whelen and Lister, 1985

	CROSSED BY OR PARALLEL TO C.N. RAILWAY	CHINOOK		COHO		SOCKEYE		PINK	
		1969-1978	1979-1983 (RANGE)	1969-1978	1979-1983 (RANGE)	1969-1978	1979-1983 (RANGE)	1969-1978	1978-1983 (RANGE)
ALBREDA SUBDIVISION									
Albreda River	Yes			129	520 (200-1000)			-	-
Blue River	Yes		10 (0-20)	310	400 (300-600)			-	-
CLEARWATER SUBDIVISION									
Finn Creek	No	580	720 (425-1000)	110	130 (15-450)		5 (0-15)		
Lion Creek	Yes	26	5 (0-15)	1240	700 (250-1200)				
Tumtum Creek	No			28	20 (0-50)				
Wire Cache Creek	Yes	-	-		100 (25-150)				
Reg Chrfstfe Creek	No			20	10 (5-15)				
Raft River	No	190	225 (175-375)	540	150 (90-250)	4168	2800 (870-3000)		
Clearwater Rfver	No	1980	3000 (1500-4000)	1500	230 (100-400)		5 (0-18)		
North Thompson Rfver	Yes	1650	1850 (750-2500)	1000	150 (90-300)	362	360 (o-1010)	150	325 (40-860)
Mann Creek	No	-	4 (0-12)	50	20 (0-45)		-	-	-
Dunn Creek	Yes		2 (0-10)	468	400 (210-550)		-	-	-
Lemieux Creek	No	25	10 (0-15)	800	330 (180-550)				
Barrfere River	Yes	30	40 (0-100)	557	415 (120-800)	1335	6500 (1140-16000)	-	-
Louis Creek	Yes	94	70 (20-150)	1000	800 (200-1400)		-	-	-

Knapp et al. (1982) estimated that downstream from the Clearwater River 94% of the spawning took place in the North Thompson mainstem, while upstream from the Clearwater River (and including in the Clearwater River) approximately 2% of the spawning took place in the mainstem. Brown et al. (1979) indicate that spawning in the North Thompson mainstem occurs mainly between Little Fort and Blackpool (located near the mouth of Mann Creek).

The distribution and timing of major spawning events in the North Thompson River and adjacent tributaries is shown in Table 6.5. Two run timings are evident: an "early" run having peak spawning in early August (Finn Creek and Raft River) and a "late" run having peak spawning in September (all streams downstream from the Raft River). The estimated time of adult migrant passage at two locations along the North Thompson mainstem (McLure and Birch Island) are shown in Table 6.6.

b) Juveniles

Most newly emergent chinook fry produced in Thompson River tributaries appear to migrate to the North Thompson River mainstem for rearing (Stewart et al., 1983). The timing of downstream migrations are shown in Table 6.5. Within the North Thompson mainstem, chinook rearing appears more concentrated downstream from the Clearwater River by August/September than upstream of the Clearwater River (Figure 2; Whelen and Lister, 1985a). Whelen and Lister (1985a) captured most yearling (1+) chinook in June (1984) at North Thompson mainstem sampling locations.

2. Abundance

a) Adults

The sizes of spawning escapments to the North Thompson River drainage are summarized in Table 6.4.

TABLE 6.5 ADULT MD JUVENILE CHINOOK MIGRATION TIMING IN THE NORTH THOMPSON DRAINAGE

Sources: Reid, Crowther and Partners Ltd. et al., 1982; Brown et al., 1979; Stewart et al., 1983

		ADULT MIGRATION AND SPAWNING							JUVENILE MIGRATION*					
		MIGRATION			SPAWNING				AGE 0+			AGED 1+		
STREAM	YEAR	START	PEAK	END	START	PEAK	END	YEAR	START	PEAK	END	START	PEAK	END
Finn	1947-1978	Jul.25	Aug.10	-	Aug.5	Aug.10	Sept.5	1982	Before Apr.22	May 1	May 14	Before Apr.22	Apr.27	May 1
	1981	Jul.21	Aug 0 4	Aug.20	Jul.24	Aug.8	Aug.24	1981	Before Apr. 3	Apr.18	May 7	Apr.10		Aug.30
Raft	1947-1978	Aug.15	Aug.30		Aug.25	Sep.5	Sep.15	1982	Before Apr.7	May 16	Jun.2	Apr.13		May 4
	1981	Aug.13	Sep.2	Sep.13	Aug.23	Sep.5	Sep.19	1981	Before Apr.3	Apr.20	Jun.11	Apr.14		Jul.24
Cl earwater	1947-1978	Aug.25	Sep.10		Sep.15	Sep. 25	Oct.15	1982	Before Apr.8	nay 22	Jun.2	Apr.14	-	Jul.24
Mahood	1970-1978	Sep.5	Sep.20	-	Sep.1 5	Sep. 25	Oct.5						-	
Dunn/Joseph	-							1982	Before Apr.10	-	Early June	Apr.20		
Lemieux		-			-	-		1982	Before Apr.10	-	Early June	Before Apr.10	Apr.10	Apr.28
Barriere	1947-1978	Aug.25	Sep.10		Sep.5	Sep.15	Sep .25	1982	Before Apr.10	-	Early June	Apr.22		
Louis	1947-1978	Aug.5	Aug.20		Aug.15	Sep.5	Sep .25							
Mainstem .	1947-1978	Aug.15	Aug.30		Sep.5	Sep.15	Oct.5	1982**	Apr.17	Jul.12		Apr.27	May 15	Jul.22
N. Thompson	1981	Aug.22	Sep.9	Sep.24	Aug.28	Sep.15	Oct.2	1981**	Before Apr.3	May1-2	May 21	Apr.12		Aug.20

* "Before" indicates fish were captured the first day of field trapping, which was the date shown in the table.

** 1982 -At Barriere; 1981 - At Little Fort.

TABLE 6.6 ESTIMATES OF ADULT CHINOOK MIGRATION TIMING AT MCCLURE AND BIRCH ISLAND, WORTH THOMPSON RIVER'

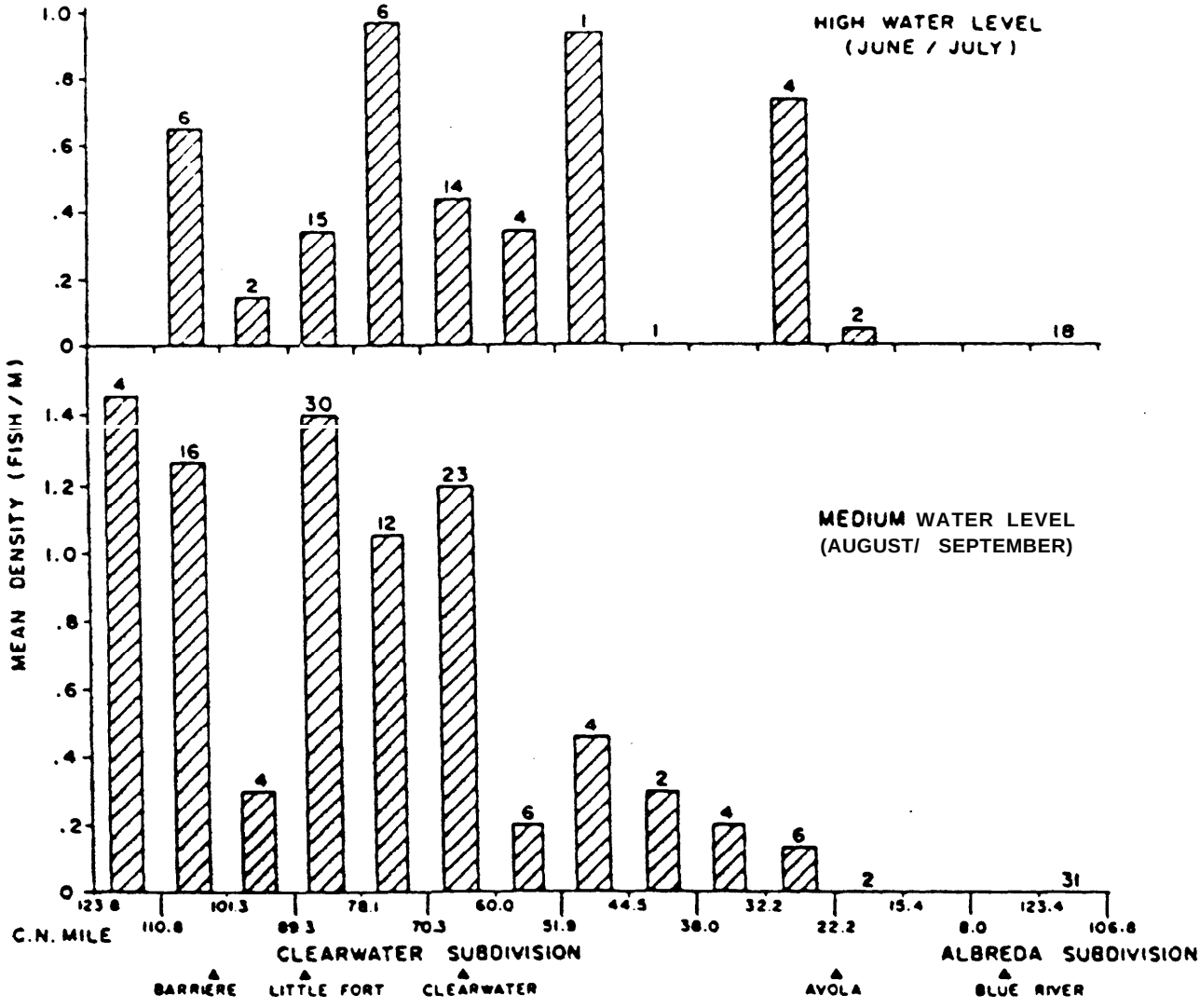
Source: Reid, Crowther and Partners Ltd. et al., 1982

STOCK TIMING	SPAWNING STREAM	RIVER DISTANCE FROM HCCLURE (km)	TRAVEL TIME FROM MCCLURE TO STREAM (Days)	ESTIMATED DATES OF PASSAGE AT MCCLURE					RIVER DISTANCE FROM BIRCH ISLAND (km)	TRAVEL TIME FROM BIRCH ISLAND TO STREAM (Days)	TIMING AT BIRCH ISLAND ESTIMATED DATES OF PASSAGE AT BIRCH ISLAND				
					Start	Median		End				Start	Median		End
EARLY RUN	Finn Creek	180	9		Jul.16	Aug.01		Aug.16	89	5		Jul.21	Aug.5		Aug.20
				10%	Jul.22	-	90%	Aug.11	-		10%	Jul.26	-	90%	Aug.15
LATE RUN	Raft River	95	3		Aug.12	Aug.27		Sep.11	-						
	Clearwater River	79	2		Aug.24	Sep.08		Sep.23	-						-
	Mahood River	119	3		Sep.02	Sep.17		Oct.02	-						-
	Barriere River	19	1		Aug.24	Sep.09		Sep.24	-						-
	Louis Creek	15	1		Aug.04	Aug.19		Sep.03	-						-
	N. Thompson River mainstem	72 (Average)	2		Aug.13	Aug.28		Sep.12	-						-
		Weighted Mean Median			-	Sep.03									
				10%	Aug.16		90%	Sep.19							

[1] Based on migration rates of 19 km/day and 37 km/day for early and late run chinook respectively.

FIGURE 6.2: DISTRIBUTION AND RELATIVE ABUNDANCE OF JUVENILE CHINOOK SALMON, NORTH THOMPSON MAINSTEM, 1984.

Numbers above bars indicate the number of sites sampled in each C.N. construction section.
Source: Whelen and Lister (1985)



b) Juveniles

The relative abundance of chinook juveniles along the North Thompson River mainstem in June/July (high water level) and August/September (medium water level), 1984, is shown in Figure 6.2. These data suggest an increase in juvenile density below the Clearwater River by August/September. Stewart et al. (1983) estimated the fry densities in ten streams, two of which (Joseph Creek and Barriere River) are crossed by the C.N. Railway and one is the North Thompson mainstem. The densities for these streams are shown in Table 6.7. These data indicate that no smolts were captured in the tributaries and fry were captured only in April in the tributaries.

Stewart et al. (1983) also estimated the number of fry migrants (0+) over the spring period (1982) to be:

Finn Creek	810,000
Raft River	150,000
Clearwater River	2,900,000
Joseph Creek	20,000
Lemieux Creek	1,600
Barriere River	7,100
N. Thompson River	1,200,000

Stewart et al. state that the migrant data must be interpreted with caution because errors in the estimates could have resulted from assumptions about the adequacy of sampling methods used (inclined plane traps). They further note that the estimates for the North Thompson mainstem (obtained near Barriere), in particular, are likely underestimates given the 50 km distance between the spawning areas and sampling location. Reliable estimates of the number of smolt (1+) migrants were not obtained because field sampling began after the onset of downstream migration. Scale analyses

TAME 6.7 CHINOOK SALMON DENSITIES (FISH/m^2) IN NORTH THOMPSON STUDY STREAMS DURING 1982

Source: Stewart, et al., 1983

		CHINOOK SMOLTS				CHINOOK FRY			
RIVER	REACH (KM)	APRIL	MAY	JUNE	JULY	APRIL	MAY	JUNE	JULY
Joseph Creek	Mouth to 7.5	0	0		0	,027	0		0
North Barriere River	Mouth to 5.0	0	-		0	.019	-		0
North Thompson River	1) Mouth to 56.4	.059	0	0	0	.137	,053	0	.224
	2) 56.4 to 96.4	.024	0	0	.003	.020	,307	0	,076
	3) 96.4 to 102.0	-	-						
	4) 102.0 to 145.8	0	.018	0	0		.oOB	.010	.011

of returning adults indicate that 94-97% were fish that reared in freshwater for at least one year (Scott et al., 1982a). Salmonid enhancement activities at the Clearwater Hatchery (described in subsection 6.1.2) will mean the annual release during spring of 1.6 million fry to the Clearwater and North Thompson Rivers and 240,000 fry to Finn Creek.

6.1.3.2 Coho Salmon

1. Distribution and Migration Timing

a) Adults

The approximate upstream limit of coho salmon spawning is shown in Figure 6.1.

Coho salmon are reported to spawn in the North Thompson mainstem and 14 tributaries (Table 6.4). Important tributaries include the Albreda River, Blue River, Lion Creek, Dunn Creek, Lemieux Creek, Barrier River. Of these, only Lemieux Creek is not crossed by the C.N. Railway line. Brown et al. (1979) indicate that most North Thompson mainstem spawning occurs between Little Fort and Blackpool (near the mouth of Mann Creek).

Recently, coho spawning has also been observed in three creeks near Thunder River (Pyramid Creek, Bone Creek, and an unnamed creek) (Whelen and Lister 1985b). The distribution and timing of major spawning events in the North Thompson River and adjacent tributaries are shown in Table 6.8. Generally, peak spawning occurs' in mid November. The estimated time of adult migrant passage at two locations along the North Thompson mainstem (McClure and Birch Island) are shown in Table 6.9.

b) Juveniles

Unlike the chinook juveniles, many coho appear to overwinter in tributaries as well as the North Thompson mainstem (Scott et al., 1982; Whelen and

TABLE 6.8 ADULT AND JUVENILE COHO MIGRATION TIMING IN THE NORTH THOMPSON DRAINAGE

Sources: Reid, Crowther and Partners Ltd. et al., 1982; Brown et al. 1979; Stewart et al., 1983

		ADULT MIGRATION AND SPAWNING						JUVENILE MIGRATION						
		MIGRATION			SPAWN IN6				AGE D+			AGED 1+		
STREAM	YEAR	START	PEAK	END	START	PEAK	END	YEAR	START	PEAK	END	START	PEAR	END
Albreda	1947-1978	Oct. 25	-	-	Oct.25	Nov.5	Nov.25							
Blue	1973-1978	Oct.25		-	Nov.5	Nov.15	Dec.5		-		-			
Finn	1947-1978	Aug.25	-	-	Nov.5	Nov.15	Nov.25	1982	May 23	Jul.17	Jul.24	Apr.27	Hay 1	
								1981	Apr.28	Jul.1	Jul.5	Apr.9		Aug.30
Lion	1947-1978	Oct.25		-	Oct.25	Nov.15	Nov.25			-	-			
Tumtum	1968-1978	Oct.25	-	-	Nov.5	Nov.15	Nov.25				-			
Reg Christie	1952-1978	Oct.15		-	Nov.5	Nov.15	Nov.25							
Raft	1947-1978	Oct.25	Nov.10	-	Nov.5	Nov.15	Dec.5	1982	Apr.16	Jun.30	Jul.6	Apr.30		May 4
								1981	Before Apr.3	Jun.29-30	Jul.5	Apr.9		Aug.9
Clearwater	1947-1978	Oct.15	Oct.30	-	Nov.5	Nov.15	Dec.5	1982	Apr.16	-			Apr.25	-
Mann	1952-1978	Oct.15	Oct.30	-	Oct.25	Nov.5	Nov.25							
Dunn/Joseph	1947-1978	Oct.15	Oct.30	-	Nov.5	Nov.15	Dec.5	1982	Apr.19	May 11	May25	May 11		May 19
Lemieux	1947-1978	Oct.25	Nov.10	-	Nov.15	Nov.25	Da.15	1982	Apr.15	-		Apr.15	Apr.24	Jun.16
Barriere	1947-1978	Oct.15	Oct.30	-	Nov.5	Nov.15	Dec.5	1982	Apr.22	-		Apr.23		Jun.30
Louis	1947-1978	Oct.15	Oct.30	-	Oct.25	Nov.15	Dec.5							
N. Thompson	1947-1978	Oct.15	Oct.30	-	Nov.5	Nov.15	Dec.5	1982*	Apr.26	-	-		May 15	
								1981**	Apr.8	May 1	Jul.15	Apr.5		Aug.

* Indicates fish were captured the first day of trapping.

** 1982 - At Barrlere; 1981 - At Little Fort.

TABLE 6.9 ESTIMATES OF ADULT COHO MIGRATION TIMING AT MCCLURE AND BIRCH ISLAND, NORTH THOMPSON RIVER[1]

Source: Reid, Crowther and Partners Ltd. et al., 1982

SPAWNING STREAM	RIVER DISTANCE FROM MCCLURE (km)	TRAVEL TIME FROM MCCLURE TO STREAM (Days)	ESTIMATED DATES OF PASSAGE AT MCCLURE			RIVER DISTANCE FROM BIRCH ISLAND (km)	TRAVEL TIME FROM BIEH ISLAND TO STREAM (Days)	TIMING AT BIRCH ISLAND ESTIMATED DATES OF PASSAGE AT BIRCH ISLAND		
			Start	Median	End			Start	Median	End
Albreda River						156	16	Sep.19	Oct.04	Oct.19
Blue River						103	10	Oct.16	Nov.01	NW.16
Finn Creek						89	9	Aug.16	Sep.01	Sep.16
Lion Creek						74	7	Oct.08	Oct.23	Nov.07
Tum Tum Creek						60	7	Oct.19	Nov.03	Nov.18
Reg Christie Creek						19	2	Oct.13	Oct.28	Nov.12
						Weighted Mean Median			Oct.16	-
Average for Streams above Birch Island	103	10	Aug.11	Oct.11	Nov.06			10% Sep.07	-	90% Nov.07
Raft River	95	10	Oct.16	Nov.01	Nov.16	-	-	-	-	-
Clearwater River system	79	8	Oct.07	Oct.22	Nov.06	-	-	-	-	-
Mann Creek	69	7	Oct.08	Oct.23	Nov.06	-	-	-	-	-
Lemieux Creek	52	5	Oct.21	Nov.05	Nov.20	-	-	-	-	-
Dunn Creek system	56	6	Oct.09	Oct.24	Nov.08	-	-	-	-	-
Barriere River system	19	2	Oct.13	Oct.28	Nov.12	-	-	-	-	-
Fennel Creek	55	6	Oct.20	Nov.04	Nov.19	-	-	-	-	-
Louis Creek	15	2	Oct.13	Oct.28	Nov.12	-	-	-	-	-
North Thompson River mainstem	72	7	Oct.08	Oct.23	Nov.07	-	-	-	-	-
	Weighted Mean Median			Oct.23						
			10% Sep.29	-	90% Nov.11					

[1] Based on migration rate of 10 km/day.

Lister, 1985). Within the North Thompson mainstem, coho juveniles appear to occur in similar concentrations upstream and downstream of the Clearwater River in both June/July and August/September (Figure 6.3), though densities appear slightly higher upstream from the Clearwater River in August/September; (Whelen and Lister 1985). The timing of coho fry and smolt migrations is summarized in Table 6.8.

2. Abundance

a) Adults

The sizes of spawning escapements to the North Thompson River drainage are summarized in Table 6.4.

b) Juveniles

The relative abundance of coho juveniles at different locations along the North Thompson River mainstem during 1984 is shown in Figure 6.5. Stewart et al. (1983) estimated the densities of coho fry in selected tributaries and the North Thompson River mainstem in 1982. These are shown in Table 6.10 for the North Thompson mainstem and two tributaries crossed by the C.N. Railway. Stewart et al.. also estimated the standing stock of juvenile coho in the North Barriere River during October (1982) to be 117,566 fish. Stewart et al. also provide the following estimates for (0+) migrants:

Finn Creek	110,000
Raft River	180,000
Joseph Creek	12,000
Lemieux Creek	4,200
Barriere River	4,200
N. Thompson River	53,000

FIGURE 6.3: DISTRIBUTION AND RELATIVE ABUNDANCE OF JUVENILE COHO SALMON EXPRESSED AS AVERAGE DENSITY OF 0+ AND 1+ FISH IN EACH C.N. CONSTRUCTION SECTION, NORTH THOMPSON MAINSTEM, 1984.

Numbers above bars indicate the number of sites sampled.
Source: Whelen and Lister (1985)

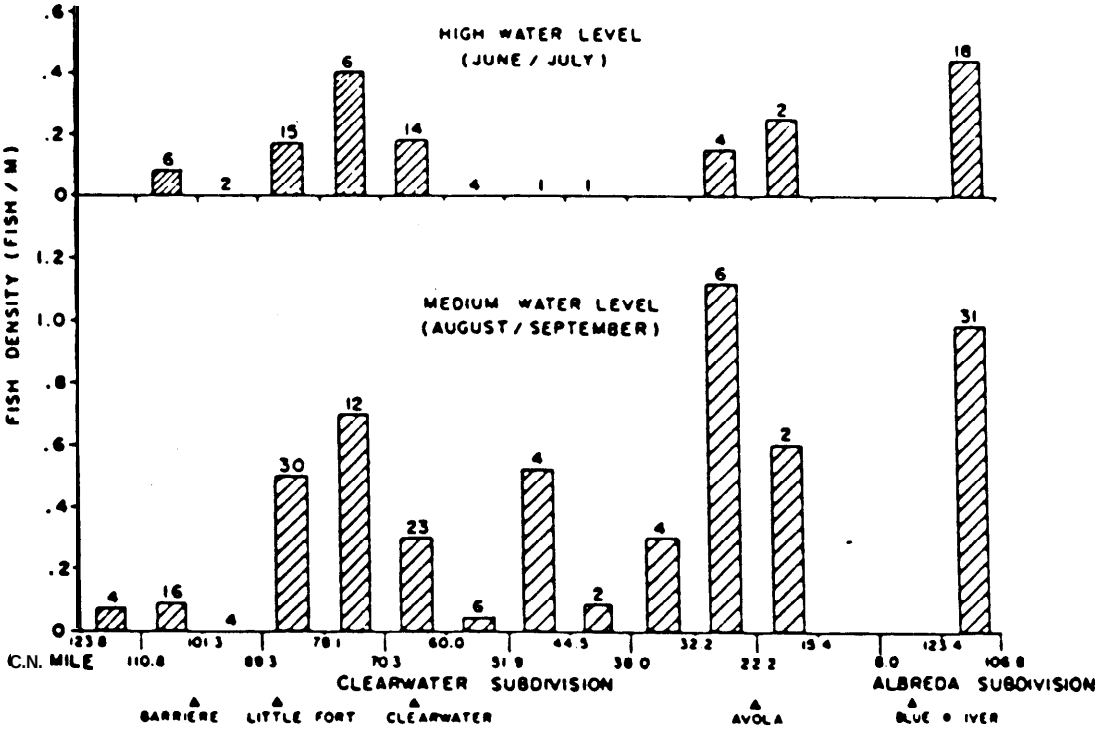


TABLE 6.10 COHO SALMON DENSITIES (FISH/m^2) IN NORTH THOMPSON STUDY STREAMS DURING 1982

Source: Stewart, et al., 1983

RIVER	REACH (KM)	CHINOOK SMOLTS					CHINOOK FRY				
		APRIL	MY	JUNE	JULY	OCT.	APRIL	MAY	JUNE	JULY	OCT.
Joseph Creek	Mouth to 7.5		.-				0.016	-			
North Barriere Creek	Mouth to 5.0	0.004	-	-	0	0	0.006	-		2.06	1.17
North Thompson River	1) Mouth to 56.4	0	0.001	0	0	0	0.004	0	0	0.001	-
	2) 56.4 to 96.4	0	0	0	0	0	0	0.002	0	0	-
	3) 96.4 to 102.0	-									
	4) 102.0 to 145.8	0	0.001	0	0	0	0	0	0	0	-

Stewart et al. caution that the estimates for Lemieux Creek, Barriere River and North Thompson River might be underestimates since an obvious peak in migration was not observed over the sample period. The densities of 0+ coho are generally lower in mainstem areas compared to tributaries (Table 6.10; Scott et al., 1982a; Whelen and Lister, 1985). Scott et al. (1982a) indicate that approximately 10% of the coho smolts remain in freshwater for two years.

Salmonid Enhancement Program activities at the Clearwater Hatchery (described in subsection 6.1.2) will mean the annual release during spring of 240,000 coho to the Clearwater River, 80,000 to the Raft River, and 160,000 to Lion Creek. Similarly, the activities by the North Thompson Indian Band Community Project at Dunn Lake will mean the annual release during fall of 60,000 coho to Fennell/Barriere Creeks, Dunn Creek and Lemieux Creek.

6.1.3.3 Sockeye

1. Distribution and Migration Timing

a) Adults

The approximate upstream limit of sockeye @awning in the North Thompson River is shown in Figure 6.1.

Sockeye salmon are reported to spawn in the North Thompson mainstem and in five tributaries (Table 6.4). Raft River and Barrier River are the most important spawning tributaries. The Barriere River is crossed by the C.N. Railway, the Raft River is not. Brown et al. (1979) indicate that sockeye spawning occurs mainly between Little Fort and Blackpool (near the mouth of Mann Creek). The distribution and timings of major spawning events in the North Thompson River are shown in Table 6.11. Peak spawning takes place over early September. The estimated time of adult passage at two locations along the North Thompson mainstem (McClure and Birch Island) are shown in Table 6.12.

TABLE 6.11 ADULT SOCKEYE MIGRATION TIMING IN THE NORTH THOMPSON DRAINAGE

Sources: Reid, Crowther and Partners Ltd. et al. 1982; Brown et al., 1979

STREAM	YEARS	MIGRATION			SPAWNING		
		START	PEAK	END	START	PEAK	END
Finn				-		-	
Raft	1947-1978	Aug.15	Aug.30	-	Aug.25	Sept.5	Sept.25
Clearwater	-					-	
Bartiere	1947-1978	Aug.25	-		Sept.5	Sept.15	Sept.15
N. Thompson	1947-1978	Aug.15	-		Sept.5	Sept.15	Oct.5

TABLE 6.12 ESTIMATES OF ADULT SOCKEYE MIGRATION TIMING AT MCCLURE, NORTH THOMPSON RIVER[1]

SPAWNING STREAM	RIVER DISTANCE FROM MCCLURE (km)	TRAVEL TIME FROM MCCLURE TO STREAM (Days)	ESTIMATED DATES OF PASSAGE AT MCCLURE		
			Start	Median	End
Raft River	95	3	Aug. 12	Aug. 27	Sept. 12
Fennel Creek	55	2	Aug. 03	Aug. 18	Sept. 03
N. Thompson R. mainstem	72	2	Aug.13	Aug. 28	Sept. 13
	Weighted Mean Median			Aug. 26	
		100%	Aug. 14	90%	Sept. 09

1 Based on migration rates of 35 km/day.

b) Juveniles

Most sockeye fry produced in the Raft River and North Thompson move downstream to rear in Kamloops Lake and most fry produced in the Barriere system rear in the associated North Barriere Lake (Knapp et al., 1982). Stewart et al. (1983) recorded smolt densities of 0.014 fish/m^2 to 0.203 fish/m^2 in the North Thompson mainstem between the mouth and a point 96 km upstream and suggest that stream rearing might take place in that area.

Fry migration in 1982 took place mainly over May (Stewart et al., 1983). Peak fry migration was recorded on May 14 for the Raft River and May 22 for the North Thompson River (Stewart et al., 1983).

2. Abundance

a) Adults

The sizes of spawning escapements to the North Thompson River are summarized in Table 6.4.

b) Juveniles

Stewart et al. (1983) estimated the numbers of migrating emergent fry to be 14,600 in the Raft River and 1.8 million in the North Thompson at Barriere during spring 1982. As indicated above, they recorded smolt densities between 0.014 fish/m^2 and 0.203 fish/m^2 in the North Thompson mainstem between the mouth and a point 96 km upstream and suggest that stream rearing for sockeye occurs in this area.

6.1.3.4 Pink Salmon

1. Distribution and Migration Timing

The upstream limit of pink salmon spawning in the North Thompson River is shown in Figure 6.1.

Pink salmon are reported to spawn in the North Thompson mainstem (Table 6.4). Stewart et al. (1983) report the presence of small numbers of pink juveniles in the Barriere River which suggests that spawning takes place in this system as well. Pink salmon in the Thompson River basin spawn primarily in odd-numbered years (Knapp et al., 1982).

In 1981, adult upstream migration and spawning occurred prior to late September until early October (Scott et al., 1982). Juvenile downstream migration occurs from mid April to May 6 in the Barriere River and from April 26 to May 22 in the North Thompson River.

2. Abundance

Recent spawning escapements average 325 adults (Table 6.4).

6.1.4 Seasonal Distribution and Abundance of Important Resident Species

Sherwood and Chorney (1982) state that only moderate populations of resident sport fish occur in the North Thompson River because the waters are generally cold and turbid. C.N. Engineering (1985) indicates that resident species are found in the following streams crossed by the railway:

Albreda River	Dolly Varden, mountain whitefish and possibly rainbow trout.
Dominion Creek	Dolly Varden, mountain whitefish.
Moonbeam Creek	Dolly Varden, mountain whitefish.

Thunder River	Dolly Varden, mountain whitefish.
Cook Creek	Dolly Varden, mountain whitefish, rainbow trout.
Cedar Creek	Dolly Varden, mountain whitefish, rainbow trout.
Blue River	Dolly Varden, mountain whitefish, rainbow trout.
Finn Creek	Dolly Varden, mountain whitefish, rainbow trout.
Lion Creek	Dolly Varden, mountain whitefish, rainbow trout.
Dunn Creek	Rainbow trout.
Barriere Creek	Dolly Varden, mountain whitefish, rainbow trout.
Louis Creek	Dolly Varden, mountain whitefish, rainbow trout.

Dominion Creek, Moonbeam Creek, Cook Creek, and Cedar Creek are small tributaries to the North Thompson River between Blue River and Albreda River.

Dolly Varden spawning has been observed in Lion Creek (Scott et al., 1982b) and in Finn Creek and North Blue River (B. Chan, MOE, personal communication cited in Whelen and Lister, 1985b). Mountain whitefish spawn in the Thunder River and in the North Thompson River upstream from Gosnell (B. Chan, personal communication). Rainbow trout occur generally throughout accessible reaches of larger tributaries (B. Chan, personal communication).

Scott and Crossman (1973) indicate that usually Dolly Varden char spawn from September to November, mountain whitefish spawn from late fall to early winter, and rainbow trout spawn from mid-April to late June. C.N. Engineering (1985) indicates that spawning in the North Thompson River occurs from August 15 to November 10 for Dolly Varden char and that spawning in the nearby Canoe River (which flows into the Columbia River) occurs for:

Dolly Varden char	- August 15	- October 30
Mountain whitefish	- October 20	- November 10
Rainbow trout	- May 1	-June 15

These data indicate that the sensitive periods for spawning and ensuing egg development for Dolly Varden char and mountain whitefish coincide with that of salmon (from mid-summer to spring) and for rainbow trout tends to occur later, during spring and early summer.

Rearing juveniles can be expected basically throughout the year at downstream locations. Stewart et al. (1983) estimate rearing densities and standing stock for rainbow trout (October 1982) in the accessible area of Joseph Creek to be 0.006 fish/m^2 and 1,138 fish, respectively, and in the accessible area of the North Barriere River to be 0.121 fish/m^2 and 94,209 fish, respectively.

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6.2 TOXICOLOGICAL IMPLICATIONS TO FISH (Author: D. J. McLeay)

6.2.1 Literature Review

Published literature concerning the toxicity of ammonia, sodium hydroxide, ethylene dichloride and styrene monomer to salmonid fish in fresh water was reviewed and summarized in the following text. Data were sought which reported median effective concentrations (EC50) of each chemical that impaired the survival of various salmonid fish species and life stages (i.e., eggs, alevins, swimup fry, fingerlings, smolts, juveniles, adults) when exposures were brief (hours, few days). Additionally, reports were sought for each chemical in freshwater which delineated the threshold strengths which caused acute sublet hal responses (e.g., fish avoidance or other behavioural reactions, stress, histopathological effects, respiratory effects, impaired swimming performance, reduced adaptive capabilities). Studies which reported lethal or sublethal responses of

responses of salmonid fish caused by their prolonged (weeks, months) exposure to these chemicals were not included in this review, as Such, exposures are not normally encountered in spills to rivers The data bases searched have been identified in Appendix 7.

6.2.2 EPS Bioassay Tests

A review of the literature indicated that pertinent toxicity information for each of the four chemicals of concern was deficient. No references were found regarding the acute toxicity of styrene monomer to salmonid fish. Reports of acute toxic effects caused by sodium hydroxide were principally related to high pH values rather than chemical concentration. Data concerning the acute toxic effects of ethylene dichloride were limited. Accordingly, it was decided to conduct a series of acute toxicity tests with each of the four chemicals, using hatchery-reared rainbow trout fry or fingerlings and North Thompson River water as the diluent and control water.

All bioassay tests were conducted by the regional laboratory of the Environmental Protection Service (EPS), Environment Canada. Basic test procedures were those prescribed in the Federal and Provincial (B.C.) guideline documents (EPS, 1980; Rocchini et al., 1982). An 800-litre sample of North Thompson River water, collected (forty S-gal plastic jerricans) near Little Fort, B.C. on April 11, 1986, was transported to the EPS laboratory in North Vancouver and stored refrigerated (8°C) until required for the tests. Each bioassay test was conducted at 8 $\pm$1°C, using this water for all chemical dilutions. Preliminary bioassays were undertaken in 4-litre glass jars using three fish per test solution. Definitive tests with groups of ten. fish per solution were conducted in 40-litre glass aquaria (test volume 15 litres).

Each test solution was aerated minimally (EPS, 1980). Lighting was regulated to provide a daily photoperiod of 14 hours light and 10 hours dark. For each definitive bioassay, fish loading density in each aquaria did not exceed 0.5 g/litre. All tests were performed as static bioassays without solution replacement.

The test chemicals were as follows:

AMMONIA:
As ammonium chloride (reagent grade white salt)

ETHYLENE DICHLORIDE:
As a clear liquid in four 500-ml clear glass bottles

SODIUM HYDROXIDE:
As a 50% concentration of'caustic soda in two l-litre plastic bottles

STYRENE MONOMER:
As a clear liquid in two l-litre amber glass bottles

The samples of ethylene dichloride, sodium hydroxide and styrene monomer were provided by Dow Chemical Canada Inc., and were in a form and concentration (sodium hydroxide) representative of the chemicals transported along the Thompson River corridor by CN Rail.

For each chemical and each test concentration, the following water quality characteristics were measured and recorded initially and at 24-hour intervals until the bioassay was terminated (at 96 hour or earlier in instances where all fish in each solution were dead): temperature (C); pH; dissolved oxygen (mg/L). Fish in each test solution were observed for survival at exposure intervals of 1, 2, 4, 24, 48, 72 and 96 hours. Sufficient concentrations of each test chemical were prepared and examined to enable a calculation of the median lethal concentrations (LC50) resulting from each of these periods of exposure.

Observations of surviving fish in each test solution were made throughout the bioassays, at regular intervals (1, 2, 4, 24, 48, 72, 96 hours). Evidence of the presence or absence of the following sublethal responses to chemical exposure was recorded:

1. respiratory distress (increased rhythmic and/or "cough" opercular rates);

2. change (increase or decrease) in swimming activity;

3. disorientation or loss of equilibrium; and

4. discolouration (darkening) of fish epithelium.

In instances where concentration-related sublethal responses were noted, estimates were made of median effective concentrations (EC50).

The median effective concentrations of each chemical estimated to cause acute lethal and sublethal effects towards rainbow trout, as calculated from the results of these laboratory bioassays, are based upon nominal chemical strengths. No measurements of concentrations of any chemical within the aquaria were made during the tests. Fish responses to sodium hydroxide were expressed both in terms of mg/L (nominal concentrations of the 50% solution of caustic soda added) and pH values for the test solutions to which fish were exposed. With respect to ammonia, test concentrations and EC50 values were calculated and expressed as mg/L un-ionized ammonia, as derived according to Trussell (1972) assuming a water temperature of 8°C and pH 8.0.

6.2.3 Chemical Spill Implication8

6.2.3.1 Ammonia

The toxicity of ammonia to salmonid and other fish species has been studied intensively; particularly with respect to its effects in fresh water. Persons wishing to review the published literature are referred to the reports by EIFAC (1970); Thurston (1980); Anon. (1981); Haywood (1983); EPS (1984a); and EPA (1985).

In aqueous ammonia solutions, un-ionized ammonia exists in equilibrium with the ammonium ion and the hydroxide ion. The toxicity of aqueous ammonia solutions to fish and other aquatic life is primarily attributable to the un-ionized ammonia species, with the ammonium ion being relatively less toxic. Accordingly, it is now common practice to

relate toxic effects for ammonia to the concentration of un-ionized ammonia in solution. The concentration of un-ionized ammonia (and thus ammonia toxicity) in solution increases with increasing water temperature and pH. Tables have been published (Trussell, 1972; Emerson et al., 1975) which permit calculation of the percentage of un-ionized ammonia (relative to total ammonia concentration) in aqueous solutions at different pH levels and temperatures.

Table 6.13 provides a summary of pertinent published data concerning the acute toxic effects of ammonia towards salmonid fish in fresh water. Values are expressed as the median effective concentrations of un-ionized ammonia demonstrated to affect fish survival or to cause acute sublethal responses. In instances where the reported ammonia concentrations were expressed only as total ammonia, conversions to un-ionized ammonia strengths were made (Trussell, 1972). Efforts were made to identify those threshold strengths which caused lethal and sublethal responses within a few hours of exposure, and to distinguish median effective concentrations with respect to salmonid fish species and life stage exposed.

As indicated in Table 6.13, the preponderance of studies which have identified EC50 values caused by the acute (hours, few days) exposure of salmonids to ammonia are related to the survival of free-swimming under-yearling or juvenile fish. These studies indicate that the susceptibility of differing salmonid fish species to ammonia is similar. Depending upon the specifics of the bioassays employed, exposures of all free-swimming life stages of salmonid fish to ammonia for periods varying from 2 to 96 hours (four days) result in death if un-ionized strengths are in the range of 0.1 - 1.0 mg/L. Toxicity is enhanced (EC50 values decrease) if other environmental stressors such as oxygen deficiency (Alabaster et al., 1979; Thurston et al., 1981c) or forced exercise (Herbert and Shurben, 1963) are imposed concurrently with ammonia exposure.

The pH and temperature of the receiving water play a critical role in influencing ammonia toxicity (due to their direct relationship to un-ionized ammonia concentration). The influence of these natural variables on ammonia toxicity is, however, still somewhat unclear. For instance, the toxicity of un-ionized ammonia is also pH-dependent. Lower

TABLE 6.13 REPORTED EFFECTS ON SALMONID FISH IN FRESH HATER, CAUSED BY THEIR ACUTE (HOURS) EXPOSURE TO UN-IONIZED AMMONIA.

FISH SPECIES	LIFE STAGE EXPOSED	NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (hours)	MEDIAN EFFECTIVE CONCENTRATION* (mg/L)	REFERENCE
rainbow trout	juvenile	survfval	1	1.82	Merkens and Downlng 1957
rainbow trout	juvenile	survival	2	0.53	Smart 1976
rafnbow trout	juvenfle	survival to 96 h	2.5	0.48	Thurston et al. 1981a
rainbow trout	juvenfle	survival	3	0.5	Ball 1967
rafnbow trout	juvenile	survival	4	0.4	Ball 1967
rafnbow trout	juvenile	survival	8	0.36	Lloyd and Herbert 1960
rafnbow trout	juvenile	survival	10-48	0.3	Ball 1967
rafnbow trout	fingerling	survival	24	0.5	Herbert and Shurben 1963
rafnbow trout	ftngerlfng	survival ff exercised	24	0.4	Herbert and Shurben 1963
rainbow trout	egg	survival	24	>3.6	Rice and Stokes 1975
rainbow trout	early alevin	survival	24	'3.6	Rice and Stokes 1975
rainbow trout	swfmup fry	survival	24	0.07	Rice and Stokes 1975
rafnbow trout	adult	survival	24	0.10	Rice and Stokes 1975
rafnbow trout	fingerlfng	survival (at pH 6.5)	96	0.13	Thurston et al. 1981b
rainbow trout	flngerlfng	survival (at pH 7.3)	96	0.37	Thurston et al. 1981b
rafnbow trout	fingerling	survfval (at pH 7.8)	96	0.52	Thurston et al. 1981b
rainbow trout	juvenfle	survival	96	0.30	Thurston et al. 1981a
rafnbow trout	adult	survival	96	0.16	Thurston et al. 1981a
rafnbow trout	alevin	survival	96	0.4-0.5	Thurston and Russo 1983
rainbow trout	swfmup fry	survival	96	0.2-0.8	Thurston and Russo 1983
rainbow trout	fingerlfng	survfval	96	0.2-1.1	Thurston and Russo 1983
ralnbow trout	juvenile	survival	96	0.3-0.6	Thurston and Russo 1983
rafnbow trout	adult	survival	96	0.16-0.23	Thurston and Russo 1983
ralnbow trout	ffngerling	survival if 80% oxygen**	96	0.70	Thurston et al. 1981c
rainbow trout	flngerlfng	survival if 60% oxygen	96	0.56	Thurston et al. 1981c
rafnbow trout	fingerling	survival If 30% oxygen	96	0.40	Thurston et al. 1981c
cutthroat trout	fingerling	survival	96	0.52-0.80	Thurston et al. 1978
cutthroat trout	fingerling	survfval	96	0.30-0.33	Thurston et al. 1981a
brown trout	swfnup	survlval	10	0.40	Penaz 1965 (cited in EIFAC 1970)
Atlantic salmon	smolt	survival	24	0.28	Herbert and Shurben 1965
Atlantic salmon	smolt	survival If 90% oxygen	24	0.15	Alabaster et al. 1979
Atlantic salmon	smolt	survival if 33% oxygen	24	0.09	Alabaster et al. 1979
pfnk salmon	eyed egg	survival	96	'1.5	Rice and Bailey 1980
pf nk salmon	early alevfn	survfval	96	0.33	Rice and Bailey 1980
pfnk salmon	late alevfn	survival	96	0.083	Rice and Bailey 1980
pfnk salmon	swimup fry	survival	96	0.10	Rice and Bailey 1980
coho salmon	fingerling	survival	3	0.97	Buckley 1978
coho salmon	fingerlfng	survfval	4	0.62	Buckley 1978
coho salmon	flngerlfng	survival	6	0.57	Buckley 1978
coho salmon	flngerlfng	survival	14	0.55	Buckley 1978
coho salmon	fingerling	suwfval	96	0.55	Buckley 1978
chinook salmon	fingerlfng	survival	24	0.36	Harader and Allen 1983

TABLE 6.13 (Cont'd.)

FISH SPECIES	LIFE STAGE EXPOSED	NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE' (hours)	MEDIAN EFFECTIVE CONCENTRATION* (mg/L)	REFERENCE
chinook salmon	fingerling	gill damage	1	so.02	Burrows 1964
rainbow trout	juvenile	gill damage	2	>0.79	Smart 1976
rainbow trout	juvenile	gill damage	6	>0.50	Smart 1976
rainbow trout	juvenile	increased urine excretion	6	0.16	Lloyd and Orr 1969
coho salmon	juvenile	impaired oxygen transport	48	0.1	Sousa and Meade 1977
rainbow trout	fingerling	increased liver proteolytfc activity	4	0.05	Arillo et al. 1979a, 1981
rainbow trout	fingerling	stress (increased blood sugar level, decreased liver glycogen level)	4	0.06	Arillo et al. 1979b
pink salmon	alevin	early gravel emergence	24	0.03	Rice and Bailey 1980

* Concentration causing a response for 50% of the exposed fish.

** Percentage saturation of oxygen in freshwater to which fish are exposed.

pH waters appear to enhance the lethal effects of un-ionized ammonia (Thurston et al., 1981b), and laboratory studies which have related fish survival to un-ionized ammonia concentration over a range of differing water temperatures have indicated that un-ionized ammonia is more toxic to salmonid fish if temperatures are cold (3-5°C) rather than temperate (10-18°C) (EIFAC, 1970; Thurston, 1980; Haywood, 1983).

Fish developmental (life) stage influences their tolerance to ammonia exposure. Although the effect of brief exposures of fish eggs on survival and long-term well-being has not been studied intensively, it appears that eggs are more tolerant to ammonia than other life stages (Table 6.13). One study reported that newly hatched alevins were also relatively tolerant to ammonia (Rice and Stokes, 1975). Controlled studies with various life stages (alevins to adults) of rainbow trout by Thurston and Russo (1983) found that tolerance to ammonia increases as the fish develop through the larval stages, is greatest at the juvenile and yearling stages, and decreases thereafter. Other investigations (Rice and Stokes, 1975) with rainbow trout confirm that, at least for this species, adult fish are as or more sensitive to ammonia than fry, fingerlings or juveniles. Information concerning the sensitivity of salmon smolts to ammonia is limited, although available data suggest a lethal tolerance similar to that for pre-smolts or juveniles.

Results for the EPS bioassay test with rainbow trout fry exposed to a range of concentrations of ammonia in Thompson River water are given in Table 6.14. The LC50 (median lethal concentration) values calculated for differing periods of exposure to ammonia indicate that exposures as brief as 2 hours caused fish deaths at concentrations less than 1 mg/L. More prolonged exposures (24-96 hours) reduced LC50 values somewhat (to 0.4 mg/L), although the difference was not dramatic. Based upon these and other findings (Table 6.13), it is apparent that brief (2-4 hour) exposure of fish to ammonia can cause deaths at strengths similar to those which affect survival when exposures are continued for four days (96 hour). The threat to fish posed by shorter (less than or equal to 1 hour) exposures to this chemical should be ascertained by transferring exposed fish to fresh water for observation of subsequent survival and well-being.

TABLE 6.14 ACUTE TOXIC EFFECTS TOWARDS RAINBOW TROUT SWIMUP FRY*, CAUSED BY BRIEF EXPOSURE TO UN-IONIZED AMMONIA** IN THOMPSON RIVER WATER-.

NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (Hours)	MEDIAN EFFECTIVE CONCENTRATION*** (mg/L)
survival (LC50)		6.45
survival (LC50)	2	0.67
survival (LC50)	4	0.44
survival (LC50)	24	0.38
survival (LC50)	48	0.38
survival (LC50)	72	0.38
survival (LC50)	96	0.38
loss of equilibrium	72-96	< 0.16, > 0.09
discolouration (darkening)	2-4	< 0.09, > 0.03
increased respiratory rate	2-4	< 0.05, > 0.03
increased swimming activity	14	< 0.05, > 0.03

* Hatchery-reared fish; weight 0.7-1.2 g, fork length 4.2-5.0 cm.

** Added as ammonium chloride; un-ionited ammonia concentration calculated according to Trussell (1972) assuming a water temperature of 8°C and pH 8.0 (i.e., 1.58% of total aqueous ammonia present as un-ionlzed ammonia.

*** Sampled April 11, 1986 near Little Fort, B.C.; pH 8.0, temperature 7.7-9.0.

**** Concentration causing a response for 50% of the exposed flsh.

Most studies which have reported the threshold concentrations of ammonia causing sublethal effects towards salmonid fish have dealt with effects caused by prolonged exposures (weeks, months). Acute sublethal-effect studies with rainbow trout fingerlings or juveniles have demonstrated that a 4-hour exposure to un-ionized ammonia concentrations as low as 0.05 mg/L can cause stress responses (increased blood sugar concentrations, decreased liver glycogen, increased liver proteolytic activity) (Arillo et al., 1979a, 1979b, 1981). Brief (hours) exposures of rainbow trout or coho salmon to 0.1 - 0.2 mg/L un-ionized ammonia can cause other sublethal effects including urinary diuresis and impaired oxygen transport by hemoglobin (Table 6.13). Observations of surviving rainbow trout swimup fry held in un-ionized ammonia concentrations as low as 0.05 mg/L for periods of l-4 hours indicated behavioural and physiological effects (increased respiratory rate and swimming, activity); and strengths (greater than or equal to 0.09 mg/L) caused fish discolouration (Table 6.14).

Based upon the present literature review and on the limited laboratory evaluation of ammonia toxicity to salmonid fish in Thompson River water, it is concluded that brief (hours) exposure of salmonid fish to concentrations of un-ionized ammonia in Thompson River water as low as 0.4 mg/L can impair survival. Lower concentrations (0.1 - 0.3 mg/L) may, depending upon fish species, condition, life stage, and the concurrent impact of natural stressors, also result in fish deaths; at least in those situations where exposure to ammonia is sustained for periods of 24 hours or longer. An un-ionized ammonia concentration in Thompson River water as low as 0.05 mg/L can cause demonstrable sublethal effects towards salmonid fish; even when exposures are as brief as 1 - 4 hours.

Current knowledge indicates that an un-ionized ammonia concentration of 0.1 mg/L represents a threshold exposure level that is critical for the short-term survival of salmonid fish in freshwater. A freshwater concentration of 0.03 mg/L un-ionized ammonia is considered critical in terms of a threshold concentration above which acute sublethal toxic effects towards salmonid fish may be evident.

6.2.3.2 Sodium Hydroxide

Reported effects on salmonid fish in freshwater caused by acute exposure to sodium hydroxide are summarized in Table 6.15.

For the majority of studies reviewed, the acute lethal and sublethal toxic effects attributed to the addition of sodium hydroxide to freshwater were expressed as those caused by specific elevated pH values, rather than as mg/L NaOH (Table 6.15). This is to be expected, since the toxic effects of sodium hydroxide in freshwater solutions are caused by the hydroxyl ion concentration, which is measurable in terms of pH. Most of the researchers reporting the results of bioassays with sodium hydroxide (Table 6.15) prepared their test solutions by adding unreported (and unmeasured) concentrations of caustic to freshwater until the desired pH value was obtained. Such an approach is defensible insofar as the pH resulting from the addition of caustic (or acid) to test or receiving waters is dependent upon the specific pH-buffering capacity of the particular diluent water, as well as on the concentration of chemical added. Thus, the pH of the test (or receiving) water, as affected by the addition of caustic, best reflects the toxic threat posed by such additions. Notwithstanding, pH-titration curves established by determining the pH resulting from the addition of a range of measured (mg/L) concentrations of sodium hydroxide to the test (or receiving) water in question will enable the interconversion of chemical (spill) concentration and resultant pH values.

The short-term survival of salmonid fish in solutions of sodium hydroxide is impacted at pH values of 9.6 - 11.0 (Table 6.15). A l-hour exposure to freshwater solutions with pH values of 10.7 or higher can kill rainbow trout or fingerlings (Jordan and Lloyd, 1964; McLeay et al., 1979). Longer (3-24 hours) exposure of rainbow and other trout species to sodium hydroxide solutions with somewhat lower (pH 9.6 - 10.3) pH values can also cause mortalities (Table 6.15). Studies which distinguish the relative sensitivity to sodium hydroxide for various life stages of salmonid fish, including eggs, alevins, smolts and adults, are lacking at present; as are reports of threshold concentrations causing acute lethal and sublethal responses for various species of Pacific salmon. The degree to

TABLE 6.15 REPORTED EFFECTS ON SALMONID FISH IN FRESH WATER, CAUSED BY THEIR ACUTE (HOURS) EXPOSURE TO SODIUM HYDROXIDE.

FISH SPECIES	LIFE STAGE EXPOSED	NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (hours)	MEDIAN EFFECTIVE CONCENTRATION* (mg/L)	PH	REFERENCE
rafnbow trout	swfmup fry	survival	1	-**	11.0	McLeay et al. 1979
rainbow trout	swimup fry	survival	24	-	>10.0	McLeay et al. 1979
rafnbow trout	fingerlfng	survival	1	-	10.7	Jordan and Lloyd 1964
rafnbou trout	ffngerlfng	survival	6	-	10.3	Jordan and Lloyd 1964
rafnbou trout	fingerlfng	survival	24	-	9.9	Jordan and Lloyd 1964
rafnbou trout	ffngerlfng	survival	96	110		Sprague and Logan 1979
rainbow trout	juvenile	survival	3	-	9.6	Murray and Zfebell 1984
rainbow trout	juvenfle	survfval	14	-	10.0	Wftschf and Zfebell 1979
cutthroat trout	ffngerlfng	survival	120	35	-	EPS 1984b
brook trout	juvenfle	survfval at 10°C	24	-	9.8	Daye and Garsfde 1975
brook trout	juvenfle	survival at 20°C	24	-	9.8	Daye and Garsfde 1975
Atlantic salmon	egg	survival	96	-	>9.5	Daye and Garsfde 1980
coho salmon	fingerling	survfval	120	20		EPS 1984b
brook trout	ffngerlfng	respiratory rate	24	-	>10.0	Carlson 1984
brook trout	ffngerlfng	coughing	24	-	>10.0	Carlson 1984
brook trout	ffngerlfng	gfll damage	167	-	9.0	Daye and Garsfde 1976
brook trout	fingerling	eye damage	167	-	9.5	Daye and Garsfde 1976
rafnbou trout	juvenfle	decreased physical activity	5	-	9.0	Wftschf and Zfebell 1979
rafnbou trout	juvenile	decreased feeding activity	48	-	9.0	Wftschf and Zfebell 1979
raf nbow trout	ffngerlfng	increased lfver prote-olytfc activity	4	-	9.0	Arfllo et al. 1979a
rainbow trout	fingerling	stress (increased blood sugar level, decreased liver glycogen level)	4	-	9.0	Arillo et al. 1979a

* Concentration causing a response for 50% of the exposed fish.
** No value provided.

which natural environmental stressors (e.g., temperature extremes, oxygen-deficient waters, water flows, turbidity, etc.) can influence the survival of salmonid fish in waters receiving sodium hydroxide has not been studied.

The sublethal toxic effects towards salmonid fish caused by their short-term (hours, few days) exposure to sodium hydroxide has received little attention. Carlson (1984) reported that sodium hydroxide solutions with pH values up to and including 10.0 did not affect the respiration of brook trout within 24 hours Daye and Garside (1976) determined that freshwater solutions at pH 9.0 caused histopathological changes in gill tissue of brook trout, and that pH 9.5 caused eye damage when exposures were continued for 10,000 minutes (167 hours). No studies have been found which examined surviving fish for tissue damage following brief (few hours) exposures to sodium hydroxide. Three separate investigations have reported that freshwater solutions adjusted to pH 9.0 with sodium hydroxide can cause sublethal toxic effects (i.e., increased blood sugar levels, decreased liver glycogen levels, increased liver proteolytic activity, decreased swimming activity) towards fingerling or juvenile trout within 4-5 hours; with effects on feeding activity if exposure is sustained for 24 hours (Table 6.15). Additional reports of the acute sublethal toxic effects towards salmonid fish, caused by their exposure to sodium hydroxide, were not found.

As shown in Table 6.16, the EPS bioassays with rainbow trout swimup fry exposed to mixtures of sodium hydroxide (50% aqueous NaOH) in Thompson River water found a median effective concentration of 240 mg/L for exposures of 1-4 hours with a somewhat lower EC50 value (126 mg/L) for exposures of 24-96 hours. The pH values for these threshold-effect concentrations were 11.0 and 10.4, respectively (Table 6.16). These pH values are consistent with those reported previously to impact the survival of this fish species when exposures are acute (Table 6.15). Concentrations of sodium hydroxide in Thompson River water as low as 32 mg/L (pH 9.4) increased fish respiratory activity within 1-4 hours; and exposure to 180 mg/L (pH 10.8) for only 4 hours caused fish to lose equilibrium (Table 2A).

The above information indicates that sodium hydroxide (as a 50% caustic solution), if mixed with North Thompson River water, can impact the acute survival of

TAME 6.16 ACUTE TOXIC EFFECTS TOWARDS RAINBOW TROUT SWIMUP FRY*, CAUSED BY BRIEF EXPOSURES TO MIXTURES OF SODIUM HYDROXIDE** IN THOMPSON RIVER WATER***.

NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (Hours)	MEDIAN EFFECTIVE CONCENTRATION**** (mg/L)	(pH)
survival (LC50)		240	11.0
survlval (LC50)	2	240	11.0
survival (LC50)	4	240	11.0
survival (LC50)	24	126	10.4
survival (LC50)	48	126	10.4
survival (LC50)	72	126	10.4
survival (LC50)	96	126	10.4
loss of equilibrium	4	<180, >100	<10.8, >10.2
increased respiratory activity	1-4	< 32, > 18	<9.4, >9.0

• Hatchery-reared fish; weight 0.6-1.1 g, fork length 4.04.8 cm.

** 50% aqueous NaOH.

*** Sampled April 11, 1986 near Little Fort, B.C.; pH 8.0, temperature 7.1-8.3.

**** Concentration causing a response for 50% of the exposed fish.

young salmonid fish at strengths as low a 127 mg/L (pH 10.4); and can cause sublethal toxic effects within 1 hour at concentrations as low as 32 mg/L (pH 9.4). These data, considered together with that provided in the literature (Table 6.151, suggest pH 10 (representing approximately 100 mg/L of a 50% NaOH solution in Thompson River water according to the present tests) as a critical value with respect to short-term fish survival. At pH 9 (approximatly 20 mg/L of NaOH in Thompson River water), sublethal toxic effects are imminent. No toxic effects attributable to the brief exposure of salmonid fish to sodium hydroxide in freshwater have been demonstrated for lower pH values or chemical concentrations.

6.2.3.3 Ethylene Dichloride

Available (published and unpublished) information concerning the acute toxic effects of ethylene dic hloride (EDC) towards salmonid fish in freshwater is shown in Table 6.17. Acute survival bioassays with fry or fingerling rainbow trout, sockeye and pink salmon indicate similar LCSO values (range, 150 - 435 mg/L) for exposures of 24-96 hours (Table 6.17). Laboratory bioassays conducted by EPS with rainbow trout fry exposed to a range of concentrations of ethylene dichloride held at 2 or 12°C show that, at least for this fish species and life stage, variations in water temperature within this range does not influence this chemical's acute lethal toxicity to any appreciable extent (Watts, 1982). These tests, as well as subsequent (unpublished) bioassays performed by the International Pacific Salmon Fisheries Commission using sockeye and pink salmon alevin, fry or fingerling life stages (Servizi, 1986), also demonstrate that results for exposures of 24-96 hours (1-4 days) do not differ appreciably if at all (Table 6.17). No acute lethal or sublethal EC50 values or observation of effect towards salmonid fish have been reported for exposures to EDC of less than 24 hours.

Reid et al. (1983) examined the survival of coho salmon eggs and alevins exposed to ethylene dichloride for a period of 21 days from the eyed egg stage. A concentration of 150 mg/L caused 50% egg mortality, which began after 6-8 days. For the alevins which survived exposure to EDC concentrations of 56 and 150 mg/L as eyed eggs, all died within nine days of hatching (Table 6.17). The effect of lower (less than 56 mg/L) concentrations of ethylene dichloride on the short-term survival and subsequent well-being of coho salmon alevins has not been studied.

TAME 6.17 REPORTED EFFECTS ON SALMONID FISH IN FRESH WATER, CAUSED BY THEIR ACUTE (HOURS) EXPOSURE TO ETHYLENE DICHLORIDE*.

FISH SPECIES	LIFE STAGE EXPOSED	NATURE OF RESPONSE MASURED	DURATION OF EXPOSURE (hours)	MEDI AN EFFECTIVE CONCENTRATION** (mg/L)	REFERENCE
rainbow trout	fingerling	survf val	24	>10	Applegate et al. 1957 (cited in Anon. 1975)
rainbow trout	ffngerlfng	survival	96	225	Johnson and Finley 1980
rafnbow trout	fingerling	survival	96	336	Bartlett (1979) (cited in Watts 1982)
rafnbow trout	swfmup fry	survfval at 12°C	24	180	Watts 1982
rainbow trout	swimup fry	survfval at 12°C	48, 72, 96	175	Watts 1982
rafnbow trout	swfmup fry	survival at 2°C	24, 48	167	Watts 1982
rafnbow trout	swimup fry	survfval at 2°C	72	160	Watts 1982
rainbow trout	swimup fry	survival at 2°C	96	155	Watts 1982
coho salmon	eyed egg	survival	504	150	Refd et al. 1983
coho salmon	egg-to-al evin	survival	504	< 56	Refd et al. 1983
sockeye salmon	alevin	survival at 3°C	24, 96	400	Servizi 1986
sockeye salmon	fingerling	survival at 3°C	24, 96	235	Servfzi 1986
pink salmon	swimup fry	survival at 3°C	24	435	Servizi 1986
pink salmon	swimup fry	survfval at 3°C	96	350	Servfzf 1986
coho salmon	eyed egg	decreased time to hatch	168	< 56	Refd et al. 1983
sockeye salmon	alevfn	loss of equilibrium	96	260	Servfzf 1986
sockeye salmon	fingerling	loss of equilibrium	96	120	Servfzf 1986
pink salmon	swimup fry	loss of equilfbrium	96	210	Servizi 1986

* Also referred to as chloroethane, dichloroethylene, dfchloroethane and ethylene chloride (EPS 1984).

** Concentration causing a response for 50% of the exposed fish.

Servizi (1986) and co-workers exposed sockeye salmon alevins to EDC, and found a relatively high acute lethal tolerance (96-hour LC50, 4500 mg/L). However, loss of equilibrium for surviving alevins was evident at somewhat lower strengths (EC50, 260 mg/L). These investigators also observed loss of equilibrium for sockeye salmon and pink salmon fry or fingerlings surviving 96-hour exposure to ethylene dic hloride, with median effective concentrations equivalent to 0.5-0.6 LC50 (Table 6.17).

No studies were found which reported the acute tolerance to ethylene dichloride for salmon smolts or juvenile and adult life stages of salmonid fish. Additionally, no reports are evident concerning any sublethal toxic effects towards salmonid fish caused by their brief (less than 96 hours) exposure to this chemical.

Results of the recent EPS bioassays with fingerling rainbow trout exposed to mixtures of ethylene dichloride in North Thompson River water are given in Table 6.18. Fish survival was dependent on the duration of chemical exposure, with LC50 values varying from 1936 mg/L (l-hour exposures) to 382 mg/L (96-hours exposure). As with the other chemicals examined, no attempt was made to examine the influence of brief (e.g., 1-24 hours) EDC exposure on the long-term survival of surviving fish returned to freshwater. The 96-hour LC50 value determined for ethylene dichloride in this study is similar to that reported previously for fingerling rainbow trout (Table 6.17).

Observations of rainbow trout surviving EDC solutions in Thompson River water indicated a number of toxic sublethal responses, at concentrations as low as 56 mg/L (Table 6.18). For instance, fish discolouration and loss of equilibrium was evident throughout the initial 72-hour period of exposure of fish to 180 mg/L (although recovery occurred by 96-hours). Decreased swimming activity was apparent at 100 mg/L and higher for all periods of observation (l-96 hours). And EDC concentrations greater than or equal to 56 mg/L caused surviving fish to swim near the surface of the water during the initial 24-hour period of exposure. These observations indicate that EDC strengths of 100 mg/L and higher caused a significant impact upon the test fish, even when exposures were as brief as 1 hour.

TABLE 6.18 ACUTE TOXIC EFFECTS TOWARDS FINGERLING RAINBOW TROUT*, CAUSED BY BRIEF EXPOSURES TO MIXTURES OF ETHYLENE DICHLORIDE IN THOMPSON RIVER WATER**.

NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (Hours)	MEDIAN EFFECTIVE CONCENTRATION*** (mg/L)
survival (LC50)	1	1936
survival (LC50)	2	1342
survival (LC50)	4	748
survfval (LC50)	24	423
survival (LC50)	48	423
survival (LC50)	72	399
survlval (LC50)	96	382
loss of equilibrium	1-72	<180, >100
discolouration (darkening)	1-72	<180, >100
increased resplratory rate	24-72	<180, >100
decreased winning activity	1-96	<100, > 56
swimming near surface	1-24	< 56, >32

* Hatchery-reared fish; weight 0.9-1.2 g, fork length 4.5-5.0 cm.

** Sampled April 11, 1986 near Little Fort, B.C.; pH 8.0, temperature 8.2-9.4.°C.

*** Concentration causing a response for 50% of the exposed fish.

From the foregoing, it is apparent that ethylene dichloride, if mixed with North Thompson River water, can cause acute mortalities for salmonid fish at strengths greater than or equal to 400 mg/L. Literature values derived for a number of salmonid fish species suggest that short-term fish survival may be impacted at strengths greater than or equal to 155 mg/L (Table 6.17). Information is deficient concerning the acute tolerance to EDC for certain life stages including adult fish and salmon smolts. And, although our knowledge concerning the acute sublethal toxic effects and EC50 concentrations for ethylene dichloride is extremely limited, present evidence indicates that rapid toxic responses may occur if salmonid fish are exposed to chemical strengths greater than or equal to 50 mg/L.

6.2.3.4 Styrene Monomer

No technical information concerning the toxicity of styrene monomer to salmonid fish was found in the published literature. Additionally, enquiries with Dow Chemical Canada Inc. failed to reveal any unpublished data for these species.

Reported results concerning the toxicity of styrene to fish are restricted to LC50 data for warmwater species (Table 6.19). Bioassays with guppies, goldfish, bluegill sunfish and fathead minnows demonstrated that styrene concentrations of 26-75 mg/L can impact fish survival within 24-96 .h. Laboratory bioassays with each of these fish species by Pickering and Henderson (1966) showed that results for 24-, 48- or 96-h exposure were similar if not identical (Table 6.19). Mattson and Arthur (1976) found that exposure of fathead minnows to 100 mg/L styrene for l-hour caused 50% fish mortalities; whereas longer (24-96 hour) exposures reduced the LC50 valued to 32 mg/L.

The above bioassay results were restricted to one life stage of fish (juveniles). Thus, the relative sensitivity of differing developmental stages to acute styrene exposure is unknown. No information regarding sublethal toxic responses for salmonid or other fish species, caused by brief exposures to styrene monomer, is available in the published literature.

TABLE 6.19 REPORTED EFFECTS ON FISH IN *FRESH* WATER, CAUSED BY THEIR *ACUTE* (HOURS) EXPOSURE TO STYRENE MONOMER.

FISH SPECIES	LIFE STAGE EXPOSED	NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (hours)	MEDIAN EFFECTIVE CONCENTRATION* (mg/L)	REFERENCE
guppy	juvenile	survlvrl	24	75	Pickering and Henderson 1966
guppy	juvenile	survival	48	75	Pickering and Henderson 1966
guppy	juvenile	survival	96	75	Pickering and Henderson 1966
goldfish	juvenile	suwlval	24	65	Pickering and Henderson 1966
goldfish	juvenile	survival	48	65	Pickering and Henderson 1966
goldfish	juvenile	suwlval	96	65	Pickering and Henderson 1966
bluegill	juvenile	survival	24	25	Pickering and Henderson 1966
bluegill	juvenile	survival	48	25	Pickering and Henderson 1966
bl uegill	juvenile	suwlval	96	25	Pickering and Henderson 1966
fathead minnow	juvenile	survlvrl	24	57	Pickering and Henderson 1966
fathead minnow	juvenile	survival	48	54	Pickering and Henderson 1966
fathead minnow	juvenile	suwlval	96	46	Pickering and Henderson 1966
fathead minnow	juvenile	survival	1	100	Mattson and *Arthur* 1976
fathead minnow	juvenile	survival	24	32	Mattson and Arthur 1976
fathead minnow	juvenile	survlvrl	96	32	Mattson and Arthur 1976
goldfish	juvenile	survival	24	26	Anon 1980 (cited in EPS 1984c)

* Concentration causing a response for 50% of the exposed fish.

Findings for the EPS bioassay with rainbow trout swimup fry exposed to mixtures of styrene in North Thompson River water are summarized in Table 6.20. The LC50 values calculated for exposures of 1-96 hours show that styrene concentrations greater than 3,200 mg/L were required to cause fish deaths within 2 hours. By 24 hours, the median lethal concentration was 114 mg/L. Longer exposures (48-96 hours) did not reduce this value further. No bioassays were undertaken to assess the impact of brief (less than 24 hours) exposures of salmonid fish to styrene on their long-term survival and well-being when returned to uncontaminated fresh water. For instance, the ability of salmonid fish to survive a l-hour exposure to styrene concentrations greater than 114 mg/L, when transferred to freshwater and observed throughout a subsequent 96 hour (or longer) period, is not known.

Observations of the rainbow trout fry surviving a 96-hour exposure in dilute concentrations of styrene monomer mixed with Thompson River water revealed a number of sublethal toxic responses. Styrene concentrations of 18 mg/L and higher caused increased respiratory rates, increased swimming activity and loss of equilibrium during the initial 24-hour period of exposure (Table 6.20). These responses were evident for exposures as brief as 1 hour. Recovery (lack of observable sublethal responses) was evident by 48 hours These fish were also discoloured (darkened epithelium) during the initial 4-hour exposure to styrene concentrations greater than or equal to 18 mg/L.

Based upon these laboratory findings for rainbow trout fry, it can be concluded that mixtures of styrene in Thompson River water may place the short-term survival of salmonid fish at risk when concentrations exceed 100 mg/L. Further, significant sublethal toxic effects may occur if styrene concentrations exceed 10 mg/L.

6.2.4 Critical Levels of Spilled Chemicals

Using the available published information together with supplemental data derived for bioassays with North Thompson River water as the diluent water and rainbow trout as the test fish, an attempt has been made to present concentrations for each chemical that are critical for the short-term survival and well-being of salmonid fish. These values are summarized in Table 6.21.

TABLE 6.20 ACUTE TOXIC EFFECTS TOWARDS RAINBOW TROUT SWIMUP FRY*, CAUSED BY BRIEF EXPOSURES TO MIXTURES OF STYRENE MONOMER IN THOMPSON RIVER WATER*.

NATURE OF RESPONSE MEASURED	DURATION OF EXPOSURE (Hours)	MEDIAN EFFECTIVE CONCENTRATION*** (mg/L)
survival (LC50)	1	>3200
survival (LC50)	2	>3200
survival (LC50)	4	1427
survival (LC50)	24	114
survival (LC50)	48	114
survival (LC50)	72	114
survi val (LC50)	96	114
loss of equilibrium	1-24	<18, >10
increased respiratory rate	1-24	<18, >10
increased swimming activity	1-24	<18, >10
discolouration	1-4	<18, >10

* Hatchery-reared fish; weight 0.4-0.9 g, fork length 3.7-4.5 cm.

** Sampled April 11, 1986 near Little Fort, B.C.; pH 8.0, temperature 6.9-9.2.°C.

- Concentration causing a response for 50% of the exposed fish.

TABLE 6.21 SUMMARY OF CONCENTRATIONS OF AMMONIA, SODIUM HYDROXIDE, ETHYLENE DICHLORIDE AND STYRENE, ESTIMATED* TO BE CRITICAL FOR THE SHORT-TERM SURVIVAL AND WELLBEING OF SALMONID FISHES-, IF ADDED TO THOMPSON RIVER WATER.

CHEMI CAL	CRITICAL LETHAL LEVEL	CRITICAL SUBLETHAL LEVEL
anfa (un-ionized)	0.1 mg/L	0.03mg/L
sodium hydroxide (as a 50% solution)	100 mg/L pH 10	18 mg/L pH g
ethylene dichloride	150 mg/L	32 mg/L
styrene monomer	100 mg/L	10 mg/L

* Based upon results for recent EPS bfoassays using North Thompson Rfver water (Tables 1A-4A), together with pertinent data in the technical literature (Tables 1-4).

** Threshold concentrations above which acute lethal and sublethal toxic effects towards salmonfd fish may occur.

The concentrations given for each chemical are those threshold values above which acute lethal and sublethal effects towards exposed salmonid fish may be anticipated. These values are estimates only; and are based solely on laboratory-derived data which are in many cases (especially with respect to the acute sublethal-effect values) of a preliminary nature. Meaningful laboratory-derived and field-proven toxicological data pertinent to the impact towards salmonid fish species caused by the spillage of these chemicals to the Thompson River or other receiving water bodies are largely lacking, Obvious information gaps include an absence of comparative bioassays with various salmonid fish life stages and species, as well as an understanding of the extent to which prior or simultaneous short-term chemical exposure may impact fish condition and their performance capabilities in the natural environment. Accordingly, caution is advised in any interpretation of the degree of environmental risk to the salmonid fisheries resource, posed by the various spill scenarios to be considered as part of this project.

7.0 ACCIDENT SCENARIOS (Author: L. Robertson)

The previous sections of this report have outlined an approach to estimating downstream chemical concentrations following a spill, capabilities and limitations of countermeasures, salmon resources and their vulnerability to anhydrous ammonia, ethylene dichloride, styrene, and caustic soda. This section reports on the application of the model to specific chemical spill situations, selectively chosen to illustrate the capability of the model and the threat to the salmonid resource.

To investigate downstream conditions following a spill, the steady state rather than the transient model was used. Several reasons dictated this choice. Basically, the steady state model appeared to generate more realistic spill concentrations, based on comparisons with limited field sampling from chemical spills Also, the main unknown for river incidents is the early hours following a spill, prior to the establishment of field sampling. In these early hourq the steady state model may effectively simulate a transient phenomenon such as a chemical spill.

The steady state model has been constructed to investigate a wide range of spill conditions. To illustrate the model and possible spill impacts, seven scenarios were selected: one a 1982 spill of ethylene dichloride into the North Thompson River, and the others chosen to focus on how impacts might vary with date, discharge, location, chemical properties and toxicity characteristics Much can depend on spill volume and release time. For each hypothetical scenario, though a 1,000 L/min release rate was arbitrarily set as a means of best approximating the rate of chemical entrainment in the river, the incremental impacts of other release rates are also considered.

A major influence on river contamination levels is discharge. In rivers such as the North Thompson, this can vary widely during the course of a year. In 1982, when the ethylene dichloride spill occurred, discharge measured at Birch Island varied from 18 to 762 cubic meters per second.

7.1 SCENARIO Xl

Date	:	March 3, 1982
Location	:	River kilometer 83
Chemical	:	Ethylene dichloride (EDC)
Volume Spilled (est.)	:	870 tons or 788,000 liters
Initial Release Rate	:	1,000 L/min
Discharge (Birch Is.)	:	28 cms (est., Environment Canada, 1983)

On March 3, 1982 a derailment 13 kilometers south of Blue River, British Columbia, resulted in 870 tons (788,000 liters) of ethylene dichloride entering the Thompson River (Neely and Lutz, 1985). An emergency response team from Dow Chemical Canada Inc. responded immediately, and local railway officials were quickly on the site. In practical terms, Blue River is a relatively remote location and the first post-spill monitoring data downstream were obtained only after 44 hours, Nothing quantitative is known about the speed at which ruptured tank cars poured their contents into the partially ice-covered North Thompson River.

The model provides a means to evaluate the fate of this spill in its early hours. For purposes of this exercise, a spill release rate of 1,000 L/m (60 tons per hour) was assumed. At this rate, all of the contaminant would have entered the river in 15 hours. This approach is admittedly arbitrary; it likely underestimates the release rate in the early hours and over-estimates the rate in the later hours. It does provide some insight into what types of concentrations might have occurred within the first 48 hours.

The results of the Scenario #1 analysis are shown in Appendix 8. According to model results, initial concentrations exceeded 1,300 mg/L and concentrations in excess of 1,000 mg/L extended from the spill site near Wolfenden, B.C. (kilometer 83) downstream to kilometer 132, approximately half way between Avola and Vavenby (Figure 7.1). Estimated concentrations in excess of the critical lethal level (150 mg/L) extended from the spill site to the junction with the South Thompson River at Kamloops (kilometer 310; Figure 7.2).

TABLE 7.1: FIELD DATA FROM THE SITE OF THE ACCIDENT.

DISTANCE (kms)	TIME POST DERAILMENT (HOURS) 44	68	92	20(a)	SITE CONDITIONS
0.2				No	• Opposite from spill
0.2	8(b)	6	10	Yes	. Same side
6	4				
a				Yes	. Both sides of the river
a				Yes	
11				Yes	• Km 2 to 16
13	5	7	4		
16				Yes	
19	14				• Km 26 to 51 is flat and ice covered.
26	45			No	
32	80				
34				No	
45	220	12	15		
51	180				• Km 51 to 77 rapids.
64	N/D		10		
a3	N/D	33	la		
96		40			• Km 100 to 161 generally flat and wide
103			13		
109		19			
116			a		
128		12	14		

(a) This column refers to the detection of odour.
(b) Concentrations are in mg/L.
N/D No data.

Source: Neely and Lutz (1985)

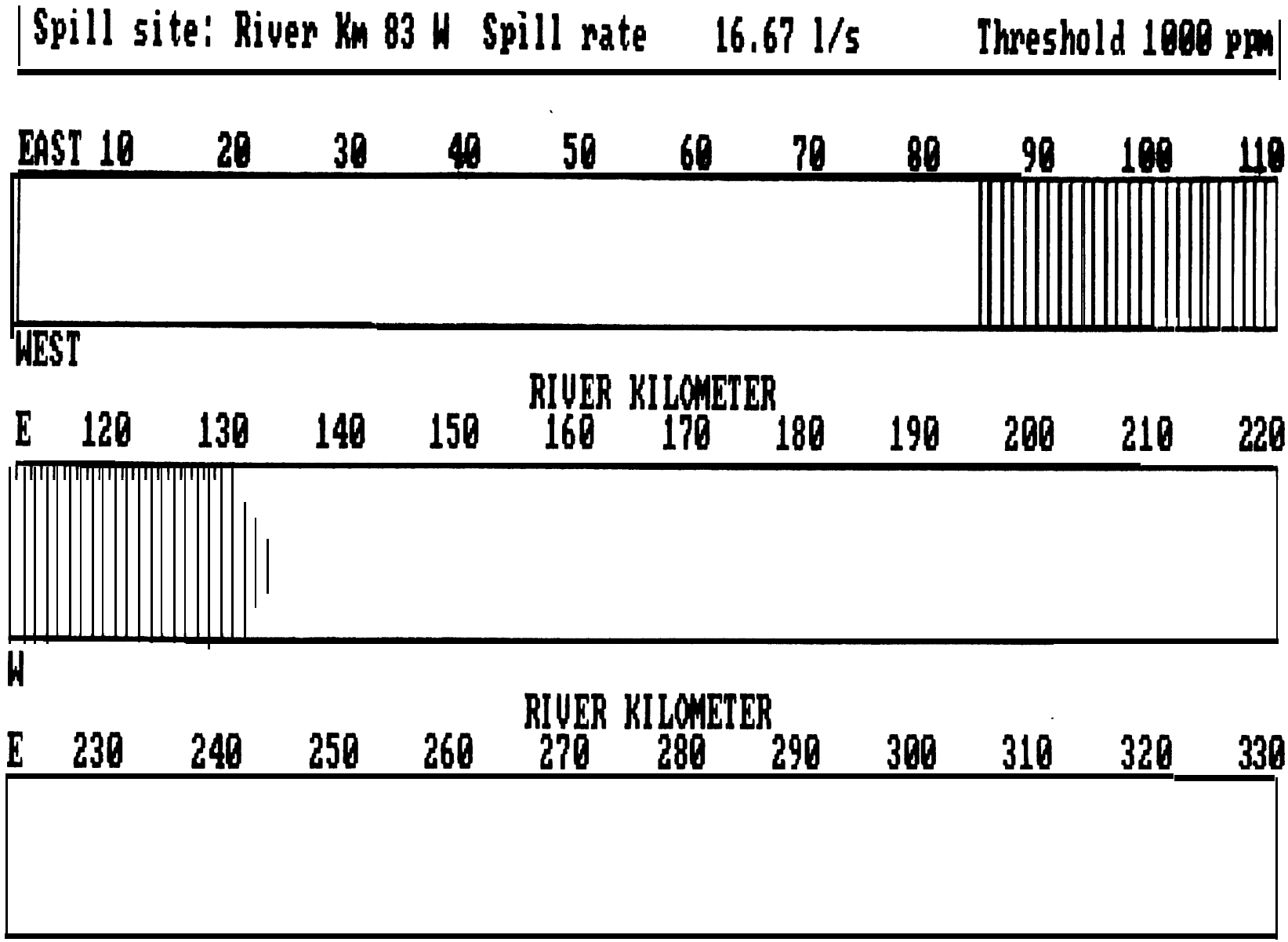

FIGURE 7.1: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ETHYLENE DICHLORIDE IN EXCESS OF 1,000 MG/L FROM MARCH 3, 1982 SPILL.

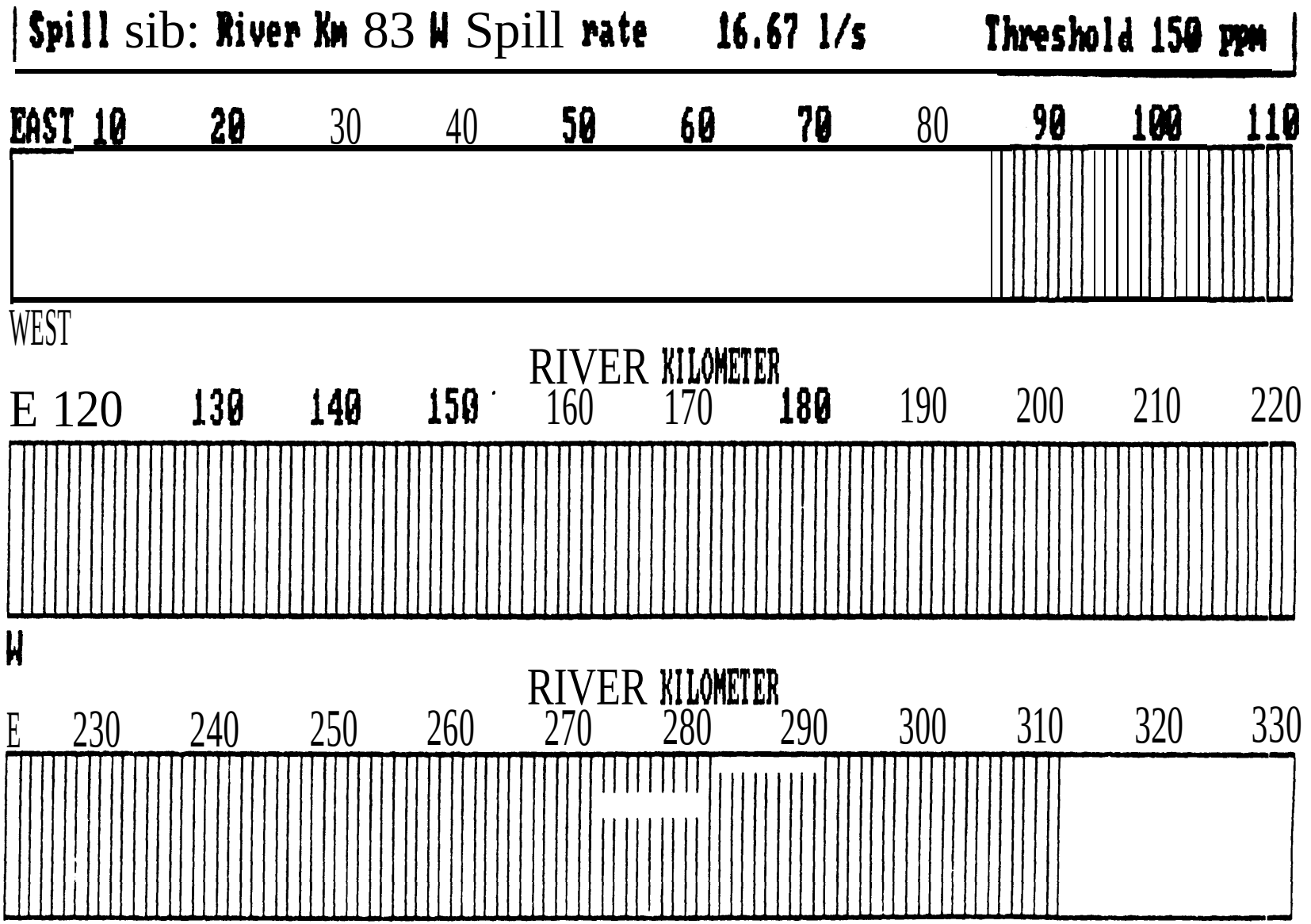

FIGURE 7.2: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ETHYLENE DICHLORIDE IN EXCESS OF 150 MG/L FROM MARCH 3, 1982 SPILL.

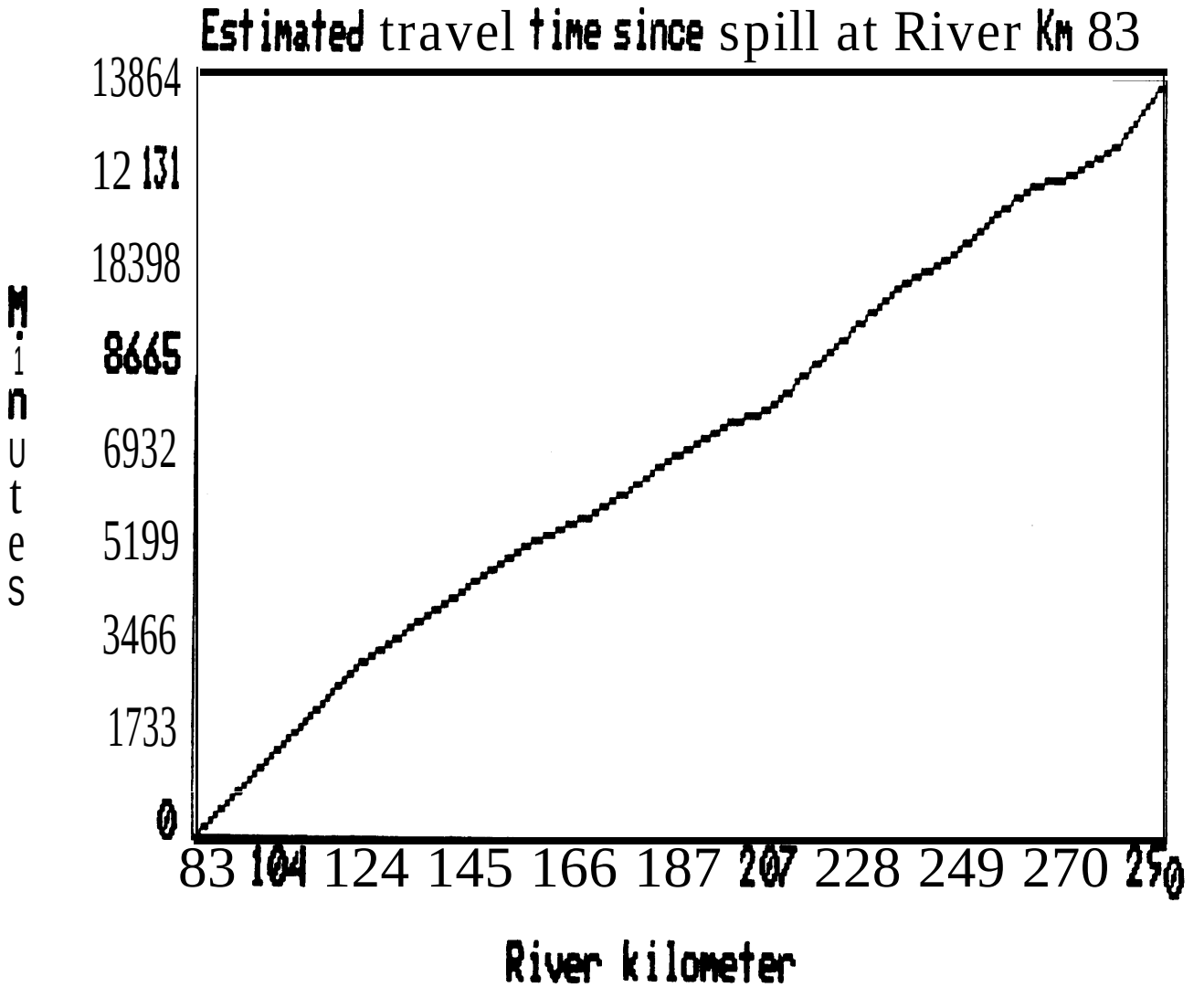

FIGURE 7.3: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF ETHYLENE DICHLORIDE AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING HYPOTHETICAL MARCH 3, 1982 SPILL

Extensive concentrations of EDC in excess of 150 mg/L in the North Thompson River were confirmed by post-spill sampling in 1982 (Table 7.1). At 45 kilometers downstream, samples indicated concentrations of 220 mg/L 44 hours after the accident. Simulating downstream concentrations, Neely and Lutz (1985) made a conservative estimate of 1,211 mg/L at 42 hours after the incident, 45 kilometers downstream. The mid-channel model estimate was 1,028 mg/L (river kilometer 128) 51 hours after the spill.

Time of travel is estimated in Figure 7.3. At velocities averaging 0.3 m/sec., the initial pulse of EDC would take approximately four days to reach Clearwater, 98 kilometers downstream of the spill. The duration of exposure is not calculated in the model, but evidence from Dow Chemical Canada Inc. indicates that at 44 hours, concentrations in excess of the critical lethal level (150 mg/L) occurred at km 51 and km 45 and some distance upstream, based on the 80 mg/L measurement at km 32. Thus, at that time, between 6 and 18 km of river was exposed to critical lethal levels, Further upstream, it is safe to assume greater concentrations and/or length of time in excess of critical let hal levels

No systematic attempts were made to remove the EDC from the water, and in a discussion of this matter (Section 5.3), the feasibility of containment was judged to be low. The main recovery opportunities would arise from the tendency of EDC to sink (S.G. 1.25) and the construction of a sand bag barrier across the width of the river. The best locations would be wide, shallow reaches with a thalweg sufficiently shallow that sand bagging and pumping functions could be quickly installed and operated. However, the remoteness of much of the area and the difficulties of mobilizing the required equipment quickly suggest the feasibility of such an operation would be poor.

The abundance and distribution of fish in the North Thompson River in early March is poorly understood. The timing is at least one month prior to the start of juvenile coho and chinook salmonid migration, and therefore most eggs from the 1981 spawning

escapement would remain at that stage. Thus, tributary spawning areas might have avoided significant losses, but main channel spawning areas could have suffered losses owing to the susceptibility of eggs at the eyed stage (Table 6.13). This susceptibility may be heightened by EDC's tendency to sink (S.G. 1.25), and concentrate on the bottom.

The status and vulnerability of smolt (1+) migrants in early March is less certain. In a review of their distribution in the system (Section 6.1) it was pointed out that winter distributions could only be inferred from late summer (August/September) samplings At that time, most juvenile chinook were located downstream of Clearwater River in the mainstem and one can cautiously hypothesize that winter distributions approximate these earlier results Most coho were found upstream of the Clearwater River, but in tributary rather than main channel habitats.

According to the modelling results, concentrations in excess of the critical lethal level (150 mg/L) extended from the spill site downstream as far as Kamloops junction, potentially exposing all coho and chinook smolts in the mainstem. Based on winter distribution assumptions, this might have exposed 100% of the juvenile chinook residing in the North Thompson River. Juvenile coho occurring primarily in tributary habitats would have avoided the spill.

If the above assumptions are correct, or partially correct, there may have been a significant mortality to juvenile chinook and numbers of adult chinook salmon returning to the North Thompson River system in 1985 would have been lower than predicted. However, spawning escapements of chinook salmon into the North Thompson system were not below average; they exceeded 1984 escapements of about 15% (M.K. Farwell, DFO, pers comm.). Even the escapement statistic is not ideal for the circumstances here; it represents the survivors of stream and ocean stages, plus the commercial and sport fisheries,

7.2 SCENARIO #2

Date	:	May 15, 1982
Location	:	River kilometer 83
Chemical	:	Ethylene dichloride (EDC)
Volume Spilled (est.)	:	870 tons or 788,000 liters
Initial Release Rate	:	1,000 L/min
Discharge (Birch Is.)	:	269 cms (est., Environment Canada, 1983)

A hypothetical May 15 accident was examined to consider the potential fate and effects during the peak period of downstream migration and the early stages of freshet. AU other spill characteristics were unchanged.

The results of Scenario #2 analysis are given in Appendix 8. Initial concentrations from the model peaked at 143 mg/L in the first kilometer, but never exceeded the critical lethal level (150 mg/L). Concentrations in excess of 100 mg/L extended 48 kilometers downstream from the spill site (Figure 7.4). Concentrations above critical sublethal levels (32 mg/L) extended downstream as far as the confluence with the Clearwater River (Figure 7.5).

The May 15 accident indicates some of the characteristics of freshet conditions. The estimated discharge (162 cms) at the accident site was almost 10 times that of the March 3 incident. Downstream velocities were about three times faster exceeding 1 m/s for significant lengths of river (Appendix 8). Estimated time to reach Clearwater (km 181) was 27 hours (Figure 7.6). River stage height was greater by over one meter, making less feasible any attempts for containment and recovery. In addition, freshet conditions would pose safety problems for any river operation.

Extensive EDC concentrations were estimated to have had a potentially significant impact on fry and smolt coho and chinook salmon, as well as other fish in the system. Concentrations close to critical lethal levels (greater than 100 mg/L) were estimated to extend 50 kilometers downstream (Figure 7.4). Concentrations at or near these levels might have persisted for at least the period during which EDC from the leaking tank cars was being entrained into the river (estimated 15 hours). Thus, even with the dilution potential of freshet conditions, a spill of realistic magnitude (i.e., less than a

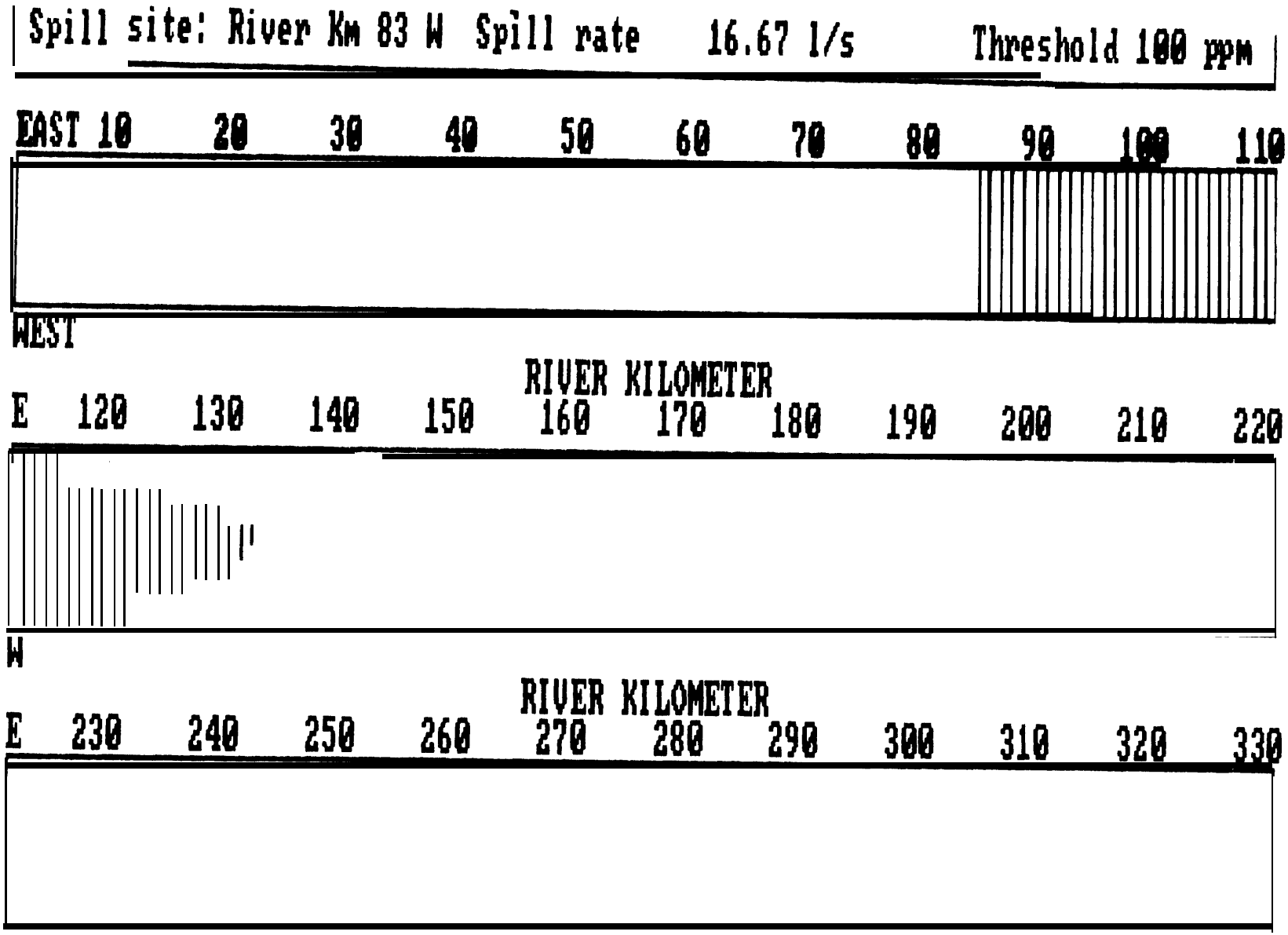

FIGURE 7.4: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ETHYLENE DICHLORIDE IN EXCESS OF 100 MG/L FROM HYPOTHETICAL MAY 15, 1982 SPILL.

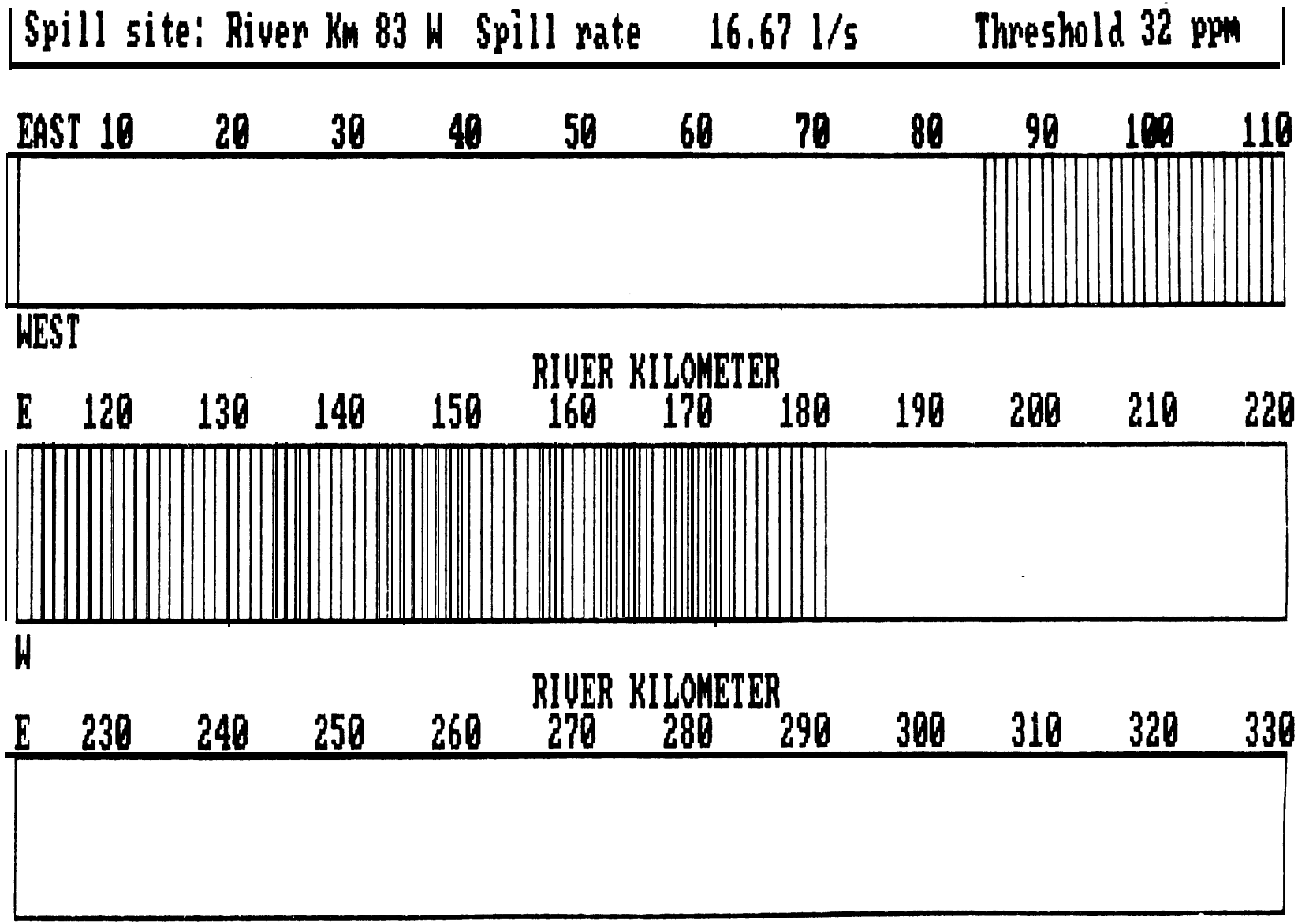

FIGURE 7.5 : ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ETHYLENE DICHLORIDE IN EXCESS OF 32 MG/L FROM HYPOTHETICAL MAY 15, 1982 SPILL.

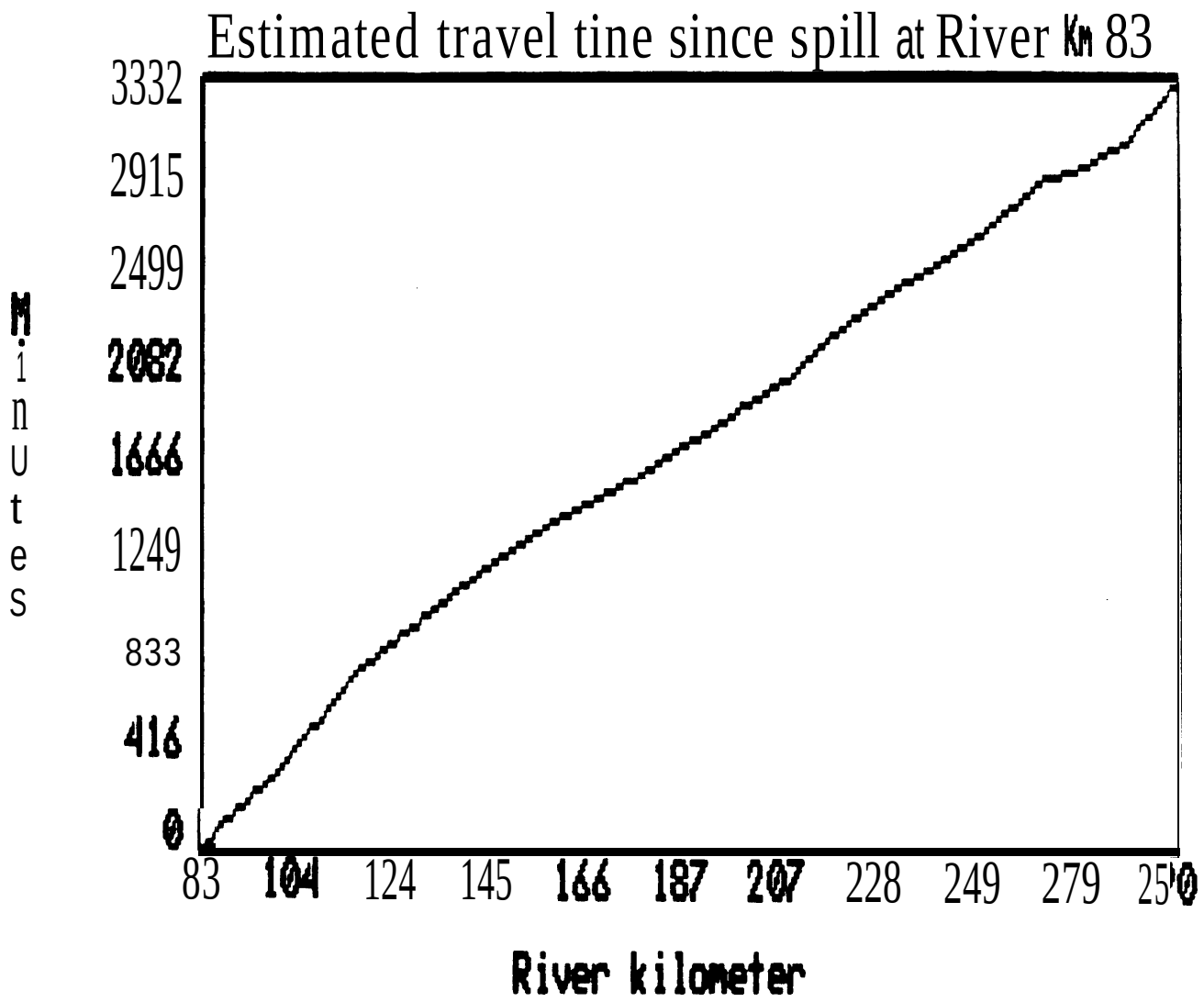

FIGURE 7.6: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF ETHYLENE DICHLORIDE AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING HYPOTHETICAL MAY 15, 1982 SPILL,

worst case scenario) could expose the fish in a 50 kilometer section to concentrations near the critical lethal level for 15 hours.

Concentrations at or above the critical sublethal level (32 mg/L) were estimated to extend from the accident site downstream to the junction of the Clearwater River. As a proportion of the entire North Thompson River system, spawning escapements in this section represent 17% of the chinook, 46% of the coho, and 29% of the sockeye (Figure 6.2). This scenario represents a significant threat to the salmonid resource during downstream migration, particularly if it coincides with the movement of Raft River sockeye to Kamloops Lake. Though almost half of the coho population spawns upstream of the Clearwater River, low mainstem densities indicate fry remain in tributaries (Figure 6.3). This distribution could protect juvenile coho from the effects of the May 15 scenario. Most of the chinook and sockeye would likely occur in the mainstem.

7.3 SCENARIO #3

Date	:	April 20, 1982
Location	:	River kilometer 169 (near Birch Island)
Chemical	:	Styrene monomer
Volume Spilled (est.)	:	900 tons
Initial Release Rate	:	1,000 L/min
Discharge (Birch Is.)	:	35 cms (est., Environment Canada, 1983)

The April 20 date was chosen to investigate the fate and effects of a major spill of styrene monomer when discharge was still low (35 cms at Birch Island), yet young salmonids, particularly mainstem chinook, would be just emerging or starting to move downstream, and thus be vulnerable. In addition, the Birch Island location was chosen so that significant concentrations might extend well downstream of the Clearwater River.

The results of Scenario #3 analysis are tabulated in Appendix 8. The model calculated peak initial concentrations as high as 390 mg/L in the first kilometer downstream. Concentrations remained above or near 300 mg/L downstream 12 kilometers

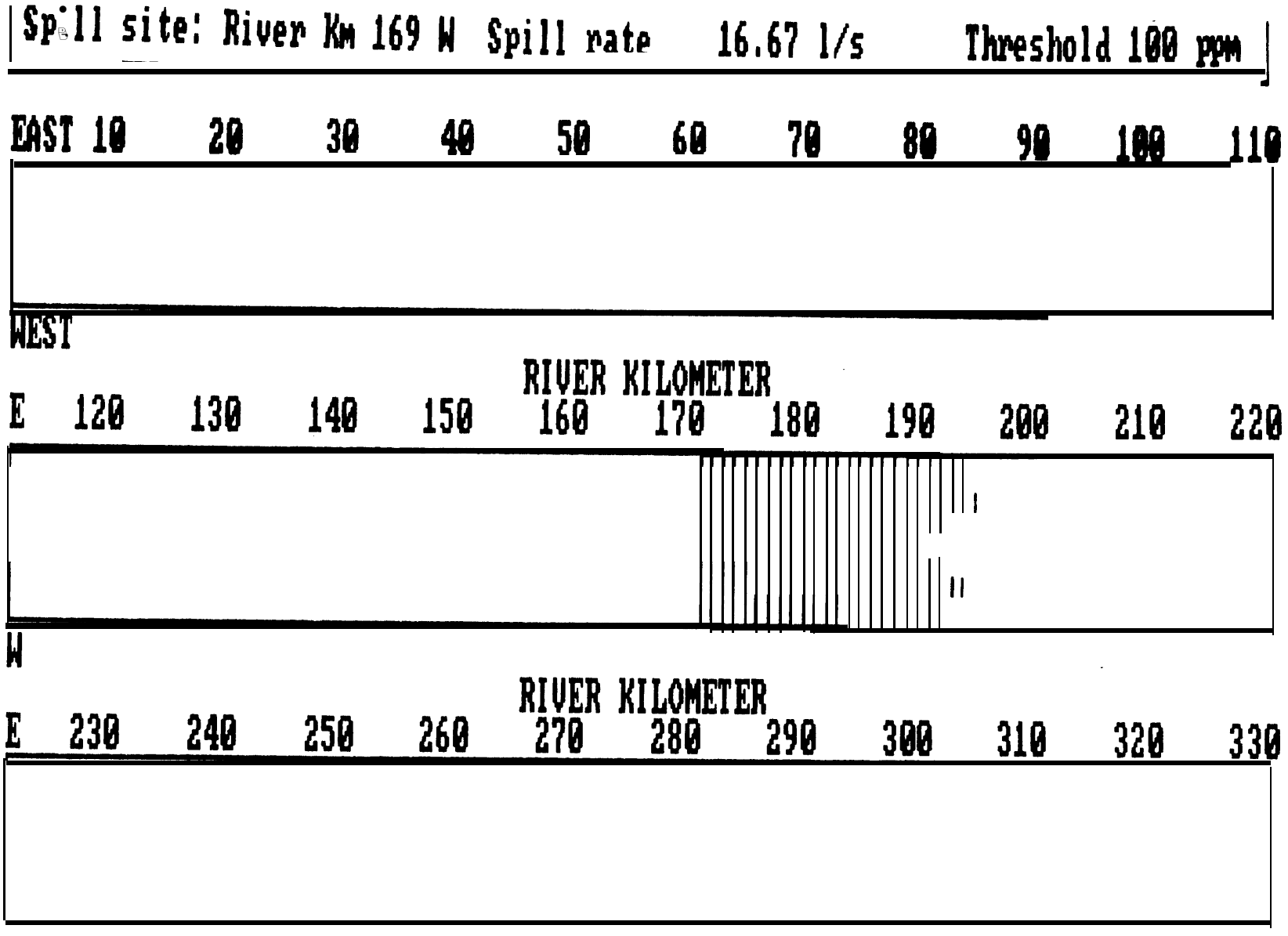

FIGURE 7.7: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF STYRENE MONOMER IN EXCESS OF 100 MG/L FROM HYPOTHETICAL APRIL 20, 1982 SPILL.

to the confluence with the Clearwater River. Concentrations in excess of the critical lethal level (100 mg/L for styrene) extended as far as kilometer 194 (Figure 7.7). Concentrations at or in excess of the critical sublethal level (10 mg/L) extended continuously to kilometer 270 and intermittently to kilometer 300 (Figure 7.8). River velocity near the spill site exceeded 0.7 m/sec. and the pollutant reached the Clearwater River (km 181) in an estimated 4.8 hours (Figure 7.9). Below Clearwater, velocity decreased (Appendix 8).

Styrene monomer tends to float (S.G. 0.91 at 25°C) and this characteristic could provide an opportunity to use conventional oil containment barriers Because of reaction with styrene, certain types of materials are not suitable (Section 5.5.1.3). Assuming compatible containment equipment and the availability of recommended skimmers (Section 5.5.2.2), significant recovery is possible. However, styrene is a moderately volatile, flammable liquid; containment and recovery operation benefits would have to be weighed against risks to workers

By April 20, juvenile salmonid migrations are in their early weeks, but still several weeks prior to their peaks The bulk of the chinook spawning areas (82%) are in the Clearwater River and the North Thompson mainstem from the mouth of Mann Creek (kilometer 193) to Little Fort (kilometer 212). Fry from the latter area might avoid (barely) the critical lethal zone, but would still face an extended exposure to concentrations above the critical sublethal level. Chinook salmon migrating down the Clearwater River would become exposed as North Thompson River water mixed with the Clearwater River, and this might represent as much as 10 kilometers of exposure to migrating fry. Coho densities in the mainstem of the North Thompson River are very low in April, indicating limited vulnerability during the period of this spill. Downstream migration of sockeye is reported to be concentrated in May.

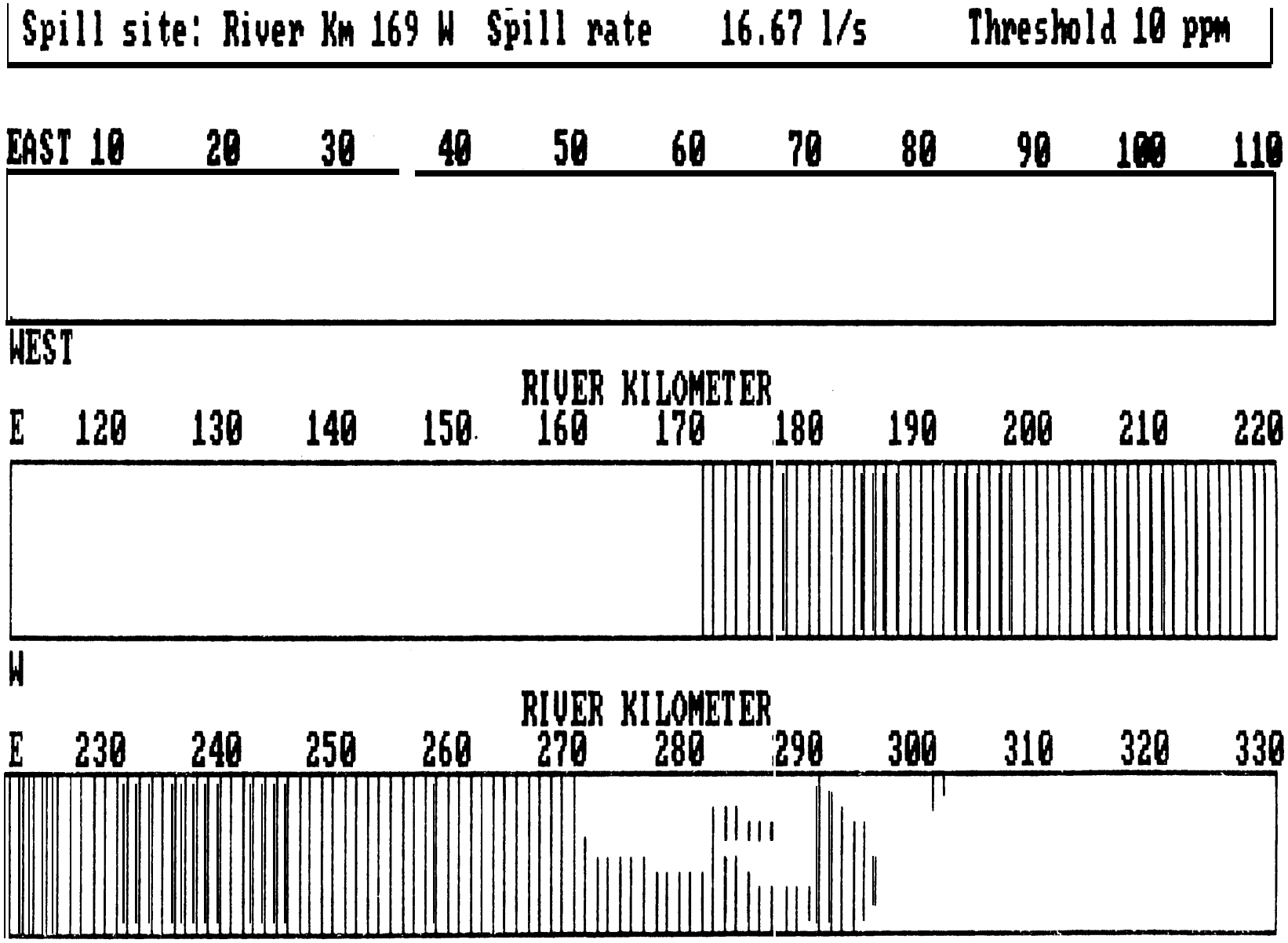

FIGURE 7.8: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF STYRENE MONOMER IN EXCESS OF 10 MG/L FROM HYPOTHETICAL APRIL 20, 1982 SPILL.

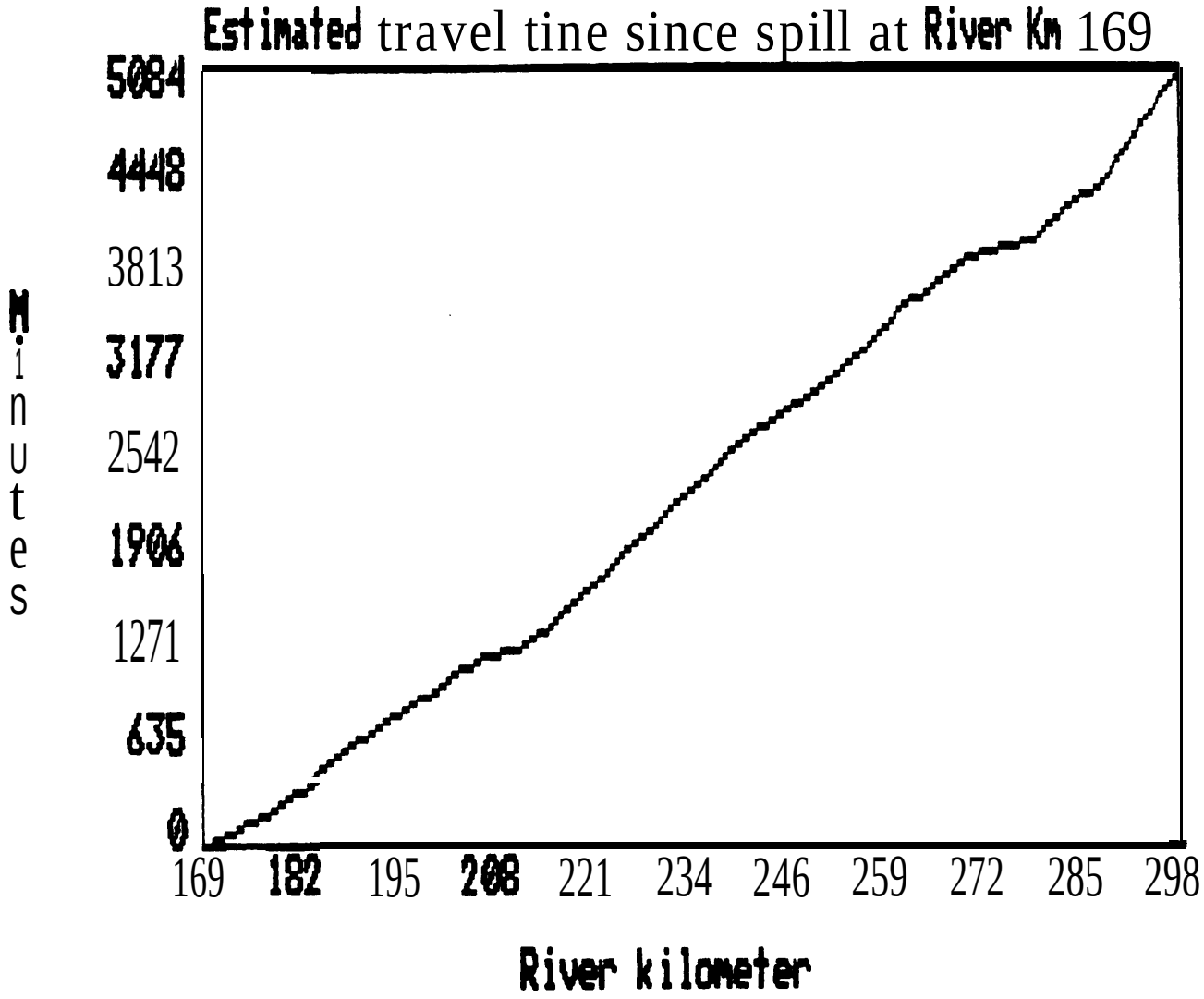

FIGURE 7.9: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF STYRENE MONOMER AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING HYPOTHETICAL APRIL 15, 1982 SPILL,

7.4 SCENARIO #4

Date	:	September 15, 1982
Location	:	River kilometer 119
Chemical	:	Caustic Soda (50% solution)
Volume Spilled (est.)	:	900 tons
Initial Release Rate	:	1,000 L/min
Discharge (Birch Is)	:	160 cms (est., Environment Canada, 1983)

The September 15 accident date involving 50% caustic soda (sodium hydroxide) coincides with the protracted decline of river discharge from peak levels. Discharge measured at Birch Island is still fairly high at 160 cms. By September, the downstream fry migration, primarily sockeye, is long completed, but 0+ chinook and coho salmon remain in the system.

The results of Scenario #4 analysis are tabulated in Appendix 8. The model estimated initial peak concentrations of 137 mg/L, and concentrations in excess of the critical lethal level (100 mg/L, or pH 10) extended from the spill site (kilometer 119) to Birch Island (kilometer 170) (Figure 7.10). Concentrations in excess of the critical sublethal level (18 mg/L, or pH 9) extended considerably downstream of the junction with the Clearwater River (Figure 7.11). Estimated time of travel is shown in Figure 7.12.

Caustic soda is transported in a 50% solution. As a highly soluble substance, containment and recovery of spilled chemical is simply not feasible once it has entered a major watercourse such as the North Thompson River (Section 5.4.2). The most effective countermeasures would be interception of spilled chemical while still on land.

Concentrations in excess of the critical lethal level extended downstream 50 kilometers Duration of exposure is estimated to have exceeded the 6-18 hours range based on measurements from the March 1982 EDC spill.

The spill date coincides with the end of upstream migration of adult chinook and sockeye salmon, Although adult salmon are believed to be much more resistant than juvenile salmon to phenomena like spills, the absent of supporting data limits useful

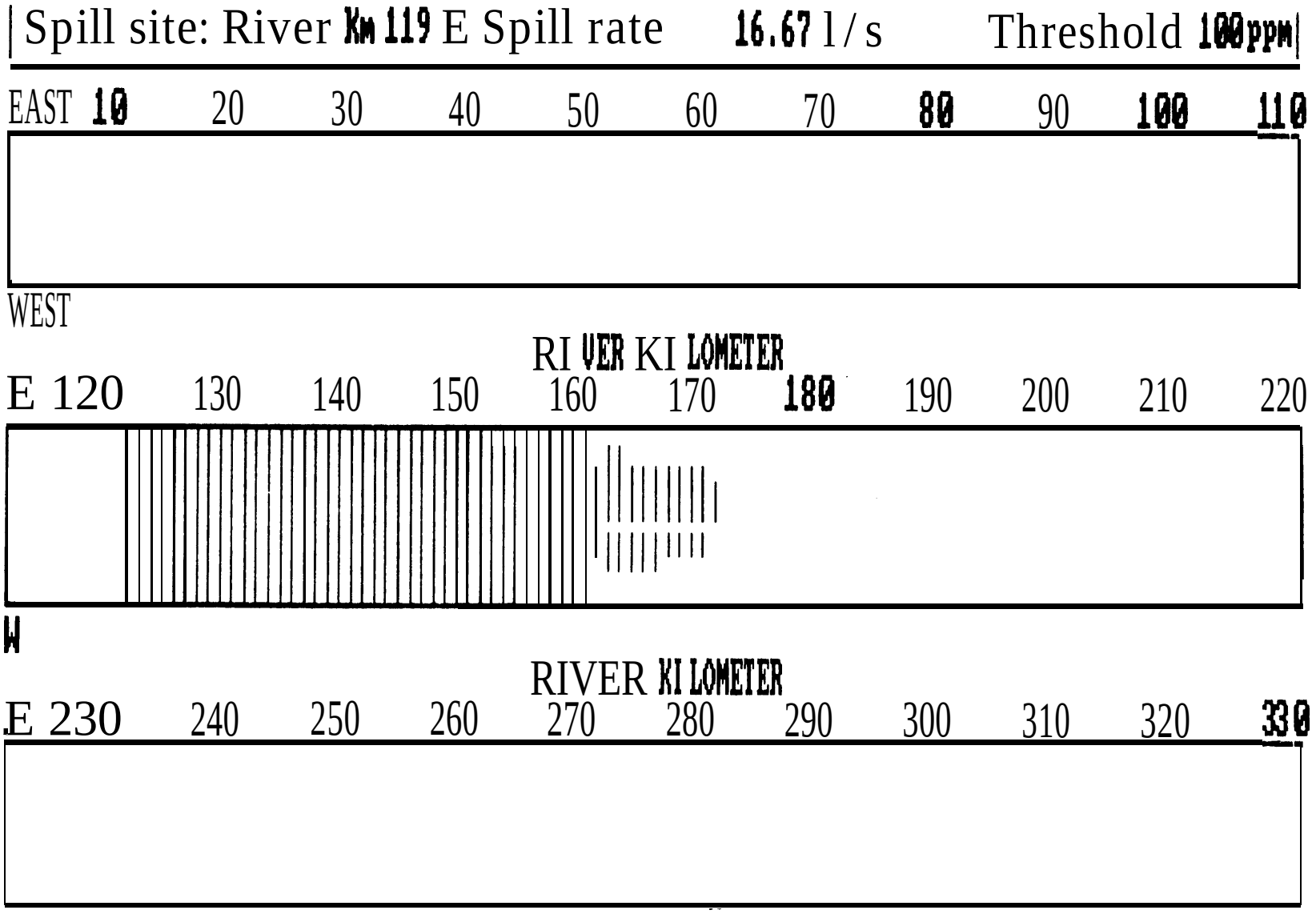

FIGURE 7.10: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF SODIUM HYDROXIDE (CAUSTIC SODA) IN EXCESS OF 100 MG/L FROM HYPOTHETICAL SEPTEMBER 15, 1982 SPILL,

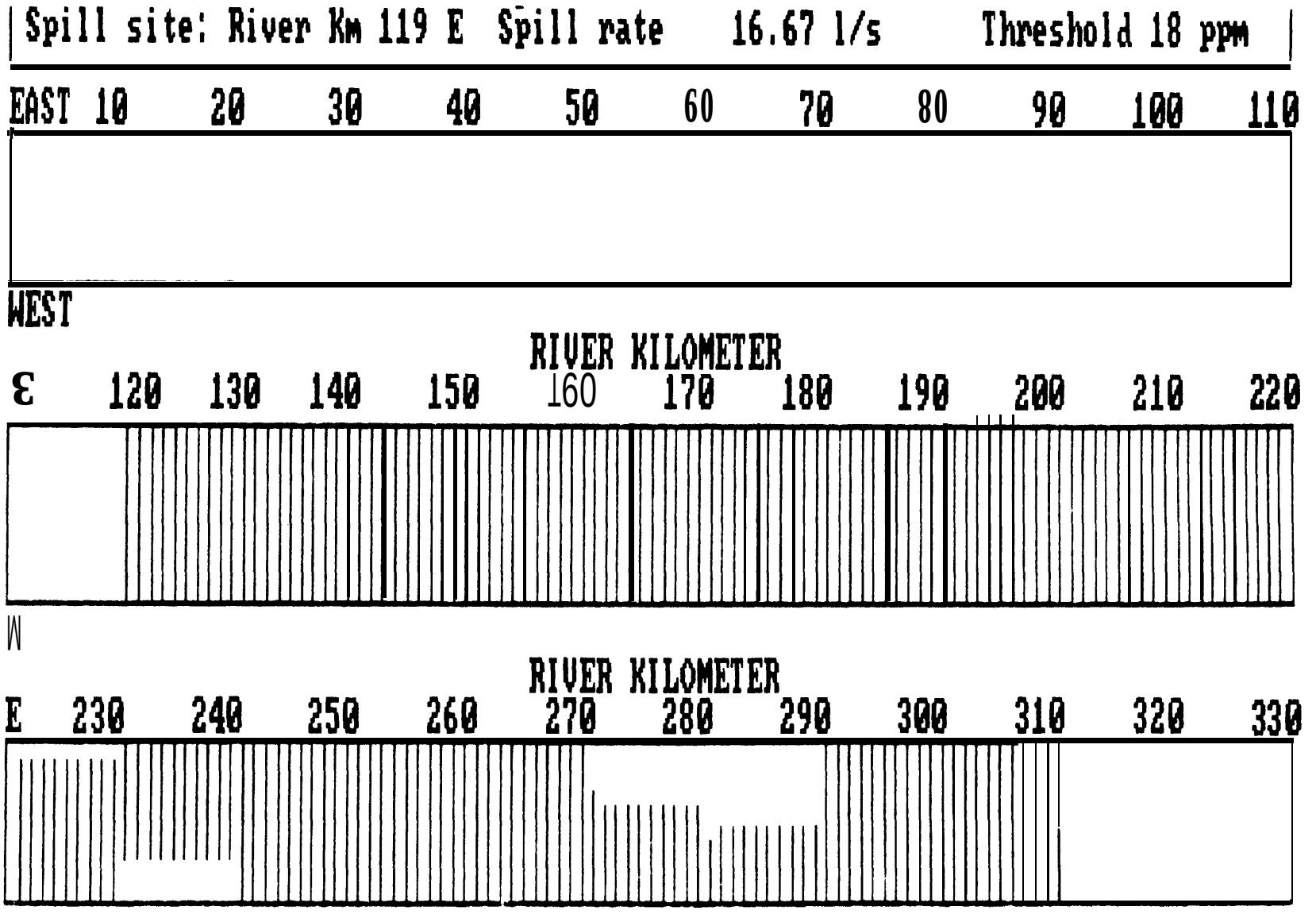

FIGURE 7.11: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF SODIUM HYDROXIDE (CAUSTIC SODA) IN EXCESS OF 18 MG/L FROM HYPOTHETICAL SEPTEMBER 15, 1982 SPILL.

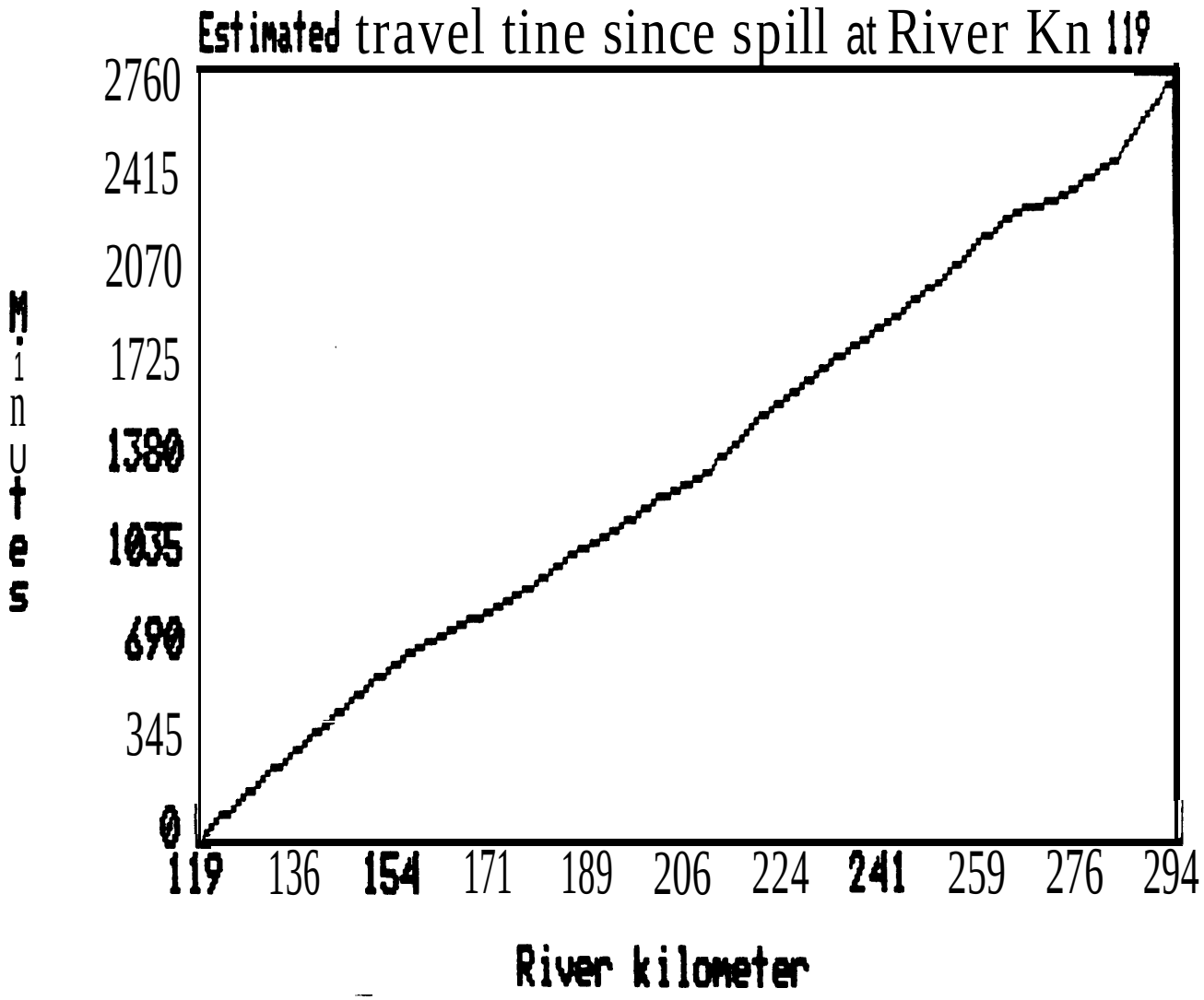

FIGURE 7.12: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF SODIUM HYDROXIDE AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING HYPOTHETICAL SEPTEMBER 15, 1982 SPILL.

discussion Critical lethal levels extended over 50 kilometers in this scenario, and some delay in reaching tributary spawning beds or temporary abandonment of mainstem spawning redds could result.

In late summer, chinook juveniles are distributed primarily downstream of the Clearwater River. In the zone of critical lethal levels, 15% of the mainstem rearing chinook are estimated to occur. However, virtually all North Thompson River chinook are exposed to critical sublethal levels (Figure 7.8). At this time, considerable concentrations of rearing coho occur in the North Thompson River, primarily upstream of the Clearwater River (68%), including a large proportion (50%) upstream of the spill site. The remaining 18% are assumed to be exposed to critical lethal levels. An additional 50 % may be exposed to critical sublethal levels

7.5 SCENARIO #5

Date	:	August 10, 1982
Location	:	River kilometer 189
Chemical	:	Caustic Soda (50% solution)
Volume Spilled (est.)	:	890 tons or 90,900 liters
Initial Release Rate	:	1,000 L/min
Discharge (Birch Is.)	:	348 cms

The August 10 spill of 50 % caustic soda (sodium hydroxide) nominally occurred in a post-freshet period, yet discharge at Birch Island was still 348 cms. At this time, the downstream fry migration is mostly complete, but rearing juvenile (0+) chinook and coho salmon reside throughout the North Thompson system.

The results of Scenario #5 analysis are tabulated in Appendix 8. Initial peak concentrations were estimated at 49 mg/L, somewhat lower than the 100 mg/L (or pH 10) critical lethal level. Critical sublethal levels were exceeded intermittently from the spill site downstream as far as km 211 (Figure 7.13). Velocity was variable (Appendix 8), but in the fastest cells averaged over 1.5 m/sec. Time of travel was comparatively rapid with pollutant occurring at McClure (km 265) in approximately 13 hours (Figure 7.14).

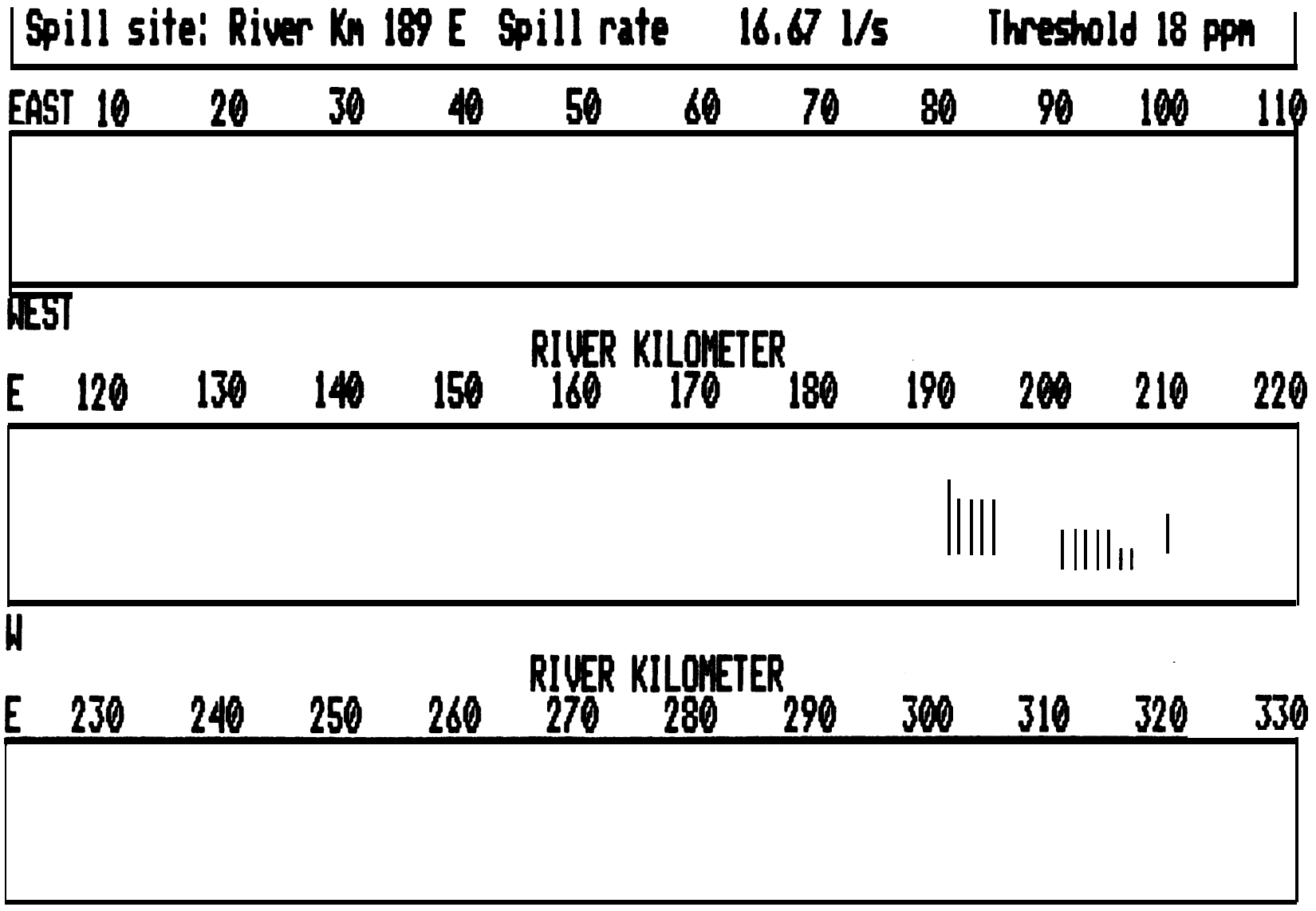

FIGURE 7.13: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF SODIUM HYDROXIDE (CAUSTIC SODA) IN EXCESS OF 18 MG/L FROM HYPOTHETICAL AUGUST 10, 1982 SPILL.

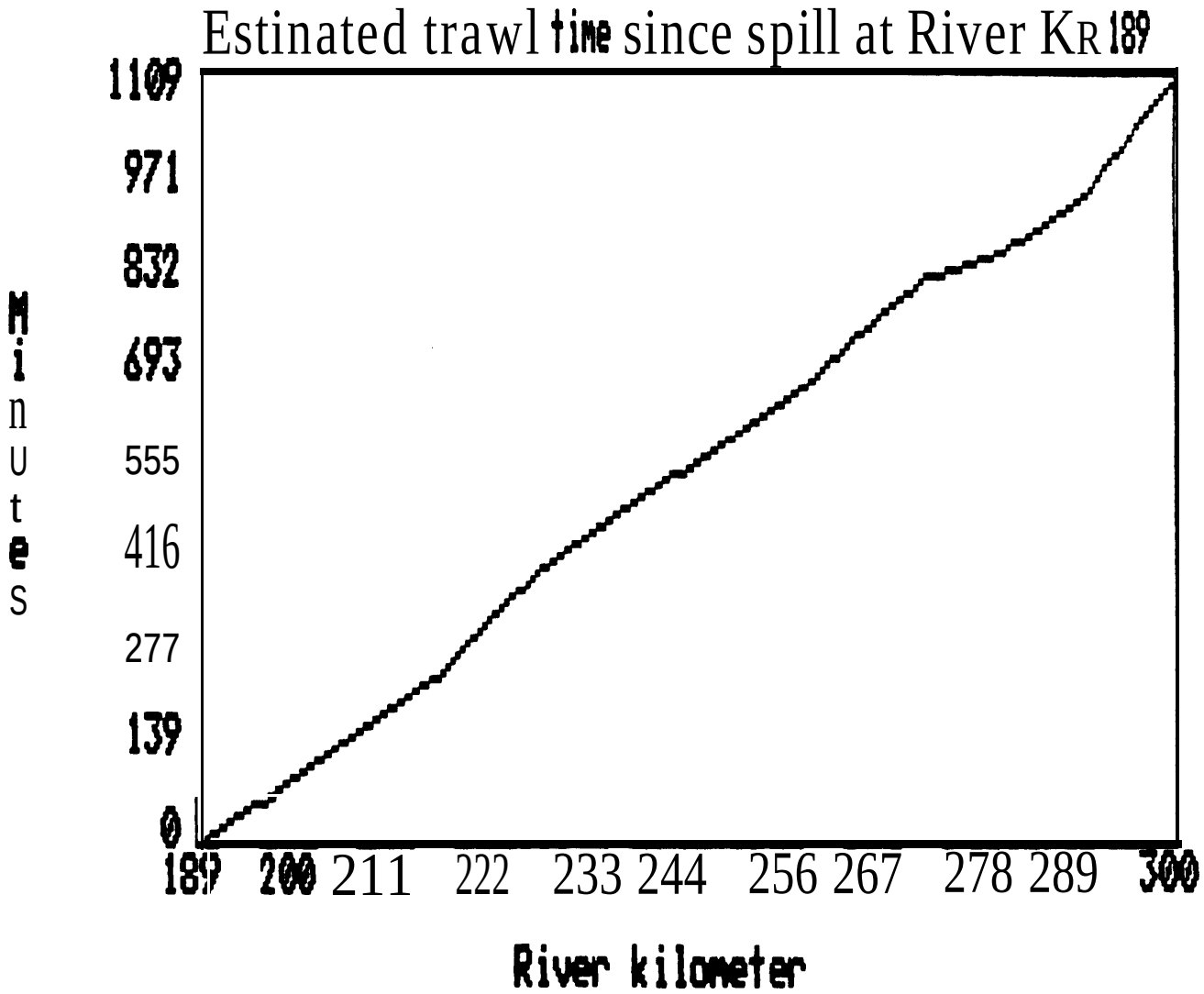

FIGURE 7.14: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF SODIUM HYDROXIDE AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING HYPOTHETICAL AUGUST 10, 1982 SPILL.

Two factors explain the much lower concentrations estimated during this scenario, compared to Scenario #4. First, discharge was over twice as great. Second, Scenario #5 occurred below the mouth of the Clearwater River, which contributes over 50% of the North Thompson River flow.

As in Scenario #4, the containment and the recovery of spilled sodium hydroxide once entrained in the river is not feasible. Interception on land is the only option.

August 10 represents the early phases of adult chinook and sockeye upstream migratioh Critical sublethal levels are only exceeded in limited sections immediately downstream; and assuming the greater tolerance of adult salmon to this type of chemical intrusion, impacts on migration and spawning may only be minor.

The location of the spill, downstream of the Clearwater River, coincides with the known distribution of chinook salmon juveniles in August in this system. Modelling results indicate impacts are limited to some surpassing of critical sublethal levels within 22 km of the spill. This could involve some indirect mortality.

7.6 SCENARIO #6

Date	:	November 9, 1982
Location	:	River kilometer 119
Chemical	:	Anhydrous Ammonia
Volume Spilled (est.)	:	900 tons
Initial Release Rate	:	300 L/min
Discharge (Birch Is.)	:	61.5 cms (est. Environment Canada, 1983)

Spills of ammonia present several special problems to response agencies, some of which affect downstream fate and effects, Most important, shipped as a liquified gas under pressure, it is likely under accidental spill conditions to vapourize quickly. The resulting heavier-than-air gas is toxic if inhaled (EPS, 1984a), posing a threat to railway

crews, nearby residents and workers and emergency response personnel. It has been estimated that 20-50% of the initial release of liquid will vapourize, or "flash off" as a puff (EPS, 1984a). (This type of release would not apply to rail cars which tumble directly into the river.) Second, there is a further vapourization process - when ammonia is spilled into water. An estimated 70% enters the water phase, with the remainder boiling violently and vapourizing (EPS, 1984a). A small fraction within the water phase remains un-ionized. The size of this fraction varies with pH and temperature (Table 7.2). It is this fraction which represents a significant threat to aquatic life.

The November 9, 1982 spill of anhydrous ammonia occurs during low flows, and just prior to significant ice form'ation on the river channel, The date coincides with large numbers of spawning coho salmon in the system, plus 0+ chinook and coho salmon.

With Scenario #6, the volume spilled is similar to earlier scenarios, and an initial release rate of 460 L/s (rather than 1,000 L/s) was chosen. This is based on vapourization estimates (discussed above) that approximately 54% would vapourize: 30% of the initial release of ammonia from the tank cars, and a further 35% of the remainder (or 24% of the original volume), which in water would boil violently and vapourize.

In estimating downstream concentrations, the model does not differentiate ionized from un-ionized ammonia. In early November, the highest recorded temperature is 5°C, and pH is assumed to approximate the 8.0 measured by the study team in April 1986. This represents an estimated 1.22 % un-ionized ammonia in aqueous ammonia solutions (Table 7.2). Therefore, for this scenario the un-ionized ammonia is 0.0122 of tabulated concentrations

The results of Scenario #6 are tabulated in Appendix 8. The model estimated initial peak concentrations of un-ionized ammonia of 2 mg/L (or 152 mg/L including ionized ammonia) and concentrations in excess of the critical lethal level (0.1 mg/L un-ionized, or 8 mg/L including ionized ammonia) extended from the spill site (kilometer 119) to all the way to the junction with the South Thompson River at Kamloops (kilometer 310) (Figure 7.15).

TABLE 7.2a Percentage of un-ionizcd ammonia in aqueous ammonia solutions at different *p*H's and temperatures.

	(C) 5	6	7	8	9	10	II	12	13	14	15	16	17	18	19	20	21	22	23	24	25
*p*H	(F) 41.0	42.8	U.6	46.4	48.2	50 0	SI.8	53.6	55.4	57 2	59 0	60.8	62.6	64.4	66.2	68.0	69 8	71 6	73.4	75.2	77.0
6.S	.04	.04	.05	.05	.06	.06	.06	.07	.07	.08	09	.09	.10	.10	.12	.13	.13	14	.16	.17	.18
6.6	.05	.05	.06	.06	.07	.07	.08	.09	.09	.10	.10	.12	.13	.13	.15	.16	.17	.18	20	.21	.22
6.7	.06	.07	.07	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	?I	.23	.2S	.26	.28
6.8	.08	.09	.09	.10	.11	[illegible]	.13	.14	.15	.16	17	.19	.20	.21	.23	.25	.27	29	.31	.33	.35
6.9	.10	.11	.12	.13	.14	.15	.16	.17	.19	.20	.22	.23	.25	.27	.29	.32	.34	.36	.39	.42	.44
7.0	.12	.14	.15	.16	.17	.19	.20	.21	.24	25	27	.29	31	.34	.46	.40	.42	45	49	.52	.55
7.1	.16	.17	.19	.20	.22	.23	.26	.27	.30	.32	.34	.37	.39	.42	.58	.50	.53	57	.62	.66	.70
7.2	.20	.22	.23	.25	.27	.29	.32	.34	.37	.40	.43	.46	.50	.53		.63	67	71	.77	.83	88
7.3	.25	.27	.30	.32	.34	.37	.40	.43	.47	51	.54	.58	.62	.67	.73	.79	.84	90	.97	1.04	1.10
7.4	.31	.34	.37	.40	.43	.47	.51	.54	.59	.64	68	.73	.78	.84	.91	.99	I 05	1.13	1.22	I.30	1.38
7.S	.39	.54	.47	.50	.54	.59	.64	.68	.74	.80	.85	.92	.98	1.06	1.15	I.24	I 32	I 42	I 53	1.63	1 73
7.6	.49	.68	.59	.63	.68	.74	.80	.85	93	1.00	1.07	I.16	I.24	1.33	1.44	I.56	1.66	I 78	I 92	2.05	2 17
7.1	.62		.74	.80	.86	.92	1.01	1.07	1.17	1.26	1.35	1.45	I 55	1.67	1.81	I.%	2.08	2 23	2.41	2 57	2 72
7.8	.78	.85	.93	1.00	1.08	1.16	1.27	1.35	1.46	1 58	1.69	I 82	1.95	2.09	2.26	2.45	2.61	2 79	3 01	3.21	3.39
7.9	.98	1.07	1.16	1.25	1.35	1.46	1.59	1.69	1.83	I 98	2.12	2.29	2.4-t	2.62	2.83	3.06	3.26	3.48	3 76	4 01	4.24
8.0	1.22	1.34	1.46	1.58	1.70	1.63	1.10	2.12	2.30	2 48	2 65	2.86	3.05	3.28	3.54	3.83	4 07	4.35	469	499	528
8.1	1.54	1.68	1.63	1.98	2.13	2.29	2.50	2.65	2.88	3.11	3.32	3.58	3.81	4.09	4 42	4.77	5 07	5 41	5.83	6.21	6 55
8.2	1.93	2.11	2.29	2.46	2.67	2.86	3.12	3.32	3.59	3.88	4 14	4.46	4.7s	5.10	5.50	5.94	6.30	6 72	7.23	7.69	8.11
6 3	2.41	2.64	2.67	3.10	3.33	3.58	3.90	4.14	448	484	5 16	5.55	5.90	6.33	6.82	7.36	7.80	8 31	8 94	9.49	10.00
6 4	3 02	3.30	3.59	3.67	4.16	4.46	4.67	5.15	5.58	6.01	6.41	6.89	7.32	7.84	8 U	9.09	9.62	10.24	10 99	II.66	12 27
8.5	3.77	4.12	4.47	4.82	5 18	5.55	6.05	6 40	6.92	7.45	19 8	852	9.04	9.68	10.40	II.18	II.81	12 56	13 45	14.25	14 97
8.6	4 70	5.13	5.57	s.99	6.U	6.89	7.50	7.93	8.56	9 21	9 79	10.49	11.12	II.88	12.74	13.68	14 44	15 31	16 37	17 30	16 14
6.7	5.85	6.38	6.91	7.43	7.97	8.53	9.26	9.78	10.54	II 32	12 02	12.66	13.61	14.51	15.53	16 63	17 53	18 54	19 77	'0 84	21 82
8.6	7.25	7.90	6.54	9.18	9 84	10.50	11.38	12.01	12.92	13.84	14.68	15.67	16.55	17.61	18.30	20 07	?I II	22 27	23 68	24.90	26 00
8.9	8.96	9.74	10.52	11.28	12.07	12.87	13.9,	14 66	15.74	16.82	17 80	18.96	19.98	21.20	22.57	'4.02	25.19	26 51	28.09	29.44	30 66
9.0	11.02	11.96	12.69	13.80	14.74	15.68	16.91	17.78	19.04	20.30	21 42	22.75	23.91	25.30	26.85	28.47	29 78	31 23	32 96	34.U	35 76

Source: Trussell, 1972.

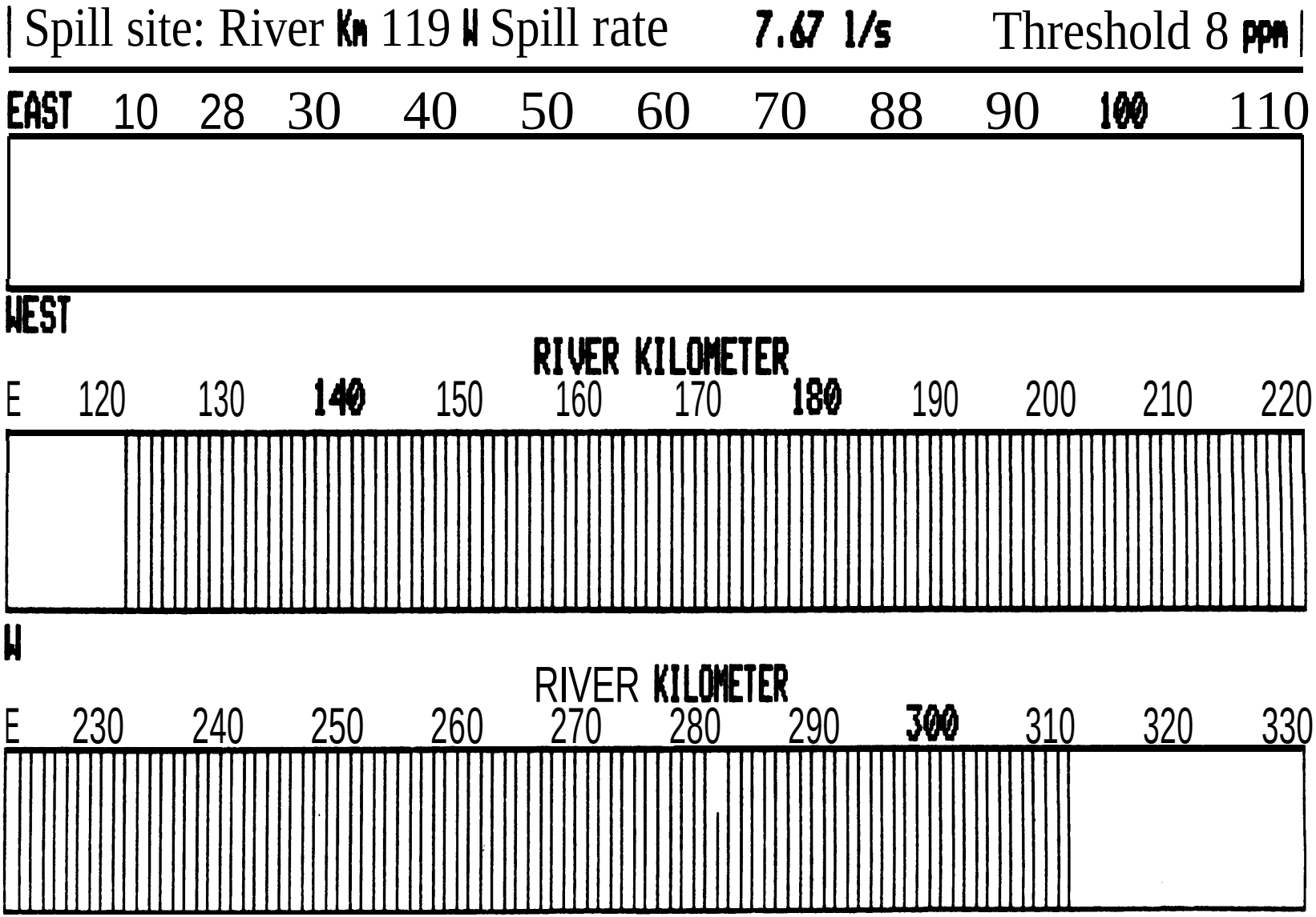

FIGURE 7.15: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ANHYDROUS AMMONIA IN EXCESS OF 8 MG/L FROM HYPOTHETICAL NOVEMBER 9, 1982 SPILL.

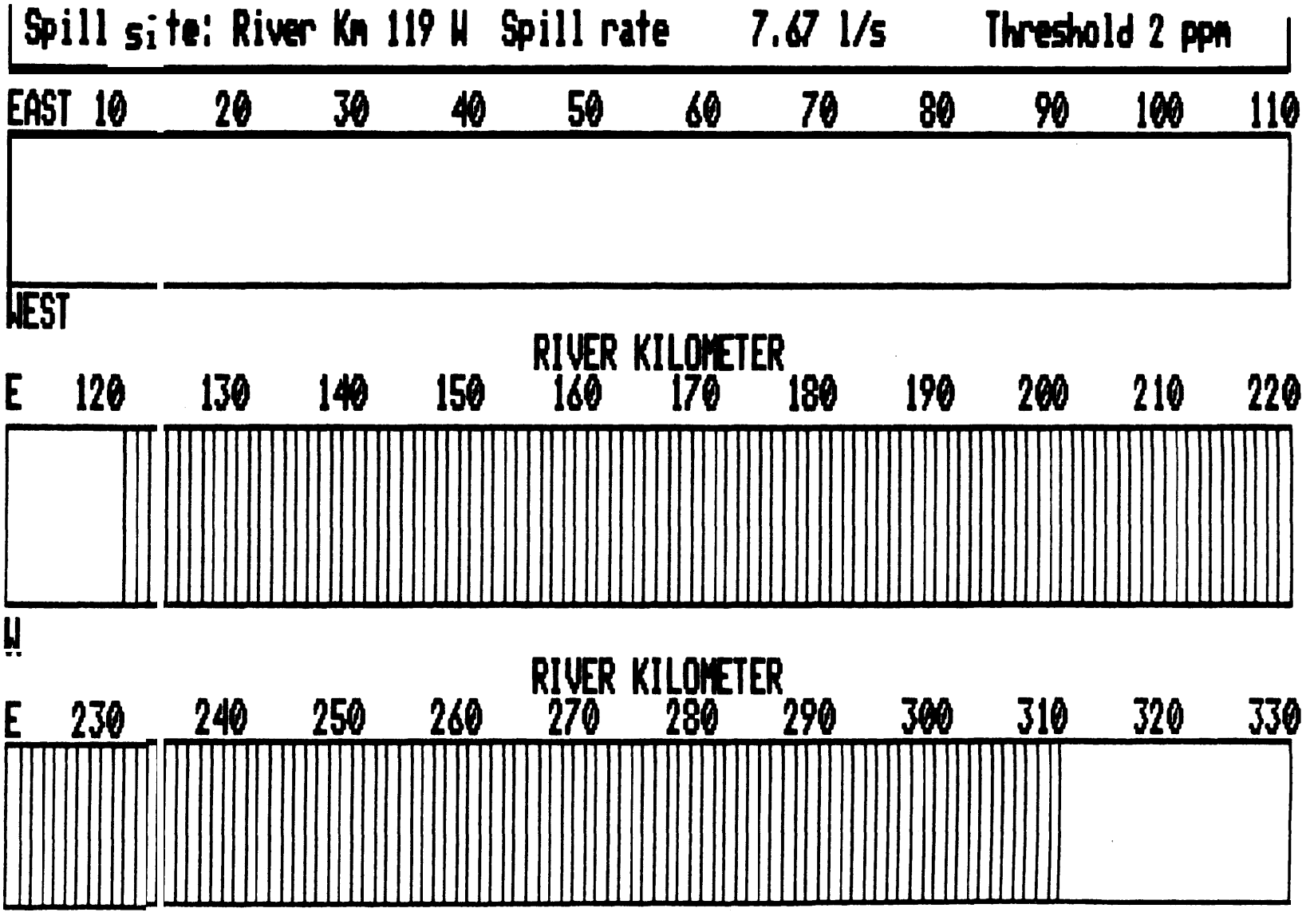

FIGURE 7.16: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ANHYDROUS AMMONIA IN EXCESS OF 2 MG/L FROM HYPOTHETICAL NOVEMBER 9, 1982 SPILL.

Below the confluence with the Clearwater River, concentrations did not exceed 0.3 mg/L (or 25 mg/L combined ammonia), and in one place they fell below the critical lethal level. Critical sublethal levels (0.03 mg/L, or 2.5 mg/L combined ammonia) extended from the spill site to the confluence with the South Thompson River (Figure 7.16). River velocity was variable, but averaged approximately 0.6 m/sec. The ammonia was estimated to arrive at Clearwater 29 hours after the spill (Figure 7.17).

Ammonia will quickly mix into the water column and thus cannot be contained and recovered, particularly in a large river (Section 5.2.2). Neutralization with sodium dihydrogen phosphate is a possibility, but such an application would require determination of precise volumes to inject and a source which could be applied within 24 hours.

Potential impacts on fish resources are considerable and complex. Spill timing coincides with the spawning of coho salmon. Most spawning takes place in tributaries upstream of the influence of the spill, but approximately 1,000 (1969-1978 average) spawn in the North Thompson River mainstem (Table 6.8). Further, considerable numbers of adult coho in transit to these tributary streams could be caught by the spill in the mainstem (Table 6.9). One can only speculate on the response of these fish; there are no field or laboratory behavioural or toxicological responses of adult salmon. Even without significant mortality, the delay by substantial numbers in their upstream migration could mean a reduction in total egg deposition.

Juvenile (0+) chinook and coho are also in the system at this time. In the zone of critical lethal levels, 98% of mainstem rearing chinook are estimated to occur. Most juvenile coho are believed to winter in tributary streams, upstream of spilled chemicals in the mainstem. However, late summer sampling indicates approximately 50% of coho juveniles in the mainstem were within the estimated critical lethal zone (Figure 6.3). It remains conjectural what proportion of juvenile coho would remain in the mainstem. It is likely there would be major losses among juvenile chinook and coho salmon.

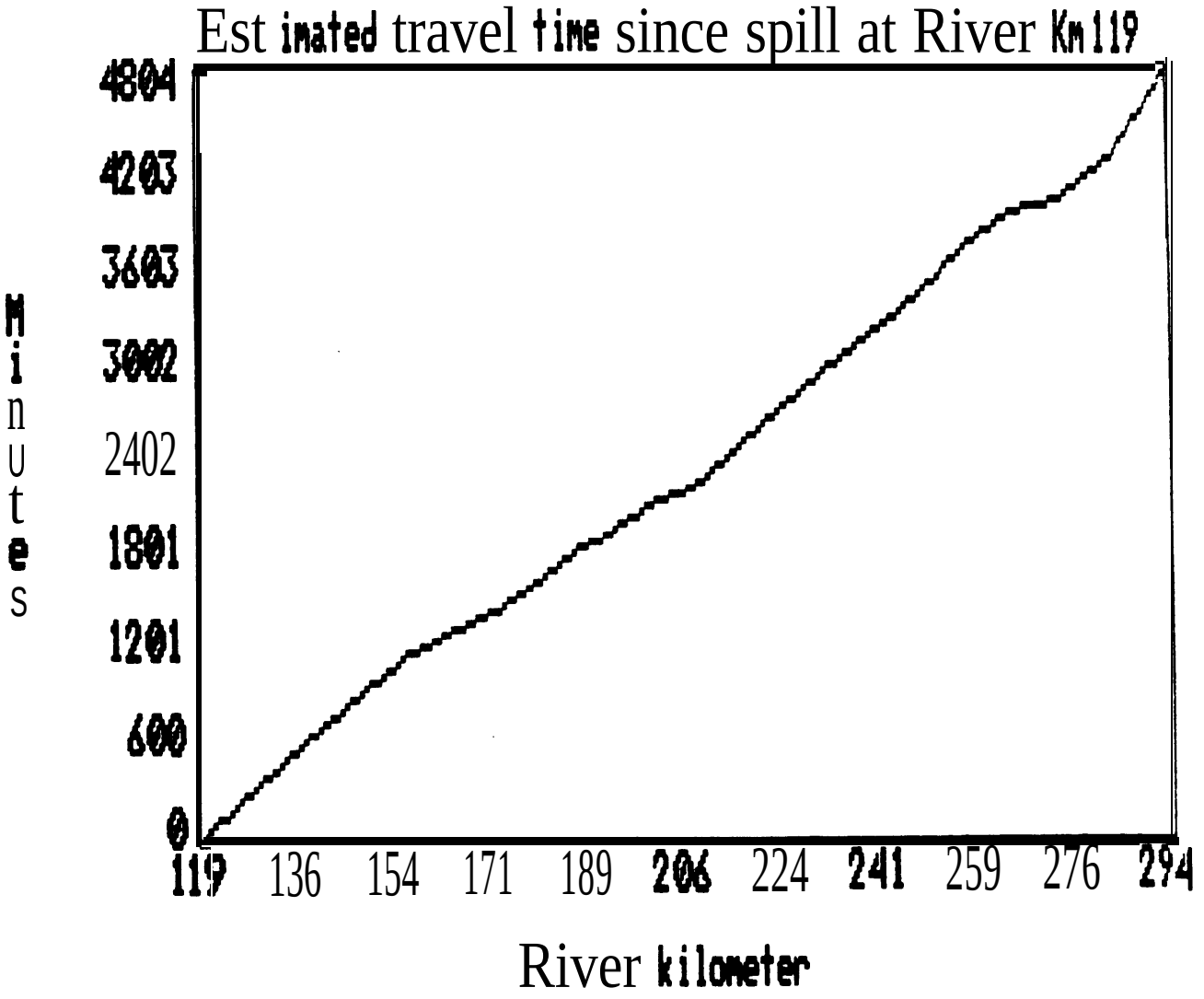

FIGURE 7.17: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF ANHYDROUS AMMONIA AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING NOVEMBER **9, 1982** SPILL.

7.7 SCENABIO #7

Date	:	May 20, 1982
Location	:	River kilometer 160
Chemical	:	Anhydrous Ammonia
Volume Spilled (est.)	:	900 tons
Initial Release Rate	:	460 L/min
Discharge (Birch Is)	:	364 cms (est. Environment Canada, 1983)

Scenario #7 explores the fate and effects of an ammonia spill during a period of peak flows and high numbers of downstream salmonid migrants The special characteristics of ammonia spills, discussed above, are not repeated here. One feature is different however. The proportion of un-ionized ammonia is determined by temperature and pH (Table 7.2). Higher May 20 temperatures, estimated at 7° from Inland Waters Canada data, indicated a higher percentage of un-ionized ammonia (1.46%), hence a lower (7 mg/L anhydrous ammonia) threshold as the critical lethal level. This represents 0.1 mg/L un-ionized ammonia.

The results of Scenario #7 analysis are tabulated in Appendix 8. Initial concentrations from the model peaked at 0.4 mg/L un-ionized ammonia (or 29 mg/L including ionized ammonia). Concentrations in excess of the critical lethal level (0.1 mg/L un-ionized ammonia) extended from the spill site continuously to km 181, and intermittently to km 230 (Figure 7.18). Critical sublethal levels extended downstream as far as the junction with the South Thompson River (Figure 7.19). Velocity in the fastest panels exceeded 3 m/sec., and the initial arrival of anhydrous ammonia at Clearwater (a distance of 21 km) was estimated in approximately 2.5 hours (Figure 7.20).

The opportunity to recover spilled ammonia from a large river is non-existent, but neutralization through application of sodium dihydrogen phosphate is at least remotely possible. The requirements are sufficient supplies of this chemical and the ability to apply the required amounts, plus an estimate of the ammonia concentrations in the river as a basis for calculating the amount of antiodote required.

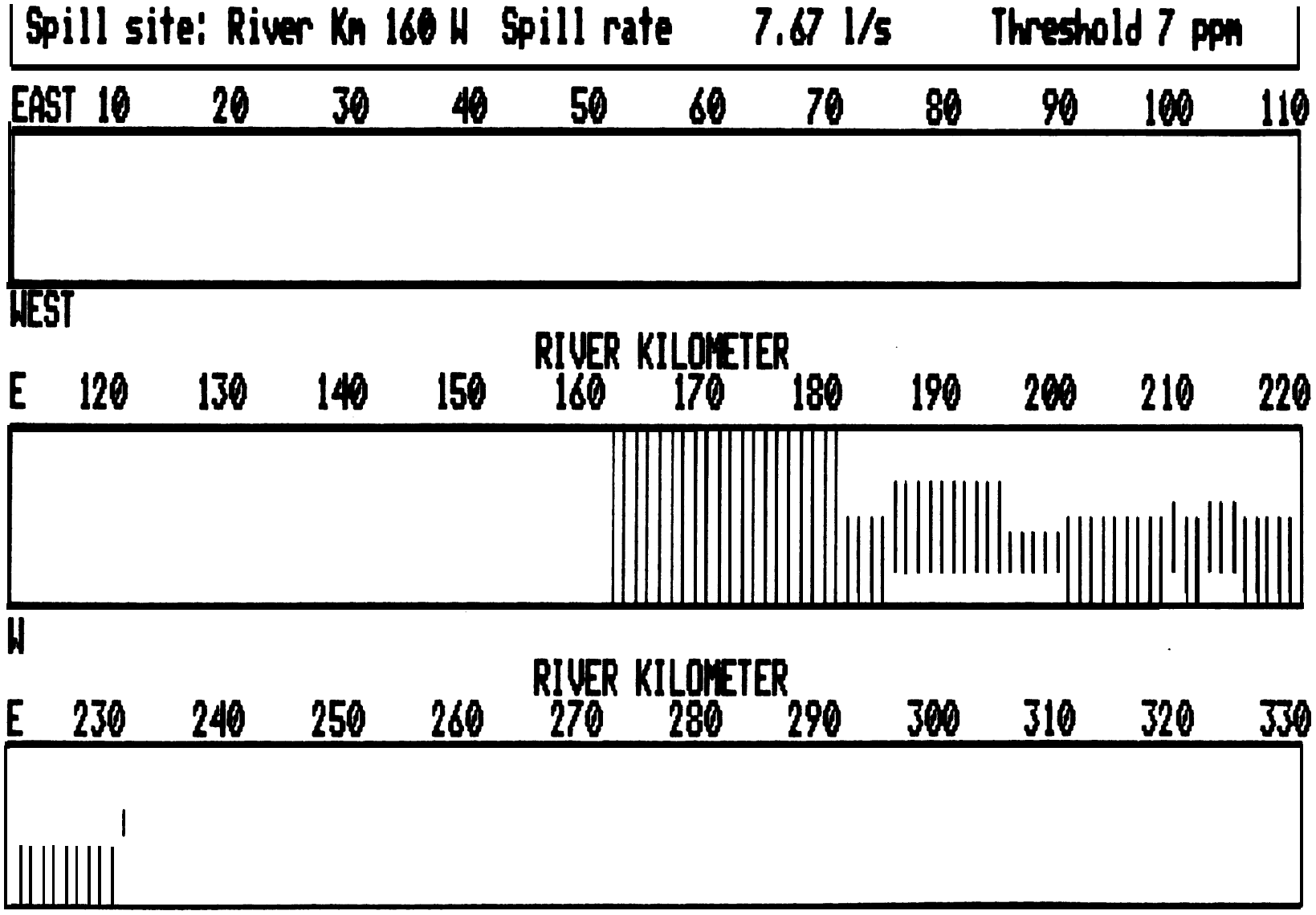

FIGURE 7.18: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ANHYDROUS AMMONIA IN EXCESS OF 7 MG/L FROM HYPOTHETICAL MAY 20, 1982 SPILL.

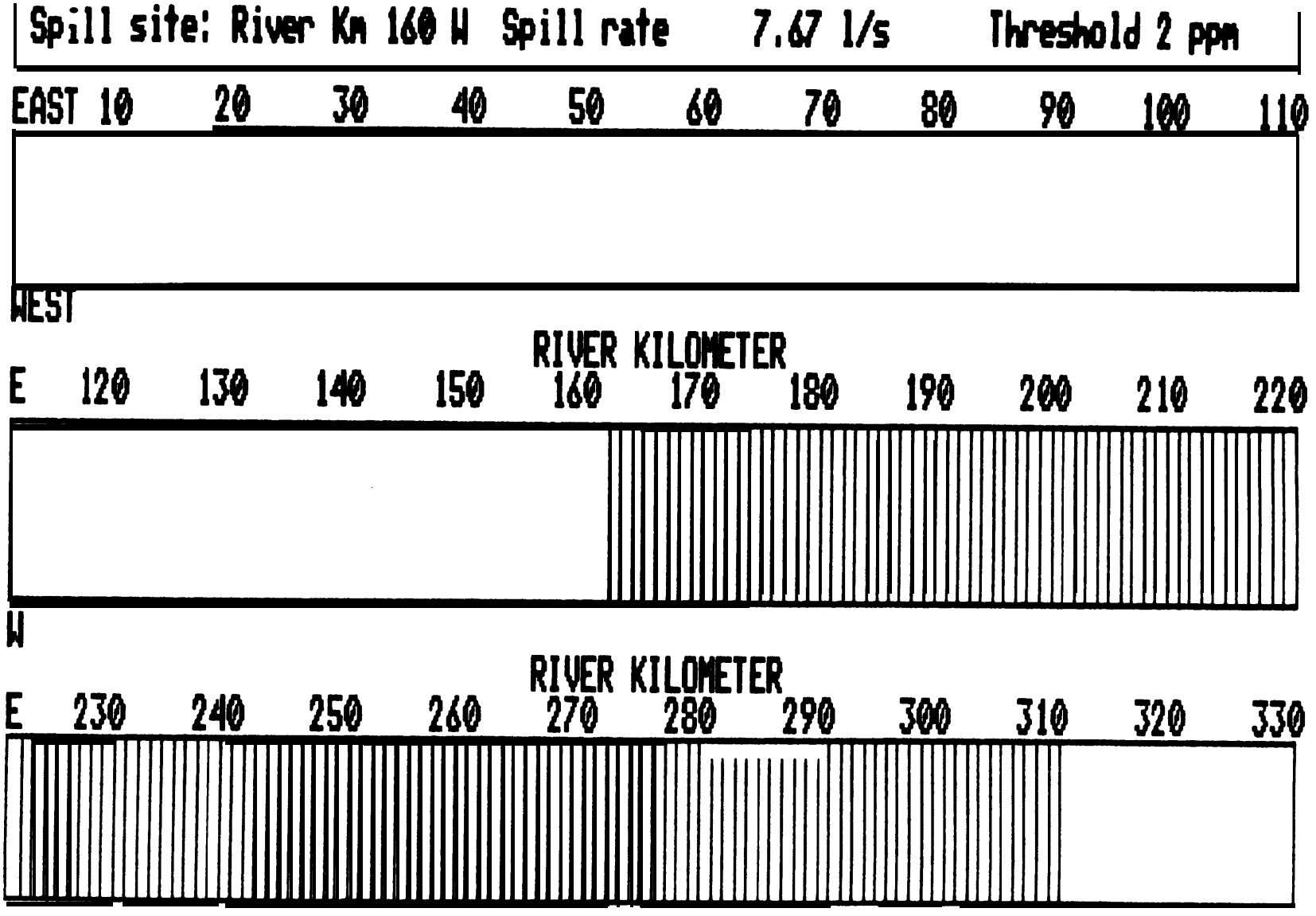

FIGURE 7.19: ESTIMATED EXTENT OF DOWNSTREAM CONCENTRATIONS OF ANHYDROUS AMMONIA IN EXCESS OF 2 MG/L FROM HYPOTHETICAL MAY 20, 1982 SPILL.

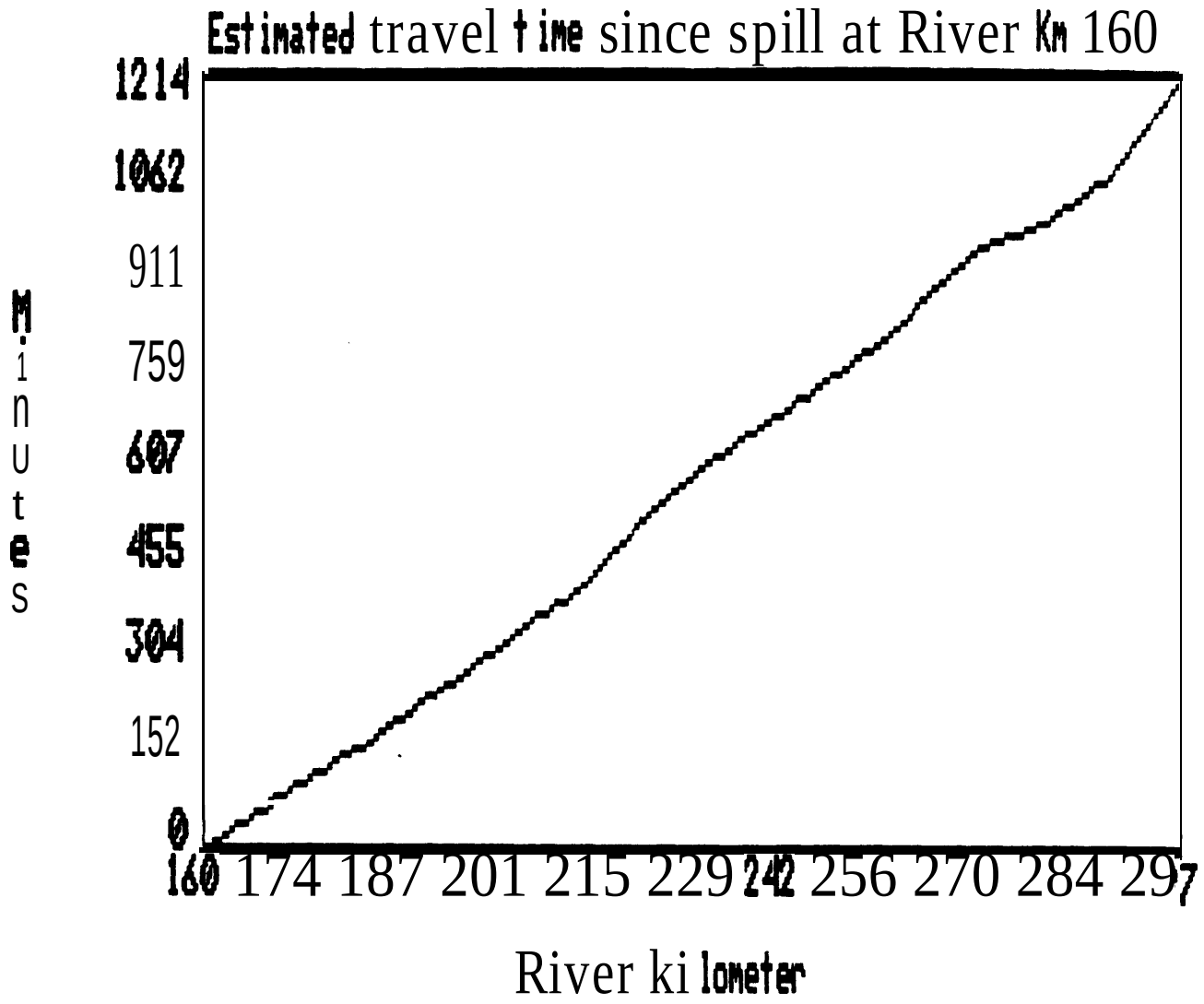

FIGURE 7.20: ESTIMATED TRAVEL TIME FOR THE INITIAL ARRIVAL OF ANHYDROUS AMMONIA AT INCREMENTAL DISTANCES DOWNSTREAM FOLLOWING MAY 20, 1982 SPILL.

The timing of the spill coincides with the downstream migration of chinook salmon juveniles (0+ and 1+ cohorts), coho salmon smolts (1+ cohort) and sockeye salmon fry. The spill represents a serious threat to all three species For example, over 80% of the North Thompson chinook rear in or emerge in streams immediately downstream of the spill (Figure 6.2). Coho smolt migration, that is the exodus of 1+ coho downstream, may largely precede May 20 (Table 6.5) and thus hypothetically protect this part of the population. However, approximately 50% of rearing coho juveniles (0+) occur downstream of the spill location, mostly between Clearwater and Little Fort, an area within the critical lethal zone. Sockeye smolts exiting the Barriere system during the spill period would emerge into a critical sublethal zone of considerable extent. Survivorship would likely be affected. More vulnerable would be the sockeye fry migrations from the Raft River and North Thompson downstream to Kamloops Lake. The proportion of these downstream migrants in the system concurrent with the May 20 spill is not known, but it is likely that their survivorship would be low.

7.8 DISCUSSION

In this section, seven hypothetical spill scenarios have been examined. They have provided predictions on downstream concentrations of spilled product, time of travel, and by inference from environmental data on salmon resources and toxicological implications. Many more or different scenarios might have been run on the model, but a finite number, in this case seven, was sufficient to examine the product of the model and the implications to fish Some of the highlights are reviewed in this section.

The model results are presented with caution. Numerical models represent imperfect simulations of the physical would, and as such it is recognized that in future hydrodynamic research will improve on the current attempts to model spill phenomena.

Certain accepted river characteristics were confirmed by the model, and are important to our later discussion of impact:

1. The annual cycle of discharge in the North Thompson River had an understandable and dramatic effect on pollutant concentrations.

2. Location along the river was an important determinant of concentrations because of its link with discharge.

3. A short half-life (e.g., 1 day for styrene monomer) quickly diluted a chemical to negligible levels.

The accurancy of the modelled concentrations is unknown, but require some discussion prior to consideration of ecological impacts In the one instance where a scenario (#1) can be compared to field results, the modelled results were approximately five times the measured results In this case, the March 3, 1982 spill of EDC both the model results developed in this study and the one developed by Neely and Lutz (1986) are similar, as well as wrong. Neely and Lutz (1986) attempted to explain the disparity in their results by introducing two factors. Volatility reduced their estimate by 15%. Reduced input had the effect of lowering concentrations by a further 80%, but it assumed "the bulk of the material will fall to the bottom of the water column ...". It is questionable if the specific gravity differential (1.26 to 1.00) is sufficient to allow such stratification in a turbulent river. If it is, particularly during low flows, when velocity is reduced, the opportunities for recovery are considerably enhanced.

The notion of reduced input bears some scrutiny. Very little is known about the rate of entrainment into the river. The model assumed a rate of 1,000 liters per minute. At this rate, the product spilled into the North Thompson River would be entrained uniformly over 13 hours. This rate was established for purposes of modelling, but bears little chance of representing reality. If the rate were less and more protracted, concentrations could have been significantly lower. In working with the model, it is the conclusion of the study team that initial peak concentrations were underestimated by the model, but far downstream (greater than 100 km), concentrations were too high.

The limitations of the model result provide little refuge for the obvious implications to the salmonid resource. Hypothetical spill scenarios taking place during low flows (Scenario No.'s 1, 3 and 6) would cause significant mortality to rearing chinook and coho salmon juveniles. Scenario #3 represents a worse case in terms of timing: (1) two cohorts (both 0+ and 1+) of chinook and coho juveniles are in the system at this time (third week of April), and (2) freshet flows have not yet started. This appears to be the worst possible time for a major chemical spill into a salmon producing river. In late summer, adult chinook and sockeye salmon migrating upstream encounter substantial discharge compared to pre-freshet conditions. Coho salmon move upstream later under lower flows. Evaluating the potential impact on adult salmon is limited by the absence of toxicological data. The potential remains for stock threatening impacts if a severe spill, for example anhydrous ammonia, coincided with upstream migration. Not only might the migration be set back both temporally and spatially, but damage to the olfactory organs could disorient fish thus preventing their successful return to spawning grounds.

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APPENDIX 1

DYE STUDY

APPENDIX I

DYE STUDY

1.0 INTRODUCTION AND METHODS (Author: John Villamere)

Based upon discussions between the scientific authority and the consultants, it was agreed that a dye study, carried out in a number of reaches of the North Thompson River, would provide important information with respect to the calibration of the computer model for the North Thompson River system and for the development of dispersion coefficients. A dye study was designed to provide the required information. Selection of the reaches for the dye study was an important component of the project and was undertaken six weeks prior to the dye study (i.e., in February 1986). Key criteria in selecting the study reaches were:

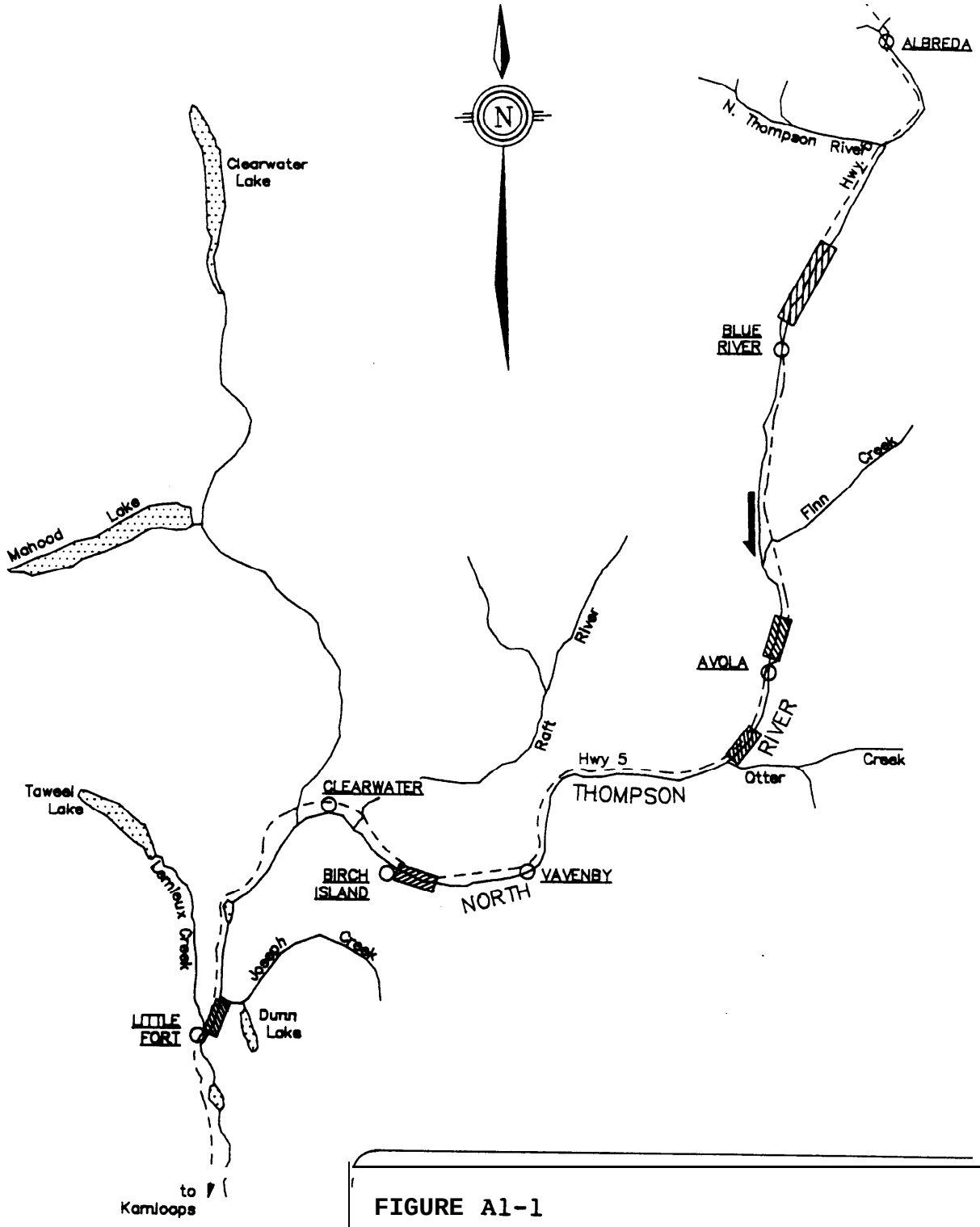
1. The availability of an upstream site where dye could be injected readily and without risks to the field crew.

2. In conjunction with the upstream dye injection location, downstream dye collection sites that could be worked effectively and that were a reasonable distance downstream.

3. Variable physical characteristics of the stream in the different dye study reaches.

4. Different geographical areas (e.g., upstream and downstream of the confluence with the Clearwater River).

The study sites are identified in Figure Al-l. It was agreed that the dye study would be carried out under the low flow conditions that exist immediately after ice breakup in early April.



DYE STUDY AREA

FIGURE A1-1

Location of North Thompson River Dye Study Areas, April 1986

0 10 20 30 40 km

Hatfield Consultants Ltd.

Rhodamine WT dye was selected for this study. In order to determine the amount of dye to be injected in each given study reach, a formula developed by Wilson, et al. and reported by F.A. Kilpatrick was used. The formula utilized was developed specifically for Rhodamine dye. The formula took into consideration:

1. the discharge rate (flow) in the reach of the liver to be examined;

2. the length of the reach;

3. an estimate of the mean velocity in a specific river reach; and

4. the desirable peak concentration of dye at the most downstream sampling site. The lower limit of fluorescence considered acceptable for this study was 3-5 ug/l.

Flow data obtained at the time of the study were provided by Environment Canada, Kamloops staff, who undertook comprehensive flow measurements at the Birch Island dye reception site on April 8, 1986, the Same day that the dye study was carried out in that reach. Flows at the other four dye injection sites are based upon the flow data obtained for Birch Island and adjusted according to the North Thompson River drainage area in each of the study reaches.

Three dye injection techniques were utilized; namely:

1. Dye was added from a boat while traversing (horizontally) the river.

2. A slug discharge was added in the middle of the river from a bridge.

3. Dye was injected near-shore by wading into the river.

The last two methods were considered to be instantaneous slug injections of dye. With respect to the first method, efforts were made to add the dye at a constant rate across the river.

Dye was collected in two manners:

1. From a bridge with samples collected from mid channel.

2. Using a boat, collecting the dye at three locations across the river (i.e., the left and right sides and the centre of the river).

Selection of the dye injection and dye collection methods was dependent upon specific features of the river in each of the reaches selected. A summary table is presented (Table Al-l) outlining the following information:

1. the location of the dye study reaches;

2. the method and amount of dye injection;

3. the distance to the downstream collection sites;

4. the method of dye sample collection;

5. the drainage area and stream gradient for the study area; and

6. the approximate flow rate at the time of the study.

The dye concentration in water samples was undertaken using fluorometers provided by Environment Canada. The analyses were performed in the field with the assistance of Mr. David Walker and Mr. Steve Sheehan of Environment Canada. The fluorometer readings obtained were adjusted as required. Corrections were based upon temperature difference and background fluorescence in the North Thompson River.

TABLE A1-1: NORTH THOMPSON RIVER DYE STUDY, BACKGROUND INFORMATION

DYE STUDY SITES	METHOD AND AMOUNT OF DYE INJECTED	DISTANCE TO DOWNSTREAM STATION(S)	METHOD OF COLLECTION	DRAINAGE AREA AT STUDY SITE & STREAM GRADIENT	APPROXIMATE FLOW RATE AT TIME OF STUDY
BIRCH ISLAND	2 litres, to mid-stream from C.N. Railway bridge north of Birch Island	1) 4.9 km 2) 5.2 km	1) Mid-stream sampling from Birch Island bridge. 2) 3 locations across river using a boat and outboard motor.	4,450 km^2, 0.15% gradient	77.4 m^3/sec.
OTTER CREEK	1.5 litres, wading into river	4.2 km	Mid-stream sampling from Otter Creek logging bridge.	3,750 km^2, 0.09% gradfent	65 m^3/sec.
LITTLE FORT	5.0 litres, from a Zodiac while travers-fng the river.	1) 3.0 km to upstream station 2) 4.3 km to a downstream station.	Dye collection at 3 locations across the at each site using boat and outboard motor.	16,000 km^2, 0.04% gradient	220 m^3/sec.
AVOLA	2 litres, from a Zodiac while travers-fng the river.	3.7 km	Dye collection at 3 locations across the river using a boat and outboard motor.	3,100 km^2, 0.09% gradient	54 m^3/sec.
BLUE RIVER	3.0 litres, to mid-channel from C.N. Railway bridge near Thunder River.	13.5 km	Mid-stream sampling from Bone Creek logging bridge.	2,000 km^2, 0.10% gradfent	35 m^3/sec.

2.0 RESULTS AND DISCUSSION

In the text that follows, dye study observations for each of the five stream reaches are discussed individually. In reviewing the text that follows, reference should be made to Figure A l-l and Table Al-l for study input information and to Table Al-2 where the dye study results are summarized.

2.1 Birch bland Reach

Dye injection took place on April 8, 1986 at 8:55 a.m. from the C.N. Railway bridge. The presence of dye was first detected at the upstream sampling site (i.e., the Birch Island bridge) at 10:00 a.m. and the peak dye measurement occurred at this site at 10:07 a.m. Dye continued to be monitored at this site until 12:03 p.m. and was still present above background levels at that time. However, the dye concentration was approaching background levels, The peak dye concentration reached this sampling site 72 minutes after injection with a velocity of 1.13 m/sec.

At the downstream sampling location, the first samples were collected at 10:05 a.m. At that time, the dye had already reached the downstream location which was only 0.3 kilometers downstream of the upstream collection site. The presence of rapids prevented access to and the establishment of a dye receptor site further dowwnstream. The peak dye measurement occurred at the mid-channel sampling station at approximately 10:09 a.m. Sampling was discontinued at 12:10 p.m. and at that time dye levels in the samples collected at 2 of the 3 sites had reached background levels The average velocity based upon the peak concentration for this overall reach was approximately 1.17 m/sec. There were no irregularities in the curve of dye concentration vs. time for the Birch Island reach. The results obtained are illustrated in Figures Al-2 and Al-3 and interpeted in Tables Al-3 and Al-4.

TABLE A1-2: NORTH THOMPSON RIVER DYE STUDY. RESULTS SUMMARY

DYE STUDY REACH	APPROXIMATE STREAM GRADIENT IN REACH	DOWNSTREAM DISTANCE TO COLLECTION SITE	TIME OF TRAVEL [1]		VELOCITY[2] (m/sec)
BIRCH ISLAND	0.15%	4.9 km	Centre	72 min.	1.13
		5.2 km	Left	74 min.	1.17
			Centre	74 min.	1.17
			Right	79 min.	1.10
OTTER CREEK	0.09%	4.2 km	Centre	92 min.	0.76
LITTLE FORT	0.04%	3.0 km	Left	46 min.	1.09
			Centre	50 min.	1.00
			Right	50 min.	1.00
		4.3 km	Left	82 min.	0.87
			Centre	72 min.	1.00
			Right	72 min.	1.00
AVOLA	0.09%	3.7 km	Left	105 min.	0.59
			Centre	105 min.	0.59
			Right	114 min.	0.54
BLUE RIVER	0.10%	13.5 km	Centre	250 min.	0.90

1 Time of travel is the measured time for the peak dye concentration to arrive at the downstream sample collection sites. It should be noted that when dye was collected from the left, centre and right sides of the river (i.e., looking upstream), the peak dye concentration did not arrive at same time at the three sampling sites across the river.

2 Velocity is based upon the time of travel infonnation presented in the preceding column.

FIGURE A1-2

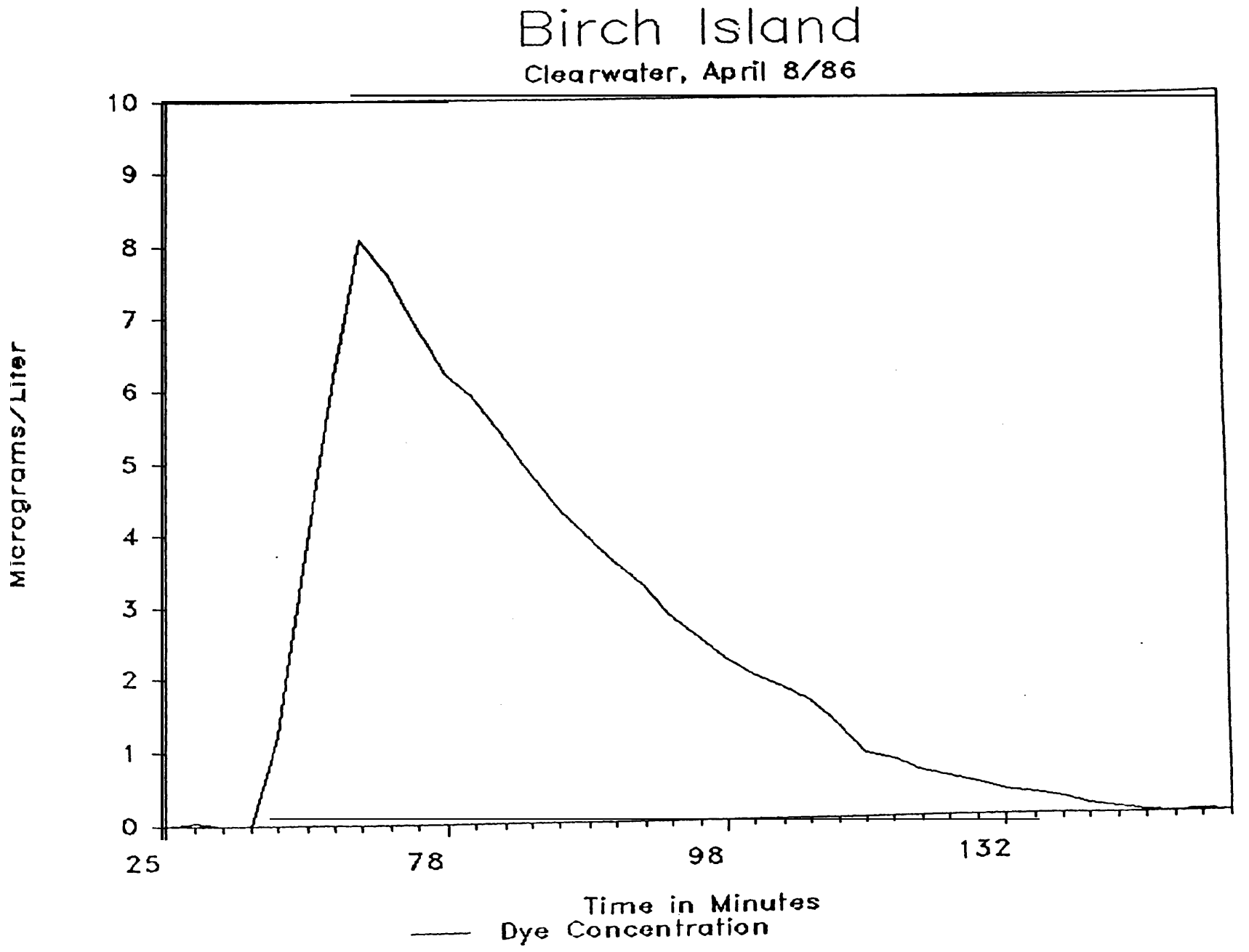

Birch Island
Clearwater, April 8/86
Micrograms/Liter
10
9
8
7
6
5
4
3
2
1
0
25
78
98
132
Time in Minutes
Dye Concentration

TABLE Al-3

AREA: CLEARWATER
SITE: BIRCH ISLAND BRIDGE
DATE: APRIL 8/86

DYE: RHODAMINE WT 20% Background 0.06
QUANTITY OF DYE: 2 LITERS
TIME OF DYE ADDITION: 08:55 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
920.00	20.00	25.00	0.055	14.00	0.000	0.000	0.00	0.00
945.00	45.00	50.00	0.070	14.00	0.033	0.416	0.42	0.21
950.00	50.00	55.00	0.055	10.00	0.000	0.083	0.50	0.25
955.00	55.00	60.00	0.055	10.00	0.000	0.000	0.50	0.25
1000.00	0.00	65.00	0.670	10.00	1.230	3.075	3.57	1.80
1003.00	3.00	68.00	2.000	10.00	3.890	7.680	11.25	5.66
1005.00	5.00	70.00	3.150	10.00	6.190	10.080	21.33	10.73
1007.00	7.00	72.00	4.100	10.00	8.090	14.280	35.61	17.91
1009.00	9.00	74.00	3.900	9.50	7.591	15.681	51.29	25.79
1011.00	11.00	76.00	3.550	9.50	6.900	14.490	65.79	33.07
1013.00	13.00	78.00	3.200	9.50	6.209	13.108	78.89	39.67
1015.00	15.00	80.00	3.000	10.00	5.890	12.099	90.99	45.75
1017.00	17.00	82.00	2.700	10.50	5.359	11.249	102.24	51.40
1019.00	19.00	84.00	2.450	10.50	4.853	10.212	112.45	56.54
1021.00	21.00	86.00	2.200	10.50	4.346	9.199	121.65	61.16
1023.00	23.00	88.00	2.000	10.50	3.941	8.287	129.94	65.33
1025.00	25.00	90.00	1.850	10.00	3.590	7.531	137.47	69.12
1027.00	27.00	92.00	1.680	10.00	3.250	6.840	144.31	72.55
1029.00	29.00	94.00	1.450	10.50	2.827	6.077	150.39	75.61
1031.00	31.00	96.00	1.300	10.50	2.523	5.349	155.74	78.30
1033.00	33.00	98.00	1.160	10.00	2.210	4.733	160.47	80.68
1035.00	35.00	100.00	1.050	10.00	1.990	4.200	164.67	82.79
1037.00	37.00	102.00	0.960	10.00	1.810	3.800	168.47	84.70
1039.00	39.00	104.00	0.870	10.00	1.630	3.440	171.91	86.43
1043.00	43.00	108.00	0.600	16.00	1.274	5.808	177.72	89.35
1047.00	47.00	112.00	0.450	14.00	0.877	4.301	182.02	91.51
1051.00	51.00	116.00	0.410	14.00	0.788	3.329	185.35	93.19
1055.00	55.00	120.00	0.330	14.50	0.618	2.812	188.16	94.60
1059.00	59.00	124.00	0.290	14.50	0.528	2.293	190.45	95.75
1103.00	3.00	128.00	0.245	15.00	0.433	1.922	192.37	96.72
1107	7.00	132.00	0.205	14.00	0.333	1.531	193.91	97.49
1111	11.00	136.00	0.180	14.00	0.277	1.221	195.13	98.10
1115	15.00	140.00	0.150	14.00	0.211	0.976	196.10	98.59
1123	23.00	148.00	0.105	14.00	0.111	1.287	197.39	99.24
1131	31.00	156.00	0.090	10.50	0.071	0.728	198.12	99.61
1139	39.00	164.00	0.070	10.50	0.030	0.405	198.52	99.81
1147	47.00	172.00	0.060	10.50	0.010	0.162	198.68	99.89
1155	55.00	180.00	0.063	11.50	0.017	0.107	198.79	99.95
1203	3.00	188.00	0.060	10.50	0.010	0.107	198.90	100.00
						198.899		

FIGURE Al-3

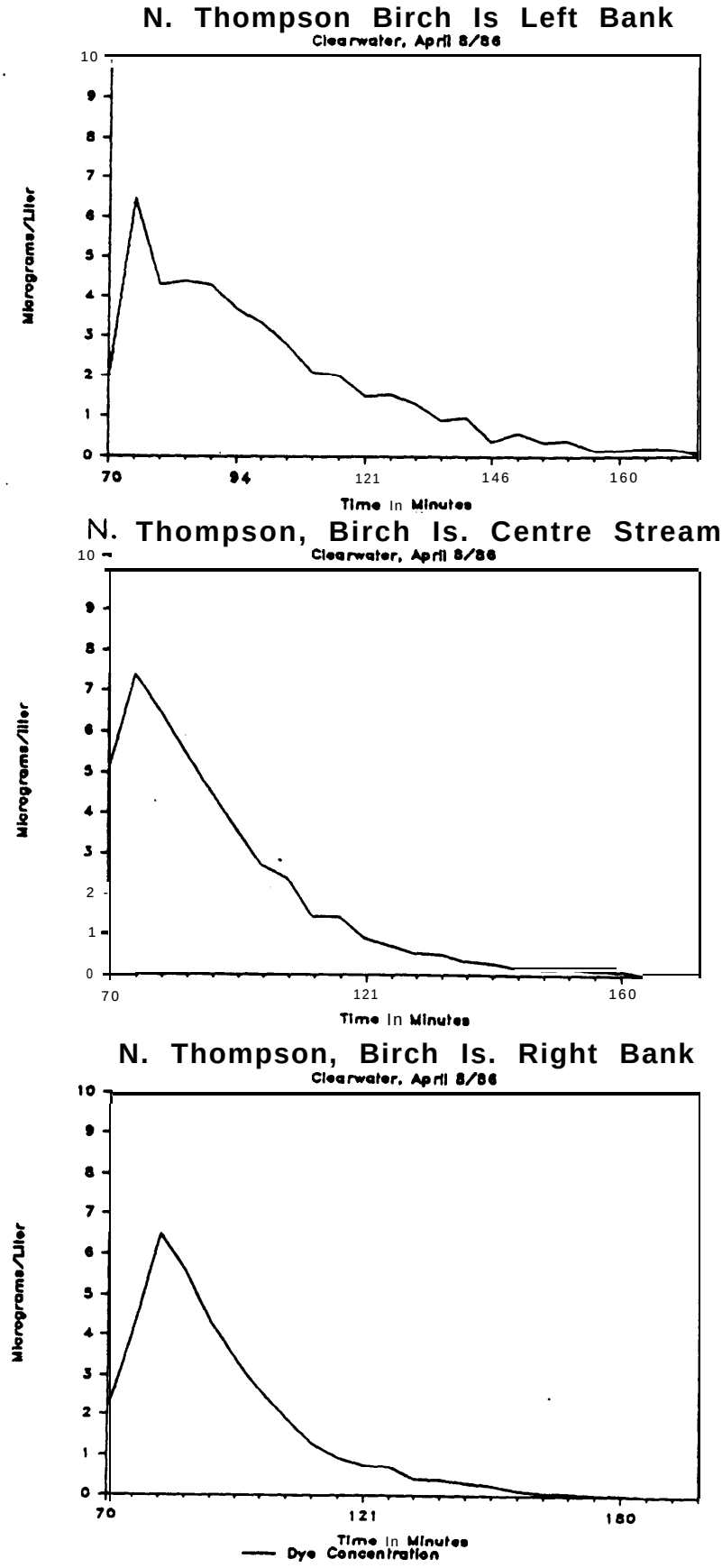

N. Thompson Birch Is Left Bank
Clearwater, April 8/86
Micrograms/Liter
Time in Minutes
N. Thompson, Birch Is. Centre Stream
Clearwater, April 8/86
Micrograms/liter
Time in Minutes
N. Thompson, Birch Is. Right Bank
Clearwater, April 8/86
Micrograms/Liter
Time in Minutes
Dye Concentration

TABLE A1-4

AREA: CLEARWATER
SITE: DOWNSTREAM BIRCH ISLAND BRIDGE, LEFT BANK
DATE: APRIL 8/86

DYE: RHODAMINE WT 20% Background 0.06
QUANTITY OF DYE: 2.0 LITERS
TIME OF DYE ADDITION: 08:55 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1005	5	70	1.000	10.50	1.915	0.000	0.00	0.00
1009	9	74	3.250	10.50	6.474	16.777	16.70	1.62
1014	14	79	2.200	10.00	4.290	26.909	43.69	19.85
1019	19	84	2.250	10.00	4.390	21.700	65.19	29.12
1024	24	89	2.200	10.00	4.290	21.700	07.09	39.58
1029	29	94	1.900	10.00	3.690	19.950	107.04	40.65
1034	34	99	1.720	10.00	3.330	17.550	124.59	56.62
1039	39	104	1.450	10.00	2.790	15.300	119.89	63.57
1046	46	111	1.000	14.00	2.097	17.105	156.99	71.35
1051	51	116	0.980	13.50	2.026	10.308	167.10	76.03
1056	56	121	0.750	13.00	1.503	8.823	176.12	80.04
1101	1	126	0.770	13.00	1.546	7.622	103.74	03.51
1106	6	131	0.660	13.00	1.308	7.135	190.88	66.75
1111	11	136	0.470	13.50	0.909	5.543	196.42	09.27
1116	16	141	0.500	13.00	0.962	4.678	201.10	91.40
1121	21	146	0.235	11.50	0.374	3.341	204.44	92.91
1135	35	160	0.320	14.00	0.588	6.737	211.10	95.90
1140	40	165	0.220	13.00	0.357	2.362	213.54	97.05
1145	45	170	0.235	13.00	0.389	1.865	215.41	97.90
1150	50	175	0.125	14.50	0.157	1.366	216.77	90.52
1155	55	180	0.125	13.00	0.151	0.772	217.54	90.07
1200	0	185	0.150	12.00	0.200	0.879	210.42	99.27
1205	5	190	0.145	12.00	0.190	0.974	219.40	99.71
1210	10	195	0.085	13.00	0.065	0.636	220.01	100.00
						220.033		

AREA: CLEARWATER
SITE: DOWNSTREAM BIRCH ISLAND BRIDGE, CENTER CHANNEL
DATE: APRIL 8/86

DYE; RHOOANINC WT20% Background 0.06
QUANTITY OF DYE: 2.0 LITRES
TIME OF DYE ADDITION: 08:55 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1005	5	70	2.550	10.50	5.055	0.000	0.00	0.00
1009	9	74	3.750	10.00	7.390	24.091	24.09	11.90
1014	14	79	3.300	10.00	6.490	34.700	59.59	20.40
1019	19	04	2.000	10.00	5.490	29.950	09.54	42.00
1024	24	09	2.300	10.00	4.490	24.950	114.49	54.73
1029	29	94	1.050	10.00	3.590	20.200	134.69	64.10
1034	34	99	1.400	10.00	2.690	15.700	150.39	71.09
1039	39	104	1.250	10.00	2.390	12.700	163.09	77.96
1046	46	111	0.700	13.50	1.413	13.310	176.40	04.32
1051	51	116	0.720	12.50	1.419	7.001	103.40	07.70
1056	56	121	0.400	12.00	0.095	5.707	109.27	90.47
1101	1	126	0.400	11.50	0.717	4.032	193.30	92.40
1106	6	131	0.310	12.00	0.537	3.137	196.44	93.90
1111	11	136	0.290	13.00	0.500	2.613	199.05	95.15
1116	16	141	0.220	12.00	0.340	2.139	201.19	96.17
1121	21	146	0.200	12.00	0.305	1.633	202.02	96.95
1135	35	160	0.140	13.50	0.106	3.442	206.26	90.59
1140	40	165	0.120	12.50	0.139	0.012	207.08	98.98
1145	45	170	0.125	12.50	0.149	0.720	207.00	99.33
1150	50	175	0.105	13.50	0.110	0.647	200.44	99.64
1155	55	100	0.100	13.00	0.097	0.517	200.96	99.00
1200	0	185	0.055	12.00	0.000	0.243	209.20	100.00
1205	s	190	0.055	11.50	0.000	0.000	209.20	100.00
1210	10	195	0.055	12.00	0.000	0.000	209.20	100.00
						209.204		

AREA: CLEARWATER
SITE: DOWNSTREAM BIRCH ISLAND BRIDGE, RIGHT BANK
DATE: APRIL 8/86

DYE: RHODAMINE WT 208 Background 0.06
QUANTITY OF DYE: 2.0 LITERS
TIME OF DYE ADDITION: 00155 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1005	5	70	1.120	10.50	2.158	0.000	0.00	0.00
1009	9	74	2.150	10.00	4.190	12.696	12.70	1.25
1014	14	79	3.300	10.00	6.490	26.700	39.40	22.49
1019	19	04	2.050	10.00	5.590	30.200	69.60	39.74
1024	24	09	2.200	10.00	4.290	24.700	94.30	53.84
1029	29	94	1.750	10.00	3.390	19.200	113.50	64.00
1034	34	99	1.350	10.00	2.590	14.950	120.45	73.34
1039	39	104	1.000	10.00	1.090	11.200	139.65	79.13
1046	46	111	0.640	13.50	1.201	11.100	150.7;	06.07
1051	51	116	0.500	12.00	0.930	5.547	156.29	09.24
1056	56	121	0.420	10.50	0.740	4.193	160.49	91.63
1101	1	126	0.390	12.00	0.706	3.613	164.10	93.69
1106	6	131	0.240	12.00	0.390	2.739	166.04	95.26
1111	11	136	0.230	13.00	0.370	1.920	160.76	96.35
1116	16	141	0.195	12.00	0.295	1.603	170.44	97.31
1121	21	146	0.160	13.50	0.230	1.312	171.75	90.06
1135	35	160	0.105	13.00	0.100	2.367	174.12	99.42
1140	40	165	0.000	12.50	0.053	0.404	174.52	99.65
1145	45	170	0.000	12.00	0.053	0.265	174.79	99.80
1150	50	175	0.065	13.00	0.022	0.106	174.90	99.90
1155	55	100	0.065	15.50	0.023	0.112	175.09	99.97
1200	0	105	0.055	13.50	0.000	0.050	175.14	100.00
1205	5	190	0.055	12.50	0.000	0.000	175.14	100.00
1210	10	195	0.055	12.50	0.000	0.000	175.14	100.00
						175.145		

2.2 Otter Creek Reach

Dye injection for this reach took place on April 8, 1986 at 15:30 hours. Dye was first observed at the Otter Creek logging bridge sampling site at 16:00 hours The length of this reach was 4.2 kilometers. The peak dye concentration reached the sampling station at 17:02 hours, i.e. one hour and 32 minutes after dye injection. The average velocity in this reach, based upon the time required for the peak concentration to reach the downstream collection site, was calculated to be 0.76 m/sec. The time of travel curve generated for this section, generally conforms to traditional curves.

The field results obtained are illustrated in Figure Al-4 and interpreted in Table A l-5.

2.3 Little Fort Reach

Dye injection at the Little Fort study site occurred on April 9, 1986 at 10:33 hours, Two sampling sites were established downstream; one 3.0 kilometers downstream, the other 4.3 kilometers downstream. At each site, samples were collected in the mainstem flow on the two sides of the river and in the centre. As a result, six time of travel curves have been developed. The peak concentration arrived at the first downstream location 46 minutes after dye injection; at the second downstream sampling location the peak concentration arrived one hour and 12 minutes after dye injection. In each instance, the peak dye concentration first obtained was in the sample collected at mid stream. The average velocity based upon the peak concentration time of travel for this dye study reach were for the first segments, 1.00 to 1.09 m/sec, and for the overall reach, 0.87 to 1.00 m/sec. With respect to the curves of dye concentration vs. time, an anomalous reading was noted at 12:30 at the left bank sampling station, Little Fort ferry crossing site.

The field results obtained are illustrated in Figure Al-5 and Figure A 1-6 and inte xpreted in Tables A 1-6 and Table A 1-7.

FIGURE Al-4

Otter Creek Logging Bridge

N.Thompson, N.of Clearwater, Apr 8/86

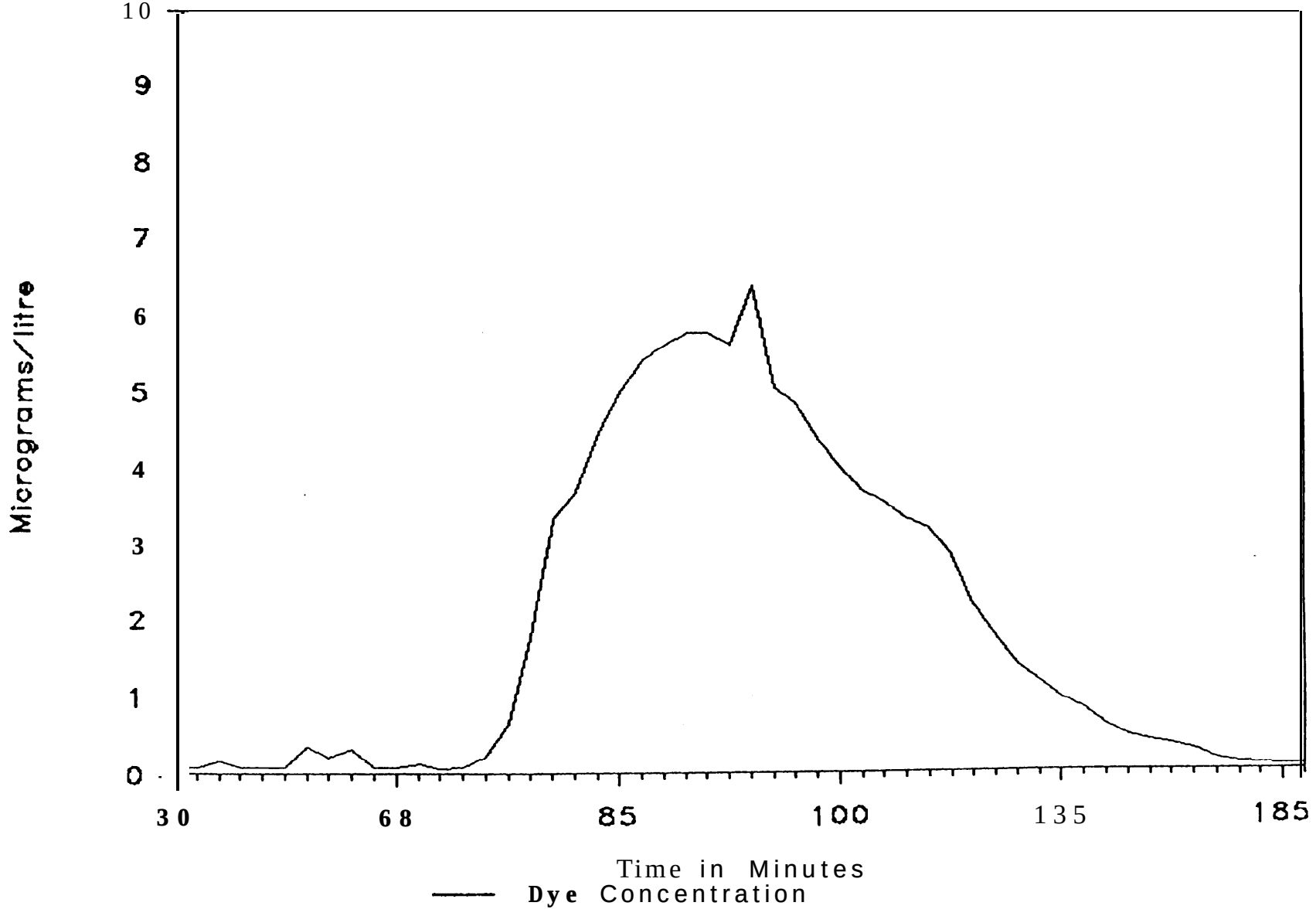


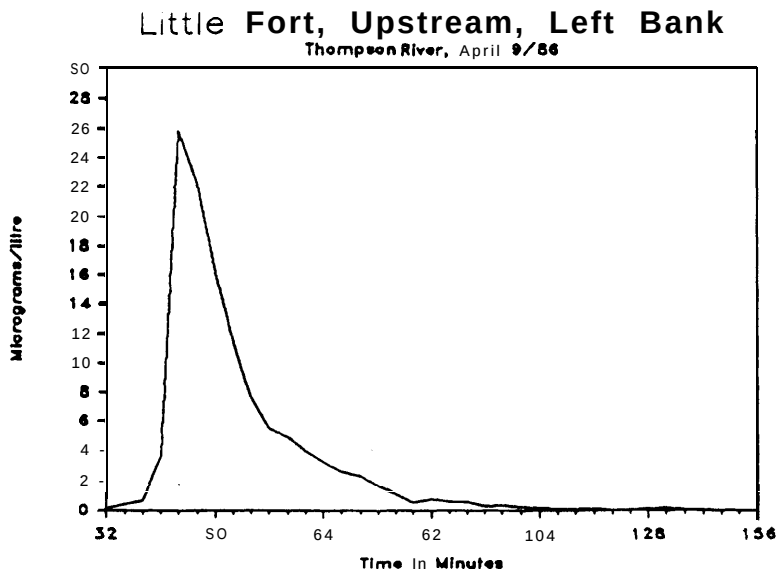
TABLE Al.5

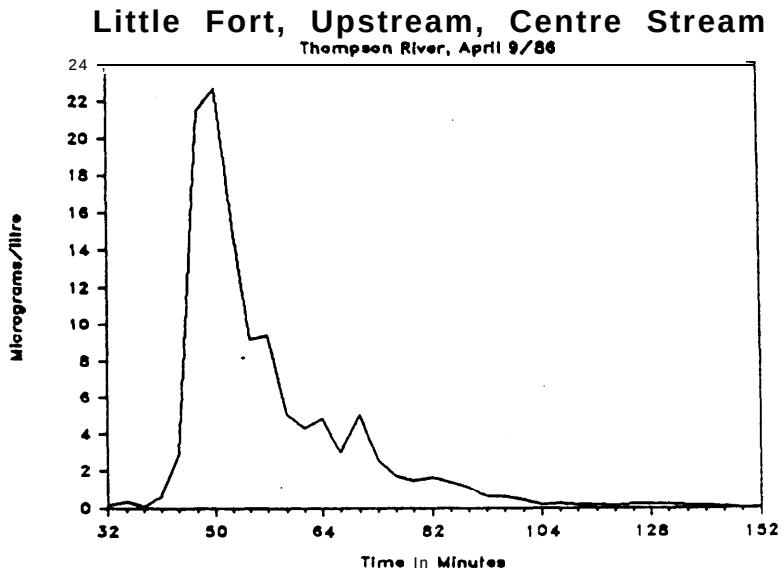
AREA: N. THOMPSON, NORTH OF CLEARWATER
SITE: OTTER CREEK LOGGING BRIDGE
DATE: APRIL 8/86

DYE: RHODAMINE WT 201 Background 0.08
QUANTITY OF DYE: 1.5 LITERS
TIME OF DYE ADDITION: 15:30 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1600	0	30	0.105	9.00	0.049	0.000	0.00	0.00
1605	5	35	0.120	8.50	0.077	0.314	0.31	0.16
1610	10	40	0.155	8.50	0.144	0.553	0.87	0.44
1615	15	45	0.11s	8.50	0.067	0.529	1.40	0.70
1620	20	50	0.120	8.50	0.077	0.361	1.76	0.88
1625	25	55	0.115	8.50	0.067	0.361	2.12	1.06
1630	30	60	0.260	8.50	0.346	1.034	3.15	1.58
1632	32	62	0.185	8.50	0.202	0.548	3.70	1.86
1634	34	64	0.245	8.50	0.317	0.519	4.22	2.12
1636	36	66	0.120	8.50	0.077	0.394	4.61	2.31
1638	38	68	0.115	8.50	0.067	0.144	4.76	2.39
1640	40	70	0.142	8.50	0.119	0.187	4.94	2.48
1642	42	72	0.110	8.50	0.058	0.177	5.12	2.57
1644	44	74	0.120	8.50	0.077	0.135	5.26	2.64
1646	46	76	0.190	8.50	0.212	0.289	5.54	2.78
1648	48	78	0.420	8.50	0.654	0.866	6.41	3.22
1650	50	80	1.000	8.50	1.770	2.424	8.83	4.43
1652	52	82	1.800	8.50	3.308	5.078	13.91	6.98
1653	53	83	2.000	8.50	3.693	3.501	17.41	8.74
1654	54	84	2.400	8.50	4.463	4.078	21.49	10.78
1655	55	85	2.680	8.50	5.001	4.732	26.22	13.16
1656	56	86	2.900	8.50	5.424	5.213	31.43	15.77
1657	57	87	3.000	8.50	5.617	5.520	36.95	18.54
1658	58	88	3.080	8.50	5.771	5.694	42.65	21.40
1659	59	89	3.080	8.50	5.771	5.771	48.42	24.29
1700	0	90	3.000	8.50	5.617	5.694	54.11	27.15
1702	2	92	3.400	8.50	6.386	12.003	66.12	33.17
1704	4	94	2.700	8.50	5.040	11.426	77.54	38.90
1706	6	96	2.600	8.50	4.847	9.887	87.43	43.86
1708	8	98	2.350	8.50	4.366	9.214	96.64	48.48
1710	10	100	2.150	8.50	3.982	8.348	104.99	52.67
1712	12	102	2.000	8.50	3.693	7.675	112.66	56.52
1714	14	104	1.920	8.50	3.539	7.232	119.90	60.15
1716	16	106	1.800	8.50	3.308	6.848	126.74	63.59
1718	18	108	1.740	8.50	3.193	6.501	133.25	66.85
1720	20	110	1.550	8.50	2.828	6.021	139.27	69.87
1725	25	115	1.210	8.50	2.174	12.503	151.77	76.14
1730	30	120	1.000	8.50	1.770	9.858	161.63	81.09
1735	35	125	0.800	8.50	1.385	7.886	169.51	85.04
1740	40	130	0.680	8.50	1.154	6.348	175.86	88.23
1745	45	135	0.570	8.50	0.943	5.242	181.10	90.86
1750	50	140	0.500	8.50	0.808	4.376	185.48	93.05
1755	55	145	0.380	8.50	0.577	3.462	188.94	94.79
1800	0	150	0.310	8.50	0.442	2.549	191.49	96.07
1805	5	155	0.280	8.50	0.385	2.068	193.56	97.11
1810	10	160	0.250	8.50	0.327	1.779	195.34	98.00
1815	1s	165	0.215	8.50	0.260	1.467	196.80	98.73
1820	20	170	0.150	8.50	0.135	0.986	197.79	99.23
1825	25	175	0.130	8.50	0.096	0.577	198.37	99.52
1830	30	180	0.115	8.50	0.067	0.409	198.77	99.72
1835	35	185	0.105	8.50	0.048	0.289	199.06	99.87
1840	40	190	0.110	8.50	0.058	0.264	199.33	100.00
						199.327		

FIGURE Al-5


Little Fort, Upstream, Left Bank
Thompson River, April 9/86
Micrograms/litre
Time in Minutes


Little Fort, Upstream, Centre Stream
Thompson River, April 9/86
Micrograms/litre
Time in Minutes

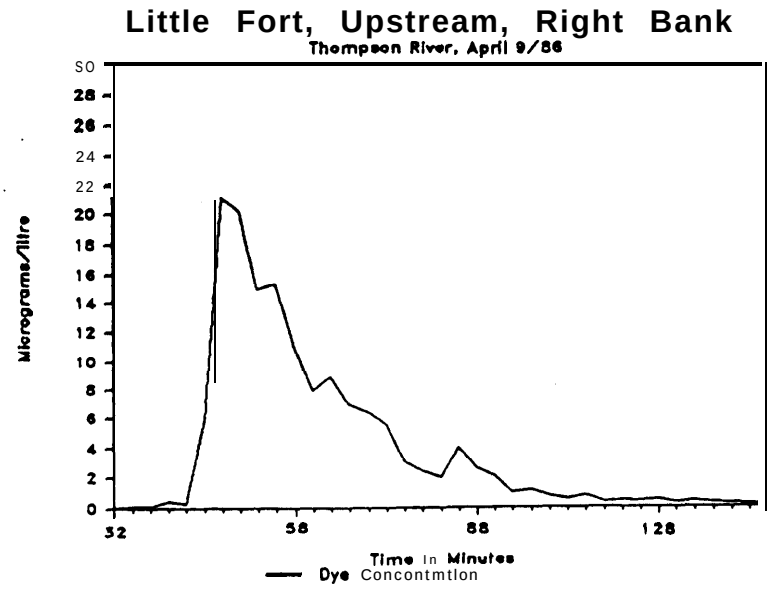

Little Fort, Upstream, Right Bank
Thompson River, April 9/86
Micrograms/litre
Time in Minutes
Dye Concentration

TABLE A1-6

AREA: LITTLE FORT
SITE: LITTLE FORT, UPSTREAM STATION, LEFT BANK
DATE: APRIL 9/86

DYE: RHODAMINE UT 20% Background 0.01
QUANTITY OF DYE: 5.0 LITERS
TIME OF DYC ADDITION: 10:33 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1105	10	32	o.oss	12.00	0.085	0.000	0.00	0.00
1110	37		0.190	16.50	0.42693		1.30	0.51
1115	15	42	0.295	14.50	0.641	2.668	3.97	J.54
1117	17	44	1.550	15.50	3.553	4.194	8.16	3.17
1119	19	46	11.500	14.50	25.832	29.386	37.55	14.58
1121	21	48	10.000	14.00	22.170	49.002	85.55	33.21
1123	23	50	7.100	15.00	lb.149	38.318	123.87	48.08
1125	25	52	5.200	13.00	11.222	27.371	151.24	58.70
1127	27	54	3.500	12.50	7.449	18.01	10.91	b5.95
1129	29	56	2.550	12.50	5.421	12.970	192.78	70.95
1131	31	58	2.250	13.00	4.843	10.265	193.05	74.93
1133	33	60	1.750	14.00	3.861	8.705	201.75	78.31
1137	37	64	1.450	13.50	3.154	14.032	215.78	83.76
1140	40	67	1.100	15.00	2.483	8.456	224.24	87.04
1143	43	70	1.000	13.50	2.169	b.977	231.22	89.75
1146	46	73	0.710	12.50	1.494	5.494	236.71	91.98
1149	49	76	o.soo	11.80	1.027	3.781	240.49	93.35
1152	52	79	0.260	12.20	0.529	2.335	242.83	94.25
1155	ss	82	0.150	13.50	0.745	1.911	244.74	94.99
1158	58	85	0.270	13.00	0.562	1.910	246.70	95.76
1201	5	88	0.265	13.80	0.563	1.608	248.39	9b.41
1205		92	0.145	12.50	0.188	1.702	250.09	97.01
1209	9	96	0.10	11.50	0.322	1.221	251.31	97.5s
1213	13	100	0.110	11.00	0.20s	1.055	252.36	97.9s
1217	17	104	0.095	11.00	0.174	0.759	253.12	98.25
1221	21	108	0.065	11.30	0.114	0.577	253.70	98.47
122s	2s	112	0.055	12.50	0.096	0.420	254.12	98.64
1229	29	116	0.070	12.00	0.126	0.445	254.56	98.81
1213	33	120	0.050	13.20	0.087	0.427	254.99	98.97
1237	37	124	0.050	13.20	0.087	0.348	255.34	99.11
1241	41	128	0.075	12.20	0.138	0.449	255.79	99.29
124s	45	132	0.085	12.00	0.158	0.591	256.38	99.51
1249	49	136	0.040	12.00	0.063	0.442	2Sb.82	99.69
1253	53	140	0.050	12.30	0.085	0.296	257.12	99.80
1301	1	JO	0.015	13.10	0.011	0.383	257.50	99.95
1305	5	152	0.01s	13.00	0.011	0.043	2S7.54	99.97
1309	9	156	0.025	14.00	0.033	0.088	257.63	100.00
						251.633		

AREA: LITTLE FORT
SITE: LITTLE FORT, UPSTREAM STATION, CENTRE
DATE, APRIL 9/86

DYE: RHODAMINE WT 20% Background: 0.01
QUANTITY Of DYE: 5.0 LITERS
TIME OF DYL ADDITION: 10:33 hrr.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1105	s	32	0.015	12.00	0.116	0.000	0.00	0.00
1110	10	37	0.175	11.00	0.339	1.136	1.14	0.41
111s	1s	42	0.050	15.00	0.091	1.074	2.21	0.81
1117	17	44	0.265	lb.00	0.596	0.687	2.90	1.06
1119	19	46	1.320	14.50	2.90	3.541	b.44	2.3s
1121	21	48	9.700	14.00	21.504	24.449	30.89	11.27
1123	23	50	10.100	14.50	22.05	44.189	75.08	27.40
1125	25	52	7.000	13.50	15.312	37.997	113.07	41.27
1127	27	54	4.300	12.50	9.156	24.468	137.54	so.20
1129	29	56	4.400	12.50	9.370	18.526	156.07	56.97
1131	31	58	2.350	13.00	5.060	14.429	170.50	62.23
1133	33	60	1.950	14.00	4.505	9.365	179.86	65.65
1137	37	64	2.220	13.50	4.841	18.293	198.16	72.33
1140	40	67	1.350	14.50	3.013	11.701	209.94	76.63
1143	43	70	2.310	13.50	5.038	12.076	222.01	81.04
1146	46	73	1.200	13.00	2.573	11.417	233.43	85.20
1149	49	76	0.820	12.00	1.706	6.419	239.85	87.55
1152	52	79	0.700	12.50	1.473	4.769	244.62	89.29
1155	5s	82	0.770	13.00	1.643	4.674	249.29	90.99
1158	58	85	0.640	13.50	1.380	4.53s	253.83	92.65
1201	5	88	0.510	13.20	1.087	3.700	257.53	94.00
1205		92	0.280	12.80	0.583	3.335	260.86	95.22
1209	9	96	0.305	11.50	0.613	2.388	263.25	96.09
1213	13	100	0.200	11.00	0.390	2.007	265.26	9b.82
1217	17	104	0.095	11.00	0.174	1.129	266.39	91.23
1221	21	108	0.125	11.20	0.237	0.824	20.21	97.53
1225	25	112	0.095	12.50	0.181	0.937	268.05	97.84
1229	29	116	0.095	12.50	0.181	0.726	268.77	98.11
1233	33	120	0.065	12.20	0.116	0.596	269.37	98.32
1237	37	124	0.110	13.20	0.217	0.668	270.04	98.57
1241	41	128	0.120	12.40	0.234	0.903	270.94	98.90
1245	45	132	0.120	12.00	0.232	0.932	271.87	99.24
1249	49	136	0.075	12.00	0.137	0.737	272.61	99.51
1253	53	140	0.075	12.60	0.139	0.552	273.16	99.71
1257	s7	144	0.055	13.50	0.099	0.475	273.64	99.88
1301	1	148	0.015	13.10	0.011	0.219	273.85	99.96
130s	5	152	0.030	13.20	0.043	0.109	273.96	100.00
						273.90		

AREA: LITTLE FORT
SITE: LITTLE FORT, UPSTREAM STATION, RIGHT BANK
DATE: APRIL 9/86

DYE: RHODAMINE WT 20% Background 0.01
QUANTITY OF DYE: 5.0 LITERS
TIME OF DYE ADDITION: 10:33 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1105	5	32	0.020	13.00	0.022	0.000	0.00.	0.00
1110	10	37	0.05s	12.00	0.095	0.291	0.29	0.08
1115	15	42	0.060	15.00	0.114	0.522	0.81	0.21
1117	17	44	0.185	16.00	0.409	0.523	1.34	0.36
1119	21	46	0.125	15.00	0.262	0.671	2.01	0.54
1121	23	48	2.650	14.00	5.859	6.121	8.13	7.21
1123		50	9.500	14.00	21.060	26.919	35.05	9.51
1125	2s	52	9.100	14.00	20.173	41.233	76.28	20.70
1127	27	54	6.900	13.50	14.874	35.046	111.33	30.22
1129	29	56	7.000	13.50	15.312	30.186	141.51	38.41
1131	31	58	4.900	14.00	10.852	26.164	167.67	0.51
1133	33	60	3.500	14.50	7.846	18.698	186.37	50.59
1137	37	64	4.000	14.00	8.855	33.402	219.78	53.65
1140	40	67	3.100	14.00	6.857	23.50	241.34	65.05
1143	43	70	2.850	14.20	6.335	19.789	263.13	11.42
1146	46	73	2.550	13.50	5.564	17.849	280.98	76.26
1149	49	76	1.450	11.80	3.018	12.873	293.85	7J.76
1152	52	79	1.120	13.00	2.400	8.117	301.98	8:.96
1155	55	82	0.890	13.50	1.928	6.492	308.47	81.73
1159	51	OS	1.800	14.40	4.014	8.912	317.39	66.15
1201	5	88	1.200	12.50	2.540	9.831	327.22	6J.81
1205		92	0.950	13.50	1.059	9.198	336.41	91.31
1209	9	96	0.450	12.50	0.939	S.996	342.41	92.94
1213	13	100	0.550	11.80	1.133	4.142	346.55	94.06
1211	17	104	0.340	11.50	0.686	1.636	350.19	95.05
1221	21	108	0.245	12.00	0.495	2.163	352.55	55.69
1225	25	112	0.350	13.00	0.715	2.461	355.01	95.36
1229	29	116	0.155	13.50	0.318	2.106	357.12	56.93
1233	33	120	0.110	12.00	0.421	1.478	358.59	57.31
1237	37	114	0.170	14.20	0.357	1.557	360.15	97.75
1241	41	128	0.22s	13.20	0.461	1.648	361.80	53.20
1245	45	132	0.130	13.00	0.259	1.454	363.25	98.59
1249	49	136	0.180	13.00	0.368	1.254	164.51	98.93
1253	53	140	0.140	13.50	0.285	1.305	165.81	59.29
1257	57	144	0.100	14.50	0.202	0.914	166.79	99.55
1301	1	148	0.095	14.50	0.191	0.781	367.51	51.77
1305	5	152	0.120	13.00	0.238	0.858	368.43	100.00
						368.431		

FIGURE Al-6

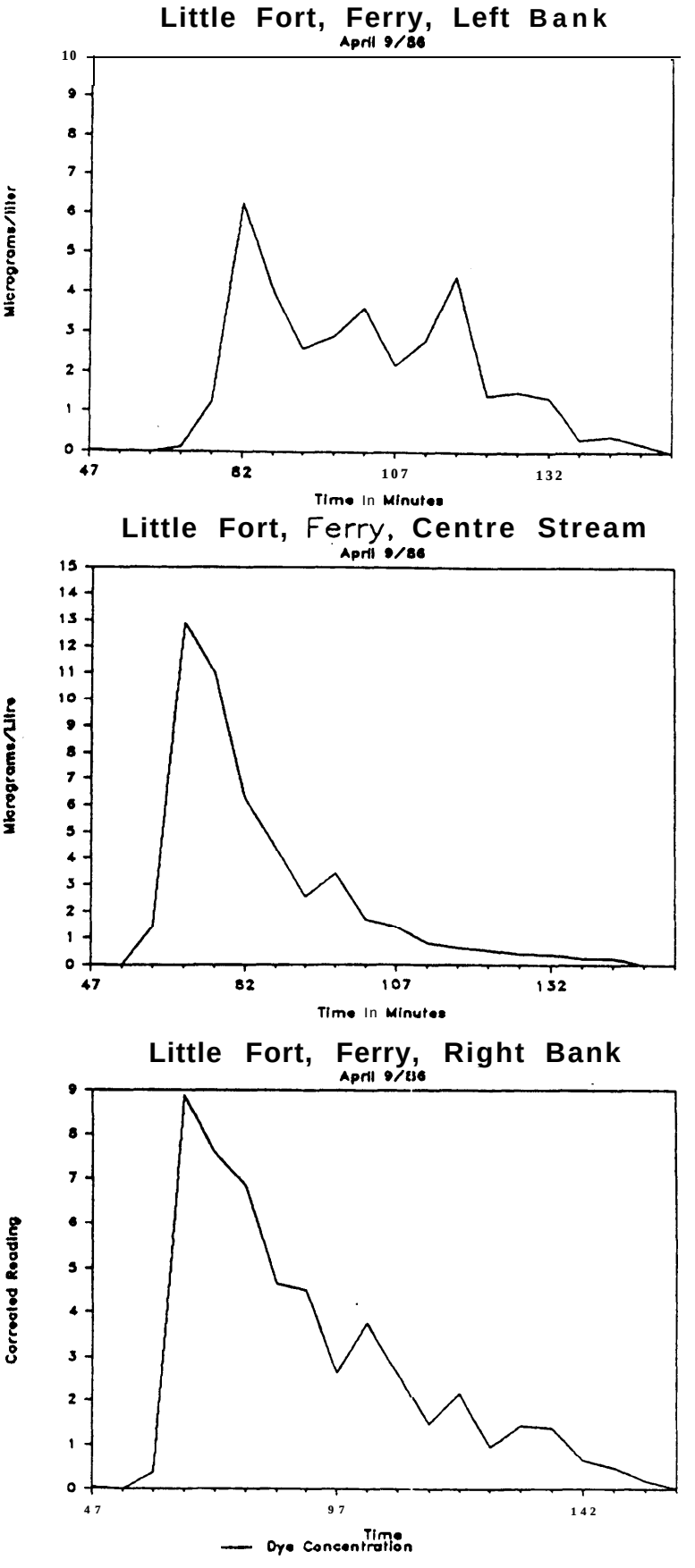

Little Fort, Ferry, Left Bank
April 9/86
Micrograms/liter
Time In Minutes
Little Fort, Ferry, Centre Stream
April 9/86
Micrograms/Litre
Time In Minutes
Little Fort, Ferry, Right Bank
April 9/86
Corrected Reading
Time
Dye Concentration

TABLE A1-7

AREA: LITTLE FORT
SITE: LITTLE FORT, PERRY CROSSING, LEFT BANK
DATE: APRIL 9/86

DYE: RHODAMINE WT 206 Background 0.01
QUANTITY OF DYE: 5.0 LITERS
TIME OF DYE ADDITION: 10:33 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1120	20	47	0.020	12.50	0.021	0.000	0.00	0.00
1130	30	57	0.015	10.00	0.010	0.157	0.16	0.08
1140	40	67	0.010	10.50	0.000	0.050	0.21	0.11
1145	45	12	0.060	10.50	0.101	0.253	0.46	0.24
1150	50	77	0.615	11.00	1.242	3.358	3.82	2.01
1155	5s	82	3.020	11.50	6.259	18.753	22.57	11.86
1200	0	87	1.900	12.50	4.034	25.733	48.30	25.38
1205	5	92	1.250	11.50	2.579	16.531	64.04	34.07
1210	10	97	1.400	11.50	2.891	13.673	79.51	41.26
1235	15	102	1.750	11.50	3.618	16.272	94.78	49.81
1220	20	107	1.070	11.00	2.176	14.466	109.27	57.42
1225	25	112	1.350	11.50	2.787	12.406	121.67	63.94
1230	30	117	2.100	12.00	4.403	17.974	139.65	73.36
1235	35	122	0.685	12.00	1.422	14.563	154.21	81.04
1240	40	127	0.750	11.00	1.519	7.353	161.56	84.90
1245	45	132	0.660	11.50	1.352	7.177	160.74	88.67
1255	55	142	0.135	11.50	0.302	8.266	177.01	93.01
1305	5	152	0.195	10.50	0.375	3.382	180.39	94.19
1330	30	177	0.105	10.00	0.190	7.061	187.45	98.50
1400	0	207	0.010	15.40	0.000	2.850	190.30	100.00
						190.298		

AREA: LITTLE FORT
SITE: LITTLE FORT, FERRY CROSSING, CENTRE
DATE: APRIL 9/86

DYE: RHODAMINE WT 20% Background 0.01
QUANTITY OF DYE: 5.0 LITERS
TIME OF DYE ADDITION: 10:33 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
	20							
1120	30	47	0.015	11.00	0.010	0.000	0.00	0.00
1130		57	0.010	11.00	0.000	0.051	0.05	0.02
1140	40	67	0.720	10.50	1.439	7.193	7.24	2.91
1145	45	72	6.450	10.00	12.880	35.796	43.04	17.27
1150	50	77	5.500	10.00	10.980	59.650	102.69	41.21
1155	55	82	3.000	11.50	6.218	42.995	145.69	58.47
1200	0	87	2.050	13.00	4.411	26.572	172.26	69.13
1205	5	92	1.225	12.00	2.560	17.427	189.68	76.13
1210	10	97	1.670	11.00	3.401	14.919	204.60	92.11
1215	15	102	0.840	10.50	1.682	12.723	211.32	87.22
1220	20	107	0.700	10.50	1.398	7.699	225.02	90.31
1225	25	112	0.405	11.00	0.811	5.522	230.55	92.53
1230	30	117	0.310	11.00	0.616	3.567	234.11	93.96
1235	35	122	0.260	11.50	0.520	2.839	236.95	95.10
1240	40	127	0.200	11.00	0.390	2.275	239.23	96.01
1245	45	132	0.195	9.00	0.361	1.676	241.10	96.76
1255	55	142	0.115	11.50	0.218	2.094	244.00	97.93
1305	5	152	0.125	10.50	0.233	2.251	246.25	98.83
1330	30	177	0.010	10.00	0.000	2.913	249.17	100.00
1400	0	207	0.010	15.00	0.000	0.000	249.17	100.00
						249.167		

AREA: LITTLE FORT
SITE: LITTLE FORT, PERRY CROSSING, RIGHT BANK
DATE: APRIL 9/86

DYE: RHODAMINE WT 20% Background 0.01
QUANTITY OF DYE: 5.0 LITERS
TIME OF DYE ADDITION: 10:33 hrr.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1120	20	47	0.025	13.00	0.032	0.000	0.00	0.00
1130	30	57	0.010	10.50	0.000	0.162	0.16	0.06
1140	40	67	0.185	11.00	0.359	1.796	1.96	0.73
1145	45	72	4.450	10.00	8.880	23.098	25.06	9.30
1150	50	77	3.650	11.50	7.570	41.124	66.18	24.56
1155	55	02	3.300	11.50	6.842	36.029	102.21	37.93
1200	0	87	2.250	11.50	4.659	28.750	130.96	48.60
1205	5	92	2.150	12.00	4.500	22.917	153.87	57.11
1210	10	97	1.280	11.50	2.41	17.174	171.75	63.74
1215	15	102	1.870	10.30	3.49	15.975	187.72	69.67
1220	20	107	1.300	10.50	2.614	15.907	203.63	75.51
1225	25	112	0.720	11.00	1.457	10.178	213.81	79.35
1230	30	117	1.050	11.20	2.146	9.008	222.82	82.69
1235	35	122	0.475	11.00	0.954	7.751	230.57	85.57
1240	40	127	0.710	11.00	1.437	5.978	236.55	87.19
1245	45	132	0.680	11.00	1.375	7.030	243.58	90.40
1255	55	142	0.315	11.50	0.634	10.048	293.62	94.13
1305	5	152	0.235	11.00	0.462	5.481	259.11	96.16
1330	30	177	0.090	10.00	0.160	7.773	266.19	99.05
1400	0	207	0.015	15.00	0.011	2.571	269.45	100.00
						269.449		

2.1 Avola Reach

Dye injection in this reach took place at 12:18 hours April 10, 1986. The dye was first observed at the Avola sampling sites at 13:05 hours The peak dye concentration reached the site at 14:09 hours. The dye concentration at the left and centre sampling sites of the river dropped off considerably after 14:09 hours. However, at the right side station, the peak concentration did not arrive until 14:12 hours and the dye level remained consistantly higher than the centre and left stream stations for the next 30 minutes Sampling continued until 17:00 hours and at that time sampling was discontinued although background levels had not been reached. The average velocities, based upon the peak concentration time of travel for this reach, were between 0.54 m/sec and 0.59 m/sec.

The field results obtained are illustrated in Figure Al-7 and interpreted in Table A1-8.

2.5 Blue River Reach

Dye injection took place in the Blue River reach at 10:10 hours, April 10, 1986. Dye first reached the sampling site at 14:00 hours. The peak concentration reached the site at 14:20 hours. Sampling continued until 17:20 hours at which point the dye level had decreased substantially but not to background levels. Noting that the length of this reach is approximately 13.5 km, the average velocity based upon the peak concentration time of travel for this reach was 0.9 m/sec. The stream gradient in this section is 0.1%.

The field results obtained are illustrated in Figure Al-8 and interpreted in Table A1-9.

FIGURE Al-7

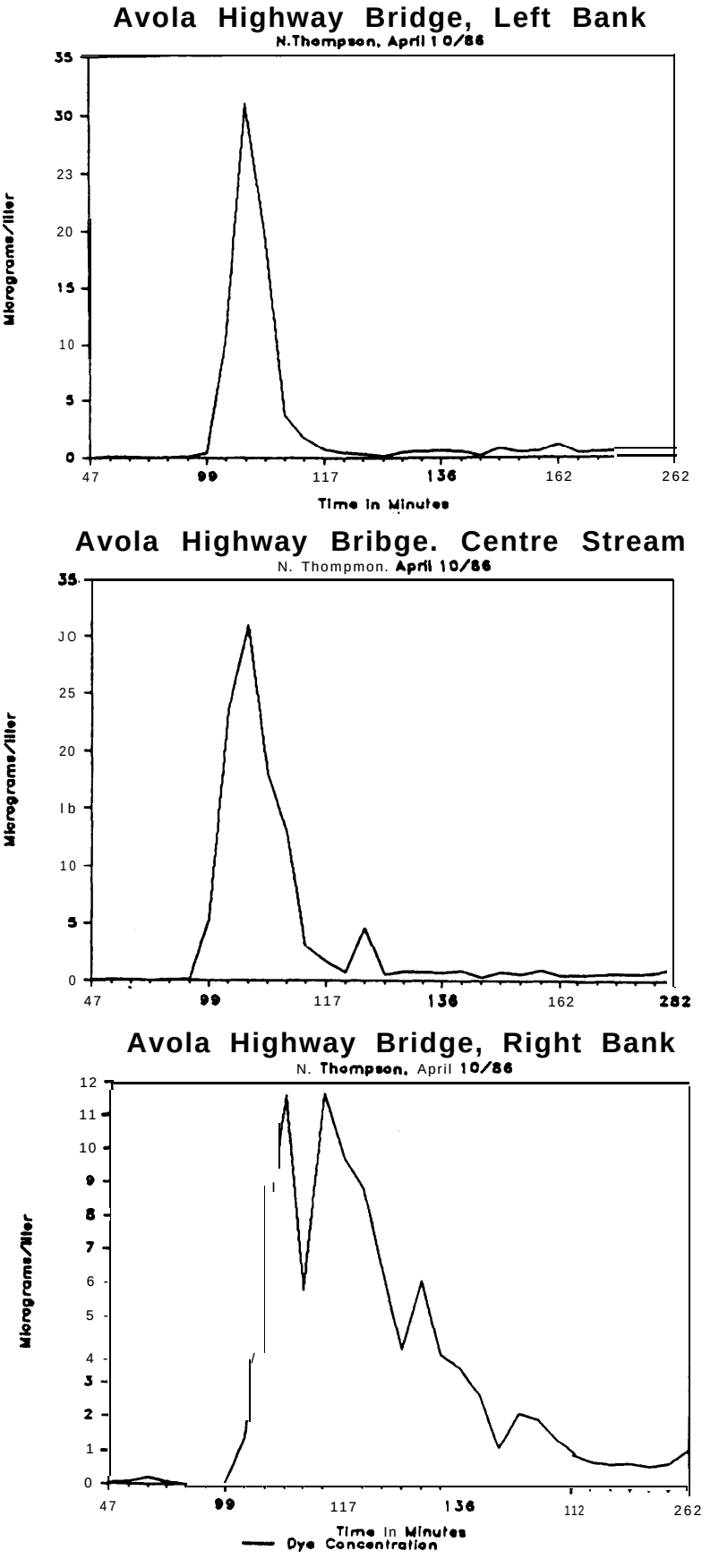

Avola Highway Bridge, Left Bank
N.Thompson, April 10/86
Micrograms/liter
35
30
23
20
15
10
5
0
47
99
117
136
162
262
Time in Minutes
Avola Highway Bribge. Centre Stream
N. Thompmon. April 10/86
Micrograms/liter
35
JO
25
20
Ib
10
5
0
47
99
117
136
162
282
Avola Highway Bridge, Right Bank
N. Thompson, April 10/86
Micrograms/liter
12
11
10
9
8
7
6
5
4
3
2
1
0
47
99
117
136
112
262
Time in Minutes
Dye Concentration

TABLE Al-8

AREA: AVOLA, N. THOMPSON
SITE: AVOLA HIGHWAY BRIDGE, LEFT BANK
DATE: APRIL 10/86

DYE: RHODAMINE WT 20% Background 0.085
QUANTITY OF DYE: 2 LITERS
TIME OF DYE ADDITION: 12:18 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1305	5	47	0.085	6.00	0.000	0.000	0.00	0.00
1332	32	74	0.115	5.40	0.053	0.719	0.72	0.24
1338	38	80	0.115	5.50	0.053	0.320	1.04	0.34
1343	43	85	0.110	5.50	0.044	0.245	1.28	0.41
1348	48	90	0.105	6.00	0.036	0.201	1.48	0.49
1353	53	95	0.115	5.50	0.053	0.224	1.71	0.56
1357	57	99	0.280	5.60	0.348	0.802	2.51	0.82
1400	0	102	5.610	6.50	10.089	15.655	18.17	5.94
1403	3	105	17.000	6.50	30.887	61.464	79.63	26.04
1406	6	108	10.800	6.80	19.719	75.910	155.54	50.87
1409	9	111	2.100	6.00	3.632	35.027	190.57	62.32
1412	12	114	1.050	6.50	1.762	8.091	198.66	64.97
1415	15	117	0.480	7.20	0.735	3.745	202.40	66.19
1418	18	120	0.300	7.60	0.404	1.708	204.11	66.15
1421	21	123	0.270	6.50	0.338	1.113	205.22	67.12
1424	24	126	0.175	6.50	0.164	0.753	205.98	61.36
1427	27	129	0.350	7.50	0.497	0.991	206.97	61.69
1430	30	132	0.370	6.50	0.520	1.526	208.49	68.19
1434	34	136	0.400	6.00	0.568	2.176	210.67	68.90
1438	38	140	0.365	6.00	0.505	2.145	212.81	69.60
1442	42	144	0.150	5.00	0.114	1.238	214.05	70.00
1446	46	148	0.520	6.50	0.794	1.817	215.87	70.60
1450	50	152	0.340	6.50	0.466	2.520	218.39	71.42
1455	55	157	0.360	6.60	0.503	2.423	220.81	71.22
1500	0	162	0.750	4.60	1.156	4.148	224.96	73.57
1516	16	178	0.320	6.00	0.424	12.635	237.59	17.70
1530	30	192	0.360	5.20	0.485	6.363	243.96	79.79
1545	45	207	0.395	5.00	0.544	7.724	251.68	82.31
1600	0	222	0.480	4.60	0.687	9.232	260.91	85.33
1625	25	247	0.430	5.00	0.606	16.155	277.07	90.61
1700	0	282	0.680	4.60	1.034	28.700	305.77	100.00
						305.769		

AREA: AVOLA, N. THOMPSON
SITE: AVOLA HIGHWAY BRIDGE. CENTRE
DATE: APRIL 10/86

DYE: RHODAMINE WT 20% Background 0.085
QUANTITY OF DYE: 2 LITERS
TIME OF DYE ADDITION: 12:18 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1305	5	47	0.095	6.00	0.018	0.000	0.00	0.00
1332	32	74	0.105	5.40	0.035	0.722	0.71	0.18
1338	38	80	0.095	5.60	0.018	0.160	0.88	0.22
1343	43	85	0.090	6.00	0.009	0.067	0.95	0.23
1348	48	90	0.100	6.00	0.027	0.090	1.04	0.26
1353	53	95	0.130	5.60	0.080	0.268	1.31	0.32
1357	57	99	3.050	5.80	5.317	10.794	12.10	2.98
1400	0	102	12.800	7.00	23.522	43.258	55.36	13.64
1403	3	105	16.900	6.80	30.945	81.701	137.06	33.76
1406	6	108	10.000	6.40	18.058	73.505	210.56	51.87
1409	9	111	7.220	6.00	12.860	46.378	256.94	63.30
1412	12	114	1.690	6.20	2.908	23.653	280.60	69.12
1415	15	117	0.950	6.50	1.580	6.731	287.33	70.78
1418	18	120	0.445	7.20	0.669	3.313	190.10	71.61
1421	21	123	2.600	6.00	4.533	7.804	298.50	73.53
1424	24	126	0.360	6.00	0.496	7.543	306.05	15.39
1427	27	129	0.490	7.80	0.765	1.01	307.94	75.86
1430	30	132	0.465	6.00	0.685	2.175	310.11	76.39
1434	34	136	0.450	5.50	0.649	2.669	312.78	77.05
1438	38	140	0.550	I.80	0.834	2.966	315.75	77.78
1442	42	144	0.220	4.80	0.236	2.139	317.89	79.31
1446	46	148	0.480	6.40	0.719	1.911	319.90	79.78
1450	50	152	0.380	6.00	0.532	2.502	322.30	79.40
1455	55	157	0.570	6.50	0.886	3.543	325.84	80.27
1500	0	162	0.305	4.80	0.384	3.115	329.02	81.05
1516	16	178	0.365	5.50	0.498	7.060	336.08	82.79
1530	30	192	0.378	5.20	0.517	7.108	343.19	84.54
1545	45	201	0.425	5.20	0.600	8.381	351.57	86.61
1600	0	222	0.438	4.60	0.614	9.103	360.67	88.85
lb25	25	247	0.460	4.60	0.652	15.816	376.49	92.74
1700	0	282	0.680	4.50	1.031	29.456	405.94	100.00
						405.942		

AREA: AVOLA. N.THOMPSON
SITE: AVOLA HIGHWAY BRIDGE. RIGHT BANK
DATE: APRIL 10186

DYE: RHODAMINE NT 201 Background 0.005
QUANTITY OF DYE: 2 LITERS
TIME Of DYL ADDITION: 12:18 hrs.

Hours	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1305	5	47	0.095	6.20	0.018	0.000	0.00	0.00
1332	32	74	0.120	6.00	0.063	1.096	1.10	0.29
1338	38	80	0.185	6.50	0.183	0.731	1.83	0.48
1343	43	85	0.120	6.50	0.064	0.616	2.45	0.64
1348	48	90	0.085	6.00	0.000	0.160	2.61	0.68
1353	53	95	0.105	6.40	0.036	0.091	2.79	0.10
1357	57	99	0.105	6.50	0.037	0.146	2.85	0.14
1400	0	102	0.820	7.60	1.381	2.126	4.97	1.29
1403	3	105	4.080	7.20	7.429	13.215	18.19	4.12
1406	6	108	6.400	6.80	11.622	28.516	46.76	12.14
1409	9	111	3.250	6.50	5.119	26.102	12.81	18.92
1411	12	114	6.500	6.40	11.684	26.194	99.06	25.73
1415	15	117	5.360	7.00	9.758	32.163	131.22	34.08
1418	18	120	4.740	8.00	8.838	21.895	159.12	41.32
1421	21	123	3.600	6.50	6.419	22.885	182.00	41.27
1424	24	126	2.280	6.60	4.019	15.656	197.66	51.33
1427	27	129	3.350	7.30	6.081	15.159	212.82	55.27
1430	30	132	2.200	6.50	3.862	14.924	227.74	59.14
1434	34	136	2.000	6.40	3.488	14.100	242.44	62.96
1438	38	140	1.550	6.30	2.661	12.298	254.14	66.15
1442	42	144	0.710	5.00	1.115	7.553	161.29	68.13
1446	46	148	1.250	6.50	2.121	6.485	268.78	69.80
1450	50	152	1.150	6.80	1.960	8.175	216.95	71.92
1455	55	157	0.820	1.00	1.360	8.299	285.25	74.08
1500	0	162	0.620	5.20	0.944	5.760	191.01	75.57
1516	lb	178	0.500	6.50	0.158	13.618	304.63	19.11
1530	30	192	0.462	6.00	0.680	10.061	314.69	81.72
1545	45	201	0.495	5.50	0.129	10.567	325.26	84.47
1600	0	222	0.450	5.00	0.641	10.279	335.54	81.14
1625	25	247	0.498	4.80	0.122	11.012	352.51	91.56
1700	0	282	0.140	4.50	1.135	12.491	385.07	100.00
						385.066		

FIGURE A1-8

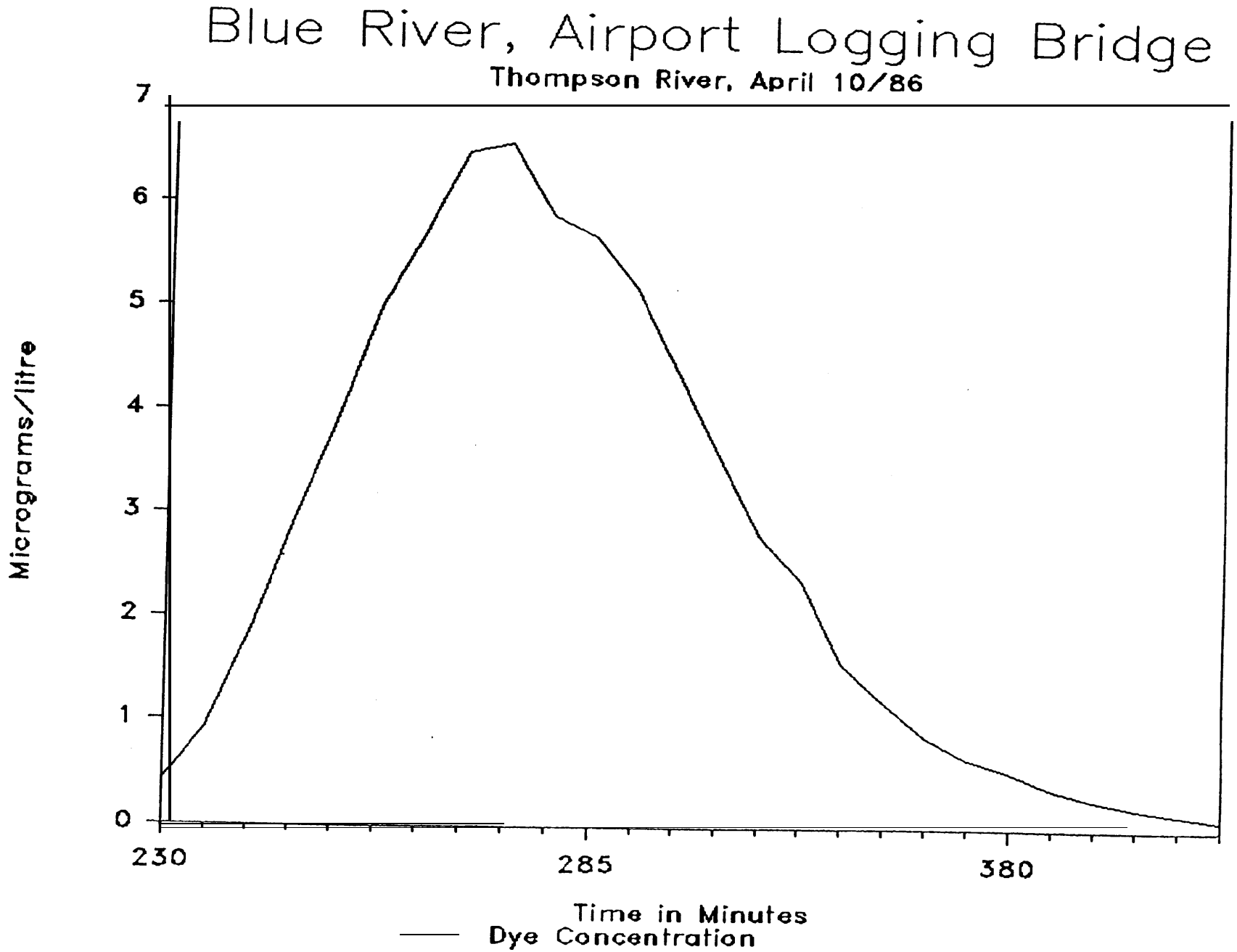

Blue River, Airport Logging Bridge
Thompson River, April 10/86
Micrograms/litre
7
6
5
4
3
2
1
0
230
285
380
Time in Minutes
Dye Concentration

TABLE Al-9

AREA: BLUE RIVER, N. THOMPSON RIVER
SITE: AIRPORT LOGGING BRIDGE, N. THOMPSON
DATE: APRIL 10/86

DYE: RHODAMINE WT 20%
QUANTITY OF DYE: 3.0 LITERS
TIME OF DYE ADDITION: 10:10 hrs.

Hour	Min	Time	Reading	Temp C	Correct	Subarea	Cumul.	Cum/Area
1400	0	230	0.210	3.00	0.420	0.000	0.00	0.00
1405	5	235	0.470	3.00	0.940	3.400	3.40	0.44
1410	10	240	0.920	3.00	1.840	6.950	10.35	1.34
1415	15	245	1.450	3.00	2.900	11.850	22.20	2.88
1420	20	250	1.950	3.00	3.900	17.000	39.20	5.08
1425	25	255	2.500	3.00	5.000	22.250	61.45	7.97
1430	30	260	2.850	3.00	5.700	26.750	88.20	11.44
1440	40	270	3.250	3.00	6.500	61.000	149.20	19.35
1445	45	275	3.300	3.00	6.600	32.750	181.95	23.60
1450	50	280	2.950	3.00	5.900	31.250	213.20	27.65
1455	55	285	2.850	3.00	5.700	29.000	242.20	31.41
1500	0	290	2.600	3.00	5.200	245.250	487.45	63.21
1510	10	300	2.200	3.00	4.400	48.000	535.45	69.44
1520	20	310	1.800	3.00	3.600	40.000	575.45	74.63
1530	30	320	1.400	3.00	2.800	32.000	607.45	78.78
1540	40	330	1.200	3.00	2.400	26.000	633.45	82.15
1550	50	340	0.790	3.00	1.580	19.900	653.35	84.73
1600	0	350	0.610	3.00	1.220	70.000	723.35	93.81
1610	10	360	0.440	3.00	0.880	10.500	733.85	95.17
1620	20	370	0.330	3.00	0.660	7.700	741.55	96.17
1630	30	380	0.270	3.00	0.540	6.000	747.55	96.95
1640	40	390	0.195	3.00	0.390	4.650	752.20	97.55
1650	50	400	0.145	3.00	0.290	3.400	755.60	97.99
1700	0	410	0.105	3.00	0.210	12.500	768.10	99.61
1710	10	420	0.075	3.00	0.150	1.800	769.90	99.84
1720	20	430	0.045	3.00	0.090	1.200	771.10	100.00
						771.100		

3.0 SUMMARY

As stated previously, this field study was undertaken to provide information for the calibration of the computer model for the North Thompson River and for the development of dispersion coefficients. The study was successful in providing information useful to the overall computer modeling objectives. Noting budget constraints and the overall objectives for acquiring the data, a thorough evaluation of the results has not been undertaken at this time. Although anomalies do occur in the data, they are minor in nature and do not affect the trends established.

2A - STEADY-STATE MODEL

MEMORANDUM

FROM : Tung Van Do

TO: File No. 8601-101

DATE: August 25th, 1986

SUBJECT: Steady state modelling for North Thompson River

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1. THEORY AND METHODOLOGY

1.1 Assumptions

- steady state 2-dimensional hydraulics: velocity in each panel and the longitudinal diffusion coefficient are constant in a 1 kilometer reach;
- Mean velocity varies laterally in each panel according to its wetted perimeter (the cross-sectional geometry) and the rating curve for the section.
- Vertical velocities follow the Universal velocity distribution law according to an approximation which uses Manning's n as a friction factor.
- the pollutant either floats, sinks or undergoes complete vertical mixing;
- the pollutant is complete mixing laterally so that at least 95% of the initial waste field is contained within $\pm 2\sigma$;

  the pollutant undergoes first order decay with time;
- homogenous turbulence: the lateral diffusion coeficient is the same as the longitudinal one; (E_x = Ey).

1.2 Model Formulation

1.2.1 Hydraulics

1.2.1.1 Lateral Velocity Distribution

Manning's equation:

$$V = \frac{1}{n} R^{2/3} S^{1/2} \tag{1}$$

in which,

V = Cross-sectional mean velocity (m/s)

n = Manning's roughness coefficient

R = Crors-sectional hydraulic radius(m)

S = River slope

Thus,

$$\frac{V}{R^{2/3}} = \frac{S^{1/2}}{n} \tag{2}$$

or,

$$\frac{V}{R^{2/3}} = \text{Constant} \tag{2a}$$

The **constant** is evaluated from values of V and R given by the-actual rating curve developed from stream gauging at the transect. **A** value of the constant is computed for each point on the stage-discharge curve. The mean velocity in each panel, at each slope, is computed using this constant, **from:**

$$v = \text{Constant} \times r^{2/3} \tag{3}$$

If the rating curve is not available the lateral velocity distribution can be computed from estimates of n and S and **in this** case ncanbe varied in each panel. This capability is not included in the current version of the computer code.

l-2.1.2 **Vertical Velocity Distribution**

From the Prandtl-von Karman universal-velocity-distribution law,

$$v_y = 2.5 \sqrt{grS} \ \text{In} \ \frac{y}{K} \qquad (4)$$

where,

v_y = velocity at the depth y (m/s)

r = hydraulic radius (m)

K = coefficient

y = water depth (m)

Combining (3) and (4) gives,

$$\frac{v_y}{\bar{v}} = \frac{2.5 \sqrt{g} \ n}{r^{1/6}} \ \ln \frac{y}{K} \qquad (5)$$

For

$$Y = 0.6\bar{y} \ , \ \frac{v_y}{\bar{v}} = 1$$

and,

$$\frac{r^{1/6}}{2.5 \sqrt{g} \ n} = \ln \frac{0.6\bar{y}}{K} \qquad (6)$$

Therefore,

$$K = 0.6\bar{y} \exp \left(- \frac{r^{1/6}}{2.5 \sqrt{g} \ n} \right) \qquad (7)$$

and,

$$v_y = 2.5 \sqrt{grS} \ \ln \left\{ y / \left[0.6\bar{y} \exp \left(- \frac{r^{1/6}}{2.5 \sqrt{g} \ n} \right) \right] \right\} \qquad (8)$$

1.2.2 Water Quality

1.2.2.1 One-dimensional distribution

From the Einstein equation for an infinite turbulent field,

$$E_x = \frac{1}{2}u^2 \frac{\partial(\sigma t^2)}{\partial t} \tag{9}$$

for E_x = diffusion constant, u = constant velocity

$$E_x = \frac{1}{2}^2 \frac{\partial(\sigma_x{}^2/u^2)}{\partial x/u} = \frac{1u}{2} \frac{\partial(\sigma_x{}^2)}{\partial x}$$

or,

$$E_x = \frac{1u}{2} \frac{(\sigma 2^2 - \sigma 1^2)}{(x_2 - x_1)} \tag{10}$$

where,

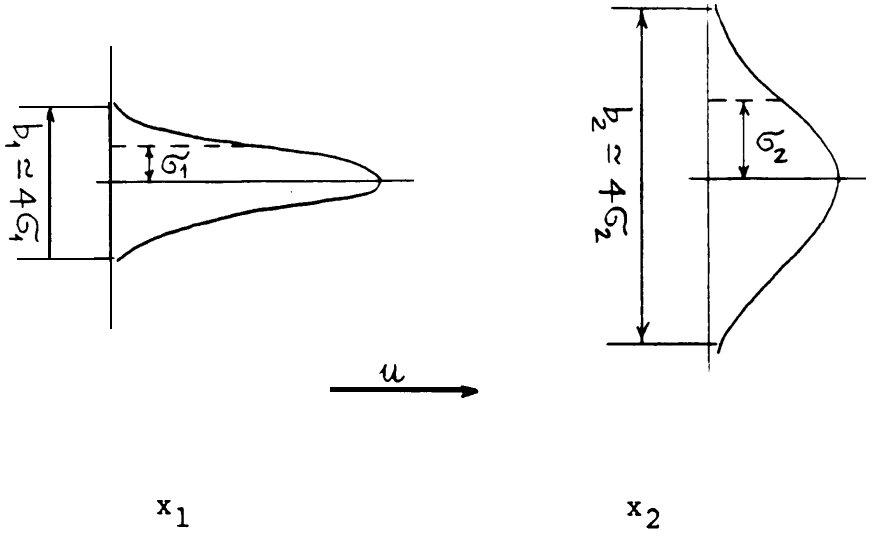
u = mean velocity in a panel

x_1, x_2 = distance along advection dispersion longitudinal axis

σ_1, σ_2 = standard deviations of dispersion pattern at x_1 and x_2

E_x, E_y = "effective diffusion" or dispersion along x-axis (parallel to flow) and y-axis (normal to flow)

The process can be defined graphically as follows:



Letting $x_1 = 0$, for a source of initial width $b_1 = 4\,\sigma_1$:

$$\frac{16.2\ E_x x}{U} = 16\ \sigma_2^{\ 2} - 16\ \sigma_1^{\ 2} = b_2^{\ 2} - b_1^{\ 2}$$

or, $$b_2 = \left[\frac{32xE_x}{u} + b_1^{\ 2}\right]^{1/2} \qquad (11)$$

But, since mass is conserved:

$$c_2\ b_2 = c_1\ b_1$$

and,

$$c_2 = c_1\ (b_1/b_2)$$

By substitution of b_2 from (11), we have:

$$C_2 = \frac{c_1 b_1}{\left(\frac{32xE_x}{U} + b_1^2\right)^{1/2}} \qquad (12)$$

where,

c_1 = initial concentration at source, mg/l

c_2 = concentration at distance x, mg/l

b_1 = initial width of spill field (= 4 σ_1), m

x = distance, m

With the first order decay,

$$\frac{c_2}{c_1} = e^{-K(t_2-t_1)} = e^{-K(x/u)} \qquad (13)$$

where,

K = first order decay constant, sec^{-1}

Modifying (12) gives

$$C_2 = \frac{c_1 b_1 \exp(-Kx/u)}{\left(\frac{32xE_x}{U} + b_1^2\right)^{1/2}} \qquad (14)$$

1.2.2.2 Two-dimensional distribution

For a normal probability density function:

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2}\frac{(y-y_0)^2}{\sigma^2}\right] \qquad (15)$$

at the centre where $y = y_0 = 0$

$$f(y) = \frac{1}{\sigma\sqrt{2\pi}} \tag{16}$$

Therefore,

$$\frac{c(y)}{c_{max}} = \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma}\right)^2\right] \tag{17}$$

or,

$$c_2(y) = c_{2max} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_2}\right)^2\right]$$

$$c_2(y) = \frac{c_{1max}\,\sigma_1 \exp\left(-y^2/2\sigma_2^2\right)}{\left(\frac{2xE_x}{u} + \sigma_1^2\right)^{1/2}} \tag{18}$$

Substituting σ_2 in (18) and simplifying yields:

$$c_2(y) = \frac{\overline{c_1} b_1 \exp\left[-\frac{8y^2}{\frac{32xE_x}{u} + b_1^2} - \frac{Kx}{u}\right]}{0.6\left[\frac{32xE_x}{u} + b_1^2\right]^{1/2}} \tag{19}$$

Equation (19) is a model of continuous spills in a homogeneous turbulent stream with a steady state advection velocity of u. It describes the toxicant concentration c (x, y) at locations downstream of a spill of initial width b_1.

2. PROGRAM AND DATA

2.1 Input Data

There are 3 input files: "REACH.NTH", "XFILE.NTH" and "KM.DAT".

The file "REACH.NTH" contains the information on the cross-section number, the discharge factor, the drainage area, the river slope and the diffusion coefficent at a location along the river specified by the river KM. The second last line of this file contains the longitudinal increment between transects used internally in the computations (d_x), the time step for the transient solution. The last line contains the exponents of the dimensionless ratios used in adjusting dispersion coefficients for different hydraulic conditions across the transects.

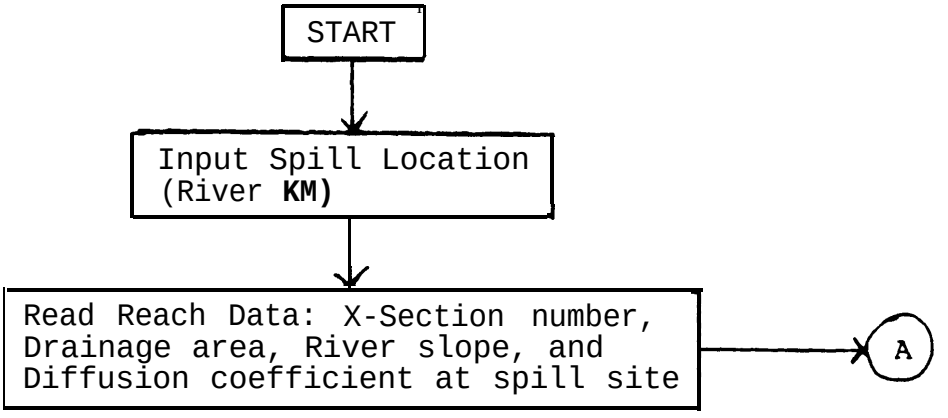
The file "XFILE.NTH" stores the cross-section data. Each cross-section has the distance vs. elevation across the river and the discharge vs. stage height.

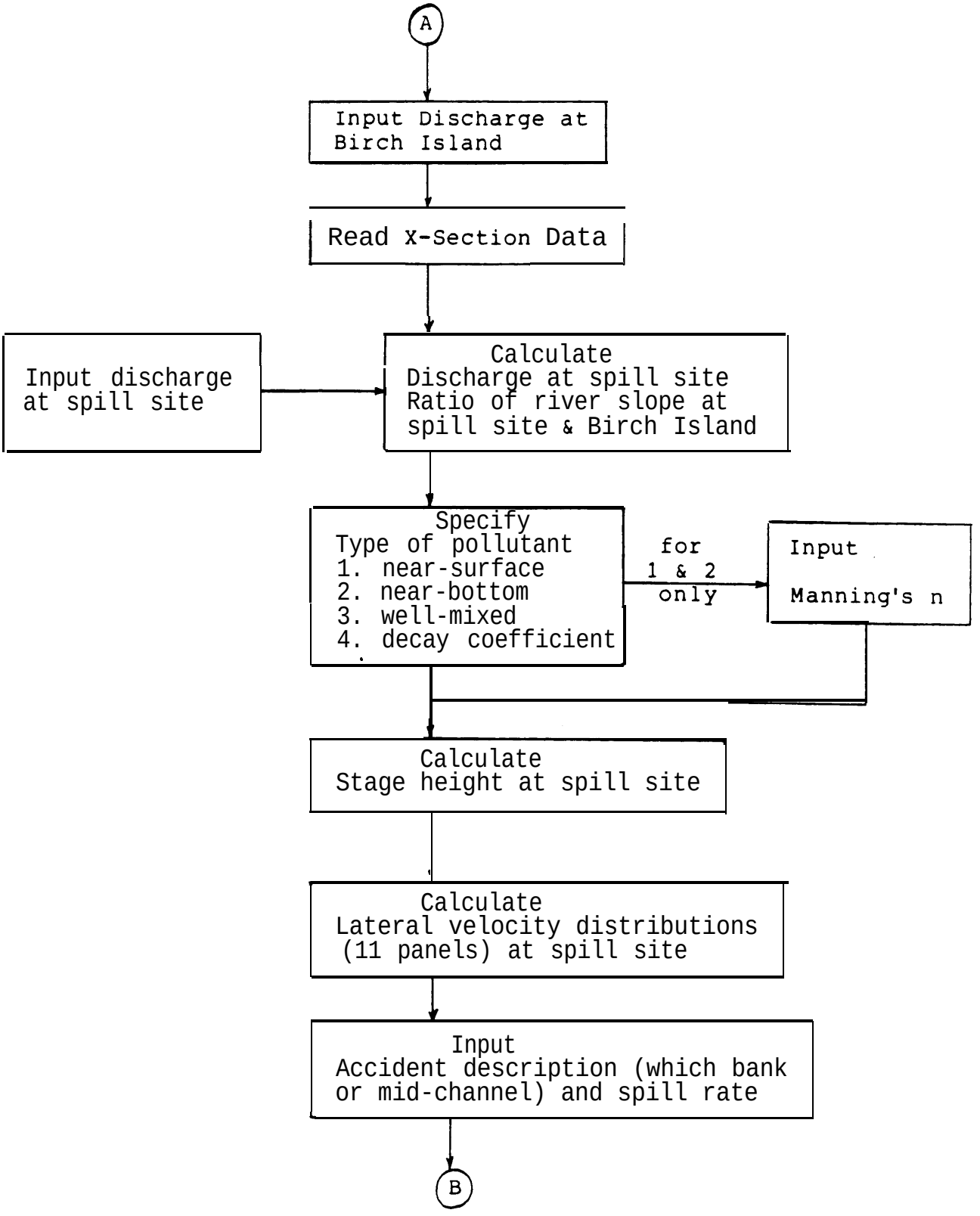
the file "KM.DAT" contains a cross-reference table for river and railroad kilometres.

2.2 Output

The program creates automatically during the execution one output file named NTxxxx.S with xxxx being the current time in 24 hour format. This file stores the information on the concentration, velocity, wetted perimeter, mean depth, and the area in 11 panels for each 1 KM downstream of the spill site. The summary result which has only the concentration is displayed on the screen.

2.2 Flow Chart for NTSG.TBC




A
Input Discharge at Birch Island
Read X-Section Data
Input discharge at spill site
Calculate Discharge at spill site Ratio of river slope at spill site & Birch Island
Specify Type of pollutant 1. near-surface 2. near-bottom 3. well-mixed 4. decay coefficient
for 1 & 2 only
Input Manning's n
Calculate Stage height at spill site
Calculate Lateral velocity distributions (11 panels) at spill site
Input Accident description (which bank or mid-channel) and spill rate
B

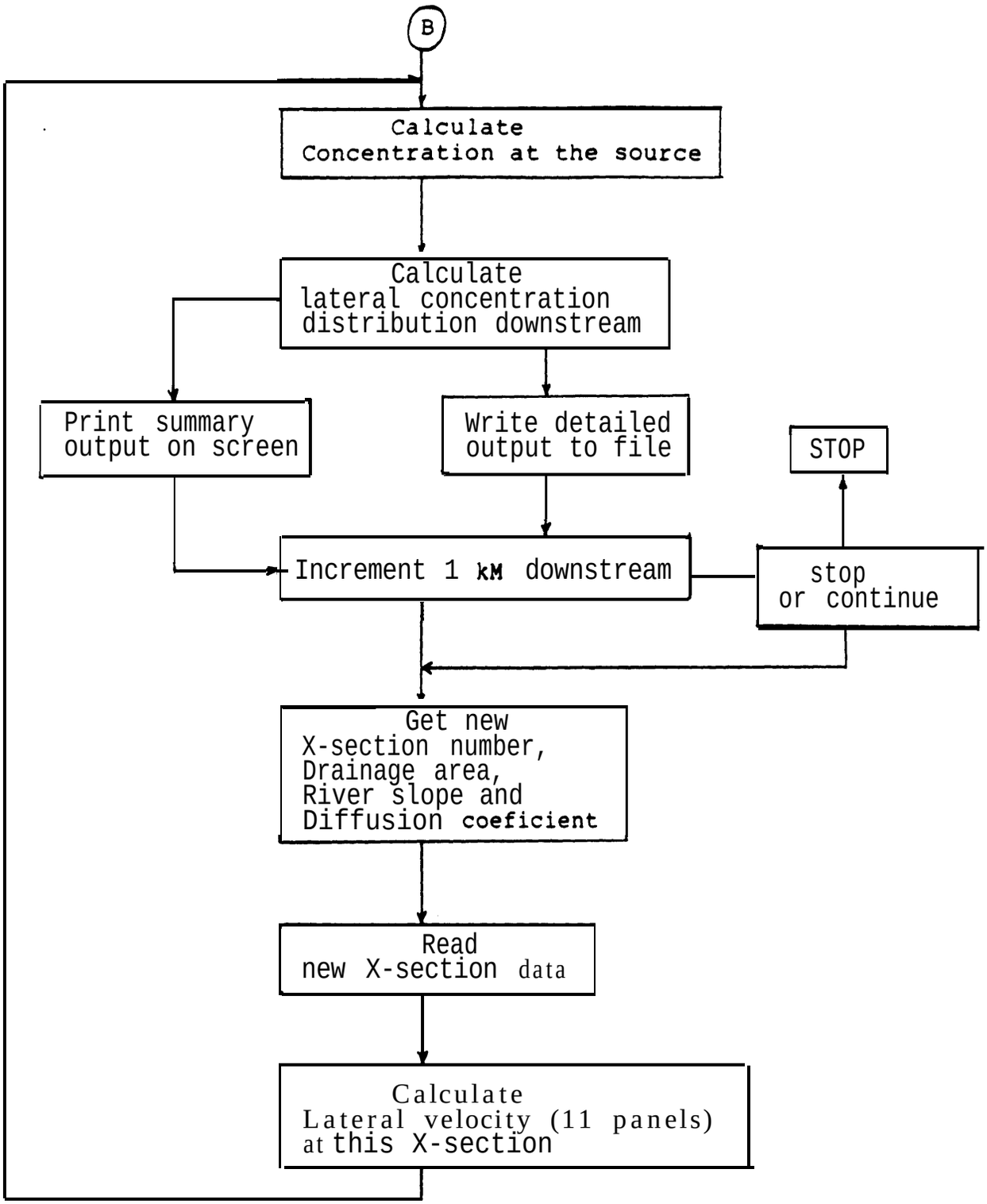
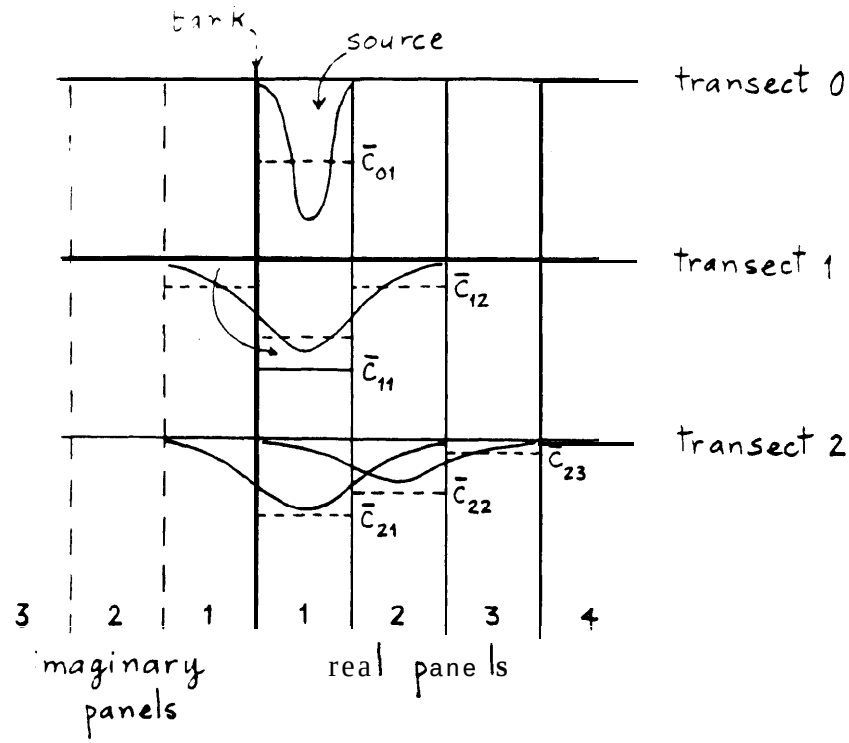

B
Calculate
Concentration at the source
Calculate
lateral concentration
distribution downstream
Print summary
output on screen
Write detailed
output to file
STOP
Increment 1 kM downstream
stop
or continue
Get new
X-section number,
Drainage area,
River slope and
Diffusion coeficient
Read
new X-section data
Calculate
Lateral velocity (11 panels)
at this X-section

Figure 2

3. COMPUTATIONAL PROCEDURE



The infinite field model expressed by equation (19) was used to calculate the concentration at downstream locations.

Figure 3 is an example in which the spill source is in the first panel on the west bank. Let c_{01} be the mean concentration at transect 0, panel 1 with the width of the pollutant equal to the width of the panel. This pollutant spreads to transect 1 where the width of the pollutant is determined by equation (11) in which u is the velocity in panel 1, x is the distance from transect 0 to transect 1. In this example there are 2 real and 1 imaginary (in the bank) panels infected at transect 1.

The concentration in each panel at transect 1 is computed by equation (11) in which

$c_1 = c_{01}$

b_1 = width of the source = width of the panel

Y = distance frommid-point in each panel to mid-point of middle panel (panel 1 in this case)

u = velocity of the source panel. Panel 1 at transect 0 is the source panel for transect 1.

E_x = diffusion coefficient

The mean concentration in the imaginary panel 1 is then added to the mean concentration in the real panel 1. These two new concentrations $\bar{c}_{11}$ and $\bar{c}_{12}$ become the sources for transect 2. Each source with its concentration value will be spread downstream using its own local velocity, therefore, each upstream source has a different lateral pollutant distribution curve at the downstream transect.

At transect 2, panel 1 receives pollutant from the two different sources $\bar{c}_{11}$, $\bar{c}_{12}$ and the reflection from the bank. The sum of these three values is the mean concentration $\bar{c}_{21}$. Similarly, $\bar{c}_{22}$ is the sum of two concentrations from $\bar{c}_{11}$ and $\bar{c}_{12}$, and $\bar{c}_{23}$ is the computed concentration from $\bar{c}_{12}$. These three mean concentrations $\bar{c}_{21}$, $\bar{c}_{22}$ and $\bar{c}_{23}$ become the new sources for the transect 3. The computation keeps going in the same manner for the downstream locations.

4. COEFFICIENTS AND PARAMETERS

The dispersion coefficients used by the program can be different at each transect by specifying it in the data file. The values used at each panel of a given transect depend on the local velocity and depth of the individual panels. The values could also be made to vary with discharge but this would require a program revision.

The decay coefficient depends on the type of pollutant. A value of 1/700 day^{-1} is the default value.

2B - TRANSIENT-STATE MODEL

MEMORANDUM

FROM: Tung Van Do

TO: File No. 8601-101

DATE: August 25th, 1986

SUBJECT: Transient state modelling for North Thompson River

REF: Memorandum on steady state modelling dated August 20th, 1986

---

1. THEORY AND METHODOLOGY

For a uniform cross-section, rectangular channel, the unit impulse response:

$$h(x,t) = \frac{x}{t(4\Pi Dt)^{1/2}} \exp\left[-\frac{(ut - x)^2}{4Dt}\right] \qquad (1)$$

in which, u = velocity in a panel (m/s)

D = diffusivity (m^2/s)

The time-varying concentration $C_2(x,t)$, at some downstream point x, is given by the convolution of h(x,t) and the pollutant released from upstream panel $C_1(x,t)$:

$$C_2(x,t) = \int_{t_1}^{t_2} C_1(x,t-\tau)\, h(x,\tau)\, d\tau, \text{ all } t_1, t_2 \qquad (2)$$

The time-varying concentration curves for the adjacent infected panels are assumed to have the same shape but different average concentration values which are determined by the equation (11) in the memo for steady state modelling.

$$C_2(x,y,t) = C_2(x,t) \frac{C_2(y)}{\int_{-y}^{y} C_2(y)}$$

or,

$$C_2(x,y,t) = C_2(x,t) \frac{C_2(y)}{2 \sum_{0}^{Y} C_2(y)} \qquad (3)$$

2. PROGRAM AND DATA

2.1 Input Data

The transient model uses the same input files as the steady state model. They are **"REACH.NTH"**, **"XFILE.NTH"** and **"KM.DAT"**.

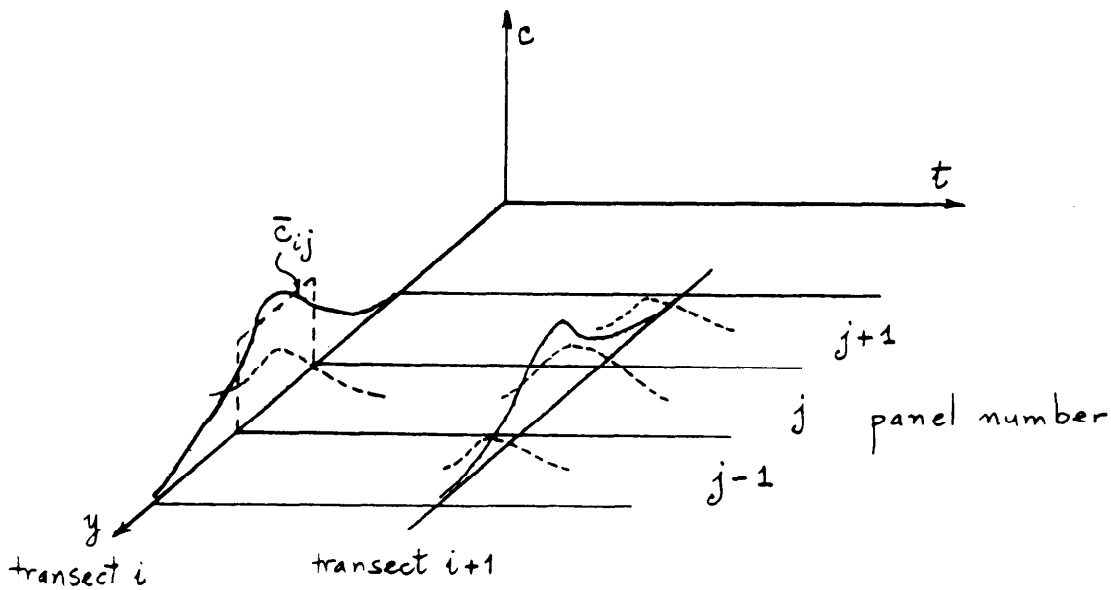
2.2 Output

The program, during execution, will automatically create an output file named **NTxxxx.T** with xxxx being the current time in 24 hour format. This file stores the information on the velocity, mean depth and time-varying concentrations for each of the 11 panels across the river. The summary result is displayed on the screen for each KM downstream as the time-varying concentration curves in 11 panels.

2.3 Flow Chart for NTTV.TBC

The same as that of steady state model.

3. COMPUTATIONAL PROCEDURE

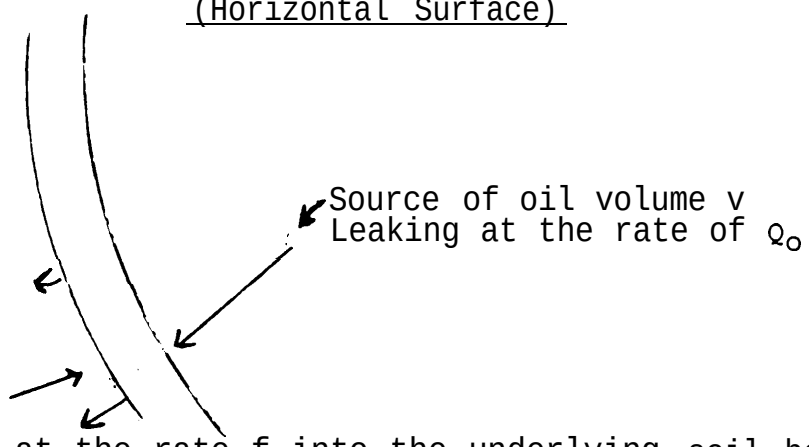


Consider one source C_{ij} at panel j, transect i (the shadow on the solid curve). This source varies with time as shown by the dashed curve. The solid curve at transect i+1 is the lateral distribution of concentration from the source C_{ij} and is determined by equation (11) in the previous memo. The time varying concentration curve in panel j, transect i+1 (dashed curve) is the convolution of the dashed curve at transect i using the unit impulse response (eqs. 1 and 2). This curve is then scaled down for all the infected panels (j-l, j, and j+1) by equation (3). These three dashed curves are then considered as three different time-varying sources for the next transect i+2. The lateral distributions resulting at transect i+2 are superposed at each time increment to determine the total concentration as a function of time in each panel. The process then repeats downstream, with the number of infected panels spreading laterally. At the banks the image of the concentration in the adjacent panels is reflected back into the panels in the river.

2C - CIRCULAR FRONT EQUATIONS (HORIZONTAL SURFACE)

APPENDIX 2C

Circular Front Equations
(Horizontal Surface)



Infiltration at the rate f into the underlying soil beneath the surface gravel layer reduces the total discharge as the pollutant spreads. The reduction is given by,

$$dQ = -2\pi f x dx \qquad \text{A1}$$

$$Q = Q_o - \pi f x^2 \qquad \text{A2}$$

If the volume is large enough, and the soil has enough capacity, a steady state would be reached when the total being infiltrated equals the total leaking. In this case, the radius of the stain would be given by,

$$x = \sqrt{\frac{Q_o}{\pi f}} \qquad \text{A3}$$

As the spill spreads it first fills depressions on the surface or is absorbed by surface materials such as straw. At prepared sites there is normally a pad of gravel which is very permeable and porous compared to the underlying soils. This gravel pad acts as a surface storage which traps the chemical and limits the spreading. Let the net effect of all of these considerations be lumped together into an effective surface depression storage Sd expressed in units of effective storage depth per unit area. In this case the volume required to extend the spill outward to a radius x_m is given by,

$$V = \pi S_d x^2 m \qquad \text{A4}$$

and

$$x_m = \sqrt{\frac{V}{\pi S_d}} \qquad \text{A5}$$

The time required to fill the surface storage is,

$$t_m = \frac{\pi S_d}{Q_o} x_m^2 \qquad \text{A6}$$

again, neglecting the effect of infiltration. Actually, infiltration will reduce x_m. The importance of infiltration in limiting the spread can be estimated using A6.

The volume lost by infiltration (V_i) during the time that spreading is occurring is, approximately,

$$V_i = \pi x_m^2 f t_m/2 \qquad \text{A7}$$

in which $t_m/2$ is an estimate of the average duration that infiltration takes place over the area. Thus,

$$V_i \simeq \pi f x_m^2 \left[\pi S_d x_m^2/Q_o\right] \qquad \text{A8}$$

$$V_i \simeq \frac{f\pi^2 S_d x_m^4}{Q_o} \qquad \text{A9}$$

This volume lost to infiltration can now be substituted into A5 to make a more precise estimate of the maximum extent of the stain.

$$x_m = \sqrt{\frac{V - V_i}{\pi S_d}} \qquad \text{A10}$$

$$x_m = \left[\frac{V - (f\pi^2 S_d/Q_o) x_m^4}{\pi S_d}\right]^{\frac{1}{2}} \qquad \text{A11}$$

$$\left[\frac{f\pi^2 S_d}{Q_o}\right] x_m^4 + \pi S_d x_m^2 - V = 0 \qquad \text{A12}$$

$$x_m = \left[\frac{-\pi S_d + \sqrt{\pi^2 S_d^2 + (4f\pi^2 S_d/Q_o)V}}{2\pi^2 f S_d/Q_0}\right]^{\frac{1}{2}} \qquad \text{A13}$$

In practice at prepared sites with gravel pads equations A5 should be adequate. However, the value of X_m should be checked by comparison with A3 in case the volume is large enough to permit the steady state to be reached. For the example shown with A3 a volume of 2500 cubic feet would be required to permit the oil to spread over the 40-foot radius. In contrast, a volume of 100 cubic feet would spread over a radius of about 8 feet according to equation A5 and about 7.8 feet according to A13.

2D - RIVULET EQUATIONS (SLOPING SURFACE)

APPENDIX 2D

Rivulet Equations
(Sloping Surface')

B1. Transition Region

A spill which occurs as a point source will spread horizontally, normal to the slope of the plane, until a width determined by surface tension is reached. This width W_o, is given by:

$$W_0 = \frac{Q_o}{8a_s}\left[\frac{\rho g}{\sigma}\right]^{1/2} \qquad \text{B1}$$

in which

Q_o = the spill discharge rate at the end of the of the transaction

$a_s = \frac{gs}{2v}$

s = the slope of the plane

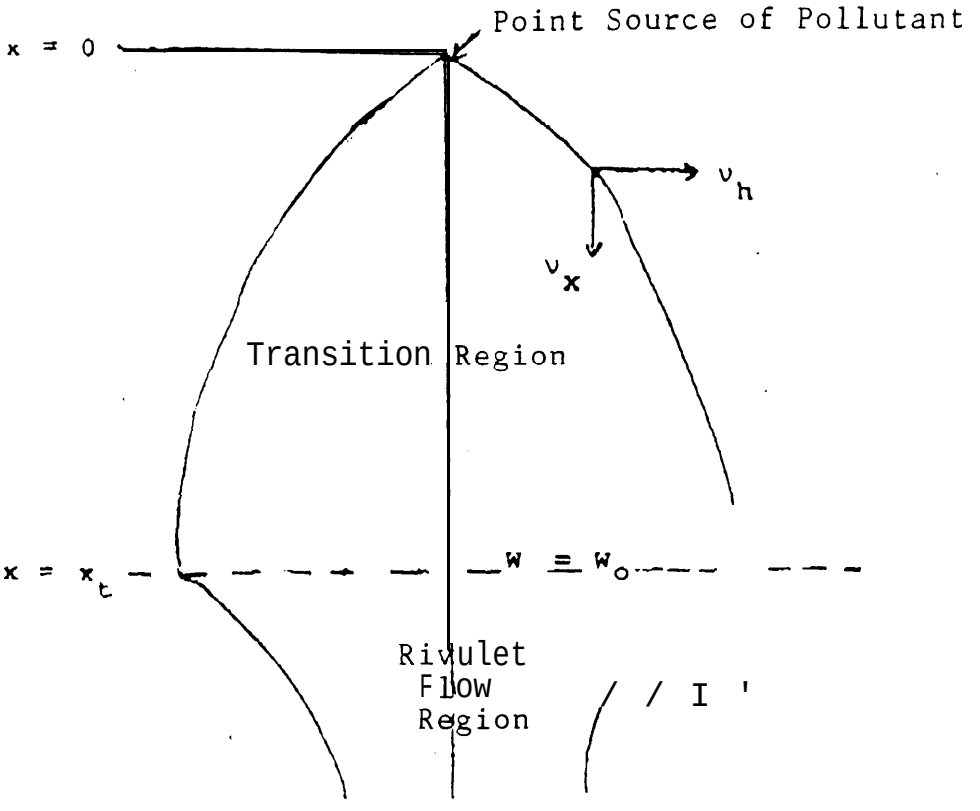
v = the kinematic viscosity

g = the acceleration of gravity

p = the mass density

0 = the surface tension force

Figure B1 illustrates the transition region.



At W(xt) the width of the transition region forms the upstream boundary for the rivulet flow region. At x = xt the depth is determined by the flow rate Q and the surface tension o. As a first approximation, the discharge can be approximated by the leakage rate from the pollutant source. This assumption neglects the loss of discharge resulting from the steady infiltration into the soil underlying the surface gravel (or snow) layer.

The horizontal velocity, v_h, depends on the depth at the outward moving front. Assume that this depth is a more rigorous development of B8 would deal directly with the basic differential equations. However, the success of such an approach depends on boundary conditions which involve assumptions similar to those made above.

B2. Rivulet Flow Region

On a smooth sloping surface the shape of the flow changes from the shape imposed near the source as a result of the manner in which the leak occurs to a Small Stream, or rivulet, with dimensions, width and depth, determined by the hydrodynamics of the flow and the effect of surface tension at the edge.

On a coarse gravel surface which is characteristic of prepared sites the flow occurs partly on the surface and partly in the sloping gravel layer which lies over the relatively impervious soil below. In this case surface tension plays little or no role in determining the width of the flowing rivulet and the flow depth is of the same order as the gravelthickness. Flow occurs in the gravel according to the equation,

$$q = ksy_g \qquad \text{B2.1}$$

in which k is the hydraulic conductivity for an unsaturated medium and q is the discharge per unit width through the gravel layer of thickness y_g.

If the flow is on the surface, the discharge per unit width would be given by

$$q = \alpha y^3 \qquad \text{D2.2}$$

in which

$$a = \frac{gs}{2v} \qquad \text{82.3}$$

and v is the kinematic viscosity. In this case the speed of the surface flow is given by,

$$\frac{dx}{dt} = 3\alpha y^2 \qquad \text{82.4}$$

and this value may be compared to KS, the superficial velocity in the gravel to gain an appreciation for the relative importance of the two flow phenomena. Both B2.2 and B2.4 require an estimate of the depth of the flow on the surface.

If the surface is very smooth the depth may be controlled by surface tension at the edge of the flow. In this case the depth would be twice the radius determined by surface tension.

$$y = \frac{4\sigma}{\rho g y} \qquad \text{B2.S}$$

$$y = 2\sqrt{\frac{\sigma}{\rho g}} \qquad \text{82.6}$$

The width may now be estimated as a function of the total discharge crossing a section of the rivulet. From B2.2 and B2.6, using the substitution,

$$q = \frac{Q}{W} \qquad 82.7$$

the result is,

$$W = \frac{Q}{8a}\left[\frac{\rho g}{\sigma}\right]^{1/2} \qquad D2.8$$

It will be convenient to write,

$$h = \frac{\rho g}{\sigma} \qquad B2.8a$$

In the vicinity of the pollutant source the depth is not determined by surface tension, but by the way in which the spill is issuing from its container. B2.8 applies at some distance from the source where surface tension effects assume importance.

If the flow is primarily through the thickness Y_g of the sloping gravel pad B2.1 and B2.7 define the width.

$$W = \frac{Q}{kSy_g} \qquad B2.9$$

The width given by B2.9 is very much greater than that given by B2.8 because the velocity through the gravel is much less than the velocity above. Still, if Q is very small B2.9 may describe the situation more realistically than B2.8.

If $\frac{dx}{dt}$ given by B2.4 is much greater than K5, the flow will be mainly on the surface, but the infiltration into the gravel pad will reduce the discharge and increase the effective depth of the flow down the surface.

As the flow continues down the slope, pollutant will be lost as the surface storage is filled and infiltration, at the rate f, occurs. The width of the flow will therefore decrease as the discharge decreases. The discharge is reduced as a result of the growing area of infiltration, but the surface storage does not affect the discharge. This is because once the local storage has filled no further volume, it is absorbed by storage at that point. The reduction in discharge is therefore given by,

$$dQ = -fW\,dx \qquad B.10$$

in which the width, $w(x)$, is to be determined by substitution from B2.8.

$$dQ = -f \frac{Q}{8\alpha} h^{3/2} dx \qquad \text{B2.11}$$

$$\int_{Q = Q_o}^{Q = Q} \frac{dQ}{Q} = -\frac{f}{8\alpha} h^{3/2} \int_{x = 0}^{x = x} dx \qquad \text{B2.12}$$

from which

$$Q = Q_o \exp\left[-(f/8\alpha) h^{3/2} x \right] \qquad \text{f32.13}$$

and from B2.8

$$W = \frac{Q_o h^{3/2}}{8\alpha} \exp\left[-(f/8\alpha) h^{3/2} x \right] \qquad \text{B2.14}$$

The area covered by the spill has a decreasing (exponential) shape with width given by B2.14. As a function of x the area is,

$$A(x) = \int_0^x W(x)\, dx \qquad \text{a2.15}$$

$$A(x) = \frac{Q_o}{f} \left[1 - \exp\left[-(f/8\alpha) h^{3/2} x \right] \right] \qquad \text{D2.16}$$

In actual fact the area covered at the surface may be less than that given by B2.16 because of flow in the surface material itself as discussed above.

The volume of the spill will limit both the area and the extent of the stain in the x-direction. When the surface storage under the area given by B2.16 contains the entire volume of the spill the spread will terminate. This is a conservative approach because infiltration into lower soil layers under the gravel will further limit spreading in the x-direction and normal to the flow.

The length of the stain can be estimated from B2.16 and B2.17:

$$V = A(x_m)S_d \qquad \text{B2.17}$$

$$x_m = -\frac{8\alpha}{fh^{3/2}} \text{in}\left[1 - \frac{fV}{Q_o S_d}\right], \quad \frac{fV}{Q_o S_d} < 1 \qquad \text{82.18}$$

in which x_m is the maximum extent of the stain.

APPENDIX 3

SCALE AND HYDRAULIC RELATIONSHIPS

APPENDIX 3

SCALE AND HYDRAULIC RELATIONSHIPS

A. Scaling

The 4/3 power law can be used:

$$E = \text{Constant } eps^{1/3} L^{4/3}$$

where, E is the effective diffusion (L^2/T)
eps is the rate of energy dissipation (L^2/T^3)
L is the mean scale of eddies

B. Hydraulics

L is proportional to the depth, i.e. the hydraulic radius. eps = u g S for open channels, where u is the mean velocity, g is the acceleration of gravity, and S is the friction slope (roughly equal to the slope of the stream bed.). This gives the same units to eps as for scaling above.

C. Scaling Relationship for Dispersion Coefficient

$$E = C_1(u\ g\ S)^{1/3} R^{4/3}$$

$$E = C_2(u\ g\ S)^{1/3} R^{4/3}$$

This relationship can be used to estimate the effect of different hydraulic conditions on the dispersion coefficients.

APPENDIX 4

CALIBRATION CONSIDERATIONS

APPENDIX 4

CALIBRATION CONSIDERATIONS

The equation used in one-dimensional hydraulic analysis of three-dimensional dispersion is:

$$\frac{\partial c}{\partial t} = \frac{\partial}{\partial x}(u\ c) + \frac{\partial}{\partial x}\left(D_x \frac{\partial c}{\partial x}\right) + \frac{\partial}{\partial y}\left(D_y \frac{\partial c}{\partial y}\right) + \frac{\partial}{\partial z}\left(D_z \frac{\partial c}{\partial z}\right)$$

in which,

u c is the convective flux caused by the mean longitudinal velocity and its mass transport,

$D_x \frac{\partial c}{\partial x}$ is the dispersive flux caused by the turbulent mixing

at the scale of the eddies in the x-direction, and similarly for the y and z directions for which the value of the coefficient would be the same for homogeneous turbulence. However, since this is a shear flow, the turbulence is not homogeneous and the lateral, vertical and longitudinal dispersion coefficients are therefore different.

For the longitudinal coefficient, the time axis of dye test results can be examined. For the lateral coefficient, it would be necessary to have a steady state test so that the differences in arrival times of the plumes at various values of y are not a factor. The vertical coefficient would require soundings for its determination. In the model, dispersion in the z-direction is not considered.

Since the above differential equation makes no provision for the velocity distribution in a real river, it would be a fluke if it actually represented the actual dispersion with good accuracy. This is why an effort was made to deal with the lateral velocity distribution in the model.

APPENDIX 5

EXAMPLESCREENSFROMTHEMODEL

APPENDIX 5

EXAMPLE SCREENS FROM THE MODEL

The following printouts illustrate most of the options and presentations which the model displays on the screen. The text here will discuss some of the features which are displayed, most of which will become obvious as experience with the model is gained.

Screen 3 shows a map of the North Thompson River and asks that you specify whether the accident occurred above or below Blue River. This information is needed because the railroad mileage co-ordinate system changes at Blue River.

Screen 4 requests the location of the accident in terms of railroad mileage. The program determines the river kilometre which corresponds to the railroad mileage by interpolating from the cross-reference table, KM.DAT. Since the river meanders and the railroad is straight there may be some ambiguity in the specification of the accident location.

Screen 5 asks that you input the current discharge at Birch Island. This information can be obtained by calling the Inland Waters Branch in Vancouver at the time of the accident. The program estimates the discharge at the site of the accident and at all locations downstream and displays this estimate on the screen. At a later stage in the analysis you will be given an opportunity to revise the estimate made by the program.

Screen 6 provides three options for the spill site. The bulk of the pollutant could enter the stream from either bank or from an accident near mid-channel. The program could deal with a location at any one of the eleven panels which are used in the computations at each transect, but for simplicity the input choices are limited. For those reaches of the river where it is flowingeasttowestthe eastbankwould be the south side of the river and the west bank would be the north side.

Screen 7 provides an opportunity to select a steady-state or a transient analysis. If the accident could be represented as a continuous leak into the river, such as a pipeline break or pollution from a very large source, the steady-state analysis would be appropriate. However, even if a small volume of spill is involved over a shortperiodoftime, it is a good idea to run the steady-state analysis before running the transient simulation. The concentrations computed by the steady-state analysis will be at least as high as those given by the transient

analysis and will therefore provide a worst case evaluation of the accident.

A transient spill is one which is of limited volume and duration. For example, a single truck-load or tank car of chemical may rupture and empty its contents in a few minutes or hours. Analysis of this case is considerably more complex than the steady-state situation because the concentration will vary not only with locationinthe river, butalsowithtime. However, if the volume and duration of the accident tends to be quite large, the concentration will rise over time to a temporary threshold and remain there for several minutes or hours. If this happens the steady-state and the transient solutions will give exactly the same maximum concentration. Dispersion of a transient spill as the plume moves downstream will tend to have a similar flattening effect on the graph of pollution concentration vs. time. Thus, at some distance downstream from the accident, the maximum reached by the transient solution can be estimated directly from the steady-state solution. This is a useful fact to keep in mind because it means that the much quicker steady-state analysis can be undertaken to track the maximum pollution concentrations.

The transient analysis provides more detail in the vicinity of the accident site. For very large spills during low flow conditions (usually the worst case situation) the transient analysis will reach a plateau within a few kilometres of the spill site and you will clearly observe this in the output. In this case, the analysis can be extended downstream by using the steady-state option.

Screen 8 requests information about the rate of spill in litres per minute. Since Screen 7 selected a steady-state analysis, this spill rate is assumed by the model to continue indefinitely.

Screen 9 provides an opportunity to revise the input data. If you decide to revise something the program will take you back to the beginning of the question and answer session. If you decide to go on, the steady-state analysis routine which you have requested will be automatically loaded into memory and the analysis will begin with requests for additional information.

Screen 10 requests information about the vertical behaviour of the pollutant. If you select the well-mixed option the subsequent calculations will use the average vertical velocity in the panels. If either the near-surface or near-bottom options are selected, the program will use velocities calculated at these locations for the subsequent transport analyses.

Screen 10 also provides an opportunity to specify a half-life for the chemical which is being transported. This may represent an actual decay of the chemical caused by some reaction or interaction with the environment or it could represent an estimate of the mass of pollutant which might be lost in the sediments or evaporated from the surface as the chemical is transported downstream. The program estimates the time of travel between each transect and from this it applies an exponential decay using the coefficient specified here.

Screen 10A provides an opportunity to revise the discharge which the program estimated at the location of the spill. This estimate was based on the value which you earlier input for the measured discharge at the Birch Island station of the Inland Waters Directorate.

Screen 12 is an example of the output from a steady-state analysis. In the first kilometre below the accident site the output shows the results at intervals of 100 metres, which was the computational distance step used in the analysis. At the bottom of the screen the program shows the effective rate of spill at the last transect displayed after the exponential decay has been considered.

Screen 13 shows the results at intervals of one kilometre. The computations internally were undertaken at intervals of 100 metres but the output was presented at one kilometre intervals. At the bottom of the screen there is information shown which cross-references the river and the railroad kilometres.

Screen 14 provides opportunities to go immediately to the plotter program to view the results in graphical form or to go back to the beginning to run another scenario.

Screen 16 presents an example in which the accident is located below Blue River.

Screen 18 shows that a transient analysis will be selected. In this case both the spill volume and its duration must be specified.

Screen 19 requests the spill volume and Screen 20 provides an opportunity to select a constant rate of spill over a specified time or a time varying release of pollutant from its container according to an exponential rate. In this case, the constant spill rate is selected.

Screen 22 shows the results of the transient analysis in tabular form. In this case the pollution plume is symmetrical about the channel centre because the accident was assumed to occur near the

centre of the river. An idealized cross-sectional shape is used by the model at this location because data were not available.

Screen 26 shows that a steady-state condition is reached between 55 minutes after the accident and 58 minutes. Thus, the maximum concentration reached could have been estimated more quickly if the steady-state model had been used for this analysis. Of course the steady-state model would not provide any information about the duration or the time at which this maximum concentration was reached.

Screen 28 shows that after 76 minutes the plume is still tailing off. The computations end at this time because the capacity of the computer has been exhausted. At locations further downstream the tail would be cut off more abruptly although the calculations would be carried out for the same total elapsed time.

Screen 29 shows the beginning of another transient analysis, this time specifying a time varying release rate from the container.

Screen 30 indicates the time required to empty half of the volume in the container. With these data **Screen 31** shows the exponential rate at which the spill enters the river. This provides the input pollutant function which will be analyzed by the model. With this input function the output format is the same as previously discussed, however the results would obviously be different.

When the analysis, either steady-state or transient, has been completed the program will give you an opportunity to run the plotter program to examine the results graphically. However, it is not necessary to do this at this time since all of the output has been saved to files and the plotter program, NTPLOT, can be run at any later time.

Screen 33 is the title page from the plotting program, NTPLOT. Notice that in the middle of this screen there is a note that indicates the naming convention for the output files which can be plotted with this program. The program will automatically list fileswhichyoucan selectforplotting. It is not necessary for you to know the names of the files before you run this program.

Screen 34 shows examples of the files which you can select. Files ending in "S" are from steady-state runs: those ending in "T" are from transient runs.

Screen 35 is a schematicdisplayofthe river fromkilometre 0 at Albreda Lake to kilometre 300 at Kamloops. The river is shown in three 110 kilometre stretches to fit conveniently onto the screen. The top of each stretch of river represents the east

screen. The top of each stretch of river represents the east bank and the bottom represents the west bank as noted on the left-hand side near the top.

On Screen 35 the top line provides various options which can be selected by touching the indicated key. By selecting a threshold the program will screen out all concentrations which are less than the indicated value. This will allow you to concentrate on those areas of the river which are most seriously polluted. The new file option will take you back to Screen 34 and allow you to examine the results from a different analysis. The concentration plot will take you to particular transects on the river and provide a capability for viewing the variation in concentration with time (if this was a transient analysis) and at the various locations across the river. The river cross-section option will show you the channel shape and the velocity distribution at any of the transect which have been analyzed. The map option brings you back to a sketch of the river similar to Screen 16 and provides a cross-reference table of key geographical place names and features which will help you locate yourself within the various co-ordinate systems used by the model. The quit option will allow you to leave the program.

The second line of Screen 35 describes the accident which is being displayed. In this case, the accident occurred at river kilometre 70. The letter "E" indicates it took place on the east bank. The volume spilled was 10,000 litres during a period of 30 minutes. At the right-hand end of the second line the current threshold is 116 parts per million and the graph below shows those areas of the river which are infected at this concentration or higher.

Screen 36 shows the velocity distribution across the river at kilometre 179 and the depth below the water surface at this location. Below the graph the streamflow at this location and the wetted width of the river are also noted. As shown on the bottom line by touching thekeyboard letter D, or U, you can move upstream or downstream from this location.

Screen 38 shows a time varying concentration computed by a transient analysis. The notation shows that the discharge at this location, kilometre 80, is 59 cms. The concentration pattern shown is for a particular location 39 metres from the west shoreline. You can move back and forth across the river by touching the plus or minus keys on the keyboard. If you wish to change to a different kilometre the keys D and U will take you downstream or upstream, respectively. The program will not allow you to move outside the area which is summarized on **Screen** 37.

Screen 39 shows the results from a steady-state analysis. In this case time is not a dimension of interest and the results can be displayed much more compactly. The example shows the variation in steady-state concentration from one side of the river to the other. You can move upstream or downstream, as before, by touching the D or U keys. Touching Q will take you back to the main menu of the plotting program.

Screen 1

CHEMICAL SPILL TRANSPORT
NORTH THOMPSON RIVER

L

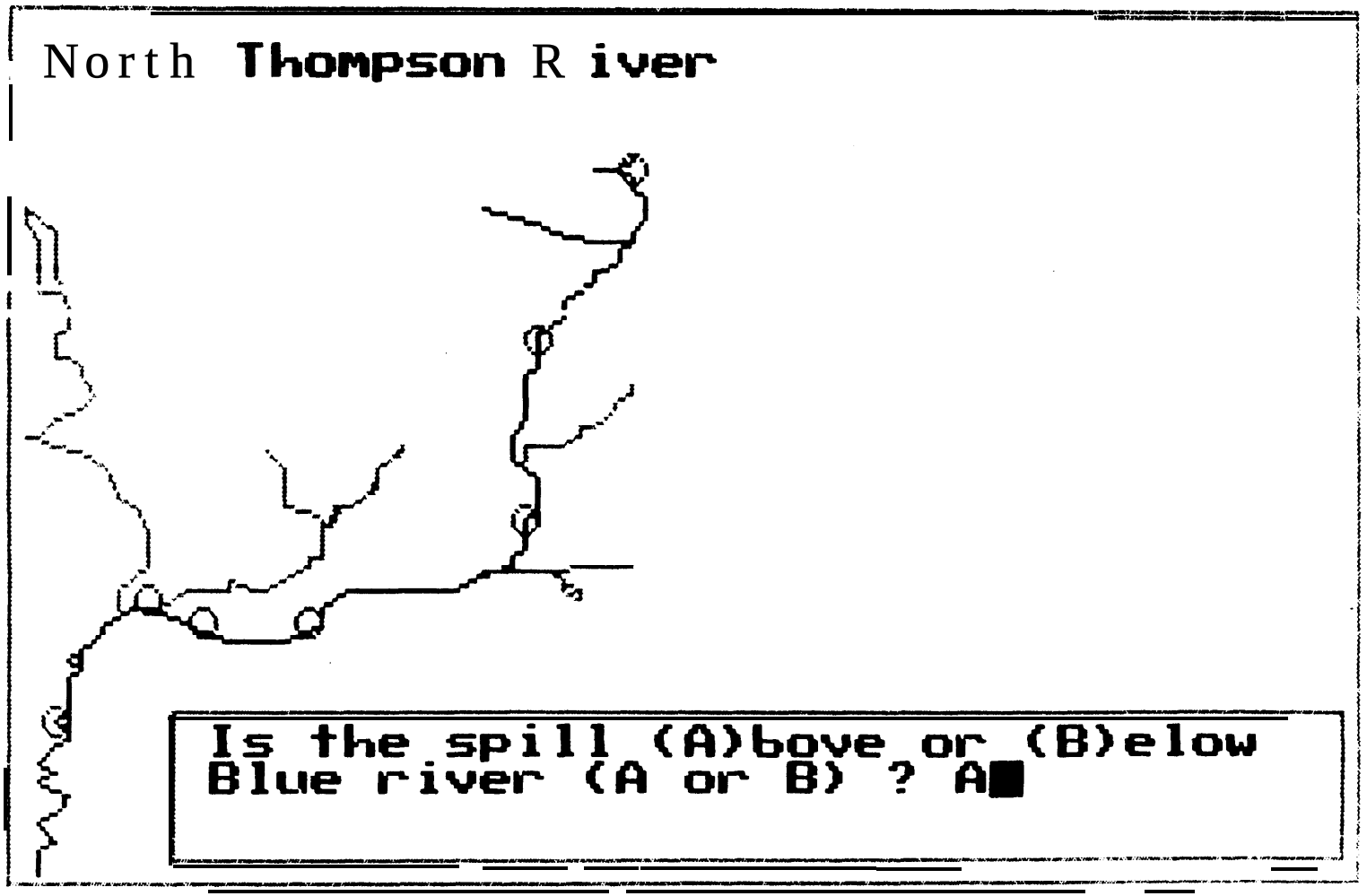
CHARLES HOWARD & ASSOCIATES LIMITED
300-1144 Fort St., Victoria B.C. V8V 3K8
Telephone (604) 385-0206

Screen 2

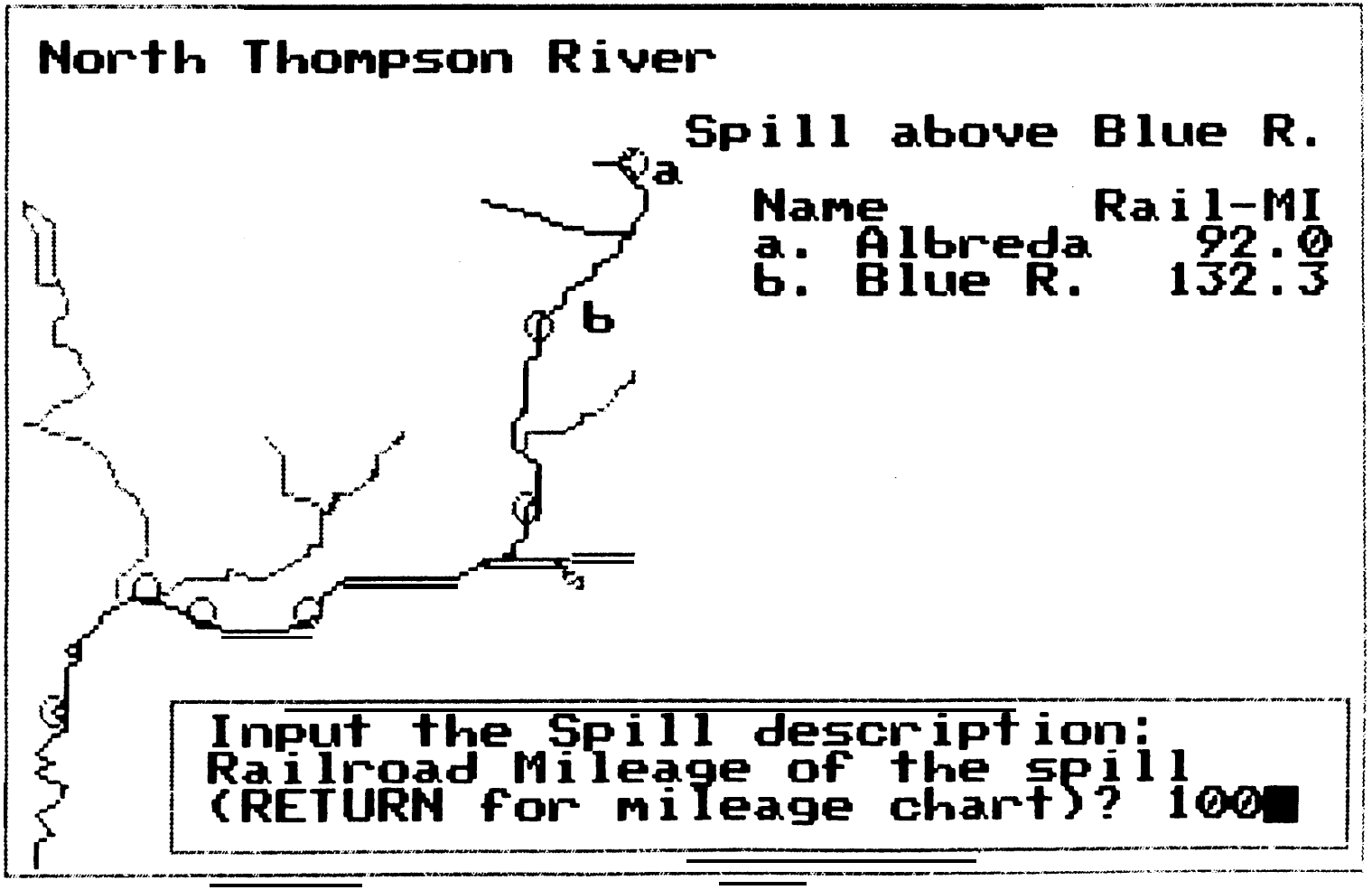
WARNING

This program and data are tools that can be used to assist an experienced engineer in making decisions about pollutant transport in the North Thompson River. They are not substitutes for engineering expertise or an accurate understanding of the hydraulic and hydrological behaviour of this river. The user is cautioned that the quality of the data is uncertain. Furthermore, since the program is new it may contain undetected errors. Program results should be reviewed with the same careful scrutiny and detailed checking that are normal in engineering practice. There is no warranty, implied or otherwise, that the program or the data are accurate.

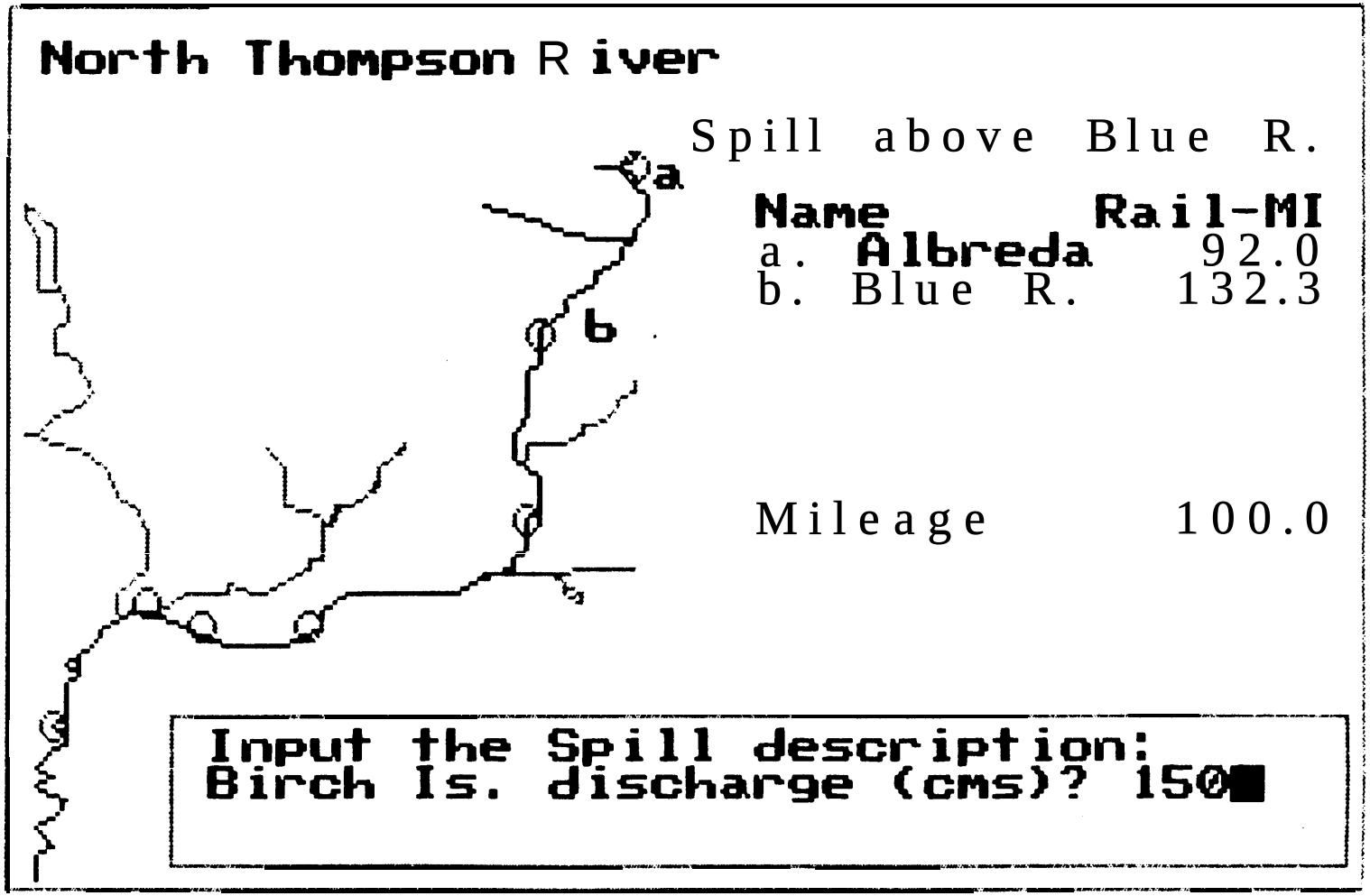
Screen 3


North Thompson River
Is the spill (A)bove or (B)elow
Blue river (A or B) ? A

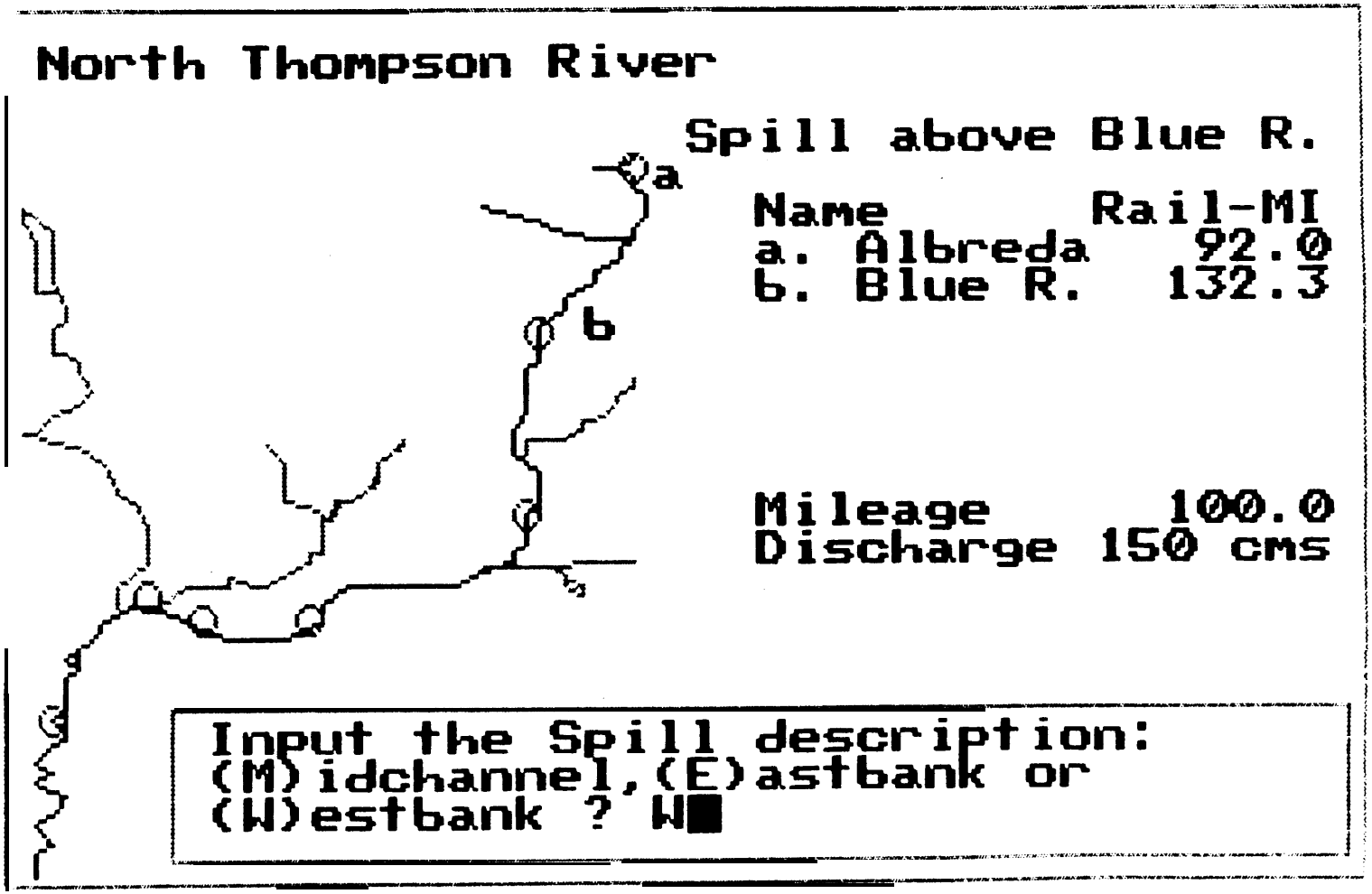
Screen 4


North Thompson River
Spill above Blue R.
a
b
Name Rail-MI
a. Albreda 92.0
b. Blue R. 132.3
Input the Spill description:
Railroad Mileage of the spill
(RETURN for mileage chart)? 100

Screen 5


North Thompson River
Spill above Blue R.
a
b
Name Rail-MI
a. Albreda 92.0
b. Blue R. 132.3
Mileage 100.0
Input the Spill description:
Birch Is. discharge (cms)? 150

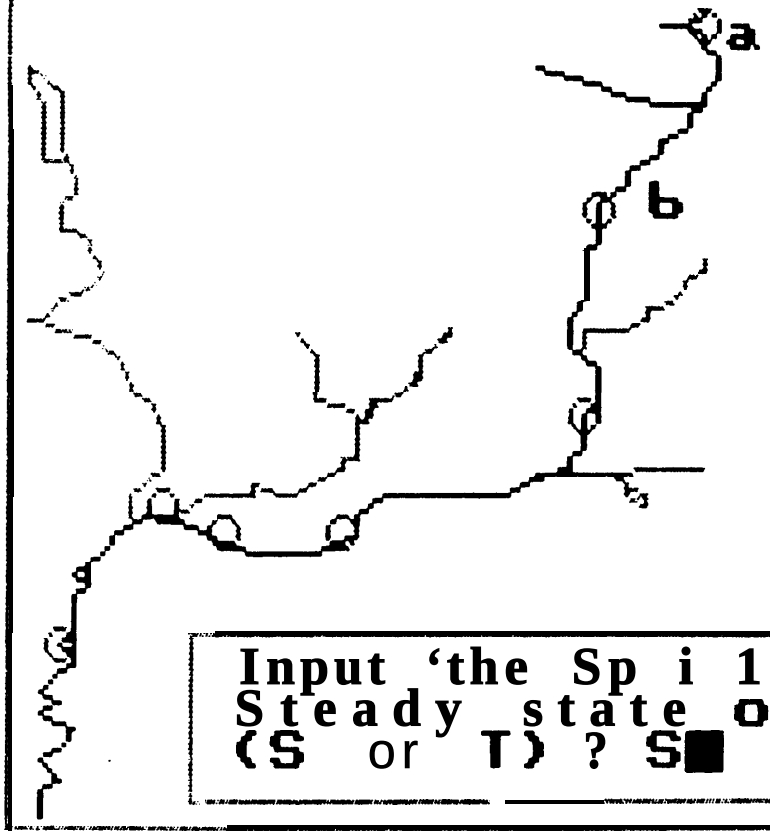
Screen 6


North Thompson River
Spill above Blue R.
a
b
Name Rail-MI
a. Albreda 92.0
b. Blue R. 132.3
Mileage 100.0
Discharge 150 cms
Input the Spill description:
(M)idchannel,(E)astbank or
(W)estbank ? W

Screen 7

North Thompson River

Spill above Blue R.

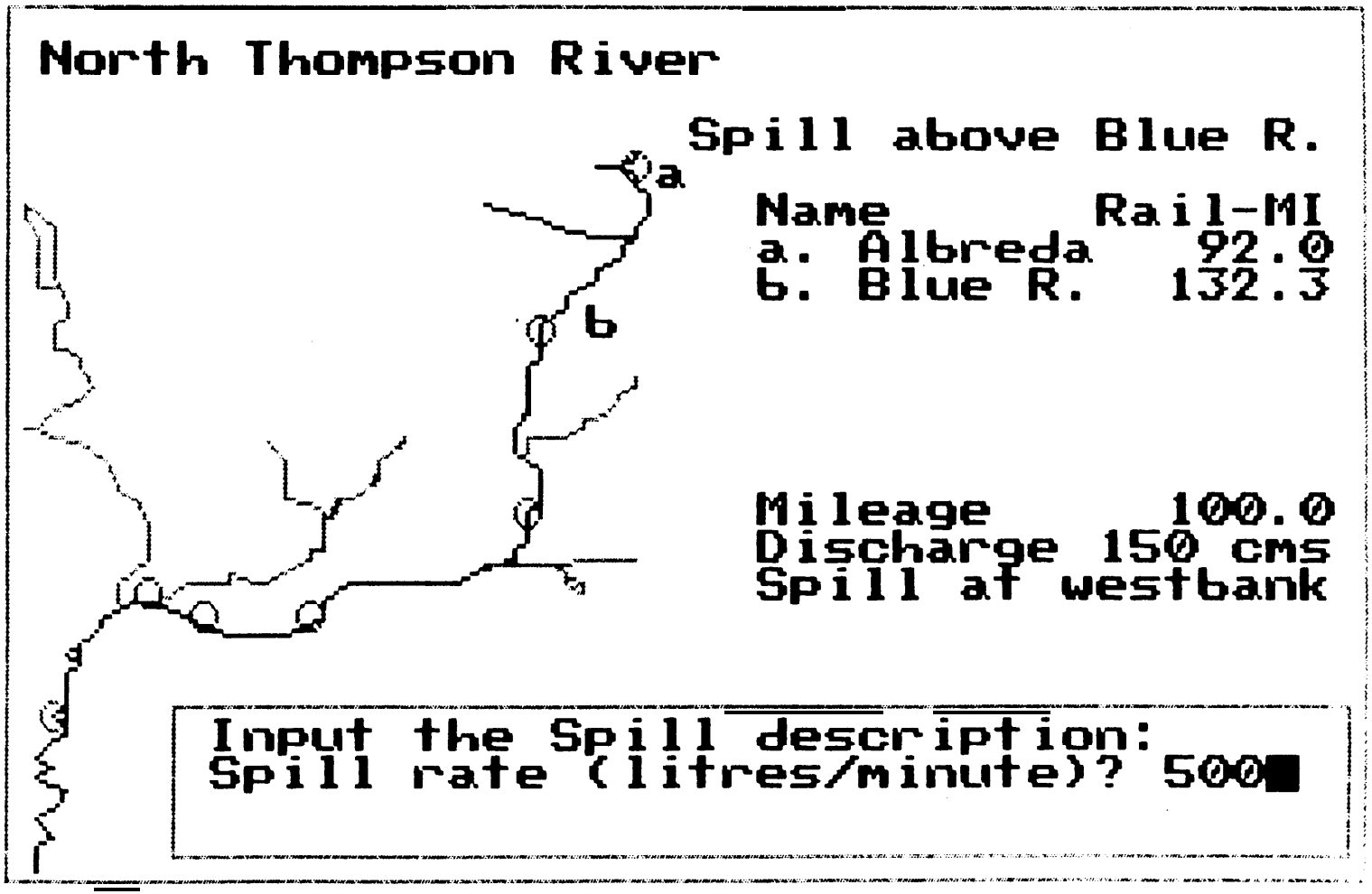


Name	Rail-MI
a. Albreda	92.0
b. Blue R.	132.3

Mileage 100.0
Discharge 150 cms
Spill at west-bank

Input the Spill description:
Steady state or Transient spill
(S or T) ? S

Screen 8


North Thompson River
Spill above Blue R.
a
b
Name Rail-MI
a. Albreda 92.0
b. Blue R. 132.3
Mileage 100.0
Discharge 150 cms
Spill at westbank
Input the Spill description:
Spill rate (litres/minute)? 500

Screen 9

North Thompson River

Spill above Blue R.

Name	Rail-MI
a. Albreda	92.0
b. Blue R.	132.3

Mileage 100.0
Discharge 150 cms
Spill at westbank
Spill r. 500 l/m

Every-thing correct (Y or N) ? Y

Screen 10

```
Discharge at Spill Location (cms): 24.1
Hit C to change discharge. any key to continue.

Where is the Pollutant :
   1. NEAR-SURFACE
   2. NEAR-BOTTOM
   3. WELL-MIXED

Enter 1, 2. or 3 :? 3


Please enter the Half Life (in days) for the chemical.
(Hit CR for default 700 days) :?
```

Screen 10A

```
Discharge at Spill Location (cms):24.1
Hit C to change discharge, any key to continue :

Enter new discharge :? 24
Discharge at Spill Location (cms): 24.0
Hit C to change discharge, any key to continue :

Where is the Pollutant :
   1. NEAR-SURFACE
   2. NEAR-BOTTOM
   3. WELL-MIXED

Enter 1. 2, or 3 :? 3


Please enter the Half Life (in days) for the chemical.
(Hit CR for default 700 days) :?
```

Screen 11

```
The Program is calculating the concentration. Please wait . . .
```

Screen 12

CONCENTRATION IN PPM DOWNSTREAM OF SPILL SITE

River KM	West Bank 1	2	3	4	S	6	7	8	9	10	East Bank 11	Panel Width (m)
KM 14	14786	0	0	0	0	0	0	0	0	0	0	4.7
KM 14.1	335	340	339	338	336	334	332	329	325	321	317	4.7
KM 14.2	326	329	332	334	33s	33s	335	334	332	329	325	4.7
KM 14.3	32s	329	332	334	33s	33s	335	334	332	329	[illegible]	3.7
KM 14.4	32s	329	332	334	33s	33s	335	334	332	[illegible]	325	4.7
KM 14.5	325	329	332	334	33s	335	33s	334	332	329	325	4.7
KM 14.6	325	329	332	334	33s	33s	33s	334	332	324	325	4.7
KM 14.7	32s	329	332	334	33s	33s	33s	334	332	329	32s	4.7
KM 14.6	325	329	332	334	33s	33s	33s	334	332	329	32s	4.7
KM 14.9	325	329	332	334	335	33s	335	334	332	329	325	4.7

Initial Spill Rate (l/sec) = 8.3 Remaining Spill Rate (l/sec) = 6.3
Any key to continue

CONCENTRATION IN PPM DOWNSTREAM OF SPILL SITE

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Panel Width (m)
KM 15	325	329	332	334	33s	33s	335	334	332	324	32s	4.7
KM 16	249	253	255	257	258	259	258	257	255	253	249	4.6
KM 17	223	226	229	231	232	233	232	231	229	226	[illegible]	4.8
KM 16	202	205	208	210	211	211	211	210	208	205	202	4.8
KM 19	184	188	190	192	193	194	193	142	190	186	184	4.8
KM 20	169	173	17s	177	178	179	178	177	175	173	169	4.9
KM 21	167	170	172	174	175	176	175	174	172	170	167	4.9
KM 22	164	167	169	171	172	173	172	171	169	167	164	4.9
KM 23	161	164	167	169	170	170	170	169	167	164	161	4.9
KM 24	158	162	164	166	167	167	167	166	164	162	158	4.9
KM 25	156	159	161	163	164	165	164	163	161	159	156	4.9
KM 26	153	156	159	161	162	162	162	161	159	156	153	4.9
KM 27	151	154	157	158	160	160	160	158	157	154	151	4.9
KM 28	149	152	154	156	157	158	157	156	154	152	145	4.4
KM 29	146	149	152	154	155	155	155	154	152	145	146	4.9

River (Railroad) KM : 15(14.0) 19(19.0) 24(24.0) 29(28.0)
Initial Spill Rate (l/sec) = 8.3 Remaining Spill Rate (l/sec) = 8.3
HIT S TO STOP. ANY KEY TO CONTINUE

Screen 13

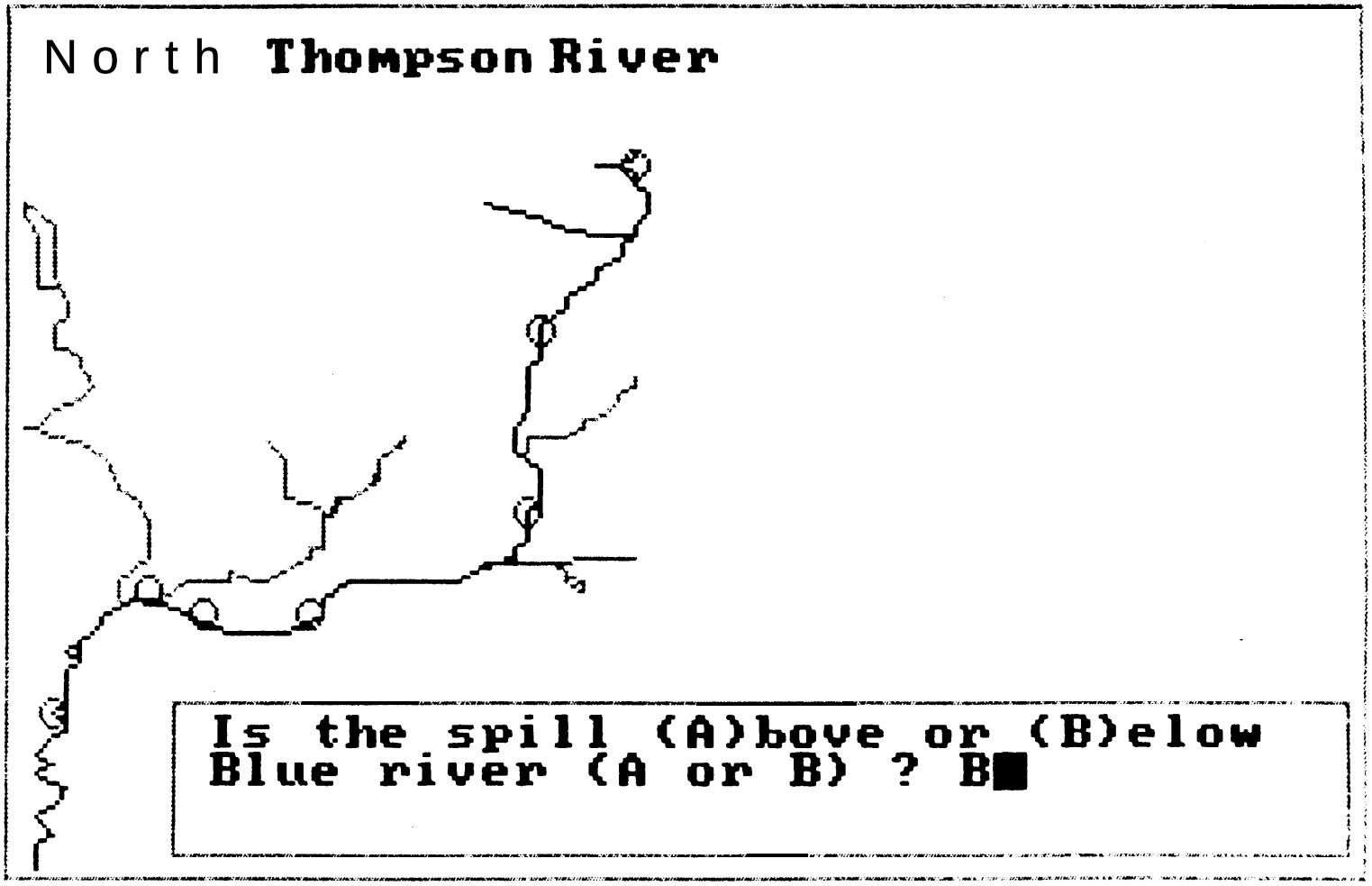
Screen 14

```
Do you wish to run the plotter now (Y or N) ? N
Do you wish to run another scenario (Y or N) ? N
```

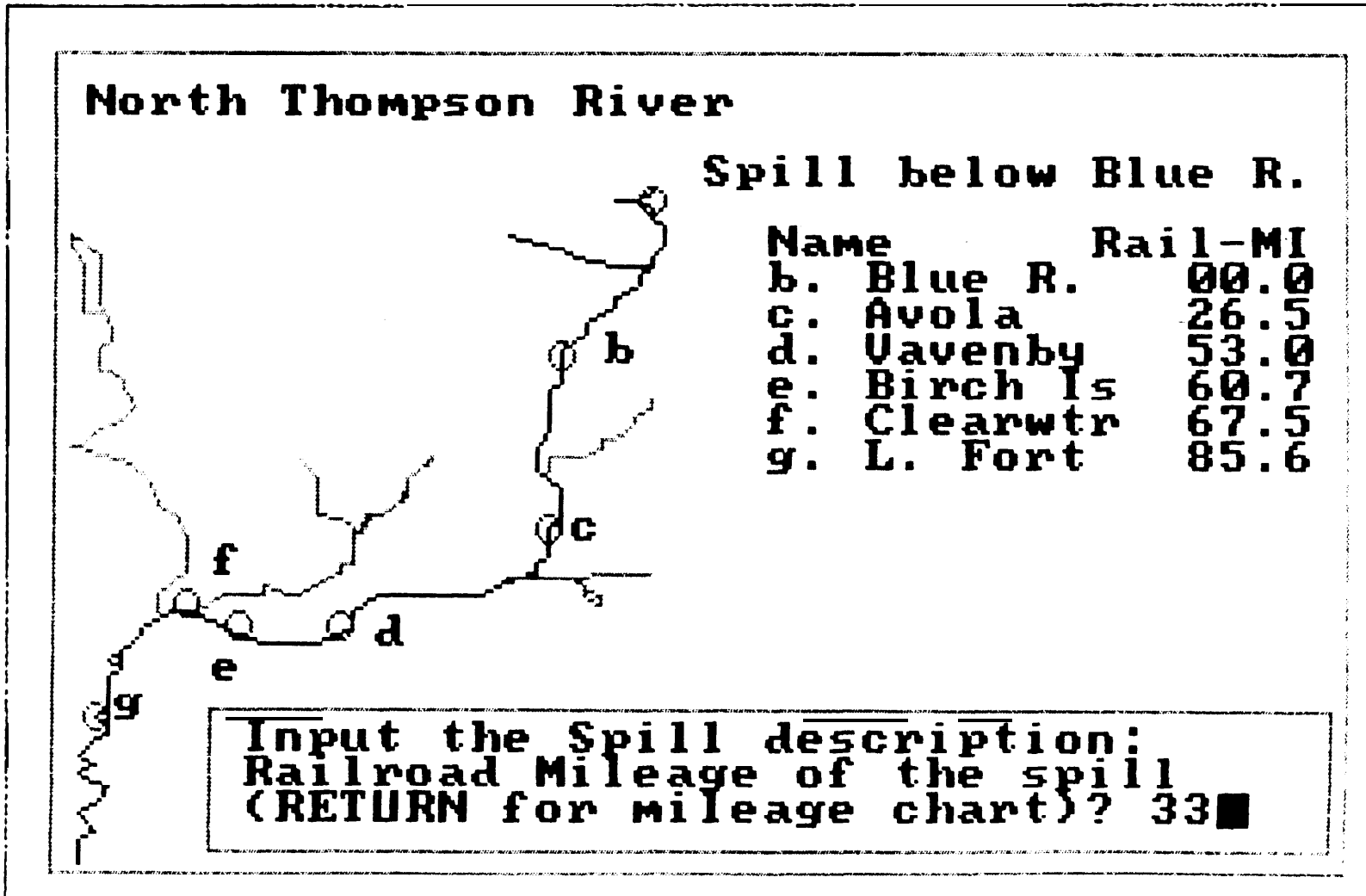
Screen 15

```
Good bye ...
```

Screen 16

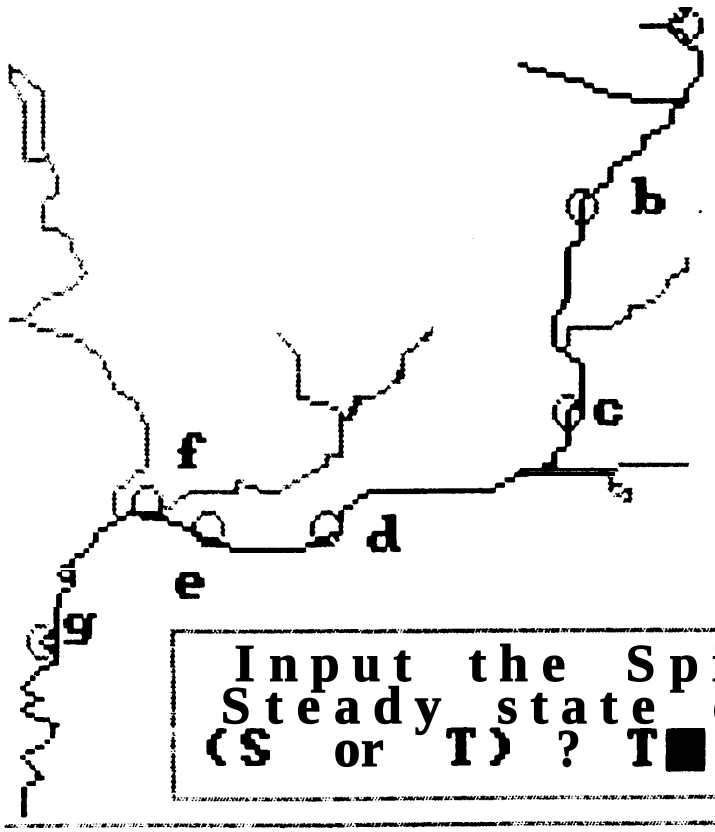

North Thompson River
Is the spill (A)bove or (B)elow
Blue river (A or B) ? B

Screen 17


North Thompson River
Spill below Blue R.
Name Rail-MI
b. Blue R. 00.0
c. Avola 26.5
d. Vavenby 53.0
e. Birch Is 60.7
f. Clearwtr 67.5
g. L. Fort 85.6
b
c
d
e
f
g
Input the Spill description:
Railroad Mileage of the spill
(RETURN for mileage chart)? 33

Screen 18

North Thompson River



Spill below Blue R.

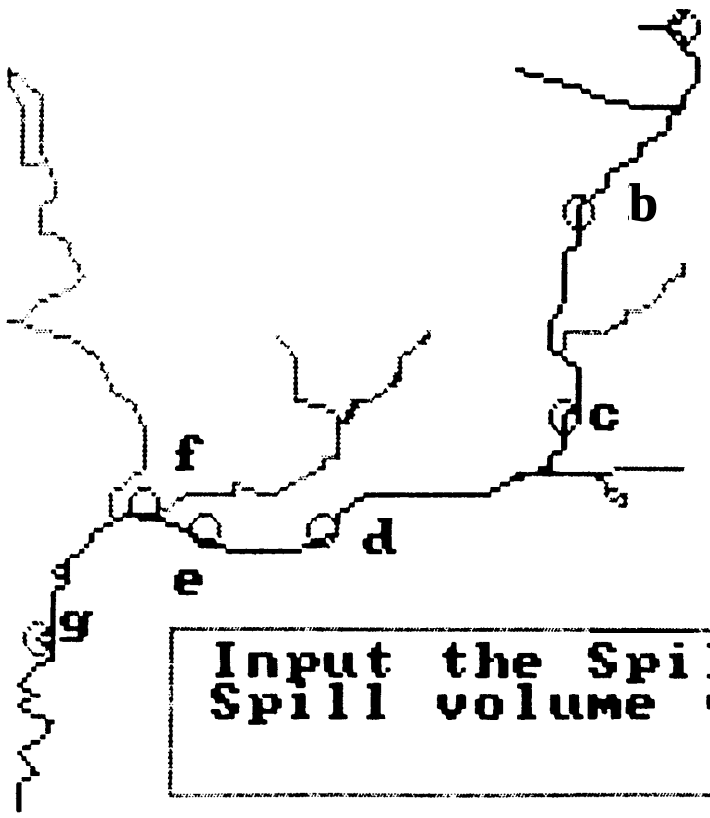
Name	Rail-MI
b. Blue R.	00.0
c. Avola	26.5
d. Vavenby	53.0
e. Birchls	60.7
f. Clearwtr	67.5
g. L. Fort	85.6

Mileage 33.0
Discharge 125 cms
Spill at middle

Input the Spill description:
Steady state or Transient spill
(S or T) ? T

Screen 19

North Thompson River



Spill below Blue R.

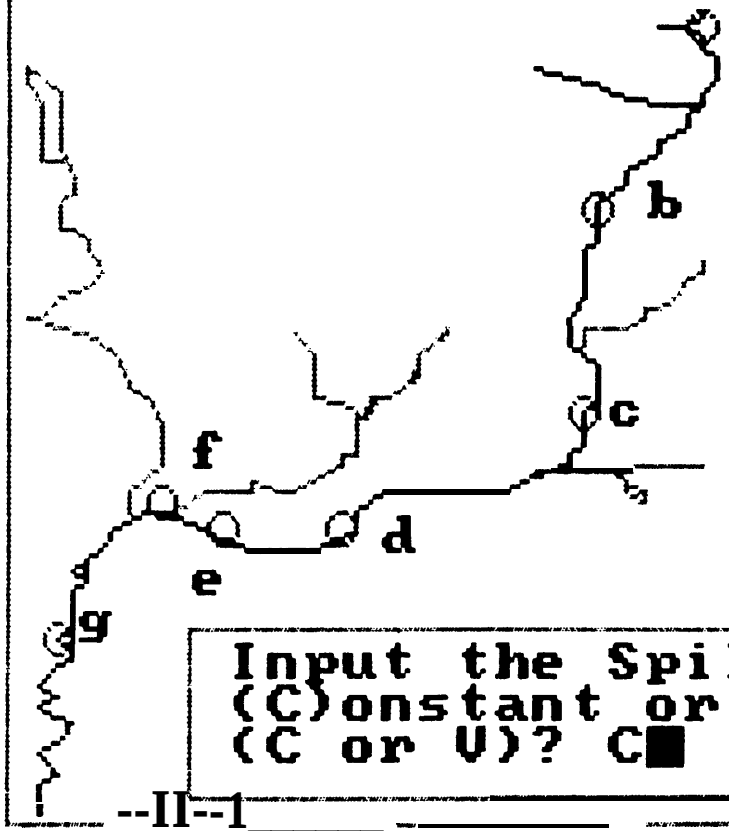
Name	Rail-MI
b. Blue R.	00.0
c. Avola	26.5
d. Vavenby	53.0
e. BirchIs	60.7
f. Clearwtr	67.5
g. L. Fort	85.6

Mileage 33.0
Discharge 125 cms
Spill at middle-

Input the Spill description:
Spill volume (litres)? 10000

Screen 20

North Thompson River



Spill below Blue R.

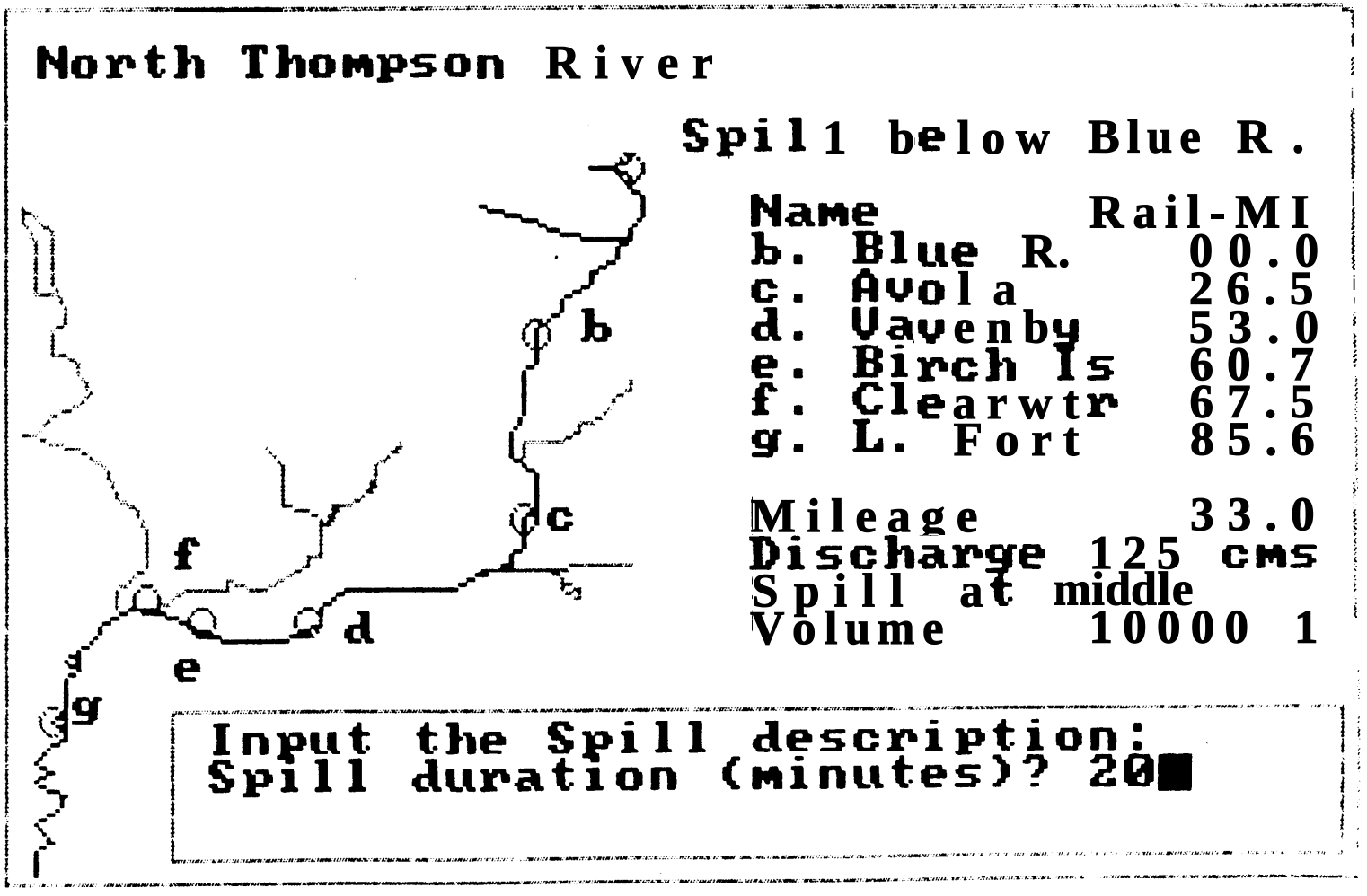
Name	Rail-MI
b. Blue R.	00.0
c. Avola	26.5
d. Vavenby	53.0
e. Birch I5	60.7
f. Clearwtr	67.5
g. L. Fort	85.6

Mileage 33.0
Discharge 125 cm5
Spill at middle
Volume 10000 l

Input the Spill description:
(C)onstant or time (V)arying
(C or V)? C

--II--1 -W.--T-_"_

Screen 21


North Thompson River
Spill below Blue R.
Name Rail-MI
b. Blue R. 00.0
c. Avola 26.5
d. Vavenby 53.0
e. Birch Is 60.7
f. Clearwtr 67.5
g. L. Fort 85.6
Mileage 33.0
Discharge 125 cms
Spill at middle
Volume 10000 1
b
c
d
e
f
g
Input the Spill description:
Spill duration (minutes)? 20

Screen 22

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM = 14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	5	6	7	8	9	10	11
15.s	0	0	0	0	0	0	0	0	0	0	0
16.0	0	0	0	0	0	0	0	0	0	0	0
16.5	1	1	1	1	1	1	1	1	1	1	1
17.0	1	1	1	1	1	1	1	1	1	1	1
17.5	1	1	1	1	1	1	1	1	1	1	1
18.0	1	1	1	1	1	1	1	1	1	1	1
18.5	1	1	1	2	2	2	2	2	1	1	1
19.0	2	2	2	2	2	2	2	2	2	2	2
19.5	2	2	2	2	2	2	2	2	2	2	2
20.0	3	3	3	3	3	3	3	3	3	3	3
20.5	3	3	3	3	3	3	3	3	3	3	3
21.0	4	4	4	4	4	4	4	4	4	4	4
21.5	S	S	S	5	S	S	S	5	5	5	S
22.0	6	6	6	6	6	6	6	6	6	6	6
22.5	7	7	7	7	7	7	7	7	7	7	7
23.0	8	8	8	8	8	a	8	8	8	8	8
23.5	9	9	9	9	9	9	9	9	9	9	9
24.0	11	11	11	11	11	11	11	11	11	11	11
24.5	12	12	12	12	12	12	12	12	12	12	12

TOUCH ANY KEY TO CONTINUE :

Screen 23

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM = 14)

West Bank Discharge= 24. 0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	S	6	7	a	9	10	11
25.0	14	14	14	14	14	14	14	14	14	14	14
25.5	16	16	16	16	16	16	16	16	16	16	16
26.0	18	18	18	18	18	18	18	18	18	18	18
26.5	20	20	20	20	20	20	20	20	20	20	20
27.0	22	22	22	22	22	22	22	22	22	22	22
27.5	24	24	24	24	24	24	24	24	24		
28.0	27	27	27	27	27	27	27	27	27	24	24
28.5	29	29	29	29	30	30	30	29	29		
29.0	32	32	32	32	32	32	32	32	32	29	32
29.5	3s	3s	3s	3s	3s	3s	3s	3s	35	35	3s
30.0	38	38	38	38	38	38	38	38	38	38	38
30.5	41	41	41	41	41	41	41	41	41	41	41
31.0	44	44	44	44	44	44	44	44		44	44
31.5	47	47	48	48	48	48	48	48	44 48	47	47
32.0	so	51	51	51	51	51	51	51	51	51	50
32.5	54	54	54	55	55	55	55	5s	54	54	54
33.5 33.0	61 57	61 58	62 58	62 58	62 58	Sa	58	58	58	58	57
						62	62	62	62	61	61
34.0	65	65	65	66	66	66	66	66	65	65	65

TOUCH ANY KEY TO CONTINUE :

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM = 14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	S	6	7	8	9	10	11
35.0 34.5	68	69	69	69	69	69	69	69	69	69	68
	72	73	73	73	73	73	73	73	73	73	72
35.5	76	76	77	77	77	77	77	77	77	76	76
36.0	80	80	81	81	81	81	81	81	81	80	80
36.5	84	84	85	85	85	85	85	85	85	84	84
37.0	87	88	88	89	89	89	89	89	88	88	97
37.5	91	92	92	93	93	93	93	93	92	92	91
38.0	95	96	96	97	97	97	97	97	96	96	95
38.5	99	100	100	100	101	101	101	100	100	100	99
39.0	103	104	104	104	105	105	10s	104	104	104	103
39.5	107	107	108	108	108	108	108	108	108	107	107
40.0	110	111	112	112	112	112	112	112	112	111	110
40.5	114	115	115	116	116	116	116	116	115	115	114
41.0	118	119	119	119	120	120	120	119	119	119	118
41.5	121	122	123	123	123	123	123	123	123	122	121
42.0	12s	126	126	127	127	127	127	127	126	126	12s
42.5	128	129	130	130	130	131	130	130	130	129	128
43.0	132	133	133	134	134	134	134	134	133	133	132
43.5	13s	136	137	137	137	137	137	137	137	136	13s

TOUCH ANY KEY TO CONTINUE :

Screen 24

Screen 25

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM = 14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	S	6	7	8	9	10	11
44.0	138	139	140	140	140	141	140	140	140	139	138
44.5	141	142	143	143	144	144	144	143	143	142	141
45.0	144	145	146	146	147	147	147	146	146	14s	144
45.5	147	148	149	149	150	150	150	149	149	148	147
46.0	150	151	152	152	152	152	152	152	152	151	150
46.5	152	153	154	155	155	155	155	155	154	153	152
47.0	155	156	157	157	158	158	158	157	157	156	155
47.5	157	158	159	160	160	160	160	160	159	158	157
48.0	159	161	161	162	162	162	162	162	161	161	159
48.5	162	163	164	164	165	165	165	164	164	163	162
49.0	164	165	166	166	167	167	167	166	166	165	164
49.5	165	167	168	168	168	169	168	168	168	167	165
SO.0	167	169	169	170	170	170	170	170	169	169	167
so.5	169	170	171	172	172	172	172	172	171	170	169
51.0	170	172	172	173	173	174	173	173	172	172	170
51.5	172	173	174	174	17s	17s	17s	174	174	173	172
52.0	173	174	17s	176	176	176	176	176	17s	174	173
52.5	174	17s	176	177	177	177	177	177	176	17s	174
53.0	17s	176	177	178	178	178	178	178	177	176	175

TOUCH ANY KEY TO CONTINUE :

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM =14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	S	6	7	a	9	10	11
53.5	176	177	178	179	179	179	179	179	178	177	176
54.0	176	178	179	179	180	180	180	179	179	178	176
54.5	177	178	179	180	180	180	180	180	179	178	177
55:0	177	179	180	180	181	181	181	180	180	179	177
55.5	178	179	180	181	181	181	181	181	180	179	178
56.0	178	179	180	181	181	181	181	181	180	179	178
56.5	178	179	180	181	181	181	181	181	180	179	178
57.0	178	179	180	181	181	181	181	181	180	179	178
57.5	178	179	180	181	181	181	181	181	180	179	178
58.0	177	179	180	180	181	181	181	180	180	179	177
58.5	177	178	179	180	180	180	180	180	179	178	177
59.0	176	178	179	179	180	180	180	179	179	178	176
s9.s	176	177	178	179	179	179	179	179	178	177	176
60.0	17s	177	178	178	179	179	179	178	178	177	17s
60.5	174	176	177	177	178	178	178	177	177	176	174
61.0	173	17s	176	177	177	177	177	177	176	175	173
61.5	173	174	17s	176	176	176	176	176	17s	174	173
62.0	171	173	174	174	17s	175	17s	174	174	173	171
62.5	170	172	173	173	174	174	174	173	173	172	170

TOUCH ANY KEY TO CONTINUE :

Screen 26

Screen 27

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM = 14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

Lapse time (min)	1	2	3	4	S	6	7	a	9	10	11
63.0	169	171	172	172	172	173	172	172	172	171	169
63.5	168	169	170	171	171	171	171	171	170	169	168
64.0	166	168	169	169	170	170	170	169	169	168	166
64.5	165	167	167	168	168	168	168	168	167	167	165
65.0	164	165	166	166	167	167	167	166	166	165	164
65.5	162	163	164	165	165	165	165	165	164	163	162
66.0	160	162	163	163	164	164	164	163	163	162	160
66.5	159	160	161	162	162	162	162	162	161	160	159
67.0	157	158	159	160	160	160	160	160	159	158	157
67.5	155	157	lS8	158	158	159	158	158	lsa	157	155
68.0	153	155	156	156	157	157	157	156	156	155	153
68.0	150	151	152	152	153	153	153	152	152	151	150
69.5	148	149	150	151	151	151	151	151	150	149	148
70.0	146	147	148	149	149	149	149	149	148	147	146
70.5	144	14s	146	147	147	147	147	147	146	14s	144
71.0	142	143	144	145	145	145	14s	14s	144	143	142
71.5	140	141	142	142	143	143	143	142	142	141	140
72.0	138	139	140	140	141	141	141	140	140	139	138

TOUCH ANY KEY TO CONTINUE :

Screen 28

CONCENTRATION IN PPM AT RIVER KM 15 (RAILROAD KM =14)

West Bank Discharge= 24.0cms Wetted Width= 52m East Bank

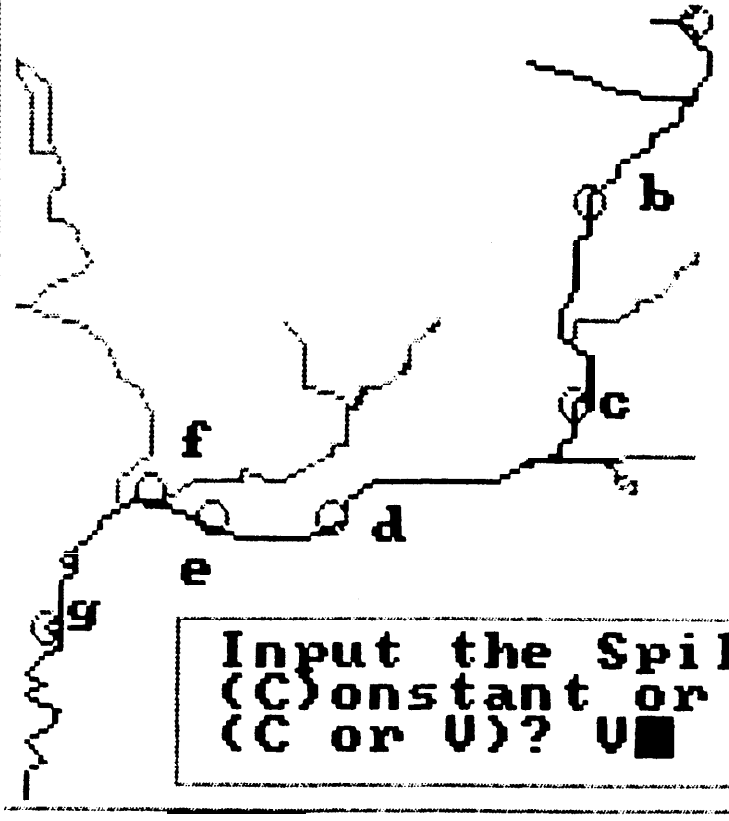
Lapse time (min)	1	2	3	4	S	6	7	a	9	10	11
72.5	136	137	138	138	138	139	138	138	138	137	136
73.0	133	13s	13s	136	136	136	136	136	13s	13s	133
73.5	131	132	133	133	133	133	133	133	133	132	131
74.0	127	128	129	130	130	130	130	130	129	128	127
74.5	123	125	12s	126	126	126	126	126	12s	12s	123
75.0	119	120	121	121	122	122	122	121	121	120	119
75.5	114	116	116	117	117	117	117	117	116	116	114
76.0	al	81	82	82	82	82	82	82	a2	al	81

Initial Volume (liters) = 10000 **Remaining** Volume (liters) = 9845

Press S to STOP, any key to continue

Screen 29

North Thompson River



Spill below Blue R.

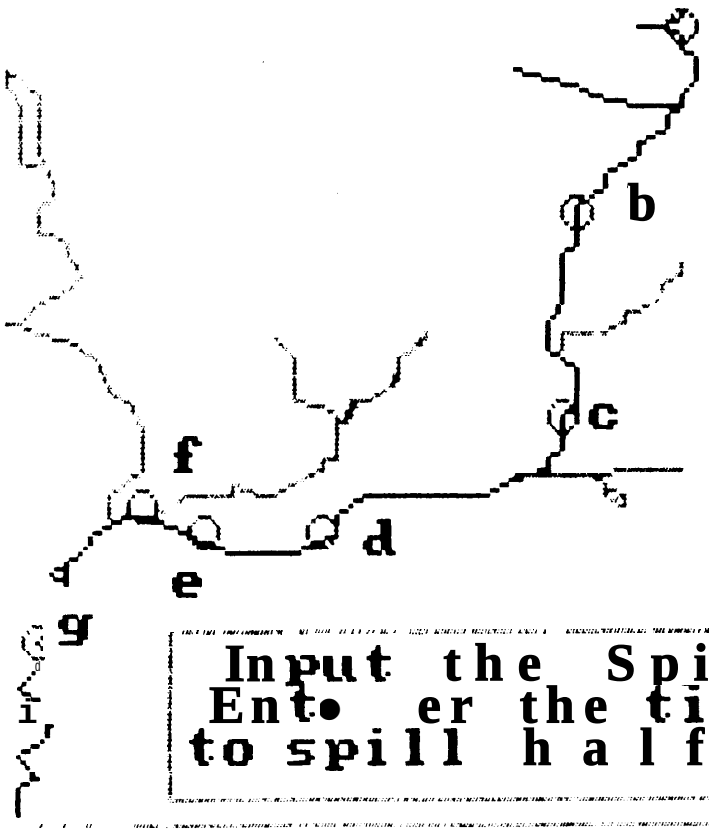
Name	Rail-MI
b. Blue R.	00.0
c. Avola	26.5
d. Vavenby	53.0
e. Birch Is	60.7
f Clearwtr	67.5
g: L. Fort	85.6

Mileage 33.0
Discharge 125 cms
Spill at eastbank
Volume 10000 1

Input the Spill description:
(C)onstant or time (V)arying
(C or V)? V

Screen 30

North Thompson River



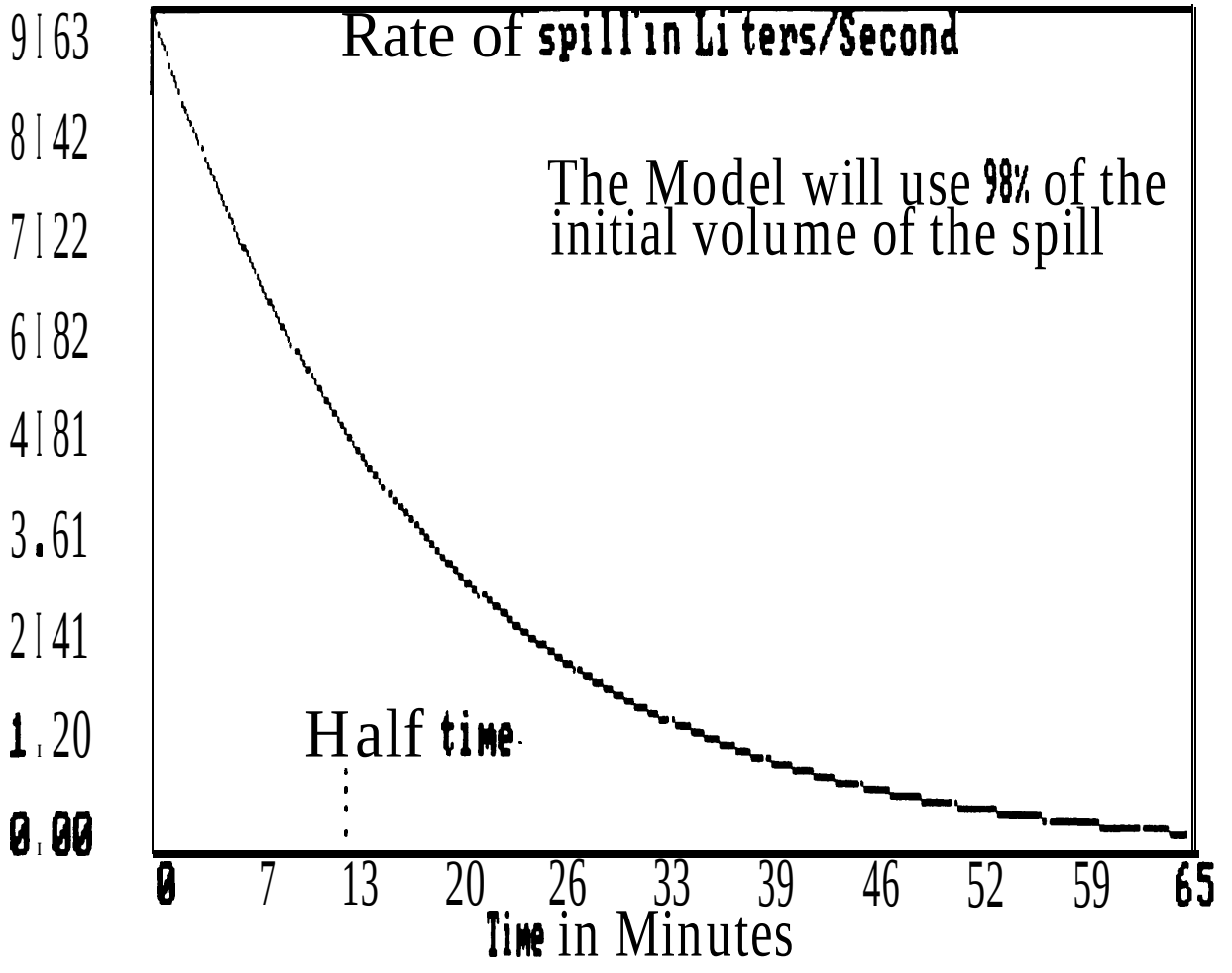
Spill below Blue R.

Name	Rail-MI
b. Blue R.	00.0
c. Avola	26.5
d. Vavenby	53.0
e. Birchls	60.7
f. Clearwtr	67.5
g. L. Fort	85.6

Mileage 33.0
Discharge 125 cms
Spill at eastbank
Volume 10000 1

Input the Spill description:
Enter the time(in minutes)
to spill half the volume? 13

Screen 31



Strike any key to eont inue

Screen 32

```
Do you wish to run the plotter now (Y or N) ? Y
```

Screen 33

NORTH THOMPSON POLLUTION PLOTTER

SUMMARY OUTPUT FILE :NTxxxx.X
FROM SPILL IS REQUIRED FOR INPUT

July 1,1987

Charles Howard & Associates Ltd.
300-1144 Fort St. Victoria B.C.
V8V 3K8 Telephone 604-385-0206

Screen 34

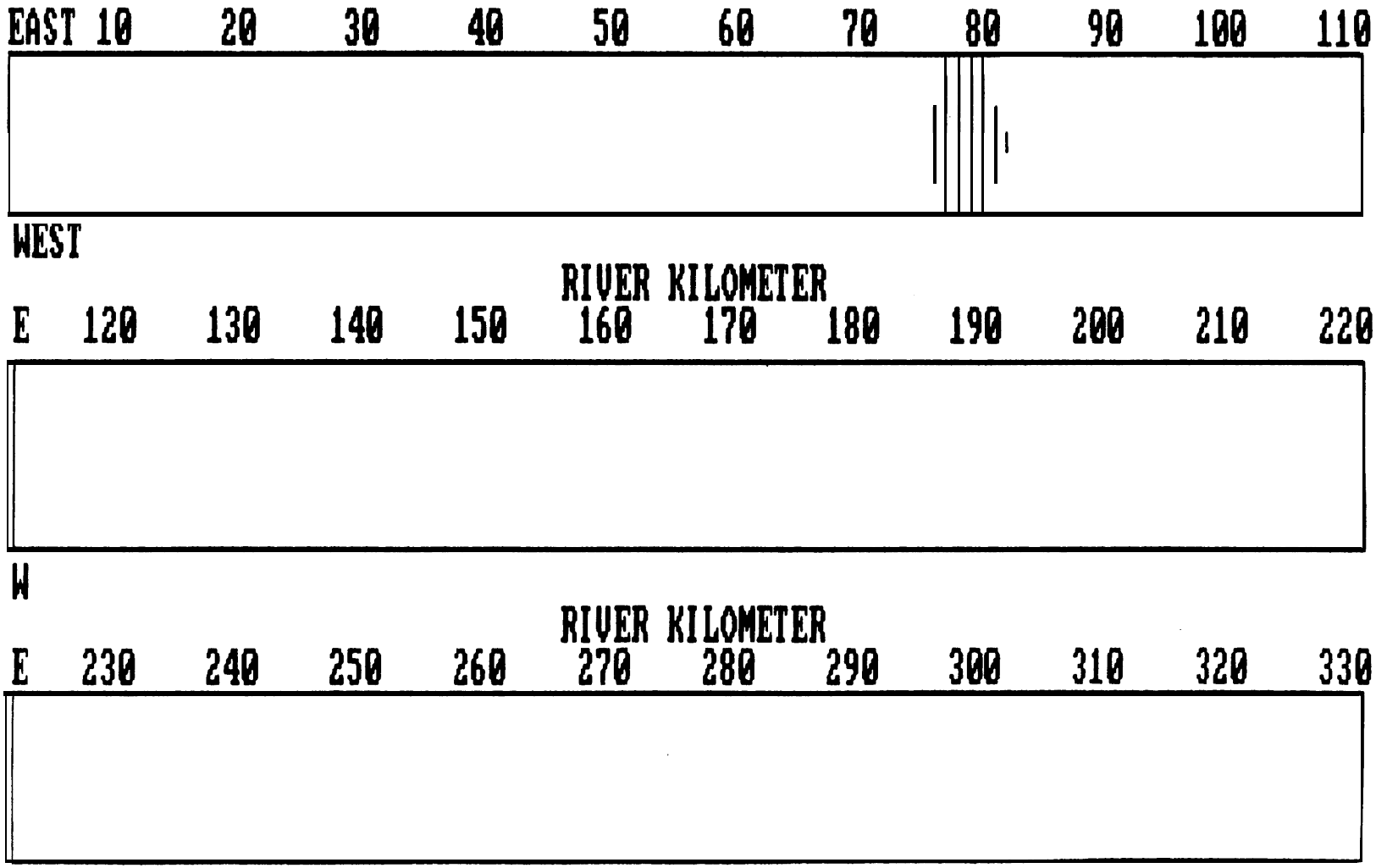
PLEASE ENTER THE FILE NUMBER FOR THE FILE YOU WISH TO LOOK AT ?

EXISTING OUTPUT FILES:

```
( 1) NT0000.S
( 2) NT0937.T
( 3) NT1045.T
```

Screen 35

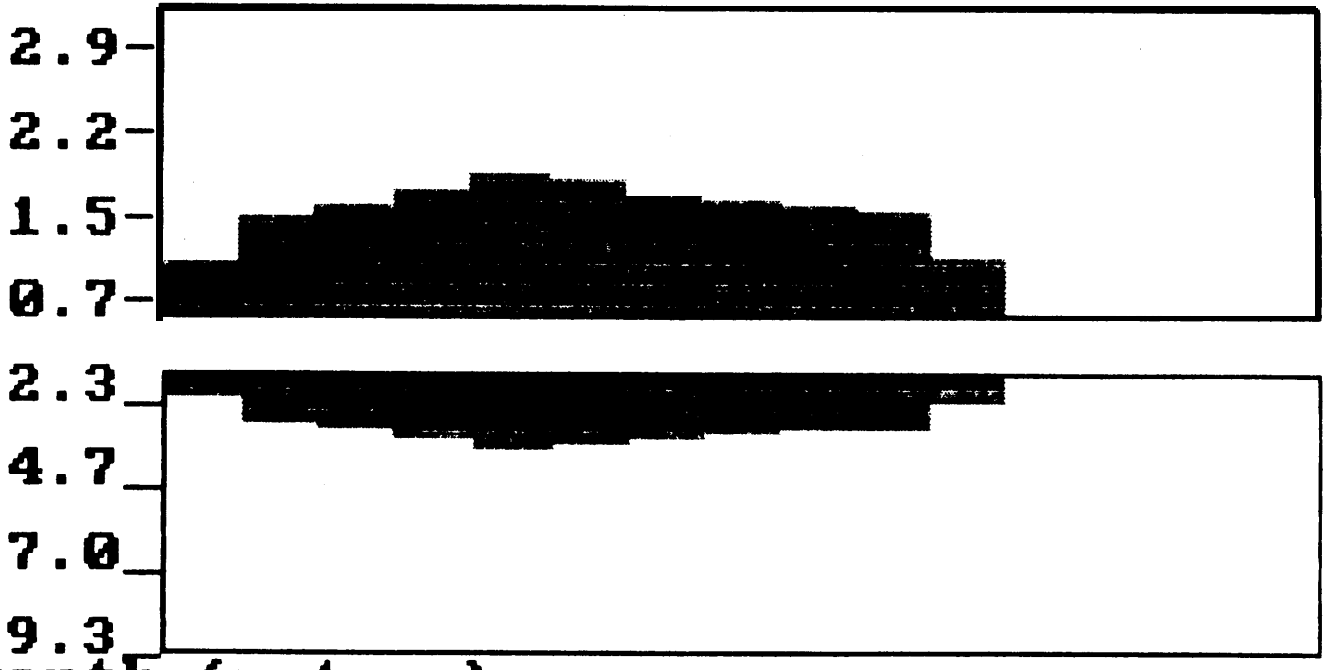
(T)hreshold (N)ewfile (C)onc plot (R)iver x-sect (M)ap (Q)uit
Spill site: River Km 70 E VOL= 10000 l in 30 min. Threshold 116 ppm



Screen 36

North Thompson River Km 179

Velocity (metres/sec)



Depth (meters)

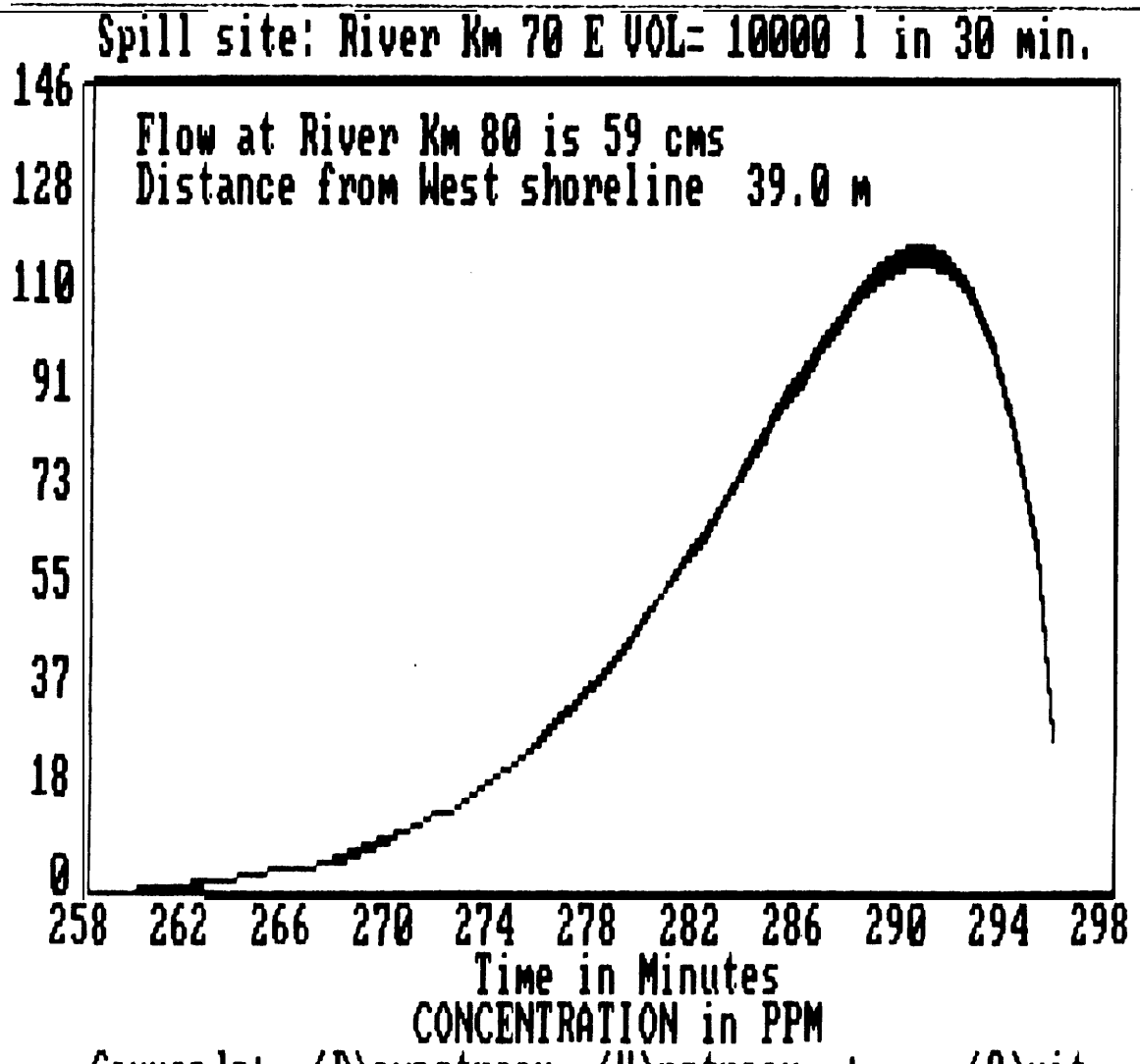
Flow = 814 cms Wetted width = 88 m

Commands: (D)own (U)pstream (Q)uit

Screen 37

Which river kilometer would you like to plot first(71 - 82)? ▮

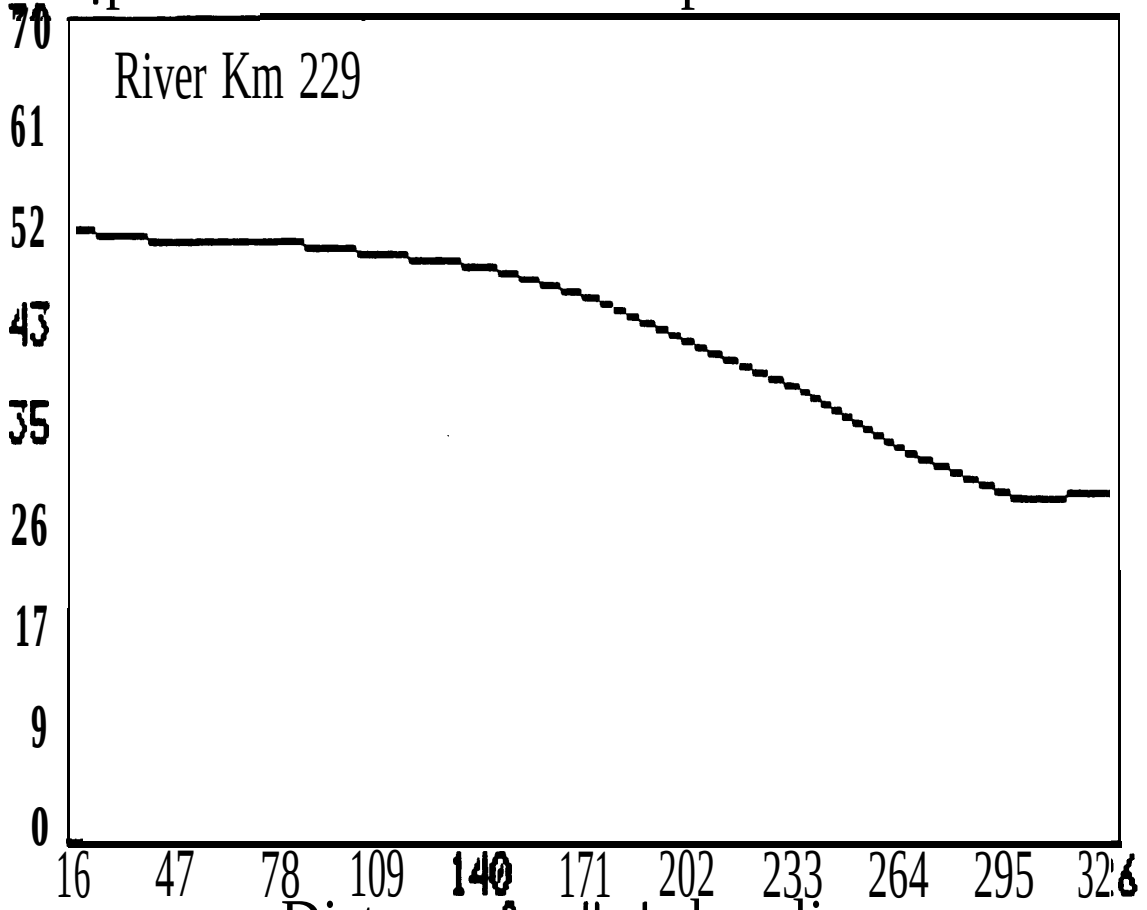
Screen 38



Commands: (D)ownstream (U)pstream + - (Q)uit

Screen 39

Spill site: River Km 210 M Spill rate 16.67 l/s



CONCENTRATION in PPM

Commands: (D)ownstream (U)pstream Quit

APPENDIX 6

PROGRAM OVERVIEW AND FILE DESCRIPTIONS

APPENDIX 6

PROGRAMS

Programs contained in the package are:

1. **SPILL. EXE**

   This is the main program which calls the others as necessary. It handles the primary keyboard inputs describing the spill and sets up the files for the actual simulation.

2. **NTSG. TBC**

   This program simulates a steady (continuous) spill. The program cannot be run alone but must be called by SPILL.

3. **NTTV. TBC**

   The program simulates a transient spill (temporary spill of variable or steady-state). The program cannot be run alone but must be called by SPILL.

4. **NTPLOT. EXE**

   This program contains a set of graphics routines which display results of the spill analysis and the hydraulic data on which it was based. The program can be run independently to analyze any previous results from NTSG or NTTV.

INPUT FILE DESCRIPTIONS

The programs SPILL and NTPLOT use several input files to display geographical information on the screen. These files are:

MAP.DAT, FINN.DAT, OTTER.DAT, RAFT.DAT, CLWAT.DAT and TOWNS.DAT.

The first five files contain digitized co-ordinates of the stream channel network. The last contains the co-ordinates of various towns along the river. An additional file, **SCRN2.DAT** contains a list of geographical features and their locations - this information may be of assistance in determining how to tell the model where the spill occurred.

Both NTSG and NTTV, the actual pollution modelling routines use the files **KM.DAT,** XFILE.NTH and REACH.NTH and these are described in the August **25,** 1986 Memorandum on the steady-state modelling procedures, Appendix 1.

FILE: REACH.NTH
REACH DATA - N. THOMPSON RIVER
RIVER KM - FLOW FACTOR - X-SECTION NO. - AREA - SLOPE - DIFFUSION COEFS.
42

0	1	1	14	.0013	15	.5
10	1	1	300	.0013	15	.5
20	1	1	1338	.0013	15	.5
30	1	1	1561	.0013	15	.5
40	1	1	1784	.0013	15	.5
50	1	1	2008	.0013	15	.5
60	1	2	2211	.0013	15	.5
70	1	2	2415	.0013	15	.5
80	1	2	2618	.0013	15	.5
90	1	2	2822	.0013	15	.5
95	1	2	2924	.0013	15	.5
100	1	3	3025	.0009	15	.5
110	1	3	3229	.0009	15	.5
115	1	3	3331	.0009	15	.5
120	1	3	3432	.0031	15	.5
130	1	3	3635	.0031	15	.5
140	1	3	3839	.0031	15	.5
150	1	3	4042	.0031	15	.5
155	1	3	4144	.0031	15	.5
160	1	4	4246	.0015	15	.5
170	1	4	4450	.0015	15	.5
180	1	5	5257	.0010	15	.5
181	.67	6	15470	.0009	15	.5
185	.67	7	15506	.0006	15	.5
195	.67	8	15884	.0005	15	.5
200	.67	9	15968	.0004	15	.5
209	.67	21	16425	.00061	15	.5
210	.67	22	16476	.00053	15	.5
211	.67	23	16527	.00054	15	.5
212	.67	24	16578	.00065	15	.5
215	.67	9	16730	.0006	15	.5
220	.67	10	17033	.0002	15	.5
230	.67	11	17639	.0002	15	.5
240	.67	12	18245	.0003	15	.5
250	.67	13	19367	.0008	15	.5
260	.67	14	19522	.0006	15	.5
265	.67	15	19600	.0003	15	.5
270	.67	16	19726	.0002	15	.5
280	.67	17	19977	.0007	15	.5
290	.67	18	20228	.0002	15	.5
300	.67	19	20479	.0002	15	.5
310	.67	20	20730	.0002	15	.5

100 200 30 delta x (m) for steady & transient - time step (sec)
0.33 1.33 0.33 1.33 exp. coef. used to adiust x- and v- diffusion coefs.

```
FILE: XFILE.NTH
1
NORTH THOMPSON RIVER - 13 MILES DOWNSTREAM ALBREDA LAKE
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
11  11  0.0013
0  15  20  25  30  35  40  45  50  55  70
4   0   0   0   0   0   0   0   0   0   4
0.0  2.0  6.5  13.1  21.6  68.2  150.4  245.5  360.2  491.5  617.7
0.0  0.4  0.8   1.2   1.6   2.0    2.4    2.8    3.2    3.6    4.0
**********
2
NORTH THOMPSON RIVER - 50 MILES DOWNSTREAM ALBREDA LAKE
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
13  11  0.0013
0  15  20  25  30  35  40  45  50  55  60  65  80
5   0   0   0   0   0   0   0   0   0   0   0   5
0.0  3.6  11.7  23.4  38.4  120.9  265.8  432.1  631.7  859.1  1076.0
0.0  0.5   1.0   1.5   2.0    2.5    3.0    3.5    4.0    4.5    5.0
**********
3
NORTH THOMPSON RIVER - 81 MILES DOWNSTREAM ALBREDA LAKE
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
13  11  0.0031
0  20  25  30  35  40  45  50  55  60  65  70  90
6   0   0   0   0   0   0   0   0   0   0   0   6
0.0  7.6  24.8  49.8  82.3  260.3  575.1  939.3  1379.5  1884.5  2370.4
0.0  0.6   1.2   1.8   2.4    3.0    3.6    4.2    4.8    5.4    6.0

**********
4
NORTH THOMPSON RIVER AT BIRCH ISLAND
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
27    39    0.0015
 0     7.5  11.5  17.5  23.5  29.5  35.5  38.5  41.5  43.5  47.5  50.5  53.5
56.5  57.5  62.5  65.5  68.5  71.5  74.5  77.5  79.5  83.5  86.5  92.5  95.0
99.0
6.0   4.02  2.71  1.83  1.48  1.42  0.66  0.17  0.03  0.35  0.25  0.00  0.58
1.11  1.28  1.36  1.36  1.52  1.58  1.64  1.67  1.62  1.79  1.62  2.78  4.02
6.0
0       17    27    40    55   71.5   90   111   132   154   178   203   228
254    282   313   344   376   411   446   482   522   562   604   646   690
735    780   825   075   922   968  1010  1060  1110  1170  1220  1260  1420
0      2.2   2.3   2.4   2.5   2.6   2.7   2.8   2.9   3.0   3.1   3.2   3.3
3.4   3.5   3.6   3.7   3.8   3.9   4.0   4.1   4.2   4.3   4.4   4.5   4.6
4.7   4.8   4.9   5.0   5.1   5.2   5.3   5.4   5.5   5.6   5.7   5.76  6.0
**********
5
NORTH THOMPSON RIVER - UPSTREAM CLEARWATER RIVER CONFLUENCE - XS #84
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 21  11  0.0010
   0.0  5.0  23.0  28.0  29.0  31.4  35.6  50.4  54.5  57.9  66.9  83.9  96.7
 107.5 121.1 122.9 125.3 126.2 133.4 141.1 144.5
 404.1 403.8 403.5 401.6 400.8 400.1 400.0 398.9 398.9 398.7 398.8 399.4 399.6
 399.8 400.4 400.9 401.6 402.1 402.7 403.1 404.1
   0.0  1.1  5.9  16.7  34.1  122.1 291.2 500.4 762.9 1075.3 1392.8
   0.0  0.5  1.1   1.6   2.2    2.7   3.2   3.8   4.3    4.9    5.4
**********
```

```
6
NORTH THOMPSON RIVER - NEAR PROVINCIAL PARK - XS #83
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 19   11    0.0009
   0.0   2.9   3.6    5.5  22.0   38.3 84.2 95.0 106.2 125.1 130.1 134.0 137.4
 138.6 141.1 142.6 145.9 149.7 158.6
 400.0 399.7 398.3 397.2 393.4 392.8 392.2 394.5 396.1 397.3 397.3 397.6 398.2
 399.0 399.2 399.2 398.8 398.8 400.0
   0.0   2.7   15.1 36.9 67.9 123.1 419.7 875.7 1566.0 2433.5 3338.2
   0.0   0.8   1.6   2.3   3.1   3.9   4.7   5.5     6.2    7.0    7.8
**********
7
NORTH THOMPSON RIVER - NORTH OF MOSQUITO FLATS - XS #80
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 21  11  0.0006
   0.0   3.5   7.5   8.5    9.9  14.1  37.7  50.5  64.8  88.5  111.9  134.0  143.0
 178.8 183.8 187.1 189.4 191.2 192.2 193.3 197.6
 397.8 396.6 396.1 395.8 395.0 394.8 393.5 391.7 391.7 391.9 392.0 392.4 392.6
 393.3 394.4 394.4 395.0 395.8 396.0 397.6 397.8
   0.0    3.0 13.8 33.6 63.0 216.3 509.1 869.6 1318.0 1841.4 2352.6
   0.0    0.6   1.2   1.8   2.4   3.1   3.7   4.3   4.9   5.5   6.1
**********
8
NORTH THOMPSON RIVER - NORTH OF QUEEN BESS RIDGE - XS #76
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 18   11    0.0005
   0.0   1.0   2.2    6.9  32.5  43.1  49.2  59.0  78.7  105.4  134.5  140.8  147.6
 150.0 152.9 156.3 156.9 168.6
 390.8 389.5 389.5 387.4 381.8 380.8 381.1 381.4 383.9 385.3 386.8 388.2 388.4
 388.6 389.4 390.2 390.4 390.8
   0.0   1.7    9.2 23.0 45.5 90.1 335.1 756.3 1432.7 2328.1 3298.9
   0.0   1.0    2.0   3.0   4.0   5.0   6.0   7.0   8.0   9.0   10.0
**********
9
NORTH THOMPSON RIVER - SOUTH OF THUYA CREEK - XS #70 (CHANGED FROM t66)
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 23  11  0.0006
   0.0    1.7  4.1  9.0  11.5  16.9   30.0  41.3  63.5  86.6  117.4  147.2
 152.0  164.6  174.3  188.6  193.6   196.0  197.3  197.7  198.3  202.3  211.3
 389.4  388.9 388.5 384.4 382.8 380.7 378.8 378.8 379.1 379.3 379.8 381.1 301.4
 380.6  381.0 381.7 381.6 382.3 384.3 384.7 385.2 386.0 386.1
   0.0    0.2  1.4  5.2  20.9  116.5 351.0 696.6 1176.0 1774.4 2401.8
   0.0    0.7   1.5   1.8   2.0   2.7   3.4   4.2    4.9    5.7    6.4
**********
```

```
10
NORTH THOMPSON RIVER - NORTH OF DARLING CREEK - XS #63
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 28   11   0.0002
   0.0   16.3  17.7   20.2   23.2   25.1   33.2   58.6   68.3  83.1  93.3  117.5  129.2
 139.9  166.0  179.8  191.2  225.4  246.2  275.5  296.5  305.6 316.1 321.1 323.1  325.1
 334.6  340.4
 380.6  380.3  380.3  377.9  376.2  376.2  373.8  372.9  372.3 372.3 371.8  372.3  372.6
 373.2  373.2  374.2  374.9  374.9  375.0  375.9  377.1  377.2 377.7 377.9  378.3  378.5
 378.4  380.6
   0.0    1.8  11.2   31.9   64.6  243.1  611.8  1102.7  1747.8 2533.2 3334.0
   0.0    0.9   1.8    2.6    3.5    4.4    5.3     6.2     7.0    7.9    8.8
**********
11
NORTH THOMPSON RIVER - NEAR CHINOOK COVE STA. - XS #59
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 19   11   0.0002
   0.0    3.8   4.5    6.8    7.8   33.7   46.3   78.0 116.8 133.8 158.1 182.8  198.2
 210.6  213.9  222.8  225.2  226.1  228.5
 378.6  377.0  376.4  375.4  374.9  374.7  374.6  373.5  371.3 370.5 370.4  369.7  370.1
 374.1  374.0  375.2  376.4  377.1  378.6
   0.0    1.6  10.0   25.6   48.6   91.9  329.1  722.5  1334.5  2118.7  2938.8
   0.0    0.9   1.8    2.7    3.6    4.5    5.3    6.2     7.1     8.0     8.9
**********
12
NORTH THOMPSON RIVER AT MCLURE
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
26   20   0.0003
    0    3.5    9.5    14.5   19.5   24.5    29.5    34.5    39.5    44.5    49.5
 54.5   59.5   64.5    69.5   74.2   79.5    84.5    89.5    94.5    99.5  104.5
109.5  119.5  129.5     133
 8.20   7.10   5.14    3.93   1.97   0.71    0.34    0.00    0.01    0.00    0.12
 0.08   0.25   0.23    0.31   0.45   0.45    0.54    0.55    0.62    0.66    1.11
 1.44   3.70   7.10    8.20
   0     79     100     150    200    300     400     500     600     700     800
1000   1200   1400    1600   1800   2000    2400    2600    2740
   0   4.03   4.12    4.33   4.54   4.88    5.17    5.43    5.67    5.89    6.07
6.42   6.73   7.03    7.33   7.63   7.91    8.45    8.72    8.90
**********
13
NORTH THOMPSON RIVER - SOUTH OF LOUIS CREEK - XS #48
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 27   11   0.001
   0.0  13.0  25.9  38.8  39.9  47.4  47.8  50.0  51.2  58.7  64.3  71.8  84.9
 100.7 116.5 143.6 148.5 158.3 160.3 163.8 172.8 175.7 177.6 177.7 179.7 180.9
 185.2
 377.6 377.0 375.5 375.3 375.1 371.7 370.6 370.2 369.8 369.0 369.3 368.8 368.4
 367.4 367.1 366.6 367.6 367.8 368.0 369.2 370.0 370.8 370.8 371.6 372.3 374.5
 377.6
   0.0    5.4 30.6 81.5 161.0 304.1 1051.9 2178.9 3819.6 5838.2 7895.5
   0.0    1.1   2.2   3.3   4.4   5.5    6.6    7.7    8.8    9.9   11.0
**********
```

```
14
NORTH THOMPSON RIVER - DOWNSTREAM MCLURE STATION - XS #34
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 24   11  0.0006
   0.0   0.7   2.8   4.7   5.0   5.4   7.2   9.6    16.1  23.1  34.3  58.0   77.2
  95.4  98.6 111.1 117.4 120.7 124.4 129.0 131.5  139.0 140.0 143.2
 360.5 360.3 359.4 358.9 358.3 357.6 356.6 356.5  353.8 352.8 352.8 352.5  352.3
 352.3 352.5 353.6 353.6 353.4 353.5 355.5 355.9  357.2 358.1 360.5
   0.0   5.4  23.6  54.6  96.2 169.2 560.8 1131.7  1947.4 2921.6 3874.4
   0.0   0.8   1.6   2.5   3.3   4.1   4.9   5.7     6.6    7.4    8.2
**********
15
NORTH THOMPSON RIVER - 3 MILES NORTH OF BLACK PINES - XS #29
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 29   11  0.0003
   0.0   8.8  18.8  21.9  23.1  26.1  26.7  30.4  38.7  57.2  60.4  101.8  108.4
 130.5 LSO.7 172.0 194.4 206.4 214.0 218.6 231.7 233.8 246.9 250.1 255.5  259.2
 260.1 262.3 264.0
 358.0 357.1 356.6 356.2 356.2 355.2 355.0 354.3 353.7 353.3 352.5 351.3  351.2
 350.8 350.6 350.3 349.7 349.5 350.0 350.5 349.8 349.8 352.1 352.4 353.7  355.2
 356.1 357.4 358.0
   0.0   1.8  12.8  37.4  77.1  150.1  535.1  1137.3  2034.1 3145.8 4280.8
   0.0   0.9   1.7   2.6   3.4   4.3   5.1   6.0     6.8    7.7    8.5
**********
16
NORTH THOMPSON RIVER - UPSTREAM BLACK PINES - XS #26
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 26   11  0.0002
   0.0   1.5   3.6   7.1  10.8  15.6  22.6  30.8  40.7  52.2  78.5  89.5  111.5
 148.5 181.0 211.3 244.4 275.1 300.0 328.7 337.5 350.7 357.3 364.3 369.3 372.4
 355.5 354.4 353.3 352.2 351.3 349.7 349.8 349.9 348.7 348.9 349.8 349.4 349.6
 350.6 351.2 351.6 352.0 352.2 352.3 352.3 352.3 352.9 354.0 354.5 355.3 355.5
   0.0   0.6   4.6  15.6  33.9  70.2 272.4 631.0 1205.9 1960.5 2767.7
   0.0   0.7   1.4   2.0   2.7   3.4   4.1   4.8     5.4    6.1    6.8
**********
17
NORTH THOMPSON RIVER - SOUTH OF JAMIESON CREEK - XS #20
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 20   11  0.0007
   0.0   2.0  3.6  10.9  14.9  25.8  52.1  58.6  73.3  91.7  114.6  132.1  145.7
 151.6 169.0 181.7 197.4 201.4 209.3 222.4
 353.5 351.8 351.0 346.7 344.6 343.7 347.5 347.9 348.5 349.0 349.4 349.3  349.1
 350.3 351.1 351.2 351.9 352.9 353.4 353.5
   0.0   1.0  5.8  15.2  30.2  62.0 244.5 612.8 1270.5 2240.5 3387.4
   0.0   1.0   2.0   2.9   3.9   4.9   5.9   6.9   7.8   8.8   9.8
**********
18
NORTH THOMPSON RIVER - NEAR RAYLEIGH - XS #14
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
 20   11  0.0002
   0.0   4.1   5.6   6.6  14.2  18.1  28.5  38.9  45.0  53.3  76.2  105.4 110.6
 118.3 123.0 124.4 124.7 126.7 131.8 132.0
 348.0 345.0 343.2 343.1 337.2 335.5 333.8 332.3 332.3 332.9 336.0 339.6  341.;
 341.9 343.4 345.0 345.7 346.2 346.6 348.0
   0.0   3.1  14.8  38.8  76.3  146.9 525.2 1125.7 2040.1 3191.9 4387.4
   0.0   1.6   3.1   4.7   6.3   7.9   9.4   11.0   12.6   14.1   15.7
**********
```

```
19
NORTH THOMPSON RIVER - 3 MILES NORTH OF KAMLOOPS BRIDGE - XS #9
Distance (m) va. Elevation (m) - Discharge (cms) vs. Stage (m)
 34  11  0.0002
   0.0  15.0  23.5  35.0  50.6  63.5  69.5  70.2  73.1  74.0  75.1  76.3  76.6
  79.9  86.5 107.3 136.9 169.2 207.4 235.9 245.9 261.8 294.9 306.5 320.5 328.8
 358.6 389.6 415.4 423.5 444.4 451.6 455.3 460.0
 345.2 345.3 344.7 344.8 344.8 344.7 345.2 345.5 346.3 346.0 345.4 343.7 343.1
 341.6 340.6 340.3 340.3 340.3 340.5 340.9 340.1 340.0 339.9 339.6 338.6 338.5
 339.0 339.0 340.4 340.1 340.8 342.2 343.9 345.2
   0.0   1.8  10.6  34.2  82.0 170.8 624.3 1338.0 2397.5 3720.2 5088.9
   0.0   0.8   1.6   2.3   3.1   3.9   4.7    5.5    6.2    7.0    7.8
**********
20
NORTH THOMPSON RIVER - UPSTREAM KAMLOOPS BRIDGE - XS #6
Distance (m) vs. Elevation (m) - Discharge (cms) vs. Stage (m)
29   11   0.0002
   0.0   2.3   3.5   4.1   8.0  12.9  22.1  43.3  49.2  55.1  65.7  86.9  95.0
 121.3 126.9 131.9 146.9 174.6 200.4 204.0 209.0 224.9 233.4 248.3 258.1 270.6
 273.3 274.3 275.2
 344.3 344.1 343.0 341.9 340.6 339.1 338.8 338.7 337.8 337.8 337.4 337.9 338.4
 338.3 338.3 337.8 338.3 338.3 338.3 338.5 338.2 338.4 338.4 338.0 337.5 341.0
 341.3 343.1 344.3
   0.0   1.1  10.1  33.2  67.8 128.4 443.8 917.0 1601.3 2425.4 3235.3
   0.0   0.7   1.4   2.1   2.8   3.5   4.1   4.8    5.5    6.2    6.9
**********
21
NORTH THOMPSON RIVER - RAILROAD MILE 83 - 4 KM U/S LITTLE FORT - X.SECTION #71
Distance (m) vs. Stage (m) - Discharge (cms) vs. Stage (m)
12   21   0.00061
0    2    3    17    39    74   108   138   153   166   172   173
4   2.3   2   0.9   0.8   0.3   0.2    0    0    1.6   2.7    4
0 1.2 6.3 16 31 52 79  111 148 191 238 290 347 409 474 544 619 697 778 864
954
0  .2 .4 .6 .8  1  1.2  1.4 1.6 1.84 2.04 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8
4.0
**********
22
NORTH THOMPSON RIVER - RAILROAD MILE 84 - 3 KM U/S LITTLE FORT - X.SECTION #70
Distance (m) vs. Stage (m) - Discharge (cms) vs. Stage (m)
16  21  0.00053
0   2.5   8   21   32   55  78  99  128  133  146  155  170  175  177  178
5.6   4   1.9   0   0  0.3  0.5  1.0  2.3  2.6  1.8  2.2  2.9  2.8  3.5  5.6
0  1.4  7.2  19  36  60  90  126  170  223  285  357  438  526  623  727  839
957 1083 1215 1354
0 .28 .56 .84 1.12 1.4 1.68 1.96 2.28 2.57 2.8 3.08 3.36 3.64 3.92 4.2 4.48
4.76 5.04 5.32 5.6
**********
```

23
NORTH THOMPSON RIVER - RAILROAD MILE 85 -2 KM U/S LITTLE FORT - X.SECTION # 6
Distance (m) vs. Stage (m) - Discharge (cms) vs. Stage (m)
17 21 0.00054
0 2 3.4 17 35 58 72 107 139 165 190 202209 216 224 224 227
4.5 2.6 1.9 0 0.3 0.3 0.6 1.1 1.1 1.6 2.2 2.8 2.3 2.0 2.2 2.9 4.5
0 0.3 2.5 8.4 18 32 54 82 118 161 212 271 338 412 495 584 680 782
891 1005 1126
0 .22 .45 .68 .9 1.13 1.35 1.58 1.8 2.07 2.30 2.47 2.7 2.92 3.15 3.38 3.6 3.82
4.05 4.28 4.5
****
24
NORTH THOMPSON RIVER - RAILROAD MILE 85.5 - LITTLE FORT - X.SECTION # 68
Distance (m) vs. Stage (m) - Discharge (cms) vs. Stage (m)
14 21 0.00065
0 3 6.7 23.5 46 62 77 98 125 141 147 149 152 152.2
6.5 4.5 3.8 1.3 0.2 0 0.5 1.5 2.2 3.5 3.7 4.1 5.2 6.5
0 1.3 7.3 19 36 62 97 140 194 257 328 410 502 605 718 840 971
1111 1259 1416 1581
0 .32 .65 .98 1.3 1.63 1.95 2.28 2.65 2.98 3.25 3.58 3.9 4.22 4.55 4.88 5.2
5.53 5.85 6.18 6.5
• *+****+**

```
FILE: KM.DAT
MILEAGE DATA - N. THOMPSON RIVER
RIVER KM - RAILROAD KM
28   .
  0      0
  8      6.4
 18.6 18.6
 23.7 23.4
 45.8 44.3
 51.2 49.3
 66.9 60.8
 79.5 76.5
 82.7 77.3
107.7 102.9
118.4 112.8
134.4 130.1
138.7 134.2
154.4 148.6
169.8 162.7
180.2 172.0
183.8 175.2
192.8 184.3
206.6 195.7
211.8 200.8
221.0 209.3
241.8 228.2
249.0 235.0
265.4 250.1
276.5 261.4
285.3 269.4
293.4 275.5
306.1 287.0
```

FILE: RAFT.DAT
RAFT RIVER - MAP CO-ORDINATES

36.2	32.05
36.2	32.05
37	32.6
37.45	33.25
38.45	33.85
39.4	34.35
40.85	34.4
41.4	34.7
42.65	34.45
44	34.45
45.1	34.95
45.75	35.7
46.4	36.2
46.4	36.5
47	36.7
47	37.6
47.5	38.1
47.6	39.05
47.85	39.95
48.05	41
48.1	41.3
49.05	42.8
49.7	43.5
50.2	43.6
50.8	45
51.5	46.45
51.95	47.8
52.9	49
54.05	50.45
54.35	50.95
53.35	49.15
52.35	47.9
51.8	47.05
50.95	45.1
49.85	43.55
49.4	43.5
48.65	41.75
48.2	41.3
47.65	42.35
46.6	43.35
45.4	43.85
45.05	44.95
45.05	46.5
44.55	48.3
44.1	49.65

FILE: CLWAT.DAT
CLEARWATER RIVER - **MAP CO-ORDINATES**

33.1	32.4
33.1	32.4
33.2	33.85
34.9	37.05
35.05	39.15
35.1	41.45
34.3	43.7
33.25	45.35
31.8	47.6
31.8	48.4
29.6	49.6
27.7	51
27.25	51.6
26.15	51.6
27.35	51.65
28.05	53.6
29.5	55.1
30.55	57.3
30.3	58.6
29.6	59.8
28.95	60.7
28.5	60.95
28.5	62.55
28.5	63.9
28.55	65.35
28.55	66.3
27.95	69.2
28.5	72.35
27.85	75
25.95	78.3
25.6	77.7
26.15	75.55
26.8	73.95
27.1	71.75
27.4	70.15
27.1	68.4
28.16	68.352

FILE: MAP.DAT
NORTH THOMPSON RIVER MAP CO-ORDINATES

71	83	62	38
71	83	62	37
70	82	61	36
68	**82**	59	35
70	82	58	34
71	81	52	34
71	80	50	34
72	79	49	33
72	77	48	32
72	77	48	30
71	75	48	30
71	74	47	29
68	74	45	28
65	75	43	28
64	76	41	28
62	77	39	29
60	78	37	31
62	77	35	32
64	76	34	32
65	75	33	31
68	74	33	31
71	74	32	30
70	73	31	**28**
70	72	30	27
69	71	30	25
68	70	30	25
68	69	29	26
67	68	30	27
66	67	30	27
66	66	30	25
65	65	30	25
64	64	29	24
64	63	29	21
64	62	29	20
64	61	28	19
64	60	29	18
63	59	29	17
63	58	28	16
63	57	27	14
63	56	28	13
63	**55**	27	12
63	54	28	11
62	**52**	29	10
62	**51**	28	8
62	**50**	27	7
62	49	28	5
63	48	27	4
64	47	27	1
64	46		
64	44		
64	43		
63	42		
63	41		
63	40		
63	39		

FILE: **SCRN2.DAT**

Rail-Road mile Above Blue R.	River kilometer Below Albreda Lk.	Place name
92.0	0	Albreda Lake
104.0	19	N. Thomp. Confluence
111.5	31	Chapel1 Creek
119.0	45	Miledge Creek
123.5	53	Thunder River
132.3	70	Blue River
Rail-Road mile Below Blue R.		
10.5	87	Canyon Creek Rapids
24.5	109	Avola
37.5	129	**McMurphy**
53.0	155	Vavenby
61.5	170	Birch Island
67.5	181	Clearwater
75.0	193	Mann Creek
85.5	212	Little Fort
104.0	245	Barriere River
116.0	265	McClure Station
128.5	286	Heffley Creek
139.0	306	**Kamloops** Junction

FILE: OTTER. DAT

OTTER RIVER - MAP CO-ORDINATES

60.3	36.4
60.3	36.4
61.1	36.1
63.7	35.85
65.35	35.85
66.2	35
66.5	34.25
66.75	33.15
66.6	34.15
66.1	34.95
65.3	35.85
67.6	36.75
68.8	37.2
70.95	37.3

FILE: FINN.DAT

FINN CREEK - MAP CO-ORDINATES

62.55	49.1
62.55	49.1
62.9	50.1
63.15	50.8
63.85	50.8
64.75	51
65.9	51.4
66.6	51.8
67.35	52.55
68.25	53.4
69.35	54.45
70.1	55.85
71.05	57.15
71.45	57.95

FILE: TOWNS. DAT

TOWNS - MAP CO-ORDINATES

70.55	82.5
63.95	62.85
63.2	41.9
46.75	29.55
39.35	30.15
34.7	33.1
27.75	19.25

OUTPUT FILES

The steady-state and transient models each produce one output file. These are used by NTPLOT to display the results graphically, but they are neatly formatted and can also be copied to a printer or viewed directly on-screen by using standard MS-DOS commands. The following pages provide examples of the first few lines of each of these files.

FILE: NT1OOO.S
Spill site: River Km 210 M Spill rate 16.67 l/s
CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Pane: Widt (m)
KM 210	287.1 cma			16.67 l/sec remaining								
Conc.	0	0	0	0	0	421	0	0	0	0	0	14.1
Vel.	0.95	1.53	1.50	1.44	1.38	1.28	1.09	0.80	0.57	0.57	0.38	
W.P.	15.01	14.76	14.77	14.76	14.76	14.77	14.77	14.78	14.76	14.76	14.78	
Depth	1.36	2.74	2.67	2.50	2.35	2.10	1.64	1.03	0.62	0.62	0.34	
Area	20.1	40.5	39.4	36.9	34.7	31.0	24.2	15.2	9.2	9.1	5.1	
KM 210.1	42	32	44	55	63	65	63	55	44	32	42	14.r
Vel.	0.95	1.53	1.50	1.44	1.38	1.28	1.09	0.80	0.57	0.57	0.38	
W.P.	15.01	14.76	14.77	14.76	14.76	14.77	14.77	14.78	14.76	14.76	14.78	
Depth	1.36	2.74	2.67	2.50	2.35	2.10	1.64	1.03	0.62	0.62	0.34	
Area	20.1	40.5	39.4	36.9	34.7	31.0	24.2	15.2	9.2	9.1	5.1	
KM 210.9	58	55	54	53	50	46	43	37	33	30	29	14.:
Vel.	0.95	1.53	1.50	1.44	1.38	1.28	1.09	0.80	0.57	0.57	0.38	
W.P.	15.01	14.76	14.77	14.76	14.76	14.77	14.77	14.78	14.76	14.76	14.78	
Depth	1.36	2.74	2.67	2.50	2.35	2.10	1.64	1.03	0.62	0.62	0.34	
Area	20.1	40.5	39.4	36.9	34.7	31.0	24.2	15.2	9.2	9.1	5.1	
KM 211	287.1 cms			16.67 l/sec remaining								
Conc.	58	55	54	53	50	46	43	37	33	30	29	14.
Vel.	0.95	1.53	1.50	1.44	1.38	1.28	1.09	0.80	0.57	0.57	0.38	
W.P.	15.01	14.76	14.77	14.76	14.76	14.77	14.77	14.78	14.76	14.76	14.78	
Depth	1.36	2.74	2.67	2.50	2.35	2.10	1.64	1.03	0.62	0.62	0.34	
Area	20.1	40.5	39.4	36.9	34.7	31.0	24.2	15.2	9.2	9.1	5.1	
KM 212	288.6 cms			16.67 l/sec remaining								
Conc.	55	57	51	52	53	52	51	50	47	46	49	11.
Vel.	0.75	1.35	1.60	1.75	1.75	1.64	1.44	1.22	1.04	0.88	0.50	
W.P.	11.46	11.35	11.35	11.34	11.33	11.34	11.35	11.34	11.34	11.34	11.37	
Depth	0.79	1.88	2.44	2.78	2.79	2.53	2.08	1.62	1.27	0.99	0.43	
Area	9.0	21.3	27.7	31.5	31.6	28.7	23.6	18.3	14.4	11.2	4.8	
KM 213	289.3 cms			16.67 l/sec remaining								
Conc.	54	57	53	52	51	52	50	49	49	46	49	11.
Vel.	0.71	1.27	1.51	1.65	1.65	1.55	1.36	1.15	0.98	0.83	0.47	
W.P.	11.46	11.36	11.35	11.34	11.34	11.35	11.35	11.35	11.34	11.34	11.38	
Depth	0.84	2.00	2.60	2.96	2.97	2.69	2.22	1.72	1.35	1.06	0.45	
Area	9.6	22.7	29.4	33.5	33.7	30.5	25.1	19.5	15.3	12.0	5.2	

FILE: NT0919.T
Spill site: River Km 2 W VOL= 100000 1 Variable rate

3	2	60	8	47 'river KM,railroad KM,# time steps,flow(cms),wetted width							
0.14	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.14	'vel (m/s)
0.45	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.45	'depth (m)
19	0	0	0	0	0	0	0	0	0	0	0
20	1	1	1	1	1	1	1	1	1	1	1
21	2	2	2	2	2	2	2	2	2	2	2
22	3	3	3	3	3	3	3	3	3	3	3
23	S	S	S	5	5	S	S	S	S	5	5
24	8	8	8	8	8	8	8	8	8	8	8
2s	12	12	12	12	12	12	12	12	12	12	12
26	17	17	17	17	17	17	17	17	17	17	17
27	2s	2s	2s	2s	2s	2s	2s	2s	2s	2s	25
28	36	36	36	36	36	36	36	36	36	36	36
29	49	49	49	49	49	49	49	49	49	49	49
30	67	67	67	67	67	67	67	67	67	67	67
31	89	89	89	89	89	89	89	89	89	89	89
32	116	116	116	116	116	116	116	116	116	116	116
33	149	149	149	150	150	150	150	149	149	149	149
34	188	189	189	189	190	190	190	189	189	189	188
3s	236	236	237	237	237	237	237	237	236	236	235
36	291	291	292	292	293	293	293	292	292	291	291
37	355	356	356	357	357	357	357	357	356	356	355
38	429	430	430	431	431	432	431	431	430	429	428
39	512	514	515	515	516	516	516	515	514	513	512
40	607	608	610	611	611	611	611	610	609	608	607
41	713	71s	716	717	718	718	718	717	716	714	713
42	830	832	834	836	836	836	836	835	834	832	830
43	960	962	965	966	967	967	967	966	964	962	960
44	1102	1105	1107	1109	1110	1110	1110	1109	1107	1104	1102
4s	1257	1260	1263	1265	1266	1266	1266	1264	1262	1259	1256
46	1424	1428	1431	1433	1434	143s	1434	1433	1430	1427	1423
47	1604	1608	1612	1614	1616	1616	1615	1614	1611	1607	1603
48	1797	1802	1806	1808	1810	1810	1810	1808	1805	1800	1796
49	2002	2008	2012	2015	2017	2017	2016	2014	2011	2006	2001
so	2220	2226	2231	2234	2236	2237	2236	2233	2230	2224	2218
51	2450	2456	2462	2466	2468	2468	2467	2465	2460	2454	2448
52	2691	2699	2704	2709	2711	2712	2711	2708	2703	2696	2689
53	2944	2952	2958	2963	2966	2966	2965	2962	2957	2950	2941
54	3207	3216	3223	3228	3231	3232	3231	3227	3221	3214	3205
55	3481	3491	3498	3504	3507	3508	3506	3502	3496	3488	3478
56	3764	377s	3783	3789	3792	3793	3792	3787	3781	3772	3761
57	4056	4068	4077	4083	4087	4088	4086	4081	4074	4064	4052
58	4356	4369	4379	4386	4390	4391	4389	4384	4376	4365	4352
59	4664	4678	4688	4696	4700	4701	4699	4694	4685	4674	4660
60	4978	4994	5005	so13	so17	5018	SO16	5010	5001	4989	4974
61	5299	5315	5327	5335	5340	5341	5339	5333	5323	5310	5294
62	5624	5642	5655	5663	5668	5670	5667	5661	5651	5637	5619
63	5954	5973	5986	5996	6001	6002	6000	5993	5982	5967	5949

APPENDIX 7

COMPUTERIZED DATA-BASE SEARCH FOR FISHERIES TOXICOLOGY

APPENDIX 7

COMPUTERIZED DATA-BASE SEARCH FOR FISHERIES TOXICOLOGY

The following computerized data bases were searched for pertinent information:

CENV (Canadian Environment)
ASF A (Aquatic Sciences and Fisheries Abstracts)
BA79 - BA86 (Biosis Previews; Biological Abstracts, Inc.)
CAS (Chemical Abstracts Search)
NTIS (National Technical Information Service); 1964 - 1986
CON (CISTI Current Catalogue 1978 - 1986; NRCC)
ELIAS 1976 - 1985 (Environment Canada)
AQUAREF 1980 - 1985 (Canadian Water Resources References)
EMBASE (Excerpta Medical)
POLLUTION ABSTRACTS 1970 - 1985
WATER RESOURCES ABSTRACTS 1968 - 1986
LIFE SCIENCES COLLECTION 1978 - 1985

In addition to the above computerized searches, recent (1984 - 1986) issues of a number of journals (Can. J. Fish. Aquat. Sci.; Trans. Amer. Fish. Soc.; Progr. Fish-Cult.; Water Res.; J. Fish Biol.; Environ. Poll. (A); Bull. Environ. Contam. Toxicol.; Arch. Environ. Contam. Toxicol.; Environ. Sci. Technol.; Aquat. Toxicol.; Comp. Biochem. Physiol.) which publish aquatic toxicological findings were searched manually. The June issues of J. Water Poll. Control Fed. (1975 - 1985) and paper copies of Pollution Abstracts (1982 - 1986) were also examined for published reports concerning the toxicity of these four chemicals to salmonid fish in fresh water.

APPENDIX6

TABULATIONOFSCENARIORESULTS

8A - Scenario #1
8B - Scenario #2
ac- Scenario #3
8D - Scenario #4
8E - Scenario #5
8F - Scenario #6
8G - Scenario #7

8A - SCENARIO #1

Spill site: River Km 83 W Spill rate 16.67 l/s

CONCENTRATION ppm, **VELOCITY** m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank **11**	Panel Width (m)
KM 83	16.9 **cms**				16.67 **l/sec** remaining							
Conc.	44489	0	0	0	0	0	0	0	0	0	0	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.1	1366	1384	1382	1379	1373	1367	1359	1349	1339	1327	1313	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	

Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	**3.2**	
KM 83.3	1341	1351	1359	1365	1369	1370	1369	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.4	1341	1351	1359	1365	1369	1370	1369	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.5	1341	1351	1359	1365	1369	1370	1369	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.6	1341	1351	1359	1365	1368	1370	1368	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM **83.7**	1341	1351	1359	1365	1368	1370	1368	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.8	1341	1351	1359	1365	1368	1370	1368	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 83.9	1341	1351	1359	1365	1368	1370	1368	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 84	16.9 **cms**		16.67 **l/sec** remaining									
Conc.	1341	1351	1359	1365	1368	1370	1368	1365	1359	1351	1341	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.35	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.35	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 85	17.1 **cms**		16.66 **l/sec** remaining									
Conc.	1320	1330	1338	1344	1347	1348	1347	1344	1338	1330	1320	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.36	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.36	
Depth	0.62	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	0.62	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 86	17.2 **cms**		16.66 **l/sec** remaining									
Conc.	1310	1320	1327	1333	1337	1338	1337	1333	1327	1320	1310	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.36	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.36	
Depth	0.62	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	0.62	
Area	3.2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.2	
KM 87	17.4 **cms**		16.66 **l/sec** remaining									
Conc.	1300	1309	1317	1323	1326	1327	1326	1323	1317	1309	1300	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	**5.37**	**5.22**	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.37	
Depth	**0.62**	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	0.62	

W.P.	5.37	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.37	
Depth	0.62	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.62	
Area	3.3	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.3	
KM 89	17.6 **cms**		16.66 **l/sec** remaining									
Conc.	1280	1289	1297	1303	1306	1307	1306	1303	1297	**1289**	1280	**5.2**
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.30	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.38	
Depth	0.63	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	0.63	
Area	3.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	3.3	
KM 90	17.8 **cms**		16.66 **l/sec** remaining									
Conc.	1270	1279	1287	1293	1296	1297	1296	**1293**	**1287**	**1279**	**1270**	**5.2**
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	**0.20**	**0.20**	**0.20**	**0.12**	
W.P.	5.38	5.23	5.23	5.23	5.23	5.23	5.23	**5.23**	**5.23**	**5.23**	**5.38**	
Depth	0.63	1.26	1.26	1.26	1.26	1.26	1.26	**1.26**	**1.26**	**1.26**	**0.63**	
Area	3.3	6.6	6.6	6.6	6.6	6.6	6.6	**6.6**	**6.6**	**6.6**	**3.3**	
KM 91	17.9 **cms**		16.66 **l/sec** remaining									
Conc.	1260	1270	1277	1283	1286	1287	1286	**1283**	**1277**	**1270**	**1260**	**5.2**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.21**	**0.12**	
W.P.	5.39	5.24	5.24	5.24	5.24	5.24	5.24	**5.24**	**5.24**	**5.24**	**5.39**	
Depth	0.63	1.26	1.26	1.26	1.26	1.26	1.26	**1.26**	**1.26**	**1.26**	**0.63**	
Area	3.3	6.6	6.6	6.6	6.6	6.6	6.6	**6.6**	**6.6**	**6.6**	**3.3**	
KM 92	18.0 **cms**		16.66 **l/sec** remaining									
Conc.	1251	1260	1268	1273	1277	1278	1277	**1273**	**1268**	**1260**	**1251**	**5.2**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.21**	**0.12**	
W.P.	5.39	5.24	5.24	5.24	5.24	5.24	5.24	**5.24**	**5.24**	**5.24**	**5.39**	
Depth	0.63	1.27	1.27	1.27	1.27	1.27	1.27	**1.27**	**1.27**	**1.27**	**0.63**	
Area	3.3	6.7	6.7	6.7	6.7	6.7	6.7	**6.7**	**6.7**	**6.7**	**3.3**	
KM 93	18.1 **cms**		16.66 **l/sec** remaining									
Conc.	1241	1251	1258	1264	1267	1268	1267	1264	1258	1251	1241	**5.2**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.12	
W.P.	5.39	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.39	
Depth	0.64	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	0.64	
Area	3.3	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	3.3	
KM 94	18.3 **cms**		16.66 **l/sec** remaining									
Conc.	1232	1241	1249	1255	1258	1259	1258	1255	**1249**	**1241**	**1232**	**5.2**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.12**	
W.P.	5.40	5.24	5.24	5.24	5.24	5.24	5.24	5.24	**5.24**	**5.24**	**5.40**	
Depth	0.64	1.28	1.28	1.28	1.28	1.28	1.28	1.28	**1.28**	**1.28**	**0.64**	
Area	3.4	6.7	6.7	6.7	6.7	6.7	6.7	6.7	**6.7**	**6.7**	**3.4**	
KM 95	18.4 **cms**		16.65 **l/sec** remaining									
Conc.	1223	1232	1240	1245	1249	1250	1249	1245	**1240**	**1232**	**1223**	**5.2**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.12**	
W.P.	5.40	5.25	5.25	5.25	5.25	5.25	5.25	5.25	**5.25**	**5.25**	**5.40**	
Depth	0.64	1.29	1.29	**1.29**	1.29	1.29	1.29	1.29	**1.29**	**1.29**	**0.64**	
Area	3.4	6.7	6.7	6.7	6.7	6.7	6.7	6.7	**6.7**	**6.7**	**3.4**	
KM 96	18.5 **cms**		16.65 **l/sec** remaining									
Conc.	1214	1223	1231	1236	1240	1241	1240	1236	1231	1223	1214	**5.3**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.12	
W.P.	5.41	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.41	
Depth	0.65	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	0.65	
Area	3.4	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	**6.8**	**3.4**	
KM 97	18.7 **cms**		16.65 **l/sec** remaining									
Conc.	1205	1214	1222	1228	1231	1232	1231	**1228**	**1222**	**1214**	**1205**	**5.3**
Vel.	0.12	0.21	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.21**	**0.12**	
W.P.	**5.41**	**5.25**	5.25	5.25	**5.25**	**5.25**	**5.25**	**5.25**	**5.25**	**5.25**	**5.41**	
Depth	**0.65**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**0.65**	
Area	**3.4**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**6.8**	**3.4**	
KM 98	**18.8 cms**		**16.65** l/sec remaining									
Conc.	1197	**1206**	1213	1219	1222	1223	1222	1219	**1213**	**1206**	**1197**	**5.3**
Vel.	**0.12**	**0.21**	0.21	0.21	0.21	0.21	0.21	**0.21**	**0.21**	**0.21**	**0.12**	
W.P.	**5.41**	**5.26**	**5.26**	**5.26**	**5.26**	**5.26**	**5.26**	**5.26**	**5.26**	**5.26**	**5.41**	
Depth	**0.65**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**1.30**	**0.65**	

W.P.	5.42	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.42	
Depth	0.65	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31	0.65	
Area	3.4	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	3.4	
KM 100	19.0 **cms**		16.65 **l/sec** remaining									
Conc.	1192	1202	1211	1217	1221	1222	1221	1217	1211	1202	1192	5.2
Vel.	0.15	0.25	0.25	0.25	**0.25**	0.25	0.25	0.25	0.25	0.25	0.15	
W.P.	5.25	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.25	
Depth	0.56	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.56	
Area	2.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2.9	
KM 101	19.2 **cms**		16.65 **l/sec** remaining									
Conc.	1167	1175	1181	1186	1189	1190	1189	1186	**1181**	1175	1167	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.25	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.25	
Depth	0.73	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.73	
Area	3.7	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	3.7	
KM 102	19.3 **cms**		16.65 **l/sec** remaining									
Conc.	1158	1166	1173	1178	1181	1182	1181	1178	1173	1166	1158	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.25	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.25	
Depth	0.73	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	1.46	0.73	
Area	3.8	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	3.8	
KM 103	19.4 **cms**		16.65 **l/sec** remaining									
Conc.	1150	1158	1165	1170	1172	1173	1172	1170	1165	1158	1150	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.26	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.26	
Depth	0.73	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	0.73	
Area	3.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	3.8	
KM 104	19.5 **cms**		16.65 **l/sec** remaining									
Conc.	1142	1150	1157	1161	1164	1165	1164	1161	1157	1150	1142	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.26	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.26	
Depth	0.74	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	0.74	
Area	3.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	3.8	
KM 105	19.7 **cms**		16.65 **l/sec** remaining									
Conc.	1134	1142	1149	1154	1156	1157	1156	1154	1149	1142	1134	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.26	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.16	5.26	
Depth	0.74	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	0.74	
Area	3.8	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	3.8	
KM 106	19.8 **cms**		16.64 **l/sec** remaining									
Conc.	1126	1134	1141	1146	1148	1149	1148	1146	1141	1134	1126	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.27	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.27	
Depth	0.74	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	0.74	
Area	3.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	3.8	
KM 107	19.9 **cms**		16.64 **l/sec** remaining									
Conc.	1119	1127	1133	1138	1141	1142	1141	1138	1133	1127	1119	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.27	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.27	
Depth	0.75	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	0.75	
Area	3.9	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	3.9	
KM 108	20.1 **cms**		16.64 **l/sec** remaining									
Conc.	1111	1119	1126	1130	1133	1134	1133	1130	1126	1119	1111	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.27	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.17	5.28	
Depth	0.75	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	0.75	
Area	3.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	3.9	
KM 109	20.2 **cms**		16.64 **l/sec** remaining									
Conc.	1104	1112	1118	1123	1125	1126	1125	1123	1118	1112	1104	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.28	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	**5.18**	**5.28**	
Depth	0.75	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	0.75	

W.P.	5.28	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.28	
Depth	0.76	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51	0.76	
Area	3.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	3.9	
KM 111	20.4 cms		16.64 l/sec remaining									
Conc.	1089	1097	1103	1108	1110	1111	1110	1100	1103	1097	1009	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.29	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.29	
Depth	0.76	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	0.76	
Area	3.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	3.9	
KM 112	20.6 cms		16.64 l/sec remaining									
Conc.	1002	1090	1096	1100	1103	1104	1103	1100	1096	1090	1002	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.29	5.10	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.18	5.29	
Depth	0.76	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	0.76	
Area	4.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	4.0	
KM 113	20.7 cms		16.64 l/sec remaining									
Conc.	1075	1082	1089	1093	1096	1097	1096	1093	1089	1002	1075	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.29	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.29	
Depth	0.77	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53	0.77	
Area	4.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	4.0	
KM 114	20.0 cms		16.64 l/sec remaining									
Conc.	1068	1075	1082	1086	1089	1090	1089	1086	1082	1075	1068	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.30	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.30	
Depth	0.77	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	0.77	
Area	4.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	0.0	8.0	4.0	
KM 115	21.0 cms		16.64 l/sec remaining									
Conc.	1061	1068	1075	1079	1082	1083	1082	1079	1075	1068	1061	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.30	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.30	
Depth	0.77	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	0.77	
Area	4.0	0.0	8.0	8.0	8.0	8.0	8.0	0.0	8.0	8.0	4.0	
KM 116	21.1 cms		16.63 l/sec remaining									
Conc.	1054	1062	1068	1072	1075	1076	1075	1072	1068	1062	1054	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.30	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.19	5.30	
Depth	0.78	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	0.70	
Area	4.0	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	0.1	4.0	
KM 117	21.2 cms		16.63 l/sec remaining									
Conc.	1047	1055	1061	1065	1068	1069	1068	1065	1061	1055	1047	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.31	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.31	
Depth	0.78	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	0.78	
Area	4.0	8.1	8.1	8.1	8.1	8.1	8.1	0.1	0.1	0.1	4.0	
KM 118	21.3 cms		16.63 l/sec remaining									
Conc.	1040	1040	1054	1059	1061	1062	1061	1059	1054	1048	1040	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.31	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.31	
Depth	0.70	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	0.78	
Area	4.1	8.1	8.1	8.1	8.1	8.1	8.1	0.1	0.1	0.1	4.1	
KM 119	21.5 cms		16.63 l/sec remaining									
Conc.	1034	1042	1048	1052	1055	1056	1055	1052	1048	1042	1034	5.2
Vel.	0.12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.12	
W.P.	5.31	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.31	
Depth	0.79	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	0.79	
Area	4.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	4.1	
KM 120	21.6 cms		16.63 l/sec remaining									
Conc.	1048	1059	1067	1074	1070	1079	1070	1074	1067	1059	1040	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29'	0.29	0.17	
W.P.	5.32	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.32	
Depth	0.54	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.54	

W.P.	5.32	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.32	
Depth	0.35	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.a9	1.09	0.55	
Area	2.0	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2.8	
KM 122	21.9	cms	16.63 l/sec remaining									
Conc.	1034	1045	1054	1061	1064	1066	1064	1061	1054	1045	1034	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.32	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.32	
Depth	0.55	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.55	
Area	2.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2.9	
KM 123	22.0	cms	16.63 l/sec remaining									
Conc.	1028	1039	1048	1054	1058	1059	1058	1054	1048	1039	1028	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.33	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.21	5.33	
Depth	0.55	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.55	
Area	2.9	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	2.9	
KM 124	22.1	cms	16.63 l/sec remaining									
Conc.	1022	1033	1041	1048	1051	1053	1051	1048	1041	1033	1022	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.33	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.33	
Depth	0.55	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.55	
Area	2.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	2.9	
KM 125	22.2	cms	16.63 l/sec remaining									
Conc.	1015	1026	1035	1041	1045	1046	1045	1041	1035	1026	1015	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.34	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.34	
Depth	0.56	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.56	
Area	2.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	2.9	
KM 126	22.4	cms	16.63 l/sec remaining									
Conc.	1009	1020	1029	1035	1039	1040	1039	lo.35	1029	1020	1009	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.34	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.34	
Depth	0.56	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.56	
Area	2.9	5.0	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	2.9	
KM 127	22.5	cms	16.63 l/sec remaining									
Conc.	1003	1014	1023	1029	1033	1034	1033	1029	1023	1014	1003	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.34	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.22	5.34	
Depth	0.56	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.56	
Area	2.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	2.9	
KM 128	22.6	cms	16.63 l/sec remaining									
Conc.	997	1008	1016	1023	1026	1028	1026	1023	1016	1008	997	5.2
Vel.	0.17	0.2.9	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.35	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.35	
Depth	0.56	l.U	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.56	
Area	2.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	2.9	
KM 129	22.7	cms	EL.62 l/sec remaining									
Conc.	991	1002	1010	1017	1020	1022	1020	1017	1010	1002	991	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.35	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.35	
Depth	0.56	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.56	
Area	3.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	3.0	
KM 130	22.9	cms	16.62 l/sec remaining									
Conc.	985	996	1004	1011	1014	1016	1014	1011	1004	996	985	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.35	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.35	
Depth	0.57	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.57	
Area	3.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	3.0	
KM 131	23.0	cms	16.62 l/sec remaining									
Conc.	979	990	998	1005	1008	1010	1008	1005	998	990	979	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.36	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.36	
Depth	0.57	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	0.57	

W.P.	5.36	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.36	
Depth	0.57	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	0.57	
Area	3.0	6.0	**6.0**	6.0	6.0	6.0	6.0	6.0	6.0	6.0	3.0	
KM 133	23.3 **cms**		16.62 **l/sec** remaining									
Conc.	968	978	987	993	997	998	997	993	**987**	**978**	**968**	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	0.29	0.17	
W.P.	5.36	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.36	
Depth	0.57	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	0.57	
Area	3.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	3.0	
KM 134	23.4 **cms**		16.62 **l/sec** remaining									
Conc.	962	973	981	987	991	992	991	**987**	981	**973**	**962**	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	0.29	**0.29**	0.17	
W.P.	5.37	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.24	5.37	
Depth	0.58	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	0.58	
Area	3.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	3.0	
KM 135	23.5 **cms**		16.62 **l/sec** remaining									
Conc.	956	967	975	981	985	986	985	981	**975**	**967**	**956**	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.17	
W.P.	5.37	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.37	
Depth	0.58	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.58	
Area	3.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	3.0	
KM 136	23.6 **cms**		16.62 **l/sec** remaining									
Conc.	951	961	970	976	979	981	979	**976**	**970**	961	951	5.2
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	**0.29**	0.29	0.17	
W.P.	5.37	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.37	
Depth	0.58	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.58	
Area	3.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	3.0	
KM 137	23.8 **cms**		16.62 **l/sec** remaining									
Conc.	945	956	964	970	974	975	974	970	**964**	**956**	**945**	5.3
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	0.29	0.17	
W.P.	5.38	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.38	
Depth	0.58	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	0.58	
Area	3.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	3.1	
KM 138	23.9 **cms**		16.62 **l/sec** remaining									
Conc.	940	950	959	965	968	970	968	**965**	**959**	950	940	5.3
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	0.29	0.29	0.17	
W.P.	5.38	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.38	
Depth	0.58	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	0.58	
Area	3.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	3.1	
KM 139	24.0 **cms**		16.62 **l/sec** remaining									
Conc.	935	945	953	959	963	964	963	**959**	**953**	945	935	5.3
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	**0.29**	0.29	0.17	
W.P.	5.39	5.26	5.26	5.26	5.26.	5.26	5.26	5.26	5.26	5.26	5.39	
Depth	0.59	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	0.59	
Area	3.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	3.1	
KM 140	24.2 **cms**		16.62 **l/sec** remaining									
Conc.	929	940	948	954	957	959	957	**954**	**948**	**940**	**929**	5.3
Vel.	0.17	0.29	0.29	0.29	0.29	0.29	0.29	**0.29**	**0.29**	**0.29**	0.17	
W.P.	5.39	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.39	
Depth	0.59	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	0.59	
Area	3.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	3.1	
KM 141	24.3 **cms**		16.62 **l/sec** remaining									
Conc.	924	934	943	949	952	953	952	**949**	**943**	**934**	**924**	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.39	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.39	
Depth	0.59	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	0.59	
Area	3.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	3.1	
KM 142	24.4 **cms**		16.62 **l/sec** remaining									
Conc.	919	929	937	943	947	948	947	**943**	**937**	**929**	919	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.40	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.26	5.40	
Depth	0.59	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	0.59	

W.P.	5.40	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.40	
Depth	0.60	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	0.60	
Area	3.1	6.3	6.3.	6.3	6.3	6.3	6.3	6.3	6.3	6.3	3.1	
KM 144	24.7 cms			16.61 l/sec remaining								
Conc.	909	919	927	933	936	938	936	933	927	919	909	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.40	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.40	
Depth	0.60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.60	
Area	3.1	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	3.1	
KM 145	24.8 cms			16.61 l/sec remaining								
Conc.	904	914	922	928	931	933	931	928	922	914	904	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.41	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.41	
Depth	0.60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.60	
Area	3.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	3.2	
KM 146	24.9 cms			16.61 l/sec remaining								
Conc.	899	909	917	923	926	928	926	923	917	909	899	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.41	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.27	5.41	
Depth	0.60	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.60	
Area	3.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	3.2	
KM 147	25.0 cms			16.61 l/sec remaining								
Conc.	894	904	912	918	922	923	922	918	912	904	894	5.3
Vel.	0.17	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.17	
W.P.	5.41	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.41	
Depth	0.60	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	0.60	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 148	25.2 cms			16.61 l/sec remaining								
Conc.	889	899	907	913	917	918	917	913	907	899	889	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.41	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.41	
Depth	0.60	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	0.60	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 149	25.3 cms			16.61 l/sec remaining								
Conc.	884	894	903	908	912	913	912	908	903	894	884	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.42	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.42	
Depth	0.61	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 150	25.4 cms			16.61 l/sec remaining								
Conc.	880	890	898	904	907	908	907	904	898	890	880	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.42	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.42	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 151	25.6 cms			16.61 l/sec remaining								
Conc.	875	885	893	899	902	904	902	899	893	885	875	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.42	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.42	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	3.2	
KM 152	25.7 cms			16.61 l/sec remaining								
Conc.	870	880	888	894	898	899	898	894	888	880	870	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.42	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.42	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	
Area	3.2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.2	
KM 153	25.8 cms			16.61 l/sec remaining								
Conc.	866	876	884	890	893	894	893	890	884	876	866	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.43	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.43	
Depth	0.61	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	0.61	

W.P.	5.43	5.29	**5.29**	**5.29**	**5.29**	**5.29**	**5.29**	**5.29**	5.29	**5.29**	5.43	
Depth	0.61	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	0.61	
Area	3.2	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.2	
KM 155	26.1 **cms**		16.61 **l/sec** remaining									
Conc.	857	867	875	880	884	885	884	880	875	867	857	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.43	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.43	
Depth	0.62	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	0.62	
Area	3.3	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.3	
KM 156	26.2 **cms**		16.61 **l/sec** remaining									
Conc.	852	862	870	876	879	881	**879**	876	870	862	852	5.3
Vel.	0.18	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.18	
W.P.	5.43	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.29	5.44	
Depth	0.62	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	0.62	
Area	3.3	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.3	
KM 157	26.3 **cms**		16.61 **l/sec** remaining									
Conc.	848	858	866	872	875	876	875	872	866	858	848	5.3
Vel.	0.18	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.18	
W.P.	5.44	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.29	5.44	
Depth	0.62	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	0.62	
Area	3.3	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	3.3	
KM 158	26.5 **cms**		16.61 **l/sec** remaining									
Conc.	844	854	861	867	871	872	871	867	861	854	844	5.3
Vel.	0.18	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.18	
W.P.	5.44	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.44	
Depth	0.62	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	0.62	
Area	3.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	3.3	
KM 159	26.6 **cms**		16.60 **l/sec** remaining									
Conc.	839	849	857	863	866	867	866	863	857	849	**839**	5.3
Vel.	0.18	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.18	
W.P.	5.44	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.30	5.44	
Depth	0.62	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	0.62	
Area	3.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	3.3	
KM 160	26.7 **cms**		16.60 **l/sec** remaining									
Conc.	706	714	721	725	728	727	725	721	714	705	**694**	6.9
Vel.	0.08	0.15	0.21	0.29	0.32	0.27	0.20	0.16	0.14	0.12	0.07	
W.P.	6.91	6.88	6.92	6.91	6.88	6.93	6.89	6.88	6.88	6.88	6.90	
Depth	0.42	0.96	1.51	2.35	2.71	2.17	1.42	1.06	0.87	0.72	0.33	
Area	2.9	6.6	10.4	16.2	18.7	14.9	9.8	7.3	6.0	5.0	2.2	
KM 161	26.8 **cms**		16.60 **l/sec** remaining									
Conc.	708	719	727	733	735	735	732	727	718	707	**694**	6.9
Vel.	0.10	0.19	0.26	0.36	0.40	0.34	0.25	0.20	0.17	0.15	0.08	
W.P.	6.92	6.88	6.92	6.91	6.88	6.93	6.89	6.88	6.88	6.88	6.90	
Depth	0.34	0.77	1.22	1.89	2.18	1.75	1.14	0.85	0.70	0.58	0.26	
Area	2.4	5.3	8.4	13.0	15.0	12.0	7.9	5.8	4.8	4.0	1.8	
KM 162	27.0 **cms**		16.60 **l/sec** remaining									
Conc.	705	716	724	729	732	732	729	723	715	704	690	6.9
Vel.	0.10	0.19	0.26	0.36	0.40	0.34	0.25	0.20	0.17	0.15	0.08	
W.P.	6.92	6.89	6.92	6.91	6.88	6.93	6.90	6.89	6.88	6.88	6.90	
Depth	0.34	0.77	1.22	1.89	2.18	1.75	1.14	0.85	0.70	0.58	0.26	
Area	2.4	5.3	8.4	13.0	15.0	12.0	7.9	5.9	4.8	4.0	1.8	
KM 163	27.1 **cms**		16.60 **l/sec** remaining									
Conc.	701	712	720	726	728	728	726	720	711	700	687	6.9
Vel.	0.10	0.19	0.26	0.36	0.40	0.34	0.25	0.20	0.17	0.15	0.08	
W.P.	6.92	6.89	6.92	6.92	6.88	6.93	6.90	6.89	6.89	6.89	6.90	
Depth	0.34	0.78	1.22	1.89	2.19	1.75	1.15	0.85	0.70	0.58	0.26	
Area	2.4	5.3	8.4	13.0	15.0	12.1	7.9	5.9	4.8	4.0	1.8	
KM 164	27.2 **cms**		16.60 **l/sec** remaining									
Conc.	698	709	717	722	725	725	722	717	708	**697**	684	6.9
Vel.	0.10	0.19	0.26	0.36	0.40	0.34	0.25	0.20	0.17	0.15	0.08	
W.P.	6.92	6.89	6.92	6.92	6.89	6.93	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.75	1.15	0.85	0.70	0.59	0.26	

W.P.	**6.92**	**6.89**	6.92	6.92	6.89	6.93	6.90	**6.89**	**6.89**	**6.89**	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.75	1.15	0.85	0.71	**0.59**	0.26	
Area	2.4	5.4	8.4	13.1	15.1	**12.17.9**		5.9	4.9	4.0	1.8	
KM 166	27.5 **cms**		16.60 **l/sec** remaining									
Conc.	692	702	710	716	718	**718**	716	710	701	690	677	**6.9**
Vel.	0.10	0.19	0.26	0.36	0.40	0.34	0.25	0.20	0.18	0.15	0.08	
W.P.	6.92	6.89	6.92	6.92	6.89	6.93	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.75	1.15	0.86	0.71	0.59	0.26	
Area	2.4	5.4	a.4	13.1	15.1	12.1	7.9	5.9	4.9	4.0	1.8	
KM 167	27.6 **cms**		**16.60 l/sec** remaining									
Conc.	688	699	707	713	715	715	712	707	**698**	687	674	**6.9**
Vel.	0.10	0.19	0.26	0.36	0.41	0.34	0.25	0.20	0.18	0.15	0.08	
W.P.	6.92	6.89	6.92	6.92	6.89	6.94	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.75	1.15	0.86	0.71	0.59	0.26	
Area	2.4	5.4	a.4	13.1	15.1	12.1	7.9	5.9	4.9	4.1	1.8	
KM 168	27.7 **cms**		16.60 **l/sec** remaining									
Conc.	685	696	704	709	712	712	709	703	**695**	684	671	**6.9**
Vel.	0.10	0.19	0.26	0.37	0.41	0.34	0.25	0.20	0.18	0.15	0.08	
W.P.	6.92	6.89	6.93	6.92	6.89	6.94	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.76	1.15	0.86	0.71	0.59	0.27	
Area	2.4	5.4	a.4	13.1	15.1	12.1	7.9	5.9	4.9	4.1	1.8	
KM 169	27.9 **cms**		16.60 **l/sec** remaining									
Conc.	682	693	701	706	709	709	706	700	**692**	681	668	**6.9**
Vel.	0.10	0.19	0.27	0.37	0.41	0.35	0.25	0.21	0.18	0.16	0.08	
W.P.	6.93	6.89	6.93	6.92	6.89	6.94	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.76	1.15	0.86	0.71	0.59	0.27	
Area	2.4	5.4	a.4	13.1	15.1	12.1	7.9	5.9	4.9	4.1	1.8	
KM 170	28.0 **cms**		16.60 **l/sec** remaining									
Conc.	679	689	698	703	706	706	703	**697**	**689**	678	664	**6.9**
Vel.	0.10	0.19	0.27	0.37	0.41	0.35	0.26	0.21	0.18	0.16	0.09	
W.P.	6.93	6.89	6.93	6.92	6.89	6.94	6.90	6.89	6.89	6.89	6.91	
Depth	0.34	0.78	1.22	1.90	2.19	1.76	1.15	0.86	0.71	0.59	0.27	
Area	2.4	5.4	8.4	13.1	15.1	12.1	7.9	5.9	4.9	4.1	1.8	
KM 171	28.5 **cms**		16.60 **l/sec** remaining									
Conc.	667	677	685	691	693	693	691	685	677	666	652	**6.9**
Vel.	0.11	0.20	0.27	0.37	0.42	0.35	0.26	0.21	0.18	0.16	0.09	
W.P.	6.93	6.90	6.93	6.93	6.90	6.94	6.91	6.90	6.90	6.90	6.92	
Depth	0.35	0.78	1.23	1.90	2.20	1.76	1.16	0.86	0.71	0.59	0.27	
Area	2.4	5.4	8.5	13.1	15.2	12.1	8.0	6.0	4.9	4.1	1.8	
KM 172	29.0 **cms**		16.60 **l/sec** remaining									
Conc.	655	665	674	679	682	682	679	673	665	654	641	**6.9**
Vel.	0.11	0.20	0.27	0.38	0.42	0.36	0.26	0.21	0.18	0.16	0.09	
W.P.	6.94	6.90	6.94	6.93	6.90	6.95	6.91	6.90	6.90	6.90	6.92	
Depth	0.35	0.79	1.23	1.91	2.20	1.77	1.16	0.87	0.72	0.60	0.27	
Area	2.4	5.4	8.5	13.2	15.2	12.2	8.0	6.0	5.0	4.1	1.9	
KM 173	29.5 **cms**		16.60 **l/sec** remaining									
Conc.	643	654	662	668	670	670	667	662	653	643	**629**	**6.9**
Vel.	0.11	0.20	0.28	0.38	0.43	0.36	0.27	0.22	0.19	0.16	**0.09**	
W.P.	6.94	6.91	6.94	6.94	6.91	6.95	6.92	6.91	6.91	6.91	**6.93**	
Depth	0.35	0.79	1.23	1.91	2.21	1.77	1.16	0.87	0.72	0.60	0.27	
Area	2.4	5.5	8.5	13.2	15.2	12.2	8.0	6.0	5.0	4.2	1.9	
KM 174	30.0 **cms**		16.59 **l/sec** remaining									
Conc.	632	643	651	657	659	659	656	651	643	632	619	**6.9**
Vel.	0.11	0.20	0.28	0.39	0.43	0.37	0.27	0.22	0.19	0.17	0.09	
W.P.	6.94	6.91	6.94	6.94	6.91	6.96	6.92	6.91	6.91	6.91	6.93	
Depth	0.35	0.79	1.24	1.92	2.21	1.77	1.17	0.87	0.73	0.60	0.27	
Area	2.4	5.5	8.5	13.2	15.3	12.2	8.1	6.0	5.0	4.2	1.9	
KM 175	30.5 **cms**		16.59 **l/sec** remaining									
Conc.	622	632	641	646	649	649	646	640	632	621	608	**6.9**
Vel.	0.11	0.21	0.29	0.39	0.44	0.37	0.27	0.22	0.19	0.17	0.09	
W.P.	6.95	6.92	6.95	6.95	6.91	6.96	6.93	**6.92**	**6.91**	6.91	6.94	
Depth	0.35	0.80	1.24	1.92	2.22	1.78	1.17	0.88	0.73	0.61	0.27	

W.P.	**6.95**	**6.92**	6.95	6.95	6.92	6.96	6.93	**6.92**	6.92	**6.92**	**6.94**	
Depth	0.35	0.80	1.24	1.92	2.22	1.78	1.18	0.88	0.73	0.61	0.28	
Area	2.4	5.5	8.6	13.3	15.4	12.3	8.1	6.1	5.1	4.2	1.9	
KM 177	31.6 **cms**			**16.59 l/sec** remaining								
Conc.	602	612	620	626	628	628	626	620	612	601	588	**6.9**
Vel.	0.11	0.21	0.29	0.40	0.45	0.38	0.28	0.23	0.20	0.17	0.10	
W.P.	6.96	6.92	6.96	6.95	6.92	6.97	6.93	6.92	6.92	6.92	6.94	
Depth	0.35	0.80	1.24	1.93	2.22	1.78	1.18	0.89	0.74	0.62	0.28	
Area	2.5	5.6	8.6	13.3	15.4	12.3	8.2	6.1	5.1	4.3	1.9	
KM 178	32.1 **cms**			16.59 **l/sec** remaining								
Conc.	592	603	611	616	619	619	616	610	602	592	579	**6.9**
Vel.	0.12	0.22	0.30	0.41	0.45	0.38	0.29	0.23	0.20	0.18	0.10	
W.P.	6.96	6.93	6.96	6.96	6.93	6.97	6.94	6.93	6.93	6.93	6.95	
Depth	0.36	0.81	1.25	1.93	2.23	1.79	1.18	0.89	0.74	0.62	0.28	
Area	2.5	5.6	8.6	13.4	15.4	12.4	8.2	6.2	5.1	4.3	1.9	
KM 179	32.6 **cms**			16.59 **l/sec** remaining								
Conc.	583	593	601	607	609	609	607	601	593	582	569	**6.9**
Vel.	0.12	0.22	0.30	0.41	0.46	0.39	0.29	0.23	0.20	0.18	0.10	
W.P.	6.97	6.93	6.96	6.96	6.93	6.98	6.94	6.93	6.93	6.93	6.95	
Depth	0.36	0.81	1.25	1.94	2.23	1.79	1.19	0.89	0.74	0.62	0.28	
Area	2.5	5.6	8.7	13.4	15.5	12.4	8.2	6.2	5.2	4.3	1.9	
KM 180	33.1 **cms**			16.59 **l/sec** remaining								
Conc.	612	623	630	636	639	639	636	631	624	614	602	8.5
Vel.	0.08	0.17	0.21	0.23	0.23	0.20	0.18	0.17	0.15	0.13	0.07	
W.P.	8.59	8.56	8.54	8.53	8.53	8.54	8.53	8.53	8.53	8.54	8.57	
Depth	0.57	1.49	2.03	2.30	2.26	1.98	1.69	1.49	1.33	1.05	0.43	
Area	4.8	12.7	17.4	19.6	19.3	16.9	14.4	12.8	11.3	9.0	3.7	
KM 181	76.1 **cms**			16.59 **l/sec** remaining								
Conc.	258	265	270	274	277	277	277	275	271	266	259	8.0
Vel.	0.13	0.25	0.28	0.29	0.30	0.31	0.32	0.33	0.33	0.25	0.10	
W.P.	8.23	8.03	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.20	8.12	
Depth	0.95	2.13	2.51	2.73	2.85	2.96	3.07	3.18	3.15	2.18	0.65	
Area	7.6	17.1	20.1	21.9	22.9	23.7	24.6	25.5	25.2	17.5	5.2	
KM 182	76.2 **cms**			16.59 **l/sec** remaining								
Conc.	258	265	270	274	277	278	277	275	271	266	259	8.0
Vel.	0.14	0.25	0.29	**0.30**	0.31	0.32	0.33	0.34	0.34	0.25	0.10	
W.P.	8.23	8.03	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.20	8.12	
Depth	0.92	2.07	2.44	2.65	2.76	2.87	2.97	3.08	3.05	2.11	0.63	
Area	7.4	16.6	19.5	21.2	22.2	23.0	23.8	24.7	24.4	16.9	5.0	
KM 183	76.2 **cms**			16.59 **l/sec** remaining								
Conc.	258	265	270	274	277	278	277	275	271	266	259	8.0
Vel.	0.14	0.25	0.29	0.30	0.31	0.32	0.33	0.34	0.34	0.25	0.10	
W.P.	8.23	8.03	8.03	8.02	8.02	8.02	8.02	8.02	8.02	8.20	8.12	
Depth	0.92	2.07	2.44	2.65	2.76	2.87	2.97	3.08	3.05	2.11	0.63	
Area	7.4	16.6	19.5	21.2	22.2	23.0	23.9	24.7	24.4	16.9	5.0	
KM 184	76.2 **cms**			16.59 **l/sec** remaining								
Conc.	258	264	270	274	277	278	277	275	271	265	259	8.0
Vel.	0.14	0.25	0.29	0.30	0.31	0.32	0.33	0.34	0.34	0.25	0.10	
W.P.	8.23	8.03	8.03	8.02	8.02	8.02	8.02	8.02	8.02	8.20	8.12	
Depth	0.92	2.07	2.44	2.65	2.76	2.87	2.97	3.08	3.05	2.11	0.63	
Area	7.4	16.6	19.5	21.2	22.2	23.0	23.9	24.7	24.4	16.9	5.0	
KM 185	76.3 **cms**			16.59 **l/sec** remaining								
Conc.	243	255	265	272	277	280	279	276	268	258	245	14.3
Vel.	0.07	0.19	0.24	0.24	0.23	0.23	0.21	0.19	0.17	0.15	0.08	
W.P.	14.31	14.35	14.27	14.27	14.27	14.27	14.28	14.28	14.28	14.28	14.31	
Depth	0.55	1.94	2.76	2.68	2.56	2.48	2.30	2.00	1.68	1.36	0.60	
Area	7.9	27.7	39.4	38.2	36.5	35.4	32.8	28.5	24.0	19.4	8.6	
KM 186	76.4 **cms**			16.59 **l/sec** remaining								
Conc.	241	254	264	272	279	282	282	279	272	261	248	14.3
Vel.	0.08	0.21	0.27	0.27	0.26	0.25	0.24	0.22	0.19	0.16	0.09	
W.P.	14.31	14.35	14.27	14.28	14.28	14.27	14.28	14.28	14.28	14.28	14.31	
Depth	0.49	1.72	2.45	2.37	2.27	2.19	2.04	1.77	1.49	1.20	0.53	

W.P.	14.31	14.35	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.77	1.49	1.20	0.53	
Area	7.0	24.6	34.9	33.8	32.4	31.3	29.1	25.3	21.2	17.2	7.6	
KM 188	76.8	**cms**		16.58	**l/sec**	remaining						
Conc.	240	253	263	271	278	281	281	278	271	260	247	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.25	0.24	0.22	0.19	0.16	0.09	
W.P.	14.31	14.35	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.77	1.49	1.20	0.53	
Area	7.0	24.6	34.9	33.9	32.4	31.4	29.1	25.3	21.2	17.2	7.6	
KM 189	76.9	**cms**		**16.58**	**l/sec**	remaining						
Conc.	239	252	262	270	277	280	280	277	270	260	246	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.26	0.24	0.22	0.19	0.16	0.09	
W.P.	14.31	14.36	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.77	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.4	31.4	29.1	25.3	21.3	17.2	7.6	
KM 190	77.1	**cms**		16.58	**l/sec**	remaining						
Conc.	239	252	262	270	276	280	280	277	270	259	246	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.26	0.24	0.22	0.19	0.17	0.09	
W.P.	14.31	14.36	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.28	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.77	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.4	31.4	29.2	25.3	21.3	17.2	7.6	
KM 191	77.2	**cms**		16.58	**l/sec**	remaining						
Conc.	238	251	261	270	275	279	279	276	269	259	246	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.26	0.24	0.22	0.19	0.17	0.09	
W.P.	14.32	14.36	14.28	14.28	14.28	14.28	14.28	14.29	14.29	14.29	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.78	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.4	31.4	29.2	25.4	21.3	17.2	7.6	
KM 192	77.4	**cms**		16.58	**l/sec**	remaining						
Conc.	237	251	261	269	274	278	279	275	269	259	245	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.26	0.24	0.22	0.19	0.17	0.09	
W.P.	14.32	14.36	14.28	14.28	14.28	14.28	14.29	14.29	14.29	14.29	14.32	
Depth	0.49	1.72	2.45	2.37	2.27	2.20	2.04	1.78	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.4	31.4	29.2	25.4	21.3	17.3	7.6	
KM 193	77.6	**cms**		16.58	**l/sec**	remaining						
Conc.	237	250	260	269	274	278	278	275	268	258	245	14.3
Vel.	0.08	0.21	0.28	0.27	'0.26	0.26	0.24	0.22	0.19	0.17	0.09	
W.P.	14.32	14.36	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.33	
Depth	**0.49**	1.72	2.45	2.38	2.27	2.20	2.04	1.78	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.5	31.4	29.2	25.4	21.3	17.3	7.6	
KM 194	77.7	**cms**		16.58	**l/sec**	remaining						
Conc.	236	249	259	268	273	277	277	274	268	257	244	14.3
Vel.	0.08	0.21	0.28	0.27	0.26	0.26	0.24	0.22	0.19	0.17	**0.09**	
W.P.	14.32	14.36	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.33	
Depth	0.49	1.72	2.45	2.38	2.27	2.20	2.04	1.78	1.49	1.21	0.53	
Area	7.0	24.6	35.0	33.9	32.5	31.4	29.2	25.4	21.3	17.3	7.6	
KM 195	77.9	**cms**		16.58	**l/sec**	remaining						
Conc.	222	227	230	232	233	232	230	226	221	215	208	8.6
Vel.	0.12	0.26	0.36	0.38	0.36	0.32	0.25	0.19	0.14	0.09	0.04	
W.P.	8.78	8.77	8.61	8.58	8.58	8.64	8.64	8.60	8.59	8.59	8.59	
Depth	0.99	2.96	4.37	4.73	4.52	3.84	2.72	1.78	1.18	0.71	0.24	
Area	8.5	25.4	37.5	40.5	38.7	32.9	23.3	15.3	10.1	6.1	2.0	
KM 196	77.9	**cms**		16.58	**l/sec**	remaining						
Conc.	222	227	231	233	234	233	230	226	221	214	207	8.6
Vel.	0.13	0.28	0.37	0.40	0.38	0.34	0.27	0.20	0.15	0.10	0.04	
W.P.	8.78	8.78	8.62	8.58	8.58	8.64	8.65	8.61	8.59	8.59	8.59	
Depth	0.94	2.81	4.14	4.48	4.28	3.63	2.58	1.69	1.12	0.67	0.22	
Area	8.0	24.1	35.5	38.4	36.7	31.2	22.1	14.5	9.6	5.8	1.9	
KM 197	78.0	**cms**		16.58	**l/sec**	remaining						
Conc.	222	227	231	233	233	232	230	226	221	**214**	207	8.6
Vel.	0.13	0.28	0.37	0.40	0.38	0.34	0.27	0.20	0.15	0.10	0.04	
W.P.	8.78	8.78	**8.62**	8.58	8.59	8.64	8.65	8.61	8.59	8.59	8.59	
Depth	0.94	2.81	4.14	4.48	4.28	3.64	2.58	1.69	1.12	0.67	0.22	

W.P.	8.79	8.78	8.62	8.59	8.59	8.65	8.65	8.61	8.60	8.60	8.60	
Depth	0.94	2.81	4.15	4.48	4.28	3.64	2.58	1.69	1.12	0.67	0.22	
Area	8.1	24.1	35.6	38.5	36.8	31.2	22.1	14.5	9.6	5.8	1.9	
KM 199	78.2	cms	16.58 l/sec remaining									
Conc.	222	227	230	232	233	232	230	226	220	214	206	8.6
Vel.	0.13	0.28	0.37	0.40	0.38	0.34	0.27	0.20	0.15	0.10	0.04	
W.P.	8.79	a.79	8.63	8.59	8.59	8.65	8.66	8.62	8.60	8.60	8.60	
Depth	0.94	2.81	4.15	4.48	4.28	3.64	2.58	1.69	1.12	0.67	0.22	
Area	8.1	24.1	35.6	38.5	36.8	31.2	22.1	14.5	9.6	5.8	1.9	
KM 200	78.2	cms	16.58 l/sec remaining									
Conc.	245	255	263	269	273	273	272	267	259	248	235	12.1
Vel.	0.18	0.32	0.33	0.31	0.30	0.29	0.27	0.25	0.21	0.15	0.07	
W.P.	12.32	12.15	12.14	12.14	12.14	12.14	12.14	12.14	12.15	12.15	12.15	
Depth	1.12	2.41	2.51	2.35	2.20	2.08	1.92	1.71	1.39	0.89	0.30	
Area	13.5	29.3	30.5	28.5	26.8	25.3	23.3	20.7	16.8	10.8	3.7	
KM 201	78.4	cms	16.58 l/sec remaining									
Conc.	245	255	262	267	271	271	270	264	256	246	233	12.1
Vel.	0.17	0.30	0.31	0.30	0.28	0.27	0.26	0.23	0.20	0.15	0.06	
W.P.	12.32	12.15	12.14	12.14	12.14	12.14	12.15	12.15	12.15	12.16	12.16	
Depth	1.18	2.55	2.65	2.48	2.33	2.20	2.03	1.80	1.46	0.94	0.32	
Area	14.3	30.9	32.2	30.1	28.3	26.8	24.6	21.9	17.8	11.4	3.9	
KM 202	78.7	cms	16.57 l/sec remaining									
Conc.	244	254	261	267	270	271	269	264	256	245	233	12.1
Vel.	0.17	0.30	0.31	0.30	0.28	0.27	0.26	0.24	0.20	0.15	0.06	
W.P.	12.32	12.15	12.15	12.15	12.15	12.15	12.15	12.15	12.15	12.16	12.16	
Depth	1.18	2.55	2.65	2.48	2.33	2.21	2.03	1.80	1.47	0.94	0.32	
Area	14.3	31.0	32.2	30.1	28.3	26.8	24.6	21.9	17.8	11.4	3.9	
KM 203	78.9	cms	16.57 l/sec remaining									
Conc.	243	254	261	266	270	270	268	263	255	245	232	12.1
Vel.	0.17	0.30	0.31	0.30	0.28	0.27	0.26	0.24	0.20	0.15	0.07	
W.P.	12.33	12.15	12.15	12.15	12.15	12.15	12.15	12.15	12.16	12.16	12.16	
Depth	1.18	2.55	2.66	2.48	2.33	2.21	2.03	1.81	1.47	0.94	0.32	
Area	14.3	31.0	32.3	30.2	28.4	26.8	24.6	21.9	17.8	11.4	3.9	
KM 204	79.1	cms	16.57 l/sec remaining									
Conc.	242	253	260	265	269	269	268	262	254	244	231	12.2
Vel.	0.17	0.30	0.31	0.30	0.28	0.27	0.26	0.24	0.20	0.15	0.07	
W.P.	12.33	12.16	12.15	12.15	12.15	12.15	12.15	12.15	12.16	12.16	12.17	
Depth	1.18	2.55	2.66	2.49	2.34	2.21	2.03	1.81	1.47	0.94	0.32	
Area	14.4	31.0	32.3	30.2	28.4	26.8	24.7	22.0	17.8	11.4	3.9	
KM 205	79.3	cms	16.57 l/sec remaining									
Conc.	242	252	259	264	268	268	267	262	254	243	231	12.2
Vel.	0.17	0.30	0.31	0.30	0.29	0.27	0.26	0.24	0.20	0.15	0.07	
W.P.	12.33	12.16	12.16	12.16	12.15	12.16	12.16	12.16	12.16	12.17	12.17	
Depth	1.18	2.55	2.66	2.49	2.34	2.21	2.03	1.81	1.47	0.94	0.32	
Area	14.4	31.0	32.3	30.2	28.4	26.9	24.7	22.0	17.9	11.4	3.9	
KM 206	79.5	cms	16.57 l/sec remaining									
Conc.	241	251	258	264	267	268	266	261	253	242	230	12.2
Vel.	0.17	0.30	0.31	0.30	0.29	0.27	0.26	0.24	0.20	0.15	0.07	
W.P.	12.34	12.16	12.16	12.16	12.16	12.16	12.16	12.16	12.16	12.17	12.17	
Depth	1.18	2.55	2.66	2.49	2.34	2.21	2.03	1.81	1.47	0.94	0.32	
Area	14.4	31.1	32.4	30.3	28.4	26.9	24.7	22.0	17.9	11.5	3.9	
KM 207	79.7	cms	16.57 l/sec remaining									
Conc.	240	251	258	263	267	267	265	260	252	242	229	12.2
Vel.	0.17	0.31	0.31	0.30	0.29	0.27	0.26	0.24	0.20	0.15	0.07	
W.P.	12.34	12.16	12.16	12.16	12.16	12.16	12.16	12.16	12.17	12.17	12.17	
Depth	1.18	2.56	2.66	2.49	2.34	2.21	2.03	1.81	1.47	0.94	0.32	
Area	14.4	31.1	32.4	30.3	28.5	26.9	24.7	22.0	17.9	11.5	3.9	
KM 208	79.9	cms	16.57 l/sec remaining									
Conc.	240	250	257	262	266	266	265	259	251	241	229	12.2
Vel.	0.17	0.31	0.31	0.30	0.29	0.28	0.26	0.24	0.20	0.15	0.07	
W.P.	12.34	12.17	12.16	12.16	12.16	12.16	12.16	12.16	12.17	12.17	12.18	
Depth	1.18	2.56	2.67	2.49	2.34	2.21	2.04	1.81	1.47	0.94	0.32	

W.P.	15.15	15.10	15.10	15.10	15.10	15.10	15910	15.10	15.10	15.10	15.24	
Depth	0.60	1.24	1.35	1.54	1.73	1.83	1.88	1.95	2.05	2.06	1.01	
Area	9.1	18.7	20.4	23.2	26.1	27.7	28.4	29.5	31.0	31.1	15.2	
KM 210	80.4 **cms**			16.57 **l/sec** remaining								
Conc.	231	241	249	251	239	239	238	249	242	232	219	15.5
Vel.	0.17	0.28	0.27	0.26	0.25	0.23	0.18	0.12	0.11	0.11	0.05	
W.P.	15.75	15.48	15.48	15.48	15.48	15.49	15.50	15.50	15.49	15.49	15.49	
Depth	1.52	3.05	2.94	2.75	2.57	2.27	1.73	1.00	0.88	0.84	0.28	
Area	23.6	47.2	45.5	42.6	39.8	35.2	26.7	15.6	13.6	13.1	4.3	
KM 211	80.6 **cms**			16.57 **l/sec** remaining								
Conc.	247	261	270	273	264	243	244	252	254	261	247	17.4
Vel.	0.19	0.31	0.30	0.28	0.25	0.22	0.21	0.21	0.18	0.13	0.06	
W.P.	17.60	17.44	17.44	17.44	17.44	17.44	17.44	17.44	17.44	17.44	17.45	
Depth	1.18	2.22	2.10	1.95	1.67	1.43	1.30	1.28	1.08	0.72	0.26	
Area	20.5	38.8	36.6	34.0	29.2	24.9	22.7	22.2	18.9	12.5	4.6	
KM 212	80.8 **cms**			16.57 **l/sec** remaining								
Conc.	230	239	245	252	255	255	254	249	242	233	222	11.9
Vel.	0.12	0.23	0.28	0.31	0.31	0.29	0.25	0.21	0.19	0.15	0.08	
W.P.	12.05	11.94	11.93	11.92	11.92	11.92	11.93	11.92	11.92	11.93	11.95	
Depth	0.84	2.07	2.73	3.10	3.11	2.83	2.35	1.87	1.53	1.15	0.46	
Area	10.0	24.6	32.6	**36.9**	37.1	33.7	27.9	22.3	18.2	13.7	5.5	
KM 213	81.0 **cms**			16.57 **l/sec** remaining								
Conc.	229	238	245	251	253	254	252	247	240	231	220	11.9
Vel.	0.11	0.22	0.27	0.29	0.30	0.28	0.24	0.20	0.18	0.14	0.07	
W.P.	12.05	11.95	11.93	11.92	11.92	11.93	11.93	11.93	11.92	11.93	11.96	
Depth	0.89	2.19	2.89	3.28	3.29	2.99	2.48	1.98	1.62	1.21	0.48	
Area	10.6	26.1	34.5	39.1	39.2	35.6	29.6	23.6	19.2	14.5	5.8	
KM 214	81.2 **cms**			16.57 **l/sec** remaining								
Conc.	229	237	244	250	252	253	251	246	239	230	219	11.9
Vel.	0.11	0.22	0.27	0.29	0.30	0.28	0.24	0.20	0.18	0.14	0.07	
W.P.	12.05	11.95	11.93	11.92	11.92	11.93	11.93	11.93	11.92	11.93	11.96	
Depth	0.89	2.19	2.89	3.28	3.29	2.99	2.48	1.98	1.62	1.22	0.48	
Area	10.6	26.1	34.5	39.1	39.3	35.6	29.6	23.7	19.3	14.5	5.8	
KM 215	81.4 **cms**			16.56 **l/sec** remaining								
Conc.	234	245	253	258	262	264	262	258	250	240	227	12.2
Vel.	0.19	0.34	0.35	0.33	0.32	0.31	0.29	0.26	0.23	0.16	0.07	
W.P.	12.36	12.19	12.18	12.18	12.18	12.18	12.18	12.18	12.19	12.19	12.19	
Depth	1.08	2.33	2.43	2.27	2.13	2.02	1.86	1.65	1.34	0.86	0.29	
Area	13.1	28.4	29.6	27.7	26.0	24.6	22.6	20.1	16.4	10.5	3.6	
KM 216	81.7 **cms**			16.56 **l/sec** remaining								
Conc.	233	244	253	258	261	264	262	258	250	239	226	12.2
Vel.	0.20	0.35	0.36	0.34	0.33	0.31	0.29	0.27	0.23	0.17	0.07	
W.P.	12.37	12.19	12.18	12.19	12.18	12.18	12.19	12.19	12.19	12.20	12.20	
Depth	1.05	2.28	2.37	2.22	2.09	1.97	1.81	1.62	1.31	0.84	0.29	
Area	12.8	27.7	28.9	27.0	25.4	24.0	22.1	19.7	**16.0**	10.2	3.5	
KM 217	82.0 **cms**			16.56 **l/sec** remaining								
Conc.	232	244	251	257	260	263	261	257	250	239	226	12.2
Vel.	0.20	0.35	0.36	0.34	0.33	0.31	0.30	0.27	0.23	0.17	0.07	
W.P.	12.37	12.19	12.19	12.19	12.19	12.19	12.19	12.19	12.19	12.20	12.20	
Depth	1.06	2.28	2.37	2.22	2.09	1.97	1.82	1.62	1.31	0.84	0.29	
Area	12.9	27.8	28.9	27.1	25.4	24.1	22.1	19.7	16.0	10.3	3.5	
KM 218	82.2 **cms**			16.56 **l/sec** remaining								
Conc.	232	243	251	256	259	262	260	256	249	238	225	12.2
Vel.	0.20	0.35	0.36	0.34	0.33	0.31	0.30	0.27	0.23	0.17	0.07	
W.P.	12.37	12.20	12.19	12.19	12.19	12.19	12.19	12.19	12.20	12.20	12.20	
Depth	1.06	2.28	2.38	2.22	2.09	1.98	1.82	1.62	1.31	0.84	0.29	
Area	12.9	27.8	29.0	27.1	25.5	24.1	22.2	19.7	16.0	10.3	3.5	
KM 219	82.5 **cms**			16.56 **l/sec** remaining								
Conc.	231	242	250	255	259	261	259	256	248	237	225	12.2
Vel.	0.20	0.35	0.36	0.34	0.33	0.32	0.30	0.27	0.23	0.17	0.08	
W.P.	12.38	12.20	12.19	12.19	12.19	12.19	12.20	12.20	12.20	12.21	12.21	
Depth	1.06	2.28	2.38	2.22	2.09	1.98	1.82	1.62	1.32	0.84	0.29	

W.P.	21.12	21.03	21.01	21.01	21.02	21.01	21.02	21.04	21.01	21.01	21.01	
Depth	1.49	3.64	4.56	4.64	4.03	3.32	2.60	1.42	0.68	0.64	0.30	
Area	31.3	76.5	95.9	97.6	84.6	69.8	54.6	29.8	14.4	13.5	6.3	
KM 221	83.0 **cms**			16.56 **l/sec** remaining								
Conc.	215	226	230	232	214	198	195	203	219	211	201	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.12	21.04	21.02	21.02	21.02	21.02	21.02	21.04	21.01	21.01	21.02	
Depth	1.07	2.62	3.28	3.34	2.90	2.39	1.87	1.02	0.49	0.46	0.22	
Area	22.6	55.1	69.0	70.2	60.9	50.2	39.3	21.4	10.4	9.7	4.5	
KM 222	83.2 **cms**			16.56 **l/sec** remaining								
Conc.	214	225	229	232	214	197	194	202	218	211	200	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.13	21.04	21.02	21.02	21.03	21.02	21.03	21.04	21.02	21.02	21.02	
Depth	1.07	2.62	3.28	3.34	2.90	2.39	1.87	1.02	0.49	0.46	0.22	
Area	22.6	55.1	69.0	70.3	60.9	50.2	39.3	21.4	10.4	9.7	4.6	
KM 223	83.5 **cms**			16.56 **l/sec** remaining								
Conc.	214	224	228	231	213	197	193	202	217	210	199	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.13	21.04	21.03	21.02	21.03	21.03	21.03	21.05	21.02	21.02	21.03	
Depth	1.07	2.62	3.29	3.34	2.90	2.39	1.87	1.02	0.50	0.46	0.22	
Area	22.6	55.1	69.1	70.3	60.9	50.3	39.3	21.4	10.4	9.8	4.6	
KM 224	83.7 **cms**			16.56 **l/sec** remaining								
Conc.	213	224	228	230	212	196	193	201	217	209	199	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.14	21.05	21.03	21.03	21.04	21.03	21.04	21.05	21.03	21.03	21.03	
Depth	1.08	2.62	3.29	3.35	2.90	2.39	1.87	1.02	0.50	0.47	0.22	
Area	22.6	55.2	69.1	70.3	61.0	50.3	39.3	21.5	10.4	9.8	4.6	
KM 225	84.0 **cms**			16.56 **l/sec** remaining								
Conc.	212	223	227	230	212	196	192	201	216	209	198	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.14	21.05	21.03	21.03	21.04	21.03	21.04	21.06	21.03	21.03	21.04	
Depth	1.08	2.62	3.29	3.35	2.90	2.39	1.87	1.02	0.50	0.47	0.22	
Area	22.6	55.2	69.2	70.4	61.0	50.3	39.3	21.5	10.5	9.8	4.6	
KM 226	84.3 **cms**			16.55 **l/sec** remaining								
Conc.	212	222	226	229	211	195	192	200	215	208	198	21.0
Vel.	0.10	0.19	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.15	21.06	21.04	21.04	21.04	21.04	21.05	21.06	21.04	21.04	21.04	
Depth	1.08	2.63	3.29	3.35	2.90	2.39	1.87	1.02	0.50	0.47	0.22	
Area	22.6	55.2	69.2	70.4	61.0	50.3	39.4	21.5	10.5	9.9	4.6	
KM 227	84.5 **cms**			16.55 **l/sec** remaining								
Conc.	211	222	226	228	210	195	191	199	215	207	197	21.0
Vel.	0.10	0.20	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.05	0.03	
W.P.	21.15	21.06	21.04	21.04	21.05	21.04	21.05	21.07	21.04	21.04	21.04	
Depth	1.08	2.63	3.29	3.35	2.90	2.39	1.87	1.02	0.50	0.47	0.22	
Area	22.7	55.3	69.3	70.5	61.0	50.4	39.4	21.5	10.5	9.9	4.6	
KM 228	84.8 **cms**			16.55 **l/sec** remaining								
Conc.	210	221	225	228	210	194	191	**199**	214	207	196	21.0
Vel.	0.10	0.20	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.06	0.03	
W.P.	21.15	21.07	21.05	21.05	21.05	21.05	21.05	21.07	21.04	21.04	21.05	
Depth	1.08	2.63	3.29	3.35	2.90	2.39	1.87	1.02	0.50	0.47	0.22	
Area	22.7	55.3	69.3	70.5	61.1	50.4	39.4	21.5	10.6	9.9	4.6	
KM 229	85.0 **cms**			16.55 **l/sec** remaining								
Conc.	210	220	224	227	209	193	190	198	213	206	196	21.0
Vel.	0.10	0.20	0.23	0.23	0.21	0.18	0.15	0.10	0.06	0.06	0.03	
W.P.	21.16	21.07	21.05	21.05	21.06	21.05	21.06	21.07	21.05	21.05	21.05	
Depth	1.08	2.63	3.29	3.35	2.90	2.40	1.87	1.02	0.50	0.47	0.22	
Area	22.7	55.4	69.4	70.6	61.1	50.4	39.4	21.5	10.6	9.9	4.6	
KM 230	85.3 **cms**			16.55 **l/sec** remaining								
Conc.	192	202	212	219	225	229	231	230	227	222	215	13.5
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	-0.22	0.13	
W.P.	13.53	13.54	13.54	13.54	13.53	13.52	13.52	13.52	13.52	13.52	14.09	
Depth	0.23	0.82	1.56	2.33	3.03	3.48	3.63	3.83	4.17	4.17	2.00	

W.P.	13.54	13.55	13.55	13.55	13.55	13.53	13.53	13.54	13.54	13.54	14.11	
Depth	0.23	0.82	1.56	2.33	3.03	3.48	3.63	3.83	4.18	4.18	2.00	
Area	3.2	11.1	21.1	31.5	41.0	**47.1**	49.2	51.8	56.5	56.5	27.1	
KM 232	85.8 **cms**			16.55 **l/sec** remaining								
Conc.	190	201	210	218	224	228	229	229	226	220	213	13.5
Vel.	0.03	**0.07**	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.56	13.57	13.57	13.57	13.56	13.55	13.55	13.55	13.55	13.55	14.13	
Depth	0.24	0.82	1.56	2.33	3.03	3.48	3.64	3.84	4.18	4.18	2.00	
Area	3.2	11.1	21.1	31.5	41.1	47.2	49.3	52.0	56.7	56.6	27.1	
KM 233	86.0 **cms**			16.55 **l/sec** remaining								
Conc.	189	200	209	217	223	227	229	228	225	220	213	13.6
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.57	13.58	13.59	13.59	13.58	13.57	13.56	13.57	13.57	13.57	14.14	
Depth	0.24	0.82	1.56	2.33	3.03	3.49	3.64	3.84	4.19	4.19	2.01	
Area	3.2	11.1	21.1	31.5	41.2	47.3	49.4	52.1	56.8	56.8	27.2	
KM 234	86.3 **cms**			16.55 **l/sec** remaining								
Conc.	189	199	209	216	222	226	228	227	224	219	212	13.6
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.59	13.60	13.60	13.60	13.59	13.58	13.58	13.58	13.58	13.58	14.16	
Depth	0.24	0.82	1.55	2.32	3.04	3.49	3.65	3.85	4.19	4.19	2.01	
Area	3.2	11.3.	21.1	**31.6**	41.2	47.4	49.5	52.2	56.9	56.9	27.3	
KM 235	86.6 **cms**			16.55 **l/sec** remaining								
Conc.	188	199	208	216	222	225	227	226	223	218	211	13.6
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.60	13.61	13.62	13.62	13.61	13.60	13.59	13.60	13.60	13.60	14.18	
Depth	0.24	0.82	1.55	2.32	3.04	3.49	3.65	3.85	4.20	4.20	2.01	
Area	3.2	11.1	21.1	31.6	41.3	47.5	49.7	52.3	57.1	57.1	27.3	
KM 236	86.8 **cms**			16.54 **l/sec** remaining								
Conc.	187	198	207	215	221	225	226	226	223	218	**210**	13.6
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.62	13.63	13.63	13.63	13.63	13.61	13.61	13.61	13.61	13.61	14.19	
Depth	0.24	0.82	1.55	2.32	3.04	3.50	3.66	3.86	4.20	4.20	2.01	
Area	3.2	11.2	21.1	31.6	41.3	47.6	49.8	52.5	57.2	57.2	27.4	
KM 237	87.1 **cms**			16.54 **l/sec** remaining								
Conc.	186	197	206	214	220	224	226	225	222	217	210	13.6
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.22	0.22	0.13	
W.P.	13.63	13.64	13.65	13.65	13.64	13.63	13.63	13.63	13.63	13.63	14.21	
Depth	0.24	0.82	1.55	2.32	3.04	3.50	3.66	3.86	4.21	4.21	2.02	
Area	3.2	11.2	21.1	31.7	41.4	47.7	49.9	52.6	57.3	57.3	27.5	
KM 238	87.3 **cms**			16.54 **l/sec** remaining								
Conc.	186	197	206	214	220	224	225	224	221	215	207	14.0
Vel.	0.03	0.07	0.11	0.15	0.18	0.20	0.20	0.21	0.23	0.21	0.11	
W.P.	14.02	14.03	14.03	14.03	14.03	14.01	14.01	14.02	14.01	14.05	14.37	
Depth	0.24	0.85	1.60	2.40	3.12	3.55	3.68	3.92	4.21	3.76	1.60	
Area	3.4	11.8	22.5	33.6	43.8	49.8	51.6	54.9	59.0	52.6	22.5	
KM 239	87.6 **cms**			16.54 **l/sec** remaining								
Conc.	185	196	205	213	219	223	224	223	220	214	207	14.0
Vel.	0.03	**0.07**	0.11	0.15	0.18	0.20	0.21	0.21	0.23	0.21	0.11	
W.P.	14.04	**14.05**	**14.05**	**14.05**	**14.04**	**14.03**	**14.03**	**14.03**	**14.03**	**14.07**	**14.39**	
Depth	**0.24**	**0.85**	**1.60**	**2.40**	**3.13**	**3.56**	**3.69**	**3.92**	**4.22**	**3.76**	**1.60**	
Area	**3.4**	**11.9**	**22.5**	**33.6**	**43.8**	**49.9**	**51.8**	**55.0**	**59.1**	**52.7**	22.5	
KM 240	87.8 **cms**			16.54 **l/sec** remaining								
Conc.	226	232	237	241	243	243	242	239	235	229	222	9.7
Vel.	0.12	0.23	0.26	**0.26**	0.25	0.24	0.24	0.23	0.23	0.20	0.10	
W.P.	10.19	9.73	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.74	9.97	
Depth	1.39	3.15	3.57	3.56	3.45	3.32	3.21	3.13	2.99	2.47	1.02	
Area	13.5	30.6	34.6	34.5	33.5	32.2	31.2	30.3	29.0	23.9	9.9	
KM 241	88.3 **cms**			16.54 **l/sec** remaining								
Conc.	224	230	235	238	240	240	239	236	232	227	221	9.7
Vel.	0.11	0.21	0.23	0.23	0.22	0.22	0.21	0.21	0.20	0.18	0.09	
W.P.	10.19	9.73	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.74	9.97	
Depth	1.57	3.56	4.03	4.02	3.90	3.76	3.63	3.54	3.37	2.79	1.16	

W.P.	10.19	9.74	9.70	9.70	9.70	9.70	9.70	**9.70**	**9.70**	**9.74**	**9.97**	
Depth	1.57	**3.56**	4.03	4.02	3.91	3.76	3.63	3.54	3.38	**2.79**	1.16	
Area	15.2	**34.6**	**39.1**	39.0	37.9	36.5	35.2	34.3	32.7	27.0	11.2	
KM 243	89.3	**cms**			**16.54 l/sec** remaining							
Conc.	222	**228**	232	235	237	237	236	234	230	225	219	9.7
Vel.	0.11	**0.21**	0.23	0.23	0.23	0.22	0.22	0.21	0.20	0.18	0.09	
W.P.	10.19	**9.74**	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.75	9.97	
Depth	1.57	**3.57**	4.03	4.03	3.91	3.76	3.63	3.54	3.38	2.79	1.16	
Area	15.2	**34.6**	39.1	39.0	37.9	36.5	35.3	34.3	32.8	27.1	11.2	
KM 244	89.7	**cms**			16.54 **l/sec** remaining							
Conc.	221	226	231	234	236	236	235	233	**229**	224	217	9.7
Vel.	0.11	0.21	0.23	0.23	0.23	0.22	0.22	0.21	0.20	0.18	0.09	
W.P.	10.20	9.74	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.75	9.97	
Depth	1.57	3.57	4.03	4.03	3.91	3.76	3.64	3.54	3.38	2.79	1.16	
Area	15.2	34.6	39.1	39.1	37.9	36.5	35.3	34.4	32.8	27.1	11.2	
KM 245	90.2	**cms**			16.54 **l/sec** remaining							
Conc.	219	225	230	233	235	235	234	231	227	222	216	9.7
Vel.	0.11	0.21	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.18	0.09	
W.P.	10.20	9.74	9.70	9.70	9.70	9.70	9.70	9.70	9.70	9.75	9.98	
Depth	1.57	3.57	4.04	4.03	3.91	3.77	3.64	3.54	3.38	2.79	1.16	
Area	15.2	34.6	39.2	39.1	38.0	36.5	35.3	34.4	32.8	27.1	11.3	
KM 246	90.7	**cms**			16.54 **l/sec** remaining							
Conc.	218	224	228	231	233	234	233	230	226	221	215	9.7
Vel.	0.11	0.21	0.23	0.23	0.23	0.22	0.22	0.21	0.21	0.18	0.09	
W.P.	10.20	9.74	9.70	9.70	9.70	9.70	9.70	9.70	9.71	9.75	9.98	
Depth	1.57	3.57	4.04	4.03	3.91	3.77	3.64	3.55	3.38	2.79	1.16	
Area	15.2	34.6	39.2	39.1	38.0	36.6	35.3	34.4	32.8	27.1	11.3	
KM 247	91.1	**cms**			16.53 **l/sec** remaining							
Conc.	217	223	227	230	232	232	231	**229**	225	220	214	9.7
Vel.	0.11	0.22	0.24	0.24	0.23	0.22	0.22	0.21	0.21	0.18	0.09	
W.P.	10.20	9.74	9.71	9.71	9.71	9.71	9.71	9.71	9.71	9.75	9.98	
Depth	1.57	3.57	4.04	4.03	3.92	3.77	3.64	3.55	3.39	2.79	1.16	
Area	15.2	34.6	39.2	39.1	38.0	36.6	35.4	34.4	32.9	27.1	11.3	
KM 248	91.6	**cms**			16.53 **l/sec** remaining							
Conc.	216	221	226	229	231	231	230	228	**224**	219	213	9.7
Vel.	0.12	0.22	0.24	0.24	0.23	0.23	0.22	0.22	**0.21**	0.18	0.09	
W.P.	10.20	9.74	9.71	9.71	9.71	9.71	9.71	9.71	**9.71**	9.75	9.98	
Depth	1.57	3.57	4.04	4.04	3.92	3.77	3.64	3.55	**3.39**	2.80	1.16	
Area	15.2	34.7	39.2	39.2	38.0	36.6	35.4	34.4	**32.9**	27.1	11.3	
KM 249	92.1	**cms**			16.53 **l/sec** remaining							
Conc.	215	220	225	228	230	230	229	226	**223**	218	211	9.7
Vel.	0.12	0.22	0.24	0.24	0.23	0.23	0.22	0.22	**0.21**	0.18	0.09	
W.P.	10.20	9.75	9.71	9.71	9.71	9.71	9.71	9.71	**9.71**	9.75	9.98	
Depth	1.57	3.57	4.04	4.04	3.92	3.77	3.65	3.55	**3.39**	2.80	1.16	
Area	15.2	34.7	39.2	39.2	38.0	36.6	35.4	34.5	**32.9**	27.2	11.3	
KM 250	92.6	**cms**			16.53 **l/sec** remaining							
Conc.	178	**191**	199	210	218	223	226	224	220	212	202	11.1
Vel.	0.12	**0.23**	0.28	0.35	0.42	0.46	0.49	0.51	0.47	0.35	0.17	
W.P.	11.18	**11.15**	11.15	11.16	11.15	11.14	11.14	11.14	11.18	11.18	11.24	
Depth	0.33	**0.81**	1.08	1.46	1.88	2.13	2.29	2.44	2.16	1.46	0.57	
Area	3.7	**9.0**	12.0	16.2	21.0	23.8	25.5	27.2	24.0	16.3	6.3	
KM 251	92.6	**cms**			16.53 **l/sec** remaining							
Conc.	186	**196**	204	211	216	218	218	216	212	206	197	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.16	11.15	11.14	11.14	11.14	11.18	11.18	11.24	
Depth	0.48	1.17	1.55	2.09	2.70	3.06	3.28	3.50	3.09	2.10	0.81	
Area	5.4	13.0	17.3	23.3	30.1	34.1	36.6	39.0	34.5	23.4	9.1	
KM 252	92.7	**cms**			16.53 **l/sec** remaining							
Conc.	185	195	204	211	215	218	218	216	212	206	197	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.16	11.15	11.14	11.14	11.14	11.18	**11.18**	**11.25**	
Depth	0.48	1.17	1.55	2.09	2.70	3.06	3.28	3.50	3.10	2.10	0.81	

W.P.	11.18	11.15	11.15	11.16	11.15	11.14	11.14	11.14	11.18	11.18	11.25	
Depth	0.48	1.17	1.55	2.10	2.70	3.06	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.0	17.3.	23.3	30.1	34.1	36.6	39.1	34.5	23.4	9.1	
KM 254	92.8 **cms**			16.53 **l/sec** remaining								
Conc.	185	195	204	210	215	218	218	216	212	205	197	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.16	11.15	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.48	1.17	1.56	2.10	2.70	3.06	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.0	17.3	23.4	30.1	34.1	36.6	39.1	34.5	23.4	9.1	
KM 255	92.9 **cms**			16.53 **l/sec** remaining								
Conc.	185	195	204	210	215	218	218	216	211	205	197	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.16	11.15	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.48	1.17	1.56	2.10	2.70	3.07	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.0	17.3	23.4	30.1	34.2	36.6	39.1	34.5	23.4	9.1	
KM 256	93.0 **cms**			16.53 **l/sec** remaining								
Conc.	185	195	203	210	215	217	218	216	211	205	197	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.16	11.15	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.48	1.17	1.56	2.10	2.71	3.07	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.1	17.4	**23.4**	30.1	34.2	36.7	39.1	34.5	23.4	9.1	
KM 257	93.0 **cms**			16.53 **l/sec** remaining								
Conc.	185	195	203	210	215	217	218	215	211	205	196	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.17	11.15	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.48	1.17	1.56	2.10	2.71	3.07	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.1	17.4	23.4	30.2	34.2	36.7	39.1	34.6	23.4	9.1	
KM 258	93.1 **cms**			16.53 **l/sec** remaining								
Conc.	185	195	203	210	215	217	217	215	211	205	196	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.17	11.16	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.48	1.17	1.56	2.10	2.71	3.07	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.1	17.4	23.4	30.2	34.2	36.7	39.1	34.6	23.5	9.1	
KM 259	93.1 **cms**			16.53 **l/sec** remaining								
Conc.	184	194	203	210	214	217	217	215	211	204	196	11.1
Vel.	0.08	0.16	0.20	0.25	0.30	0.33	0.35	0.36	0.33	0.25	0.12	
W.P.	11.18	11.15	11.15	11.17	11.16	11.15	11.15	11.15	11.19	11.18	11.25	
Depth	0.49	1.17	1.56	2.10	2.71	3.07	3.29	3.51	3.10	2.10	0.81	
Area	5.4	13.1	17.4	23.4	30.2	34.2	36.7	39.1	34.6	23.5	9.1	
KM 260	93.2 **cms**			16.53 **l/sec** remaining								
Conc.	211	218	223	227	229	230	229	226	222	216	209	10.7
Vel.	0.12	0.21	0.21	0.22	0.23	0.23	0.24	0.23	0.21	0.17	0.10	
W.P.	11.00	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.71	10.67	10.86	
Depth	1.55	3.15	3.27	3.42	3.57	3.70	3.77	3.71	3.12	2.47	1.17	
Area	16.6	33.6	34.9	36.5	38.0	39.5	40.2	39.6	33.3	26.3	12.5	
KM 261	93.3 **cms**			16.52 **l/sec** remaining								
Conc.	**210**	218	225	229	232	232	231	228	223	216	208	10.7
Vel.	0.14	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.24	0.20	0.12	
W.P.	11.00	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.71	10.67	10.86	
Depth	1.33	2.71	2.80	2.93	3.06	3.17	3.24	3.19	2.67	2.12	1.01	
Area	14.2	28.9	29.9	31.3	32.7	33.9	34.5	34.0	28.5	22.6	10.8	
KM 262	93.3 **cms**			16.52 **l/sec** remaining								
Conc.	210	218	224	229	232	232	231	228	223	216	208	10.7
Vel.	0.14	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.24	0.20	0.12	
W.P.	11.00	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.71	10.67	10.86	
Depth	1.33	2.71	2.81	2.93	3.06	3.18	3.24	3.19	2.68	2.12	1.01	
Area	14.2	28.9	29.9	31.3	32.7	33.9	34.6	34.0	28.6	22.6	10.8	
KM 263	93.4 **cms**			16.52 **l/sec** remaining								
Conc.	210	218	224	229	231	232	231	228	223	216	208	10.7
Vel.	0.14	0.24	0.25	0.25	0.26	0.27	0.27	0.27	0.24	0.20	0.12	
W.P.	**11.00**	**10.67**	**10.67**	**10.67**	**10.67**	**10.67**	**10.67**	**10.67**	**10.71**	**10.67**	**10.86**	
Depth	**1.34**	2.71	2.81	2.94	3.06	3.18	3.24	3.19	2.68	2.12	1.01	

W.P.	11.00	10.67	10.67	10.67	10.67	10.67	10.67	10.67	10.71	10.68	10.86	
Depth	1.34	2.71	2.81	2.94	3.06	3.18	3.24	3.19	2.68	2.12	1.01	
Area	14.3	28.9	30.0	31.3	32.7	33.9	34.6	34.0	28.6	22.7	10.8	
KM 265	93.5	**cms**		16.52 **l/sec** remaining								
Conc.	181	193	204	213	220	225	226	225	220	213	203	17.7
Vel.	0.05	0.09	0.11	0.13	0.14	0.15	0.16	0.17	0.17	0.16	0.10	
W.P.	17.76	17.74	17.73	17.73	17.73	17.73	17.73	17.73	17.75	17.73	17.99	
Depth	0.64	1.61	2.16	2.60	2.92	3.17	3.55	4.04	3.82	3.54	1.87	
Area	11.4	28.5	38.3	46.1	51.7	56.3	63.0	71.7	67.8	62.8	33.2	
KM 266	93.7	**cms**		16.52 **l/sec** remaining								
Conc.	175	187	197	209	219	226	230	230	226	219	208	17.7
Vel.	0.06	0.11	0.14	0.15	0.17	0.18	0.19	0.21	0.20	0.19	0.12	
W.P.	17.76	17.74	17.74	17.73	17.73	17.73	17.74	17.74	17.75	17.73	17.99	
Depth	0.52	1.30	1.76	2.11	2.37	2.58	2.89	3.28	3.11	2.88	1.52	
Area	9.3	23.1	31.2	37.5	42.0	45.7	51.2	58.2	55.1	51.1	27.0	
KM 267	93.8	**cms**		16.52 **l/sec** remaining								
Conc.	174	187	197	209	219	226	229	229	226	218	208	17.7
Vel.	0.06	0.11	0.14	0.16	0.17	0.18	0.19	0.21	0.20	0.19	0.12	
W.P.	17.76	17.74	17.74	17.73	17.73	17.73	17.74	17.74	17.75	17.73	17.99	
Depth	0.52	1.31	1.76	2.12	2.37	2.58	2.89	3.29	3.11	2.88	1.52	
Area	9.3	23.2	31.2	37.5	42.0	45.8	51.2	58.3	55.1	51.1	27.0	
KM 268	93.9	**cms**		16.52 **l/sec** remaining								
Conc.	174	187	197	208	218	226	229	229	225	218	208	17.7
Vel.	0.06	0.11	0.14	0.16	0.17	0.18	0.19	0.21	0.20	0.19	0.12	
W.P.	17.76	17.74	17.74	17.74	17.73	17.73	17.74	17.74	17.75	17.74	17.99	
Depth	0.53	1.31	1.76	2.12	2.37	2.58	2.89	3.29	3.11	2.88	1.52	
Area	9.3	23.2	31.2	37.5	42.1	45.8	51.2	58.3	55.1	51.1	27.0	
KM 269	94.0	**cms**		16.52 **l/sec** remaining								
Conc.	174	186	197	208	218	225	229	229	225	218	207	17.7
Vel.	0.06	0.11	0.14	0.16	0.17	0.18	0.19	0.21	0.20	0.19	0.12	
W.P.	17.77	17.74	17.74	17.74	17.73	17.74	17.74	17.74	17.75	17.74	17.99	
Depth	0.53	1.31	1.76	2.12	2.37	2.58	2.89	3.29	3.11	2.88	1.52	
Area	9.3	23.2	31.2	37.6	42.1	45.8	51.2	58.3	55.1	51.1	27.0	
KM 270	94.1	**cms**		16.52 **l/sec** remaining								
Conc.	206	213	215	200	173	162	150	151	154	158	166	24.1
Vel.	0.12	0.23	0.23	0.22	0.21	0.17	0.13	0.10	0.07	0.04	0.02	
W.P.	24.23	24.13	24.13	24.12	24.12	24.12	24.12	24.12	24.12	24.12	24.12	
Depth	1.32	3.11	3.16	2.87	2.71	2.07	1.47	1.02	0.65	0.33	0.09	
Area	31.9	75.1	76.2	69.1	65.3	49.9	35.3	24.6	15.8	7.9	2.1	
KM 271	94.2	**cms**		16.52 **l/sec** remaining								
Conc.	215	221	212	196	179	159	153	144	142	162	172	24.1
Vel.	0.14	0.26	0.26	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.23	24.13	24.13	24.12	24.13	24.13	24.12	24.12	24.12	24.12	24.12	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.5	67.5	61.2	57.9	44.2	31.3	21.8	14.0	7.0	1.9	
KM 272	94.3	**cms**		16.51 **l/sec** remaining								
Conc.	215	221	211	196	178	159	153	144	142	162	171	24.1
Vel.	0.14	0.26	0.26	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.24	24.14	24.14	24.13	24.13	24.13	24.13	24.13	24.13	24.13	24.13	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.5	67.5	61.2	57.9	44.2	31.3	21.8	14.0	7.0	1.9	
KM 273	94.4	**cms**		16.51 **l/sec** remaining								
Conc.	215	221	211	195	178	159	152	143	142	161	171	24.1
Vel.	0.14	0.26	0.26	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.24	24.15	24.14	24.13	24.14	24.14	24.13	24.13	24.13	24.13	24.13	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.6	67.5	61.3	57.9	44.2	31.3	21.8	14.0	7.0	1.9	
KM 274	94.5	**cms**		16.51 **l/sec** remaining								
Conc.	215	220	211	195	178	158	152	143	142	161	171	24.1
Vel.	0.14	0.26	0.26	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.25	24.15	24.15	24.14	24.14	24.14	24.14	24.14	24.14	24.14	24.14	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	

W.P.	24.26	24.16	24.15	24.14	24.15	24.15	24.15	24.14	24.14	24.14	24.14	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.6	67.6	61.3	57.9	44.2	31.3	21.8	13.9	7.0	1.9	
KM 276	94.7	**cms**		16.51 **l/sec** remaining								
Conc.	214	220	210	195	178	158	152	143	141	161	171	24.1
Vel.	0.14	0.26	0.27	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.26	24.16	24.16	24.15	24.15	24.15	24.15	24.15	24.15	24.15	24.15	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.6	67.6	61.3	57.9	44.2	31.3	21.8	13.9	7.0	1.9	
KM 277	94.8	**cms**		16.51 **l/sec** remaining								
Conc.	214	219	210	194	177	158	152	143	141	161	170	24.2
Vel.	0.14	0.26	0.27	0.25	0.24	0.19	0.15	0.12	0.08	0.05	0.02	
W.P.	24.27	24.17	24.16	24.15	24.16	24.16	24.16	24.15	24.15	24.15	24.15	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.3	66.7	67.6	61.4	57.9	44.2	31.3	21.8	13.9	7.0	1.9	
KM 278	94.9	**cms**		16.51 **l/sec** remaining								
Conc.	214	219	210	194	177	157	151	142	141	160	170	24.2
Vel.	0.14	0.26	0.27	0.25	0.24	0.20	0.15	0.12	0.08	0.05	0.02	
W.P.	24.27	24.17	24.17	24.16	24.16	24.17	24.16	24.16	24.16	24.16	24.16	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	0.29	0.08	
Area	28.4	66.7	67.6	61.4	57.9	44.2	31.3	21.8	13.9	7.0	1.9	
KM 279	95.0	**cms**		16.51 **l/sec** remaining								
Conc.	213	219	210	194	177	157	151	142	141	160	170	24.2
Vel.	0.14	0.26	0.27	0.25	0.24	0.20	0.15	0.12	0.08	0.05	0.02	
W.P.	24.28	24.18	24.17	24.16	24.17	24.17	24.17	24.16	24.16	24.16	24.16	
Depth	1.17	2.76	2.80	2.54	2.40	1.83	1.30	0.90	0.58	**0.29**	0.08	
Area	28.4	66.7	67.7	61.4	58.0	44.2	31.3	21.8	13.9	7.0	1.9	
KM 280	95.1	**cms**		16.51 **l/sec** remaining								
Conc.	172	176	179	180	180	179	176	172	166	158	150	6.9
Vel.	0.51	0.99	1.07	0.98	0.81	0.62	0.44	0.31	0.22	0.14	0.05	
W.P.	7.94	6.99	6.94	7.01	7.01	7.01	6.97	6.94	6.94	6.94	6.94	
Depth	1.33	2.94	3.24	2.91	2.22	1.53	0.95	0.60	0.39	0.21	0.06	
Area	9.2	20.4	22.5	20.2	15.4	10.6	6.6	4.2	2.7	1.5	0.4	
KM 281	95.2	**cms**		16.51 **l/sec** remaining								
Conc.	170	173	175	176	176	174	171	167	162	155	149	6.9
Vel.	0.36	0.70	0.75	0.69	0.57	0.43	0.31	0.22	0.16	0.10	0.04	
W.P.	7.94	6.99	6.94	7.01	7.01	7.01	6.97	6.95	6.94	6.94	6.94	
Depth	1.93	4.29	4.72	4.24	3.23	2.23	1.39	0.88	0.57	0.31	0.09	
Area	13.4	29.7	32.8	29.4	22.4	15.5	9.6	6.1	3.9	2.1	0.7	
KM 282	95.3	**cms**		16.51 **l/sec** remaining								
Conc.	170	173	175	176	175	174	171	167	161	155	148	6.9
Vel.	0.36	0.70	0.75	0.69	0.57	0.43	0.31	0.22	0.16	0.10	0.04	
W.P.	7.95	6.99	6.94	7.01	7.01	7.01	6.97	6.95	6.95	6.94	6.94	
Depth	1.93	4.29	4.72	4.24	3.23	2.23	1.39	0.88	0.57	0.31	0.09	
Area	13.4	29.8	32.8	29.4	22.4	15.5	9.6	6.1	3.9	2.1	0.7	
KM 283	95.5	**cms**		16.51 **l/sec** remaining								
Conc.	169	172	175	175	175	173	170	166	161	155	148	6.9
Vel.	0.36	0.70	0.75	0.69	0.57	0.43	0.31	0.22	0.16	0.10	0.04	
W.P.	7.95	6.99	6.94	7.01	7.01	7.01	6.98	6.95	6.95	6.95	6.94	
Depth	1.94	4.29	4.72	4.24	3.23	2.23	1.39	0.88	0.57	0.31	0.09	
Area	13.4	29.8	32.8	29.4	22.4	15.5	9.6	6.1	3.9	2.1	0.7	
KM 284	95.6	**cms**		16.51 **l/sec** remaining								
Conc.	169	172	174	175	175	173	170	166	161	155	148	6.9
Vel.	0.36	0.70	0.75	0.69	0.57	0.43	0.31	0.22	0.16	0.10	0.04	
W.P.	7.95	6.99	6.94	7.02	7.02	7.02	6.98	6.95	6.95	6.95	6.95	
Depth	1.94	4.29	4.72	4.24	3.23	2.23	1.39	0.88	0.57	0.31	0.09	
Area	13.4	29.8	32.8	29.4	22.4	15.5	9.6	6.1	3.9	2.1	0.7	
KM 285	95.7	**cms**		16.51 **l/sec** remaining								
Conc.	169	172	174	175	175	173	170	166	161	155	148	6.9
Vel.	0.36	0.70	0.75	0.69	0.57	0.43	0.31	0.22	0.16	0.10	0.04	
W.P.	**7.95**	**7.00**	**6.95**	**7.02**	**7.02**	**7.02**	**6.98**	6.95	6.95	6.95	6.95	
Depth	1.94	4.29	4.72	4.24	3.23	2.23	1.39	0.88	0.57	0.31	0.09	

W.P.	7.96	7.00	**6.95**	**7.02**	**7.02**	**7.02**	**6.98**	**6.96**	**6.95**	**6.95**	**6.95**	
Depth	1.94	4.29	**4.72**	**4.24**	**3.23**	**2.23**	**1.39**	**0.88**	0.57	0.31	**0.09**	
Area	13.5	29.8	**32.8**	**29.4**	**22.5**	**15.5**	**9.6**	**6.1**	3.9	2.1	0.7	
KM 287	95.9	**cms**			**16.51 l/sec** remaining							
Conc.	169	172	**174**	**175**	**174**	**173**	**170**	**166**	**160**	**154**	**147**	7.0
Vel.	0.36	0.70	**0.75**	**0.69**	**0.57**	**0.43**	**0.31**	**0.22**	**0.16**	**0.10**	**0.04**	
W.P.	7.96	7.00	**6.95**	**7.02**	**7.02**	**7.02**	**6.98**	**6.96**	**6.96**	**6.95**	**6.95**	
Depth	1.94	4.29	**4.72**	**4.24**	**3.23**	**2.23**	**1.38**	**0.88**	**0.57**	**0.31**	**0.09**	
Area	13.5	29.8	**32.8**	**29.4**	**22.5**	**15.5**	**9.6**	**6.1**	**3.9**	**2.1**	**0.7**	
KM 288	96.0	**cms**			**16.51 l/sec** remaining							
Conc.	168	171	**174**	**174**	**174**	**172**	**169**	165	160	154	147	7.0
Vel.	0.36	0.70	**0.75**	**0.69**	**0.57**	**0.43**	**0.31**	0.22	0.16	0.10	0.04	
W.P.	7.96	7.00	**6.95**	**7.02**	**7.02**	**7.02**	**6.99**	6.96	6.96	6.96	6.95	
Depth	1.94	4.29	**4.72**	**4.24**	**3.23**	**2.23**	**1.38**	0.88	0.57	0.31	0.09	
Area	13.5	29.9	**32.8**	**29.4**	**22.5**	**15.5**	**9.6**	6.1	3.9	2.1	0.7	
KM 289	96.1	**cms**			**16.50 l/sec** remaining							
Conc.	168	171	**173**	**174**	**174**	**172**	**169**	165	160	154	147	7.0
Vel.	0.36	0.70	**0.75**	**0.69**	**0.57**	**0.44**	**0.31**	0.22	0.16	0.10	0.04	
W.P.	7.96	7.00	**6.95**	**7.03**	**7.03**	**7.03**	**6.99**	6.96	6.96	6.96	6.96	
Depth	1.94	4.30	**4.72**	**4.23**	**3.23**	**2.23**	**1.38**	0.88	0.57	0.31	0.09	
Area	13.5	29.9	**32.9**	**29.4**	**22.5**	**15.5**	**9.6**	6.1	3.9	2.1	0.7	
KM 290	96.2	**cms**			**16.50 l/sec** remaining							
Conc.	186	188	189	190	191	191	190	188	186	184	180	8.1
Vel.	0.08	0.16	0.19	**0.21**	**0.21**	**0.19**	**0.16**	0.13	0.10	0.07	0.03	
W.P.	8.97	8.21	**8.19**	**8.11**	**8.12**	**8.17**	**8.18**	8.18	8.16	8.16	8.16	
Depth	2.80	6.57	**8.39**	**9.54**	**9.44**	**8.30**	**6.75**	5.16	3.64	2.18	0.73	
Area	22.7	53.2	**68.0**	**77.3**	**76.5**	**67.3**	**54.7**	41.8	29.5	17.7	5.9	
KM 291	96.3	**cms**			**16.50 l/sec** remaining							
Conc.	187	190	193	194	195	194	193	191	188	184	180	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	0.19	0.15	0.10	0.05	
W.P.	8.97	8.21	**8.19**	**8.11**	**8.12**	**8.17**	**8.18**	8.18	8.17	8.17	8.17	
Depth	1.93	4.51	**5.76**	**6.55**	**6.49**	**5.70**	**4.64**	3.54	2.50	1.50	0.50	
Area	15.6	36.6	**46.7**	**53.1**	**52.6**	**46.2**	**37.6**	28.7	20.2	12.1	4.0	
KM 292	96.4	**cms**			**16.50 l/sec** remaining							
Conc.	187	190	192	194	194	194	193	**191**	188	184	**179**	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	**0.19**	0.15	0.10	0.05	
W.P.	8.98	8.21	**8.19**	**8.12**	**8.12**	**8.17**	**8.18**	8.18	8.17	8.17	8.17	
Depth	1.93	4.52	**5.77**	**6.56**	**6.49**	**5.71**	**4.64**	3.54	2.50	1.50	0.50	
Area	15.6	36.6	**46.8**	**53.1**	**52.6**	**46.3**	**37.6**	28.7	20.3	12.2	4.1	
KM 293	96.5	**cms**			**16.50 l/sec** remaining							
Conc.	187	190	192	194	194	194	193	190	**187**	184	179	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	0.19	**0.15**	0.10	0.05	
W.P.	8.98	8.22	**8.19**	**8.12**	**8.13**	**8.17**	**8.18**	8.18	**8.17**	8.17	8.17	
Depth	1.93	4.52	**5.77**	**6.56**	**6.49**	**5.71**	**4.64**	3.55	**2.50**	1.50	0.50	
Area	15.6	36.6	**46.8**	**53.2**	**52.6**	**46.3**	**37.6**	28.7	**20.3**	$2.2	4.1	
KM 294	96.6	**cms**			**16.50 l/sec** remaining							
Conc.	186	189	192	193	194	194	192	**190**	187	183	179	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	**0.19**	0.15	0.10	0.05	
W.P.	8.98	8.22	**8.20**	**8.12**	**8.13**	**8.18**	**8.18**	**8.18**	8.17	8.17	8.17	
Depth	1.93	4.52	**5.77**	**6.56**	**6.49**	**5.71**	**4.64**	**3.55**	2.50	1.50	0.50	
Area	15.6	36.7	**46.8**	**53.2**	**52.7**	**46.3**	**37.6**	**28.8**	20.3	12.2	4.1	
KM 295	96.7	**cms**			**16.50 l/sec** remaining							
Conc.	186	189	192	193	194	193	192	190	187	183	179	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	0.19	0.15	0.10	0.05	
W.P.	8.98	8.22	**8.20**	**8.12**	**8.13**	**8.18**	**8.19**	8.19	8.17	8.17	8.17	
Depth	1.93	4.52	**5.77**	**6.56**	**6.50**	**5.71**	**4.64**	3.55	2.50	1.50	0.50	
Area	15.7	36.7	**46.9**	**53.3**	**52.7**	**46.3**	**37.7**	28.8	20.3	12.2	4.1	
KM 296	96.8	**cms**			**16.50 l/sec** remaining							
Conc.	186	189	191	193	193	193	192	190	187	183	179	8.1
Vel.	0.12	0.23	**0.27**	**0.30**	**0.30**	**0.27**	**0.23**	0.19	0.15	0.10	0.05	
W.P.	8.99	8.22	**8.20**	**8.12**	**8.13**	**8.18**	**8.19**	8.19	8.18	8.18	8.18	
Depth	1.93	4.52	**5.78**	**6.57**	**6.50**	**5.71**	**4.64**	3.55	2.50	1.50	0.50	

W.P.	8.99	8.22	8.20	8.13	8.13	8.18	8.19	8.19	8.18	8.18	**8.18**	
Depth	1.93	4.53	5.78	6.57	6.50	5.71	4.64	3.55	2.50	1.50	0.50	
Area	15.7	36.7	46.9	53.3	52.8	46.4	37.7	28.8	20.3	12.2	4.1	
KM 298	97.0 **cms**			16.50 **l/sec** remaining								
Conc.	185	189	191	192	193	193	191	189	186	183	178	8.1
Vel.	0.12	0.23	0.27	0.30	0.30	0.27	0.23	0.19	0.15	0.10	0.05	
W.P.	8.99	8.23	8.20	8.13	8.14	8.19	8.19	8.19	8.18	8.18	8.18	
Depth	1.93	4.53	5.78	6.57	6.50	5.72	4.65	3.55	2.50	1.50	0.50	
Area	15.7	36.8	47.0	53.4	52.8	46.4	37.7	28.8	20.3	12.2	4.1	
KM 299	97.1 **cms**			16.50 **l/sec** remaining								
Conc.	185	188	191	192	193	192	191	189	186	182	178	8.1
Vel.	0.12	0.23	0.27	0.30	0.30	0.27	0.23	0.19	0.15	0.10	0.05	
W.P.	9.00	8.23	8.21	8.13	8.14	8.19	8.20	8.19	8.18	8.18	8.18	
Depth	1.93	4.53	5.79	6.57	6.51	5.72	4.65	3.55	2.50	1.50	0.50	
Area	15.7	36.8	47.0	53.4	52.8	46.4	37.7	28.8	20.3	12.2	4.1	
KM 300	97.2 **cms**			16.50 **l/sec** remaining								
Conc.	173	185	190	195	169	179	184	224	238	254	266	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.63	33.60	33.60	33.60	33.61	33.60	33.62	33.60	33.60	33.63	33.63	
Depth	0.72	1.44	1.41	1.26	1.40	1.72	2.26	2.82	2.82	2.04	0.67	
Area	24.1	48.3	47.3	42.4	46.9	57.9	76.1	94.7	94.9	68.6	22.6	
KM 301	97.4 **cms**			16.49 **l/sec** remaining								
Conc.	173	185	190	195	169	179	183	224	238	254	266	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.63	33.60	33.60	33.60	33.61	33.60	33.62	33.60	33.60	33.63	33.63	
Depth	0.72	1.44	1.41	1.26	1.40	1.72	2.26	2.82	2.82	2.04	0.67	
Area	24.2	48.3	47.3	42.4	47.0	57.9	76.1	94.8	94.9	68.6	22.6	
KM 302	97.5 **cms**			16.49 **l/sec** remaining								
Conc.	173	184	189	195	168	179	183	223	237	254	265	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.63	33.60	33.60	33.60	33.61	33.60	33.62	33.60	33.60	33.63	33.63	
Depth	0.72	1.44	1.41	1.26	1.40	1.72	2.27	2.82	2.82	2.04	0.67	
Area	24.2	48.4	47.4	42.5	47.0	57.9	76.1	94.8	94.9	68.7	22.6	
KM 303	97.6 **cms**			16.49 **l/sec** remaining								
Conc.	172	184	189	195	168	179	183	223	237	253	265	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.63	33.60	33.60	33.60	33.61	33.60	33.62	33.60	33.60	33.63	33.63	
Depth	0.72	1.44	1.41	1.26	1.40	1.72	2.27	2.82	2.83	2.04	0.67	
Area	24.2	48.4	47.4	42.5	47.0	58.0	76.2	94.9	95.0	68.7	22.7	
KM 304	97.7 **cms**			16.49 **l/sec** remaining								
Conc.	172	184	189	194	168	178	183	223	237	253	265	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.64	33.60	33.60	33.61	33.61	33.60	33.62	33.61	33.61	33.63	33.63	
Depth	0.72	1.44	1.41	1.27	1.40	1.73	2.27	2.82	2.83	2.05	0.67	
Area	24.2	48.4	47.4	42.5	47.1	58.0	76.2	94.9	95.0	68.7	22.7	
KM 305	97.8 **cms**			16.49 **l/sec** remaining								
Conc.	172	184	189	194	168	178	182	223	237	253	264	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.11	0.14	0.16	0.16	0.13	0.06	
W.P.	33.64	33.61	33.61	33.61	33.61	33.61	33.62	33.61	33.61	33.63	33.63	
Depth	0.72	1.44	1.41	1.27	1.40	1.73	2.27	2.82	2.83	2.05	0.68	
Area	24.2	48.5	47.5	42.6	47.1	58.0	76.2	94.9	95.0	68.8	22.7	
KM 306	97.9 **cms**			16.49 **l/sec** remaining								
Conc.	172	184	189	194	168	178	182	222	236	253	264	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.12	0.14	0.16	0.16	0.13	0.06	
W.P.	33.64	33.61	33.61	33.61	33.61	33.61	33.62	33.61	33.61	33.63	33.63	
Depth	0.72	1.44	1.41	1.27	1.40	1.73	2.27	2.83	2.83	2.05	0.68	
Area	24.2	48.5	47.5	42.6	47.1	58.1	76.3	95.0	95.1	68.8	22.7	
KM 307	98.0 **cms**			16.49 **l/sec** remaining								
Conc.	172	183	188	194	167	178	182	222	236	252	264	33.6
Vel.	0.06	0.10	0.10	0.09	0.10	0.12	0.14	0.16	0.16	0.13	0.06	
W.P.	33.64	33.61	33.61	33.61	33.61	33.61	33.62	33.61	33.61	33.64	33.63	
Depth	0.72	1.44	1.41	1.27	1.40	1.73	2.27	2.83	2.83	2.05	0.68	

8B - SCENARIO #2

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Spill site: River Km 83 W Spill rate 16.67 l/s
CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Panel Width (m)
KM 83	162.0 cms			16.67 l/sec remaining								
Conc.	6647	0	0	0	0	0	0	0	0	0	0	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.1	141	143	142	140	138	135	131	127	122	117	111	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.2	123	128	132	135	136	137	136	134	131	126	121	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.3	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.4	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.5	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.6	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.7	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.8	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 83.9	122	127	131	134	136	137	136	134	131	127	122	6.0
Vel.	0.42	0.81	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.81	0.42	
W.P.	6.31	6.02	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.02	6.31	
Depth	1.00	2.32	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.32	1.00	
Area	6.0	13.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.9	6.0	
KM 84	162.0 cms			16.67 l/sec remaining								
Conc.	122	127	131	134	136	137	136	134	131	127	122	6.0

KM 85	164.4	**cms**			16.67 **l/sec** remaining							
Conc.	120	125	129	132	134	135	134	132	129	125	120	6.0
Vel.	0.42	0.81	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.81	0.42	
W.P.	6.32	6.03	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.03	6.32	
Depth	1.00	2.32	2.65	2.65	2.65	**2.65**	2.65	2.65	2.65	2.32	1.00	
Area	6.0	13.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.9	6.0	
KM 86	165.7	**cms**			16.67 **l/sec** remaining							
Conc.	119	124	128	131	133	134	133	131	128	124	119	6.0
Vel.	0.43	0.82	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.82	0.43	
W.P.	6.32	6.03	5.99	5.99	5.99	5.99	5.99	5.99	5.99	6.03	6.32	
Depth	1.00	2.33	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.33	1.00	
Area	6.0	13.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.9	6.0	
KM 87	166.9	**cms**			16.67 **l/sec** remaining							
Conc.	118	123	127	130	132	133	132	130	127	123	118	6.0
Vel.	0.43	0.82	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.82	0.43	
W.P.	6.32	6.03	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.03	6.32	
Depth	1.00	2.33	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.33	1.00	
Area	6.0	14.0	15.9	15.9	15.9	15.9	15.9	15.9	15.9	14.0	6.0	
KM 88	168.1	**cms**			16.67 **l/sec** remaining							
Conc.	117	122	126	129	131	132	131	129	126	122	117	6.0
Vel.	0.43	0.83	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.83	0.43	
W.P.	6.32	6.03	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.03	6.32	
Depth	1.00	2.33	2.66	2.66	2.66	2.66	2.66	2.66	2.66	2.33	1.00	
Area	6.0	14.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	14.0	6.0	
KM 89	169.4	**cms**			16.67 **l/sec** remaining							
Conc.	116	121	125	128	130	131	130	128	125	121	116	6.0
Vel.	0.43	0.83	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.83	0.43	
W.P.	6.32	6.04	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.04	6.32	
Depth	1.00	2.33	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.33	1.00	
Area	6.0	14.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	14.0	6.0	
KM 90	170.6	**cms**			16.67 **l/sec** remaining							
Conc.	115	120	124	127	129	130	129	127	124	120	115	6.0
Vel.	0.43	0.84	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.84	0.43	
W.P.	6.33	6.04	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.04	6.33	
Depth	1.00	2.34	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.34	1.00	
Area	6.0	14.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	14.0	6.0	
KM 91	171.8	**cms**			16.66 **l/sec** remaining							
Conc.	114	119	123	126	128	129	128	126	123	119	114	6.0
Vel.	0.44	0.84	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.84	0.44	
W.P.	6.33	6.04	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.04	6.33	
Depth	1.00	2.34	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.34	1.00	
Area	6.0	14.0	16.1	16.1	16.1	16.1	16.1	16.1	16.1	14.0	6.0	
KM 92	173.1	**cms**			16.66 **l/sec** remaining							
Conc.	113	118	122	125	127	128	127	125	122	118	113	6.0
Vel.	0.44	0.85	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.85	0.44	
W.P.	6.33	6.05	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.05	6.33	
Depth	1.00	2.34	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.34	1.00	
Area	6.0	14.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	14.1	6.0	
KM 93	174.3	**cms**			16.66 **l/sec** remaining							
Conc.	113	118	122	125	126	127	126	125	122	118	113	6.0
Vel.	0.44	0.85	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.85	0.44	
W.P.	6.33	6.05	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.05	6.33	
Depth	1.00	2.34	2.68	2.68	2.68	2.68	2.68	2.68	2.68	2.34	1.00	
Area	6.0	14.1	16.1	16.1	16.1	16.1	16.1	16.1	16.1	14.1	6.0	
KM 94	175.5	**cms**			16.66 **l/sec** remaining							
Conc.	111	116	120	123	125	126	126	124	121	117	112	6.0
Vel.	0.44	0.85	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.85	0.44	
W.P.	6.34	6.05	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.05	6.34	
Depth	1.00	2.35	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.35	1.00	
Area	6.0	14.1	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.1	6.0	
KM 95	176.8	**cms**			16.66 **l/sec** remaining							
Conc.	111	115	119	122	125	125	125	123	120	116	111	6.0

KM 96	**178.0 cms**				**16.66 l/sec** remaining							
Conc.	110	115	119	122	124	124	124	122	119	115	111	6.0
Vel.	0.45	0.86	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.86	0.45	
W.P.	6.34	6.06	**6.02**	6.02	6.02	6.02	6.02	6.02	6.02	6.06	6.34	
Depth	1.00	2.35	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.35	1.00	
Area	6.0	14.1	16.2	16.2	16.2	16.2	16.2	16.2	16.2	14.1	6.0	
KM 97	179.2 **cms**				16.66 **l/sec** remaining							
Conc.	109	114	118	121	123	124	123	121	118	115	110	6.0
Vel.	0.45	0.87	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.87	0.45	
W.P.	6.34	6.06	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.06	6.34	
Depth	1.00	2.35	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.35	1.00	
Area	6.0	14.2	16.3	16.3	16.3	16.3	16.3	16.3	16.3	14.2	6.0	
KM 98	180.4 **cms**				16.66 **l/sec** remaining							
Conc.	108	113	117	120	122	123	122	121	118	114	109	6.0
Vel.	0.45	0.87	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.87	0.45	
W.P.	6.35	6.06	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.06	6.35	
Depth	1.00	2.36	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.36	1.00	
Area	6.0	14.2	16.3	16.3	16.3	16.3	16.3	16.3	16.3	14.2	6.0	
KM 99	181.6 **cms**				16.66 **l/sec** remaining							
Conc.	107	112	116	119	121	122	121	120	117	113	108	6.0
Vel.	0.45	0.88	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.88	0.45	
W.P.	6.35	6.06	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.06	6.35	
Depth	1.00	2.36	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.36	1.00	
Area	6.0	14.2	16.3	16.3	16.3	16.3	16.3	16.3	16.3	14.2	6.0	
KM 100	182.9 **cms**				16.66 **l/sec** remaining							
Conc.	106	111	114	117	119	119	119	117	114	111	106	6.2
Vel.	0.38	0.76	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.76	0.38	
W.P.	6.48	6.27	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.27	6.48	
Depth	1.04	2.57	3.06	3.06	3.06	3.06	3.06	3.06	3.06	2.57	1.04	
Area	6.4	15.9	19.0	19.0	19.0	19.0	19.0	19.0	19.0	15.9	6.4	
KM 101	184.1 **cms**				16.66 **l/sec** remaining							
Conc.	106	109	112	114	116	116	116	114	112	109	106	6.2
Vel.	0.30	0.60	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.60	0.30	
W.P.	6.48	6.27	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.27	6.48	
Depth	1.35	3.34	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.34	1.35	
Area	8.4	20.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	20.7	8.4	
KM 102	185.3 **cms**				16.66 **l/sec** remaining							
Conc.	105	109	111	114	115	115	115	114	111	109	105	6.2
Vel.	0.30	0.60	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.60	0.30	
W.P.	6.48	6.27	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.27	6.48	
Depth	1.35	3.34	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.34	1.35	
Area	8.4	20.7	24.7	24.7	24.7	24.7	24.7	24.7	24.7	20.7	8.4	
KM 103	186.6 **cms**				16.66 **l/sec** remaining							
Conc.	104	108	111	113	114	115	114	113	111	108	104	6.2
Vel.	0.30	0.60	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.60	0.30	
W.P.	6.49	6.28	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.28	6.49	
Depth	1.35	3.34	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.34	1.35	
Area	8.4	20.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	20.8	8.4	
KM 104	187.8 **cms**				16.66 **l/sec** remaining							
Conc.	103	107	110	112	113	114	113	112	110	107	103	6.2
Vel.	0.30	0.60	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.60	0.30	
W.P.	6.49	6.28	6.22	6.22	6.22	6.22	6.22	6.22	6.22	6.28	6.49	
Depth	1.35	3.35	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.35	1.35	
Area	8.4	20.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	20.8	8.4	
KM 105	189.0 **cms**				16.66 **l/sec** remaining							
Conc.	103	106	109	111	113	113	113	111	109	106	103	6.2
Vel.	0.31	0.61	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.61	0.31	
W.P.	6.49	6.28	6.22	6.22	6.22	6.22	6.22	6.22	6.22	6.28	6.49	
Depth	1.35	3.35	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.35	1.35	
Area	8.4	20.8	24.9	24.9	24.9	24.9	24.9	24.9	24.9	20.8	8.4	
KM 106	190.3 **cms**				16.66 **l/sec** remaining							
Conc.	102	106	108	111	112	112	112	111	108	106	102	6.2

KM 107 191.5 **cms** 16.66 **l/sec** remaining

Conc.	101	105	108	110	111	112	111	110	108	105	101	**6.2**
Vel.	0.31	0.61	0.70.	0.70	0.70	0.70	0.70	0.70	0.70	0.61	0.31	
W.P.	6.50	6.29	6.22	6.22	6.22	6.22	6.22	6.22	6.22	6.29	6.50	
Depth	1.35	3.36	4.01	4.01	4.01	4.01	4.01	4.01	4.01	3.36	1.35	
Area	8.4	20.9	25.0	25.0	25.0	25.0	25.0	25.0	25.0	20.9	8.4	

KM 108 192.7 **cms** 16.66 **l/sec** remaining

Conc.	101	104	107	109	110	111	110	109	107	104	101	**6.2**
Vel.	0.31	0.61	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.61	0.31	
W.P.	6.50	6.29	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.29	6.50	
Depth	1.35	3.36	4.02	4.02	4.02	4.02	4.02	4.02	4.02	3.36	1.35	
Area	8.4	20.9	25.0	25.0	25.0	25.0	25.0	25.0	25.0	20.9	8.4	

KM 109 194.0 **cms** 16.66 **l/sec** remaining

Conc.	100	103	106	108	110	110	110	108	106	103	100	**6.2**
Vel.	0.31	0.62	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.62	0.31	
W.P.	6.50	6.29	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.29	6.50	
Depth	1.35	3.37	4.02	4.02	4.02	4.02	4.02	4.02	4.02	3.37	1.35	
Area	8.4	21.0	25.1	25.1	25.1	25.1	25.1	25.1	25.1	21.0	8.4	

KM 110 195.2 **cms** 16.66 **l/sec** remaining

Conc.	99	103	106	108	109	109	109	108	106	103	99	**6.2**
Vel.	0.31	0.62	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.62	0.31	
W.P.	6.50	6.30	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.30	6.50	
Depth	1.35	3.37	4.03	4.03	4.03	4.03	4.03	4.03	4.03	3.37	1.35	
Area	8.4	21.0	25.1	25.1	25.1	25.1	25.1	25.1	25.1	21.0	8.4	

KM 111 196.4 **cms** 16.66 **l/sec** remaining

Conc.	99	102	105	107	108	109	108	107	105	102	99	**6.2**
Vel.	0.31	0.62	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.62	0.31	
W.P.	6.51	6.30	6.23	6.23	6.23	6.23	6.23	6.23	6.23	6.30	6.51	
Depth	1.35	3.37	4.04	4.04	4.04	4.04	4.04	4.04	4.04	3.37	1.35	
Area	8.4	21.0	25.2	25.2	25.2	25.2	25.2	25.2	25.2	21.0	8.4	

KM 112 197.7 **cms** 16.66 **l/sec** remaining

Conc.	98	101	104	106	108	108	108	106	104	101	98	**6.2**
Vel.	0.31	0.63	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.63	0.31	
W.P.	6.51	6.30	6.24	6.24	6.24	6.24	6.24	6.24	6.24	6.30	6.51	
Depth	1.36	3.38	4.04	4.04	4.04	4.04	4.04	4.04	4.04	3.38	1.36	
Area	8.5	21.1	25.2	25.2	25.2	25.2	25.2	25.2	25.2	21.1	8.5	

KM 113 198.9 **cms** 16.66 **l/sec** remaining

Conc.	97	101	104	106	107	107	107	106	104	101	97	**6.2**
Vel.	0.32	0.63	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.63	0.32	
W.P.	6.51	6.31	6.24	6.24	6.24	6.24	6.24	6.24	6.24	6.31	6.51	
Depth	1.36	3.38	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.38	1.36	
Area	8.5	21.1	25.3	25.3	25.3	25.3	25.3	25.3	25.3	21.1	8.5	

KM 114 200.1 **cms** 16.66 **l/sec** remaining

Conc.	97	100	103	105	106	107	106	105	103	100	97	**6.2**
Vel.	0.32	0.63	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.63	0.32	
W.P.	6.52	6.31	6.24	6.24	6.24	6.24	6.24	6.24	6.24	6.31	6.52	
Depth	1.36	3.38	4.05	4.05	4.05	4.05	4.05	4.05	4.05	3.38	1.36	
Area	8.5	21.1	25.3	25.3	25.3	25.3	25.3	25.3	25.3	21.1	8.5	

KM 115 201.4 **cms** 16.66 **l/sec** remaining

Conc.	96	99	102	104	106	106	106	104	102	99	96	**6.2**
Vel.	0.32	0.63	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.63	0.32	
W.P.	6.52	6.31	6.24	6.24	6.24	6.24	6.24	6.24	6.24	6.31	6.52	
Depth	1.36	3.39	4.06	4.06	4.06	4.06	4.06	4.06	4.06	3.39	1.36	
Area	8.5	21.1	25.3	25.3	25.3	25.3	25.3	25.3	25.3	21.1	8.5	

KM 116 202.6 **cms** 16.66 **l/sec** remaining

Conc.	95	99	102	104	105	105	105	104	102	99	95	**6.2**
Vel.	0.32	0.64	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.64	0.32	
W.P.	6.52	6.31	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.31	6.52	
Depth	1.36	3.39	4.07	4.07	4.07	4.07	4.07	4.07	4.07	3.39	1.36	
Area	8.5	21.2	25.4	25.4	25.4	25.4	25.4	25.4	25.4	21.2	8.5	

KM **117** **203.8** **cms** 16.66 **l/sec** remaining

Conc.	**95**	**98**	101	103	104	105	104	103	101	98	95	6.2

KM 118	205.0 **cms**				16.66 **l/sec** remaining							
Conc.	94	98	100	**102**	104	104	104	102	100	**98**	**94**	6.3
Vel.	0.32	0.64	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.64	0.32	
W.P.	6.53	6.32	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.32	6.53	
Depth	1.36	3.40	4.08	4.08	4.08	4.08	4.08	4.08	4.08	3.40	1.36	
Area	8.5	21.2	25.5	25.5	25.5	25.5	25.5	25.5	25.5	21.2	8.5	
KM 119	206.2 **cms**				16.66 **l/sec** remaining							
Conc.	93	97	100	102	103	104	103	102	100	**97**	**93**	6.3
Vel.	0.32	0.64	0.74	0.74	0.74	0.74	0.74	0.74	**0.74**	**0.64**	**0.32**	
W.P.	6.53	6.32	6.25	6.25	6.25	6.25	6.25	6.25	**6.25**	**6.32**	**6.53**	
Depth	1.36	3.40	4.08	4.08	4.08	4.08	**4.08**	4.08	**4.08**	**3.40**	**1.36**	
Area	8.5	21.3	25.5	25.5	25.5	25.5	25.5	25.5	**25.5**	**21.3**	8.5	
KM 120	207.5 **cms**				16.66 **l/sec** remaining							
Conc.	91	96	100	103	105	106	106	104	102	**98**	**93**	6.3
Vel.	0.46	0.92	1.06	1.06	1.06	1.06	1.06	1.06	1.06	**0.92**	**0.46**	
W.P.	6.53	6.33	6.26	6.26	6.26	6.26	6.26	6.26	6.26	**6.33**	**6.53**	
Depth	0.94	2.35	2.82	2.82	2.82	2.82	2.82	2.82	2.82	**2.35**	**0.94**	
Area	5.9	14.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	**14.7**	**5.9**	
KM 121	208.7 **cms**				16.66 **l/sec** remaining							
Conc.	91	95	99	102	104	106	105	104	101	**97**	**93**	6.3
Vel.	0.46	0.92	1.06	1.06	1.06	1.06	1.06	1.06	**1.06**	**0.92**	**0.46**	
W.P.	6.53	6.33	6.26	6.26	6.26	6.26	6.26	6.26	**6.26**	**6.33**	**6.53**	
Depth	0.94	2.35	2.83	2.83	2.83	2.83	2.83	2.83	**2.83**	**2.35**	**0.94**	
Area	5.9	14.7	17.7	17.7	17.7	17.7	17.7	17.7	**17.7**	**14.7**	**5.9**	
KM 122	209.9 **cms**				16.66 **l/sec** remaining							
Conc.	90	95	99	102	104	105	105	103	100	**97**	**92**	6.3
Vel.	0.46	0.93	1.07	1.07	1.07	1.07	1.07	1.07	1.07	**0.93**	0.46	
W.P.	6.54	6.33	6.26	6.26	6.26	6.26	6.26	6.26	6.26	**6.33**	6.54	
Depth	0.94	2.35	2.83	2.83	2.83	2.83	2.83	2.83	2.83	**2.35**	0.94	
Area	5.9	14.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	**14.7**	5.9	
KM 123	211.1 **cms**				16.66 **l/sec** remaining							
Conc.	89	94	98	101	103	104	104	103	100	**96**	91	6.3
Vel.	0.46	0.93	1.07	1.07	1.07	1.07	1.07	1.07	1.07	**0.93**	0.46	
W.P.	6.54	6.34	6.26	6.26	6.26	6.26	6.26	6.26	6.26	6.34	6.54	
Depth	0.94	2.36	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.36	0.94	
Area	5.9	14.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	14.8	5.9	
KM 124	212.4 **cms**				16.66 **l/sec** remaining							
Conc.	89	93	97	101	103	104	103	**102**	**99**	**95**	**91**	6.3
Vel.	0.46	0.93	1.08	1.08	1.08	1.08	1.08	**1.08**	1.08	**0.93**	0.46	
W.P.	6.54	6.34	6.27	6.27	6.27	6.27	6.27	**6.27**	6.27	6.34	6.54	
Depth	0.94	2.36	2.84	2.84	2.84	2.84	2.84	**2.84**	2.84	2.36	0.94	
Area	5.9	14.8	17.8	17.8	17.8	17.8	17.8	**17.8**	17.8	14.8	5.9	
KM 125	213.6 **cms**				16.66 **l/sec** remaining							
Conc.	88	93	97	100	102	103	103	101	**99**	**95**	**90**	6.3
Vel.	0.47	0.94	1.08	1.08	1.08	1.08	1.08	1.08	1.08	**0.94**	0.47	
W.P.	6.54	6.34	6.27	6.27	6.27	6.27	6.27	6.27	6.27	6.34	6.54	
Depth	0.94	2.36	2.84	2.84	2.84	2.84	2.84	2.84	2.84	2.36	0.94	
Area	5.9	14.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8	14.8	5.9	
KM 126	214.8 **cms**				16.66 **l/sec** remaining							
Conc.	88	92	96	99	101	103	102	**101**	**98**	**94**	**90**	6.3
Vel.	0.47	0.94	1.08	1.08	1.08	1.08	1.08	**1.08**	1.08	**0.94**	**0.47**	
W.P.	6.55	6.34	6.27	6.27	6.27	6.27	6.27	**6.27**	6.27	**6.34**	**6.55**	
Depth	0.94	2.36	2.85	2.85	2.85	2.85	2.85	**2.85**	2.85	**2.36**	**0.94**	
Area	5.9	14.8	17.9	17.9	17.9	17.9	17.9	**17.9**	17.9	**14.8**	**5.9**	
KM 127	216.1 **cms**				16.66 **l/sec** remaining							
Conc.	87	91	95	98	101	102	102	101	**98**	**94**	**90**	6.3
Vel.	0.47	0.94	1.09	1.09	1.09	1.09	1.09	1.09	**1.09**	**0.94**	**0.47**	
W.P.	6.55	6.35	6.27	6.27	6.27	6.27	6.27	6.27	**6.27**	6.35	**6.55**	
Depth	0.94	2.37	2.85	2.85	2.85	2.85	2.85	2.85	**2.85**	2.37	**0.94**	
Area	5.9	14.8	17.9	17.9	17.9	17.9	17.9	17.9	**17.9**	14.8	**5.9**	
KM **128**	**217.3** **cms**				**16.66** **l/sec** **remaining**							
Conc.	**86**	**91**	95	98	100	**101**	**101**	100	**97**	**94**	**89**	6.3

KM 129	218.5 cms		16.66 l/sec remaining									
Conc.	86	90	94	97	100	101	101	99	97	93	89	6.3
Vel.	0.47	0.95	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.95	0.47	
W.P.	6.55	6.35	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.35	6.55	
Depth	0.94	2.37	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.37	0.94	
Area	5.9	14.9	18.0	18.0	18.0	18.0	18.0	18.0	18.0	14.9	5.9	
KM 130	219.7 cms		16.66 l/sec remaining									
Conc.	85	90	93	97	99	100	100	99	96	93	88	6.3
Vel.	0.47	0.95	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.95	0.47	
W.P.	6.56	6.36	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.36	6.56	
Depth	0.94	2.37	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.37	0.94	
Area	5.9	14.9	18.0	18.0	18.0	18.0	18.0	18.0	18.0	14.9	5.9	
KM 131	221.0 cms		16.66 l/sec remaining									
Conc.	85	89	93	96	99	99	100	98	96	92	88	6.3
Vel.	0.48	0.96	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.96	0.48	
W.P.	6.56	6.36	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.36	6.56	
Depth	0.94	2.38	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.38	0.94	
Area	5.9	14.9	18.0	18.0	18.0	18.0	18.0	18.0	18.0	14.9	5.9	
KM 132	222.2 cms		16.66 l/sec remaining									
Conc.	84	89	92	96	98	99	99	98	95	92	87	6.3
Vel.	0.48	0.96	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.96	0.48	
W.P.	6.56	6.36	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.36	6.56	
Depth	0.94	2.38	2.87	2.87	2.87	2.87	2.87	2.87	2.87	2.38	0.94	
Area	5.9	15.0	18.1	18.1	18.1	18.1	18.1	18.1	18.1	15.0	5.9	
KM 133	223.4 cms		16.65 l/sec remaining									
Conc.	84	88	92	95	97	98	98	97	95	91	87	6.3
Vel.	0.48	0.96	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.96	0.48	
W.P.	6.57	6.37	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.37	6.57	
Depth	0.94	2.38	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.38	0.94	
Area	5.9	15.0	18.1	18.1	18.1	18.1	18.1	18.1	18.1	15.0	5.9	
KM 134	224.7 cms		16.65 l/sec remaining									
Conc.	83	88	91	94	97	98	98	97	94	91	86	6.3
Vel.	0.48	0.97	1.12	1.12	1.12	1.12	1.12	1.12	1.12	0.97	0.48	
W.P.	6.57	6.37	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.37	6.57	
Depth	0.94	2.38	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.38	0.94	
Area	5.9	15.0	18.1	18.1	18.1	18.1	18.1	18.1	18.1	15.0	5.9	
KM 135	225.9 cms		16.65 l/sec remaining									
Conc.	83	87	91	94	96	97	97	96	94	90	86	6.3
Vel.	0.48	0.97	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.97	0.48	
W.P.	6.57	6.37	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.37	6.57	
Depth	0.94	2.39	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.39	0.94	
Area	5.9	15.0	18.2	18.2	18.2	18.2	18.2	18.2	18.2	15.0	5.9	
KM 136	227.1 cms		16.65 l/sec remaining									
Conc.	82	87	90	93	96	97	97	96	93	90	85	6.3
Vel.	0.48	0.98	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.98	0.48	
W.P.	6.57	6.37	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.37	6.57	
Depth	0.94	2.39	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.39	0.94	
Area	5.9	15.0	18.2	18.2	18.2	18.2	18.2	18.2	18.2	15.0	5.9	
KM 137	228.4 cms		16.65 l/sec remaining									
Conc.	82	86	90	93	95	96	96	95	93	89	85	6.3
Vel,	0.48	0.98	1.13	1.13	1.13	1.13	1.13	1.13	1.13	0.98	0.48	
W.P.	6.58	6.38	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.38	6.58	
Depth	0.94	2.39	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.39	0.94	
Area	6.0	15.1	18.2	18.2	18.2	18.2	18.2	18.2	18.2	15.1	6.0	
KM 138	229.6 cms		16.65 l/sec remaining									
Conc.	81	85	89	92	95	96	96	95	92	89	84	6.3
Vel.	0.49	0.98	1.14	1.14	1.14	1.14	1.14	1.14	1.14	0.98	0.49	
W.P.	6.58	6.38	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.38	6.58	
Depth	0.95	2.39	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.39	0.95	
Area	6.0	15.1	18.3	18.3	18.3	18.3	18.3	18.3	18.3	15.1	6.0	
KM 139	230.8 cms		16.65 l/sec remaining									
Conc.	81	85	89	92	94	95	95	94	92	88	84	6.3

KM 140 232.1 **cms** **16.65 l/sec** remaining

Conc.	80	85	88	91	94	95	95	**94**	91	88	83	6.3
Vel.	0.49	0.99	1.15	1.15	1.15	1.15	1.15	1.15	1.15	0.99	0.49	
W.P.	6.58	6.39	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.39	6.58	
Depth	0.95	2.40	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.40	0.95	
Area	6.0	15.1	18.3	18.3	18.3	18.3	18.3	18.3	18.3	15.1	6.0	

KM 141 233.3 **cms** 16.65 **l/sec** remaining

Conc.	80	84	88	91	93	94	94	**93**	91	87	83	6.3
Vel.	0.49	0.99	1.15	1.15	1.15	1.15	1.15	1.15	1.15	0.99	0.49	
W.P.	6.59	6.39	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.39	6.59	
Depth	0.95	2.40	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.40	0.95	
Area	6.0	15.1	18.4	18.4	18.4	18.4	18.4	18.4	18.4	15.1	6.0	

KM 142 234.5 **cms** 16.65 **l/sec** remaining

Conc.	79	84	87	90	93	94	94	**93**	**90**	87	82	6.3
Vel.	0.49	1.00	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.00	0.49	
W.P.	6.59	6.39	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.39	6.59	
Depth	0.95	2.40	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.40	0.95	
Area	6.0	15.2	18.4	18.4	18.4	18.4	18.4	18.4	18.4	15.2	6.0	

KM 143 235.7 **cms** 16.65 **l/sec** remaining

Conc.	79	83	87	90	92	93	93	**92**	**90**	86	82	6.3
Vel.	0.49	1.00	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.00	0.49	
W.P.	6.59	6.40	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.40	6.59	
Depth	0.95	2.41	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.41	0.95	
Area	6.0	15.2	18.4	18.4	18.4	18.4	18.4	18.4	18.4	15.2	6.0	

KM 144 237.0 **cms** 16.65 **l/sec** remaining

Conc.	78	83	86	89	92	93	93	**92**	**89**	86	81	6.3
Vel.	0.50	1.00	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.00	0.50	
W.P.	6.59	6.40	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.40	6.59	
Depth	0.95	2.41	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.41	0.95	
Area	6.0	15.2	18.5	18.5	18.5	18.5	18.5	18.5	18.5	15.2	6.0	

KM 145 238.2 **cms** 16.65 **l/sec** remaining

Conc.	78	82	86	89	91	92	92	91	**89**	85	81	6.3
Vel.	0.50	1.01	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.01	0.50	
W.P.	6.60	6.40	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.40	6.60	
Depth	0.95	2.41	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.41	0.95	
Area	6.0	15.2	18.5	18.5	18.5	18.5	18.5	18.5	18.5	15.2	6.0	

KM 146 239.4 **cms** 16.65 **l/sec** remaining

Conc.	77	82	85	88	91	92	92	91	88	85	81	6.3
Vel.	0.50	1.01	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.01	0.50	
W.P.	6.60	6.40	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.40	6.60	
Depth	0.95	2.41	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.41	0.95	
Area	6.0	15.3	18.5	18.5	18.5	18.5	18.5	18.5	18.5	15.3	6.0	

KM 147 240.7 **cms** 16.65 **l/sec** remaining

Conc.	77	81	85	88	90	91	91	**90**	88	84	80	6.3
Vel.	0.50	1.01	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.01	0.50	
W.P.	6.60	6.41	6.32	6.32	6.32	6.32	6.32	6.32	6.32	6.41	6.60	
Depth	0.95	2.42	2.93	2.93	2.93	2.93	2.93	2.93	2.93	2.42	0.95	
Area	6.0	15.3	18.6	18.6	18.6	18.6	18.6	18.6	18.6	15.3	6.0	

KM 148 241.9 **cms** 16.65 **l/sec** remaining

Conc.	76	81	84	87	90	91	91	**90**	87	84	80	6.3
Vel.	0.50	1.02	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.02	0.50	
W.P.	6.60	6.41	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.41	6.60	
Depth	0.95	2.42	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.42	0.95	
Area	6.0	15.3	18.6	18.6	18.6	18.6	18.6	18.6	18.6	15.3	6.0	

KM 149 243.1 **cms** 16.65 **l/sec** remaining

Conc.	76	80	84	87	89	90	91	**89**	87	83	**79**	6.3
Vel.	0.50	1.02	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.02	0.50	
W.P.	6.61	6.41	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.41	6.61	
Depth	0.95	2.42	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.42	0.95	
Area	6.0	15.3	18.6	18.6	18.6	18.6	18.6	18.6	18.6	15.3	6.0	

KM 150 244.3 **cms** 16.65 **l/sec** remaining

Conc.	76	80	83	87	89	90	90	**89**	86	83	**79**	6.3

KM 151	245.6 cms		16.65 l/sec remaining									
Conc.	75	79	83	86	88	a9	90	88	86	a3	78	6.3
Vel.	0.51	1.03	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.03	0.51	
W.P.	6.61	6.42	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.42	6.61	
Depth	0.95	2.43	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.43	0.95	
Area	6.0	15.4	la.7	la.7	la.7	la.7	la.7	la.7	la.7	15.4	6.0	
KM 152	246.8 cms		16.65 l/sec remaining									
Conc.	75	79	a3	86	88	a9	a9	88	86	a2	78	6.3
Vel.	0.51	1.03	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.03	0.51	
W.P.	6.62	6.42	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.42	6.62	
Depth	0.95	2.43	2.95	2.95	2.95	2.95	2.95	2.95	2.95	2.43	0.95	
Area	6.0	15.4	la.7	18.7	la.7	18.7	la.7	la.7	18.7	15.4	6.0	
KM 153	248.0 cms		16.65 l/sec remaining									
Conc.	74	79	a2	a5	88	a9	a9	88	a5	a2	77	6.3
Vel.	0.51	1.03	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.03	0.51	
W.P.	6.62	6.43	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.43	6.62	
Depth	0.95	2.43	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.43	0.95	
Area	6.0	15.4	18.8	18.8	18.8	18.8	18.8	18.8	18.8	15.4	6.0	
KM 154	249.3 cms		16.65 l/sec remaining									
Conc.	74	78	al	a4	a7	88	88	a7	85	a2	78	6.3
Vel.	0.51	1.04	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.04	0.51	
W.P.	6.62	6.43	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.43	6.62	
Depth	0.95	2.43	2.96	2.96	2.96	2.96	2.96	2.96	2.96	2.43	0.95	
Area	6.0	15.4	18.8	18.8	18.8	la.8	18.8	18.8	18.8	15.4	6.0	
KM 155	250.5 cms		16.65 l/sec remaining									
Conc.	73	78	al	a4	86	88	88	a7	a5	a2	78	6.3
Vel.	0.51	1.04	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.04	0.51	
W.P.	6.62	6.43	6.34	6.34	6.34	6.34	6.34	6.34	6.34	6.43	6.62	
Depth	0.95	2.44	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.44	0.95	
Area	6.0	15.4	18.8	18.8	18.8	la.8	18.8	18.8	18.8	15.4	6.0	
KM 156	251.7 cms		16.65 l/sec remaining									
Conc.	73	77	80	a3	a6	a7	a7	a7	a4	81	77	6.3
Vel.	0.51	1.04	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.04	0.51	
W.P.	6.63	6.44	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.44	6.63	
Depth	0.95	2.44	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.44	0.95	
Area	6.0	15.5	la.9	18.9	18.9	la.9	la.9	la.9	la.9	15.5	6.0	
KM 157	253.0 cms		16.65 l/sec remaining									
Conc.	72	77	80	a3	a5	87	a7	86	a4	al	77	6.3
Vel.	0.51	1.05	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.05	0.51	
W.P.	6.63	6.44	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.44	6.63	
Depth	0.95	2.44	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.44	0.95	
Area	6.0	15.5	la.9	la.9	18.9	la.9	la.9	la.9	la.9	15.5	6.0	
KM 158	254.2 cms		16.65 l/sec remaining									
Conc.	72	76	80	a3	a5	a6	a6	86	a4	a l	76	6.4
Vel.	0.52	1.05	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.05	0.52	
W.P.	6.63	6.44	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.44	6.63	
Depth	0.95	2.44	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.44	0.95	
Area	6.1	15.5	la.9	la.9	la.9	la.9	la.9	la.9	la.9	15.5	6.1	
KM 159	255.4 cms		16.65 l/sec remaining									
Conc.	72	76	79	82	a4	86	86	a5	a3	80	76	6.4
Vel.	0.52	1.05	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.05	0.52	
W.P.	6.63	6.44	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.44	6.63	
Depth	0.95	2.44	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.44	0.95	
Area	6.1	15.5	19.0	19.0	19.0	19.0	19.0	19.0	19.0	15.5	6.1	
KM 160	256.7 cms		16.65 l/sec remaining									
Conc.	70	74	78	80	a2	a2	, a4	a3	a2	79	75	7.7
Vel.	0.43	0.80	0.94	1.15	1.27	1.15	0.98	0.88	0.83	0.82	0.48	
W.P.	7.82	7.69	7.68	7.73	7.67	7.70	7.69	7.68	7.67	7.67	7.87	
Depth	0.94	2.15	2.67	3.52	4.04	3.53	2.82	2.42	2.24	2.19	1.10	
Area	7.2	16.5	20.5	27.0	31.0	27.1	21.7	18.6	17.2	16.8	a.4	
KM 161	257.9 cms		16.65 l/sec remaining									
Conc.	70	75	79	a3	84	72	86	86	a5	a3	79	7.7

KM 162	**259.1**	**cms**			**16.65 l/sec** remaining							
Conc.	70	75	78	**82**	**84**	**72**	**86**	**86**	**85**	**82**	**78**	7.7
Vel.	0.53	0.99	**1.16**	**1.41**	**1.57**	**1.42**	**1.21**	**1.08**	**1.03**	**1.01**	**0.60**	
W.P.	7.83	7.69	**7.69**	**7.74**	**7.68**	**7.71**	**7.69**	**7.68**	**7.68**	**7.68**	**7.88**	
Depth	0.76	1.73	**2.16**	**2.84**	**3.25**	**2.84**	**2.28**	**1.96**	**1.81**	**1.77**	**0.89**	
Area	5.8	13.3	**16.6**	**21.8**	**25.0**	**21.8**	**17.5**	**15.0**	**13.9**	**13.6**	**6.8**	
KM 163	260.4	**cms**			**16.65 l/sec** remaining							
Conc.	69	74	**78**	**82**	**84**	**72**	**85**	86	**84**	**82**	**78**	7.7
Vel.	0.53	0.99	**1.17**	**1.42**	**1.57**	**1.42**	**1.21**	1.09	**1.03**	**1.01**	**0.60**	
W.P.	7.83	7.69	**7.69**	**7.74**	**7.68**	**7.71**	**7.69**	7.68	**7.60**	**7.68**	**7.88**	
Depth	0.76	1.74	**2.16**	**2.84**	**3.26**	**2.85**	**2.28**	1.96	**1.82**	**1.78**	**0.89**	
Area	5.8	13.3	**16.6**	**21.8**	**25.0**	**21.9**	**17.5**	15.1	**14.0**	**13.7**	**6.8**	
KM 164	261.6	**cms**			16.65 **l/sec** remaining							
Conc.	69	**74**	**78**	82	83	71	85	85	**84**	82	**78**	7.7
Vel.	**0.54**	**1.00**	1.17	1.42	1.58	1.43	1.22	1.09	**1.03**	1.02	0.60	
W.P.	**7.83**	**7.69**	7.69	7.74	7.68	7.71	7.69	7.68	**7.68**	7.68	7.89	
Depth	**0.76**	**1.74**	2.16	2.85	3.26	2.85	2.29	1.96	**1.82**	1.78	0.89	
Area	**5.8**	**13.4**	16.6	21.9	25.1	21.9	17.6	15.1	**14.0**	13.7	6.9	
KM 165	**262.8**	**cms**			16.65 **l/sec** remaining							
Conc.	69	**74**	77	81	83	71	84	**85**	**84**	81	77	7.7
Vel.	**0.54**	**1.00**	1.17	1.42	1.58	1.43	1.22	**1.09**	**1.04**	1.02	0.60	
W.P.	**7.83**	**7.70**	7.69	7.74	7.68	7.71	7.70	**7.69**	**7.68**	7.68	7.89	
Depth	**0.76**	**1.74**	2.17	2.85	3.27	2.86	2.29	**1.97**	**1.83**	1.79	0.90	
Area	**5.9**	**13.4**	16.7	21.9	25.1	22.0	17.6	**15.1**	**14.0**	13.7	6.9	
KM 166	**264.1**	**cms**			16.65 **l/sec** remaining							
Conc.	**68**	**73**	**77**	**81**	**82**	**71**	**84**	85	**83**	**81**	**77**	7.7
Vel.	**0.54**	**1.00**	**1.18**	**1.43**	**1.58**	**1.43**	**1.22**	1.10	**1.04**	**1.02**	**0.60**	
W.P.	**7.84**	**7.70**	**7.70**	**7.75**	**7.69**	**7.72**	**7.70**	7.69	**7.69**	**7.69**	**7.89**	
Depth	**0.76**	**1.75**	**2.17**	**2.86**	**3.27**	**2.86**	**2.30**	1.97	**1.83**	**1.79**	**0.90**	
Area	**5.9**	**13.4**	**16.7**	**22.0**	**25.1**	**22.0**	**17.7**	15.2	**14.1**	**13.8**	**6.9**	
KM 167	**265.3**	**cms**			**16.65 l/sec** remaining							
Conc.	**68**	**73**	76	80	82	70	84	**84**	**83**	80	76	7.7
Vel.	**0.54**	**1.01**	1.18	1.43	1.59	1.44	1.23	**1.10**	**1.04**	1.03	0.61	
W.P.	**7.84**	**7.70**	7.70	7.75	7.69	7.72	7.70	**7.69**	**7.69**	7.69	7.90	
Depth	**0.77**	**1.75**	2.18	2.86	3.27	2.87	2.30	**1.98**	**1.83**	1.80	0.90	
Area	**5.9**	**13.5**	16.7	22.0	25.2	22.0	17.7	**15.2**	**14.1**	13.8	6.9	
KM 168	**266.5**	**cms**			16.65 **l/sec** remaining							
Conc.	**68**	**73**	76	80	82	70	83	**84**	**83**	80	**76**	7.7
Vel.	**0.54**	**1.01**	1.18	1.43	1.59	1.44	1.23	**1.10**	**1.05**	1.03	**0.61**	
W.P.	**7.84**	**7.70**	7.70	7.75	7.69	7.72	7.70	**7.69**	**7.69**	7.69	**7.90**	
Depth	**0.77**	**1.75**	2.18	2.86	3.28	2.87	2.31	**1.98**	**1.84**	1.80	**0.90**	
Area	**5.9**	**13.5**	16.8	22.0	25.2	22.1	17.7	**15.2**	**14.1**	13.9	**6.9**	
KM 169	**267.8**	**cms**			16.65 **l/sec** remaining							
Conc.	**67**	**72**	76	80	81	70	83	**83**	**82**	**80**	**76**	7.7
Vel.	**0.54**	**1.01**	1.18	1.44	1.59	1.44	1.23	**1.11**	**1.05**	**1.03**	**0.61**	
W.P.	**7.84**	**7.70**	7.70	7.75	7.69	7.72	7.70	**7.69**	**7.69**	**7.69**	**7.90**	
Depth	**0.77**	**1.76**	2.18	2.87	3.28	2.88	2.31	**1.99**	**1.84**	**1.81**	**0.90**	
Area	**5.9**	**13.5**	16.8	22.1	25.2	22.1	17.8	**15.3**	**14.2**	**13.9**	**7.0**	
KM 170	**269.0**	**cms**			16.65 **l/sec** remaining							
Conc.	**67**	**72**	75	79	81	69	83	**83**	**82**	**79**	**75**	7.7
Vel.	**0.54**	**1.01**	1.19	1.44	1.60	1.45	1.24	**1.11**	**1.05**	**1.04**	**0.61**	
W.P.	**7.85**	**7.71**	7.70	7.75	7.69	7.72	7.71	**7.70**	**7.69**	**7.69**	**7.90**	
Depth	**0.77**	**1.76**	2.19	2.87	3.29	2.88	2.32	**1.99**	**1.85**	**1.81**	**0.91**	
Area	**5.9**	**13.6**	16.8	22.1	25.3	22.2	17.8	**15.3**	**14.2**	**13.9**	**7.0**	
KM 171	**273.9**	**cms**			16.65 **l/sec** remaining							
Conc.	66	71	75	78	79	68	81	82	81	**78**	74	7.7
Vel.	0.55	1.03	1.20	1.45	1.61	1.46	1.25	1.12	1.06	**1.05**	0.62	
W.P.	7.86	7.71	7.71	7.76	7.70	7.73	7.71	7.70	7.70	**7.70**	7.92	
Depth	0.77	1.78	2.20	2.89	3.30	2.90	2.33	2.01	1.87	**1.83**	0.92	
Area	6.0	13.7	17.0	22.2	25.4	22.3	18.0	15.5	14.4	**14.1**	7.1	
KM 172	278.8	**cms**			16.65 **l/sec** remaining							
Conc.	**65**	**70**	75	77	76	68	76	81	80	78	74	7.7

KM 173 283.6 **cms** 16.65 **l/sec** remaining

Conc.	64	69	73	76	74	67	75	80	**79**	77	73	7.7
Vel.	0.56	1.05	1.22	1.48	1.64	1.49	1.28	1.15	1.09	1.07	0.63	
W.P.	7.88	7.73	7.73	7.78	7.72	7.75	7.73	7.72	7.72	7.72	7.94	
Depth	0.79	1.80	2.23	2.92	3.34	2.93	2.37	2.04	1.90	1.87	0.94	
Area	6.1	13.9	17.2	22.5	25.7	22.6	18.3	15.8	14.7	14.4	7.2	

KM 174 288.5 **cms** 16.65 **l/sec** remaining

Conc.	63	68	72	75	73	65	74	78	78	76	72	**7.7**
Vel.	0.57	1.06	1.24	1.49	1.65	1.50	1.29	1.16	1.10	1.09	0.64	
W.P.	7.88	7.74	7.73	7.79	7.73	7.75	7.74	7.73	7.72	7.72	7.95	
Depth	0.79	1.82	2.25	2.93	3.35	2.95	2.39	2.06	1.92	1.88	0.94	
Area	6.1	14.0	17.4	22.6	25.9	22.8	18.4	15.9	14.8	14.5	7.3	

KM 175 293.4 **cms** 16.65 **l/sec** remaining

Conc.	63	68	72	75	70	65	67	**79**	78	76	72	7.7
Vel.	0.57	1.07	1.25	1.50	1.67	1.52	1.30	1.17	1.11	1.10	0.65	
W.P.	7.89	7.75	7.74	7.79	7.73	7.76	7.74	7.73	7.73	7.73	7.96	
Depth	0.80	1.83	2.26	2.94	3.37	2.96	2.40	2.07	1.93	1.90	0.95	
Area	6.1	14.1	17.5	22.8	26.0	22.9	18.6	16.0	14.9	14.7	7.4	

KM 176 298.3 **cms** 16.65 **l/sec** remaining

Conc.	62	67	71	73	69	64	66	77	77	75	71	7.7
Vel.	0.58	1.08	1.26	1.52	1.68	1.53	1.32	1.19	1.13	1.11	0.66	
W.P.	7.90	7.75	7.75	7.80	7.74	7.77	7.75	7.74	7.74	7.74	7.97	
Depth	0.80	1.84	2.27	2.96	3.38	2.98	2.42	2.09	1.95	1.92	0.96	
Area	6.2	14.2	17.6	22.9	26.2	23.0	18.7	16.2	15.1	14.8	7.4	

KM 177 303.1 **cms** 16.65 **l/sec** remaining

Conc.	61	66	70	72	68	63	65	76	76	74	70	7.7
Vel.	0.58	1.09	1.27	1.53	1.69	1.54	1.33	1.20	1.14	1.13	0.66	
W.P.	7.91	7.76	7.76	7.81	7.75	7.78	7.76	7.75	7.75	7.75	7.99	
Depth	0.81	1.85	2.29	2.97	3.39	2.99	2.43	2.10	1.96	1.93	0.97	
Area	6.2	14.4	17.7	23.0	26.3	23.2	18.9	16.3	15.2	15.0	7.5	

KM 178 308.0 **cms** 16.65 **l/sec** remaining

Conc.	60	64	69	71	67	62	64	75	74	72	**69**	7.8
Vel.	0.59	1.10	1.28	1.54	1.71	1.56	1.34	1.21	1.15	1.14	0.67	
W.P.	7.92	7.77	7.76	7.82	7.75	7.78	7.77	7.76	7.75	7.75	8.00	
Depth	0.81	1.87	2.30	2.98	3.41	3.01	2.45	2.12	1.98	1.95	0.98	
Area	6.3	14.5	17.9	23.1	26.4	23.3	19.0	16.4	15.3	15.1	7.6	

KM 179 312.9 **cms** 16.65 **l/sec** remaining

Conc.	59	63	67	70	66	61	63	74	73	71	68	7.8
Vel.	0.59	1.11	1.29	1.55	1.72	1.57	1.35	1.22	1.16	1.15	0.68	
W.P.	7.93	7.78	7.77	7.82	7.76	7.79	7.77	7.76	7.76	7.76	8.01	
Depth	0.81	1.88	2.32	3.00	3.42	3.03	2.47	2.14	2.00	1.97	0.99	
Area	6.3	14.6	18.0	23.3	26.6	23.5	19.1	16.6	15.5	15.3	7.7	

KM 180 317.8 **cms** 16.65 **l/sec** remaining

Conc.	58	63	66	68	65	63	64	67	72	70	67	9.0
Vel.	0.49	0.93	1.08	1.15	1.14	1.07	1.00	0.95	0.90	0.81	0.45	
W.P.	9.22	9.02	9.01	9.00	9.00	9.00	9.00	9.00	9.00	9.01	9.17	
Depth	1.13	2.64	3.25	3.56	3.51	3.20	2.91	2.72	2.53	2.21	0.99	
Area	10.2	23.8	29.2	32.0	31.6	28.8	26.2	24.5	22.8	19.9	8.9	

KM 181 731.4 **cms** 16.65 **l/sec** remaining

Conc.	28	28	26	27	26	25	24	22	20	20	21	11.5
Vel.	0.69	1.37	1.63	1.71	1.74	1.78	1.77	1.42	0.87	0.47	0.18	
W.P.	11.88	11.63	11.55	11.54	11.54	11.54	11.54	11.76	11.63	11.56	11.55	
Depth	1.45	3.65	4.61	4.89	5.05	5.20	5.17	3.87	1.95	0.83	0.23	
Area	16.7	42.2	53.2	56.5	58.3	60.1	59.6	44.7	22.5	9.6	2.6	

KM 182 731.8 **cms** 16.65 **l/sec** remaining

Conc.	28	28	26	27	26	25	24	22	20	19	21	11.5
Vel.	0.71	1.42	1.68	1.76	1.80	1.84	1.83	1.46	0.90	0.48	0.18	
W.P.	11.88	11.63	11.55	11.54	11.54	11.54	11.54	11.77	11.63	11.56	11.55	
Depth	1.40	3.54	4.47	4.74	4.89	5.04	5.01	3.75	1.89	0.81	0.22	
Area	16.2	40.9	51.6	54.7	56.5	58.2	57.8	43.3	21.8	9.3	2.5	

KM 183 732.1 **cms** 16.65 **l/sec** remaining

Conc.	28	28	26	27	26	25	24	22	20	19	21	11.5

KM 184 732.5 cms 16.65 l/sec remaining

Conc.	28	28	26	27	26	25	24	22	20	19	21	11.5
Vel.	0.71	1.42	1.69	1.76	1.80	1.84	1.83	1.47	0.90	0.48	0.18	
W.P.	11.88	11.64	11.55	11.54	11.54	11.54	11.54	11.77	11.63	11.57	11.55	
Depth	1.40	3.54	4.47	4.74	4.89	5.04	5.01	3.75	1.89	0.81	0.22	
Area	16.2	40.9	51.6	54.7	56.5	58.2	57.8	43.3	21.8	9.3	2.5	

KM 185 732.9 cms 16.65 l/sec remaining

Conc.	22	24	26	28	29	30	30	29	28	26	27	16.6
Vel.	0.35	0.74	1.02	1.15	1.12	1.10	1.07	1.01	0.94	0.86	0.49	
W.P.	16.67	16.65	16.64	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.79	
Depth	0.89	2.50	3.90	4.55	4.43	4.32	4.14	3.81	3.44	3.07	1.44	
Area	14.8	41.5	64.8	75.5	73.5	71.7	68.7	63.3	57.1	51.0	24.0	

KM 186 734.4 cms 16.65 l/sec remaining

Conc.	22	23	26	28	29	30	30	29	28	26	25	16.6
Vel.	0.39	0.83	1.15	1.29	1.26	1.24	1.20	1.13	1.05	0.97	0.55	
W.P.	16.68	16.65	16.65	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.80	
Depth	0.79	2.21	3.46	4.03	3.93	3.83	3.67	3.38	3.05	2.72	1.28	
Area	13.1	36.7	57.4	66.9	65.2	63.5	60.9	56.1	50.6	45.2	21.2	

KM 187 735.9 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	28	26	25	16.6
Vel.	0.39	0.83	1.15	1.29	1.26	1.24	1.20	1.13	1.05	0.97	0.56	
W.P.	16.68	16.65	16.65	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.80	
Depth	0.79	2.22	3.46	4.03	3.93	3.83	3.67	3.38	3.05	2.72	1.28	
Area	13.2	36.8	57.5	67.0	65.2	63.6	60.9	56.1	50.6	45.2	21.3	

KM 188 737.5 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	27	26	25	16.6
Vel.	0.39	0.84	1.15	1.29	1.27	1.24	1.21	1.14	1.06	0.97	0.56	
W.P.	16.68	16.65	16.65	16.60	16.60	16.60	16.60	16.61	16.61	16.61	16.80	
Depth	0.79	2.22	3.46	4.04	3.93	3.83	3.67	3.38	3.05	2.73	1.28	
Area	13.2	36.8	57.5	67.0	65.3	63.6	61.0	56.2	50.7	45.2	21.3	

KM 189 739.0 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	27	26	25	16.6
Vel.	0.39	0.84	1.16	1.29	1.27	1.24	1.21	1.14	1.06	0.97	0.56	
W.P.	16.68	16.65	16.65	16.60	16.60	16.60	16.60	16.61	16.61	16.61	16.80	
Depth	0.80	2.22	3.47	4.04	3.93	3.83	3.67	3.38	3.05	2.73	1.28	
Area	13.2	36.9	57.6	67.1	65.3	63.7	61.0	56.2	50.7	45.3	21.3	

KM 190 740.5 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	27	26	25	16.6
Vel.	0.39	0.84	1.16	1.29	1.27	1.25	1.21	1.14	1.06	0.97	0.56	
W.P.	16.68	16.65	16.65	16.60	16.60	16.60	16.61	16.61	16.61	16.61	16.80	
Depth	0.80	2.22	3.47	4.04	3.94	3.84	3.68	3.39	3.06	2.73	1.28	
Area	13.2	36.9	57.6	67.1	65.4	63.7	61.1	56.2	50.8	45.3	21.3	

KM 191 742.1 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	27	25	25	16.6
Vel.	0.39	0.84	1.16	1.30	1.27	1.25	1.21	1.14	1.06	0.98	0.56	
W.P.	16.68	16.65	16.65	16.60	16.61	16.60	16.61	16.61	16.61	16.61	16.80	
Depth	0.80	2.22	3.47	4.04	3.94	3.84	3.68	3.39	3.06	2.73	1.29	
Area	13.2	36.9	57.6	67.2	65.4	63.7	61.1	56.3	50.8	45.4	21.3	

KM 192 743.6 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	30	29	27	25	25	16.6
Vel.	0.40	0.84	1.16	1.30	1.27	1.25	1.21	1.14	1.06	0.98	0.56	
W.P.	16.68	16.65	16.65	16.61	16.61	16.61	16.61	16.61	16.61	16.61	16.80	
Depth	0.80	2.23	3.47	4.05	3.94	3.84	3.68	3.39	3.06	2.74	1.29	
Area	13.3	37.0	57.7	67.2	65.4	63.8	61.1	56.3	50.8	45.4	21.4	

KM 193 745.1 cms 16.65 l/sec remaining

Conc.	22	23	25	28	29	30	29	29	27	25	25	16.6
Vel.	0.40	0.84	1.16	1.30	1.27	1.25	1.21	1.14	1.06	0.98	0.56	
W.P.	16.68	16.65	16.65	16.61	16.61	16.61	16.61	16.61	16.61	16.61	16.81	
Depth	0.80	2.23	3.48	4.05	3.94	3.84	3.68	3.39	3.06	2.74	1.29	
Area	13.3	37.0	57.7	67.3	65.5	63.8	61.2	56.4	50.9	45.5	21.4	

KM 194 746.7 cms 16.64 l/sec remaining

Conc.	22	23	25	28	29	30	29	29	27	25	25	16.6

KM 195	**748.2**	**cms**		**16.64**	**l/sec**	remaining						
Conc.	28	30	25	25	24	24	23	22	22	23	23	12.1
Vel.	0.55	1.19	1.61	1.71	1.57	1.31	1.09	0.95	0.79	0.63	0.33	
W.P.	12.41	12.36	12.16	12.08	12.13	12.18	12.10	12.10	12.09	12.09	12.16	
Depth	1.50	4.39	6.54	7.09	6.32	4.93	3.78	3.11	2.44	1.78	0.73	
Area	18.1	53.0	79.0	85.6	76.3	59.6	45.7	37.5	29.5	21.5	8.8	
KM 196	748.9	**cms**		16.64	l/**sec**	remaining						
Conc.	28	30	24	25	25	**25**	**24**	**23**	**22**	**23**	**23**	12.1
Vel.	0.58	1.26	1.69	1.80	1.66	1.38	1.15	1.00	0.84	0.67	0.34	
W.P.	12.41	12.37	12.16	12.09	12.13	12.18	12.10	12.10	12.10	12.10	12.16	
Depth	1.42	4.16	6.19	6.71	5.98	4.67	3.58	2.94	2.31	1.69	0.69	
Area	17.1	50.2	74.8	81.1	72.2	56.4	43.3	35.5	27.9	20.4	8.3	
KM 197	749.5	**cms**		16.64	**l/sec**	remaining						
Conc.	28	30	24	25	25	25	24	23	22	23	23	12.1
Vel.	0.58	1.26	1.70	1.80	1.66	1.38	1.15	1.00	0.84	0.67	0.34	
W.P.	12.41	12.37	12.16	12.09	12.13	12.18	12.10	12.10	12.10	12.10	12.16	
Depth	1.42	4.16	6.19	6.72	5.98	4.67	3.58	2.94	2.31	1.69	0.69	
Area	17.1	50.3	74.8	81.1	72.3	56.5	43.3	35.6	28.0	20.4	8.3	
KM 198	750.2	**cms**		16.64	**l/sec**	remaining						
Conc.	28	30	24	25	25	25	24	23	22	23	23	12.1
Vel.	0.58	1.26	1.70	1.81	1.66	1.39	1.15	1.00	0.84	0.67	0.34	
W.P.	12.41	12.37	12.17	12.09	12.13	12.18	12.10	12.10	12.10	12.10	12.16	
Depth	1.42	4.16	6.20	6.72	5.98	4.67	3.58	2.94	2.32	1.69	0.69	
Area	17.2	50.3	74.9	81.2	72.3	56.5	43.3	35.6	28.0	20.4	8.3	
KM 199	750.9	**cms**		16.64	**l/sec**	remaining						
Conc.	28	30	24	25	25	25	24	23	22	23	23	12.1
Vel.	0.58	1.26	1.70	1.81	1.66	1.39	1.15	1.00	0.84	0.67	0.34	
W.P.	12.41	12.37	12.17	12.09	12.13	12.18	12.10	12.10	12.10	12.10	12.16	
Depth	1.42	4.16	6.20	6.72	5.99	4.68	3.59	2.95	2.32	1.69	0.69	
Area	17.2	50.3	74.9	81.2	72.3	56.5	43.3	35.6	28.0	20.4	8.3	
KM 200	751.6	**cms**		16.64	**l/sec**	remaining						
Conc.	29	29	30	30	29	27	26	23	21	19	19	16.9
Vel.	0.73	1.25	1.26	1.21	1.17	1.12	1.02	0.85	0.80	0.77	0.42	
W.P.	17.32	16.86	16.86	16.86	16.86	16.86	16.87	16.87	16.86	16.87	16.96	
Depth	2.13	4.39	4.40	4.20	4.00	3.74	3.28	2.57	2.35	2.24	0.97	
Area	35.9	74.0	74.3	70.8	67.5	63.1	55.3	43.3	39.7	37.7	16.4	
KM 201	753.6	**cms**		16.64	**l/sec**	remaining						
Conc.	29	29	30	29	28	27	26	24	21	19	19	16.9
Vel.	0.69	1.19	1.19	1.15	1.12	1.06	0.97	0.81	0.76	0.73	0.40	
W.P.	17.32	16.86	16.86	16.86	16.86	16.86	16.87	16.88	16.86	16.87	16.96	
Depth	2.25	4.64	4.66	4.44	4.23	3.96	3.47	2.72	2.49	2.37	1.03	
Area	37.9	78.2	78.5	74.8	71.3	66.7	58.5	45.8	42.0	39.9	17.3	
KM 202	755.7	**cms**		16.64	**l/sec**	remaining						
Conc.	29	29	29	29	28	27	25	24	21	19	19	16.9
Vel.	0.69	1.19	1.20	1.16	1.12	1.06	0.97	0.81	0.76	0.73	0.40	
W.P.	17.32	16.86	16.86	16.86	16.86	16.86	16.87	16.88	16.86	16.87	16.96	
Depth	2.25	4.64	4.66	4.44	4.24	3.96	3.47	2.72	2.49	2.37	1.03	
Area	37.9	78.3	78.6	74.9	71.4	66.8	58.5	45.9	42.0	39.9	17.4	
KM 203	757.8	**cms**		16.64	**l/sec**	remaining						
Conc.	29	29	29	29	28	27	25	24	21	19	19	16.9
Vel.	0.69	1.20	1.20	1.16	1.12	1.07	0.97	0.81	0.76	0.74	0.40	
W.P.	17.33	16.86	16.86	16.86	16.86	16.86	16.87	16.88	16.86	16.87	16.96	
Depth	2.25	4.65	4.66	4.45	4.24	3.96	3.47	2.72	2.50	2.37	1.03	
Area	37.9	78.3	78.6	75.0	71.5	66.8	58.6	45.9	42.1	40.0	17.4	

8C- SCENARIO #3

Spill site: **River Km** 169 W Spill rate 16.67 **l/s**

CONCENTRATION ppm, **VELOCITY** m/s, **WETTED PERIMETER m, DEPTH** m, AREA m2

River **KM**	West Bank 1	2	3	4	5	6	7	**8**	9	10	East Bank 11	Panel Width (m)
KM 169	35.2 **cms**			16.64 **l/sec** remaining								
Conc.	31014	0	0	0	0	0	0	0	0	0	0	7.0

KM 169.1	384	390	388	385	380	**374**	367	**359**	350	340	328	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	**0.39**	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	**6.96**	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.2	354	364	372	378	380	380	377	372	363	353	340	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.3	352	363	371	377	380	380	377	372	364	353	341	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.4	352	363	371	376	379	379	376	371	363	353	340	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.5	351	362	370	376	379	379	376	370	362	352	340	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.6	351	361	370	375	378	378	375	370	362	352	339	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.7	350	361	369	375	377	377	375	369	361	351	338	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.8	349	360	368	374	377	377	374	369	361	351	338	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 169.9	349	360	368	373	376	376	374	368	360	350	337	7.0
Vel.	0.21	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 170	35.2 **cms**			**16.41 1/sec remaining**								
Conc.	348	359	367	373	376	376	373	368	360	350	337	7.0
Vel.	**0.21**	0.36	0.48	0.64	0.70	0.61	0.47	0.39	0.35	0.31	0.18	
W.P.	6.99	6.96	6.99	6.99	6.95	7.00	6.97	6.96	6.95	6.95	6.98	
Depth	0.36	0.83	1.27	1.96	2.26	1.81	1.21	0.91	0.76	0.64	0.29	
Area	2.5	5.7	8.8	13.6	15.7	12.6	8.4	6.4	5.3	4.5	2.0	
KM 171	36.0 **cms**			**16.17 1/sec remaining**								
Conc.	335	346	**354**	359	362	362	360	354	347	337	324	7.0
Vel.	0.22	0.37	0.49	0.65	0.72	0.62	0.48	0.40	0.35	0.32	0.19	
W.P.	7.00	6.96	6.99	7.00	6.96	7.00	6.97	6.96	6.96	6.96	6.98	
Depth	0.37	0.83	1.27	1.96	2.26	1.82	1.22	0.92	0.77	0.65	0.29	
Area	2.5	5.8	8.8	13.6	15.8	12.6	8.5	6.4	5.4	4.5	2.0	
KM 172	36.7 **cms**			**15.93 1/sec remaining**								
Conc.	325	335	343	348	351	351	348	343	336	326	**314**	**7.0**
Vel.	0.22	0.38	0.50	0.66	0.73	0.63	0.48	0.40	0.36	0.32	0.19	
W.P.	**7.00**	**6.97**	7.00	7.00	6.97	7.01	6.98	6.97	6.97	6.97	6.99	
Depth	**0.37**	**0.84**	**1.27**	1.97	**2.27**	1.82	1.22	0.92	0.77	0.65	0.29	

W.P.	7.01	6.97	7.00	7.01	6.97	7.01	6.98	**6.97**	**6.97**	**6.97**	7.00	
Depth	0.37	0.84	1.28	1.97	2.27	1.83	1.23	**0.93**	0.78	0.66	0.30	
Area	2.6	5.9	a.9	13.7	15.9	12.7	8.5	6.5	5.4	4.6	2.1	
KM 174	38.0 **cms**			15.46 **l/sec** remaining								
Conc.	304	314	322	327	330	330	327	322	315	306	294	7.0
Vel.	0.23	0.39	0.51	0.67	0.74	0.64	0.50	0.41	0.37	0.33	0.20	
W.P.	7.01	6.98	7.01	7.01	6.98	7.02	6.99	6.98	6.98	6.98	7.00	
Depth	0.37	0.04	1.28	1.98	2.28	1.83	1.23	0.93	0.78	0.66	0.30	
Area	2.6	5.9	8.9	13.8	15.9	12.8	8.6	6.5	5.5	4.6	2.1	
KM 175	38.6 **cms**			15.24 **l/sec** remaining								
Conc.	295	305	312	317	320	320	317	313	305	296	285	7.0
Vel.	0.23	0.39	0.51	0.68	0.75	0.65	0.50	0.42	0.37	0.33	0.20	
W.P.	7.02	6.98	7.01	7.02	6.98	7.03	6.99	6.98	6.98	6.98	7.01	
Depth	0.37	0.85	1.28	1.98	2.29	1.84	1.24	0.94	0.79	0.66	0.30	
Area	2.6	5.9	9.0	13.8	16.0	12.8	8.6	6.6	5.5	4.6	2.1	
KM 176	39.3 **cms**			15.03 **l/sec** remaining								
Conc.	286	296	303	308	311	311	308	303	296	287	276	**7.0**
Vel.	0.23	0.40	0.52	0.69	0.76	0.66	0.51	0.42	0.38	0.34	0.20	
W.P.	7.03	6.99	7.02	7.02	6.99	7.03	7.00	6.99	6.99	6.99	7.01	
Depth	0.37	0.85	1.29	1.99	2.29	1.84	1.24	0.94	0.79	0.67	0.30	
Area	2.6	5.9	9.0	13.9	16.0	12.9	8.7	6.6	5.5	4.7	2.1	
KM 177	39.9 **cms**			14.82 **l/sec** remaining								
Conc.	277	287	294	299	302	302	299	295	288	279	268	7.0
Vel.	0.23	0.40	0.53	0.70	0.77	0.66	0.51	0.43	0.38	0.34	0.20	
W.P.	7.03	7.00	7.02	7.03	6.99	7.04	7.00	6.99	6.99	6.99	7.02	
Depth	0.38	0.86	1.29	1.99	2.30	1.85	1.25	0.95	0.80	0.68	0.31	
Area	2.6	6.0	9.0	13.9	16.1	12.9	8.7	6.6	5.6	4.7	2.1	
KM 178	40.5 **cms**			14.61 **l/sec** remaining								
Conc.	269	279	286	290	293	293	291	286	279	271	260	7.0
Vel.	0.24	0.41	0.53	0.70	0.78	0.67	0.52	0.44	0.39	0.35	0.21	
W.P.	7.04	7.00	7.03	7.04	7.00	7.04	7.01	7.00	7.00	7.00	7.02	
Depth	0.38	0.86	1.30	1.99	2.30	1.85	1.25	0.95	0.80	0.68	0.31	
Area	2.6	6.0	9.1	14.0	16.1	12.9	8.8	6.7	5.6	4.8	2.2	
KM 179	41.2 **cms**			14.41 **l/sec** remaining								
Conc.	261	270	277	282	285	285	282	278	271	263	252	7.0
Vel.	0.24	0.41	0.54	0.75.	0.78	0.68	0.53	0.44	0.39	0.35	0.21	
W.P.	7.04	7.00	7.03	7.04	7.00	7.05	7.01	7.00	7.00	7.00	7.03	
Depth	0.38	0.86	1.30	2.00	2.31	1.85	1.26	0.96	0.81	0.68	0.31	
Area	2.6	6.0	9.1	14.0	16.2	13.0	8.8	6.7	5.6	4.8	2.2	
KM 180	41.8 **cms**			14.06 **l/sec** remaining								
Conc.	272	281	287	292	294	294	292	**288**	282	274	264	8.6
Vel.	0.16	0.30	0.36	0.39	0.39	0.36	0.32	0.30	0.28	0.24	0.14	
W.P.	a.63	a.59	8.57	8.57	8.57	8.57	8.57	a.57	8.57	8.57	8.61	
Depth	0.61	1.58	2.12	2.39	2.35	2.06	1.77	1.58	1.41	1.13	0.47	
Area	5.2	13.5	18.2	20.5	20.1	17.7	15.2	13.5	12.1	9.7	4.0	
KM 181	96.3 **cms**			13.82 **l/sec** remaining								
Conc.	114	119	123	126	128	128	128	126	123	119	113	8.3
Vel.	0.23	0.40	0.46	0.48	0.50	0.51	0.52	0.53	0.51	0.38	0.17	
W.P.	8.54	8.34	8.32	8.32	8.32	8.32	a.32	8.32	8.33	8.50	8.40	
Depth	0.99	2.31	2.79	3.03	3.15	3.27	3.38	3.49	3.30	2.14	0.61	
Area	a.2	19.2	23.2	25.2	26.2	27.2	28.1	29.0	27.4	17.8	5.1	
KM 182	96.3 **cms**			13.60 **l/sec** remaining								
Conc.	111	116	121	124	126	126	126	124	121	117	111	8.3
Vel.	0.24	0.42	0.47	0.50	0.51	0.52	0.54	0.55	0.53	0.39	0.17	
W.P.	8.54	8.34	8.33	8.32	8.32	8.32	8.32	8.32	8.33	8.50	8.40	
Depth	0.96	2.24	2.71	2.93	3.06	3.17	3.27	3.38	3.19	2.07	0.59	
Area	8.0	18.6	22.5	24.4	25.4	26.3	27.2	28.1	26.6	17.2	4.9	
KM 183	96.3 **cms**			13.38 **l/sec** remaining								
Conc.	109	115	119	122	123	124	124	122	119	115	109	8.3
Vel.	0.24	0.42	0.47	0.50	0.51	0.52	0.54	0.55	0.53	0.39	0.17	
W.P.	8.54	8.35	8.33	8.32	8.32	8.32	8.32	8.32	8.33	8.50	8.41	
Depth	0.96	2.24	2.71	2.93	3.06	3.17	3.27	3.38	3.19	2.07	0.59	

W.P.	a.54	a.35	a.33	a.32	a.32	a.32	a.32	a.32	8.34	a.51	8.41	
Depth	0.96	2.24	2.71	2.93	3.06	3.17	3.28	3.38	3.19	2.07	0.59	
Area	a.0	18.6	22.5	24.4	25.4	26.4	27.3	28.2	26.6	17.2	4.9	
KM la5	96.4	**cms**		12.87 **l/sec** remaining								
Conc.	101	109	115	lla	114	108	111	117	122	118	113	14.5
Vel.	0.13	0.32	0.42	0.41	0.40	0.39	0.37	0.34	0.31	0.27	0.16	
W.P.	14.49	14.56	14.46	14.46	14.46	14.46	14.47	14.47	14.47	14.47	14.51	
Depth	0.49	1.93	2.87	2.79	2.67	2.58	2.41	2.11	1.78	1.46	0.65	
Area	7.1	27.9	41.5	40.3	38.6	37.4	34.9	30.5	25.8	21.1	9.4	
KM 186	96.6	**cms**		12.61 **l/sec** remaining								
Conc.	98	107	112	117	112	105	106	113	121	**118**	112	14.5
Vel.	0.15	0.36	0.48	0.47	0.45	0.44	0.42	0.39	0.35	0.31	0.18	
W.P.	14.49	14.56	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.51	
Depth	0.43	1.71	2.54	2.47	2.36	2.29	2.13	**1.87**	1.58	1.29	0.58	
Area	6.2	24.7	36.8	35.7	34.2	33.1	30.9	27.0	22.9	la.7	a.3	
KM la7	96.8	**cms**		12.37 **l/sec** remaining								
Conc.	96	105	110	115	110	102	104	110	118	115	110	14.5
Vel.	0.15	0.36	0.48	0.47	0.45	0.44	0.42	0.39	0.35	0.31	0.18	
W.P.	14.49	14.57	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.51	
Depth	0.43	1.71	2.54	2.47	2.37	2.29	2.14	**1.87**	1.58	1.29	0.58	
Area	6.2	24.7	36.8	35.8	34.2	33.1	30.9	27.1	22.9	la.7	a.3	
KM 188	97.1	**cms**		12.13 **l/sec** remaining								
Conc.	94	102	107	112	107	100	102	**108**	115	113	107	14.5
Vel.	0.15	0.37	0.48	0.47	0.45	0.44	0.43	0.39	0.35	0.31	0.18	
W.P.	14.49	14.57	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.51	
Depth	0.43	1.71	2.54	2.47	2.37	2.29	2.14	1.87	1.58	1.29	0.58	
Area	6.2	24.7	36.8	35.8	34.2	33.2	30.9	27.1	22.9	18.7	a.3	
KM la9	97.3	**cms**		11.89 **l/sec** remaining								
Conc.	92	100	105	110	105	98	100	106	113	110	105	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	0.39	0.35	0.31	0.18	
W.P.	14.50	14.57	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.47	14.52	
Depth	0.43	1.71	2.55	2.47	2.37	2.29	2.14	1.87	1.58	1.30	0.58	
Area	6.2	24.7	36.8	35.8	34.3	33.2	30.9	27.1	22.9	**18.8**	8.4	
KM 190	97.5	**cms**		11.66 **l/sec** remaining								
Conc.	90	98	103	108	103	96	**98**	103	111	**108**	103	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	0.39	0.35	0.31	**0.18**	
W.P.	14.50	14.57	14.47	14.47	14.47	14.47	14.47	14.48	14.48	14.48	14.52	
Depth	0.43	1.71	2.55	2.47	2.37	2.29	2.14	**1.87**	**1.58**	1.30	0.58	
Area	6.2	24.7	36.9	35.8	34.3	33.2	31.0	27.1	22.9	**18.8**	a.4	
KM 191	97.7	**cms**		11.43 **l/sec** remaining								
Conc.	**88**	96	100	105	100	94	95	101	108	106	101	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	0.39	0.35	0.31	**0.18**	
W.P.	14.50	14.57	14.47	**14.48**	14.47	14.47	**14.48**	**14.48**	14.48	14.48	14.52	
Depth	0.43	1.71	2.55	2.48	2.37	2.29	2.14	1.87	1.59	1.30	0.58	
Area	6.2	24.7	36.9	35.8	34.3	33.2	31.0	27.1	22.9	la.8	a.4	
KM 192	97.9	cmo		11.21 **l/sec** remaining								
Conc.	86	94	98	103	**98**	92	93	**99**	106	103	99	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	**0.39**	0.35	0.31	**0.18**	
W.P.	14.50	14.58	14.48	14.48	14.48	14.48	**14.48**	14.48	14.48	14.48	14.52	
Depth	0.43	1.71	2.55	2.48	2.37	2.29	2.14	1.87	1.59	1.30	0.58	
Area	6.2	24.7	36.9	35.9	34.3	33.2	31.0	27.1	23.0	la.8	a.4	
KM 193	98.1	**cms**		10.99 **l/sec** remaining								
Conc.	a4	92	96	101	96	90	91	**97**	104	101	96	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	**0.39**	0.35	0.31	0.18	
W.P.	14.50	14.58	14.48	**14.48**	14.48	14.48	14.48	14.48	14.48	14.48	14.52	
Depth	0.43	1.71	2.55	2.48	2.37	2.30	2.14	1.88	1.59	1.30	0.58	
Area	6.2	24.7	36.9	35.9	34.3	33.2	31.0	27.2	23.0	18.8	a.4	
KM 194	98.3	**cms**		10.78 **l/sec** remaining								
Conc.	82	90	94	99	94	88	89	**95**	101	**99**	**94**	14.5
Vel.	0.15	0.37	0.48	0.47	0.46	0.45	0.43	**0.39**	0.35	0.31	0.18	
W.P.	14.51	14.58	14.48	14.48	14.48	14.48	14.48	14.48	14.48	14.48	14.53	
Depth	0.43	1.71	2.55	2.48	2.37	2.30	2.14	1.88	1.59	1.30	0.58	

W.P.	**9.46**	**9.46**	**9.29**	**9.25**	**9.25**	**9.32**	**9.32**	**9.26**	**9.26**	**9.26**	**9.26**	
Depth	1.07	3.20	4.73	5.06	4.73	3.89	2.66	1.78	1.27	0.76	0.25	
Area	9.9	29.6	43.7	46.8	43.7	36.0	24.5	16.5	11.7	7.0	2.3	
KM 196	98.5 **cms**			10.43 **l/sec** remaining								
Conc.	75	79	81	82	83	83	82	81	78	75	71	9.2
Vel.	0.22	0.46	0.60	0.62	0.60	0.52	0.41	0.31	0.25	0.18	0.09	
W.P.	9.47	9.46	9.29	9.25	9.26	9.32	9.32	9.26	9.26	9.26	9.26	
Depth	1.01	3.03	4.48	4.79	4.47	3.68	2.51	1.69	1.20	0.72	0.24	
Area	9.4	28.0	41.4	44.3	41.4	34.1	23.2	15.6	11.1	6.6	2.2	
KM 197	98.6 **cms**			10.27 **l/sec** remaining								
Conc.	74	77	79	80	81	82	81	**79**	77	74	69	9.2
Vel.	0.22	0.46	0.60	0.63	0.60	0.52	0.41	0.31	0.25	0.18	0.09	
W.P.	9.47	9.46	9.29	9.25	9.26	9.32	9.32	9.26	9.26	9.26	9.26	
Depth	1.01	3.03	4.48	4.80	4.47	3.68	2.51	1.69	1.20	0.72	0.24	
Area	9.4	28.0	41.4	44.3	41.4	34.1	23.2	15.6	11.1	6.6	2.2	
KM 198	98.7 **cms**			10.10 **l/sec** remaining								
Conc.	73	76	78	79	80	80	79	78	76	72	68	9.2
Vel.	0.22	0.46	0.60	0.63	0.60	0.52	0.41	0.32	0.25	0.18	0.09	
W.P.	9.47	9.47	9.29	9.25	9.26	9.32	9.32	9.26	9.26	9.26	9.26	
Depth	1.01	3.03	4.48	4.80	4.47	3.68	2.51	1.69	1.20	0.72	0.24	
Area	9.4	28.0	41.4	44.3	41.4	34.1	23.2	15.6	11.1	6.6	2.2	
KM 199	98.8 **cms**			9.94 **l/sec** remaining								
Conc.	72	75	77	78	79	79	78	77	74	71	67	9.2
Vel.	0.22	0.46	0.60	0.63	0.60	0.52	0.41	0.32	0.25	0.18	0.09	
W.P.	9.47	9.47	9.29	9.25	9.26	9.32	9.32	9.26	9.26	9.26	9.26	
Depth	1.01	3.03	4.48	4.80	4.48	3.68	2.51	1.69	1.20	0.72	0.24	
Area	9.4	28.0	41.4	44.4	41.4	34.1	23.3	15.6	11.1	6.6	2.2	
KM 200	98.9 **cms**			9.77 **l/sec** remaining								
Conc.	77	82	85	88	88	80	84	88	88	85	81	12.4
Vel.	0.32	0.53	0.54	0.52	0.50	0.48	0.46	0.42	0.37	0.28	0.14	
W.P.	12.59	12.40	12.40	12.40	12.40	12.40	12.40	12.40	12.41	12.41	12.41	
Depth	1.19	2.56	2.67	2.50	2.36	2.23	2.06	1.84	1.49	0.95	0.33	
Area	14.7	31.7	33.1	31.0	29.2	27.7	25.5	22.8	18.5	11.8	4.1	
KM 201	99.2 **cms**			9.59 **l/sec** remaining								
Conc.	75	80	83	85	86	82	82	86	85	82	78	12.4
Vel.	0.30	0.50	0.51	0.49	0.47	0.46	0.43	0.40	0.35	0.26	0.13	
W.P.	12.60	12.41	12.40	12.40	12.40	12.40	12.40	12.40	12.41	12.41	12.42	
Depth	1.25	2.71	2.82	2.65	2.49	2.36	2.17	1.95	1.57	1.01	0.35	
Area	15.5	33.6	35.0	32.8	30.9	29.3	26.9	24.1	19.5	12.5	4.4	
KM 202	99.4 **cms**			9.42 **l/sec** remaining								
Conc.	74	79	81	83	84	80	80	**84**	84	81	76	12.4
Vel.	0.30	0.50	0.51	0.49	0.47	0.46	0.43	0.40	0.35	0.26	0.13	
W.P.	12.60	12.41	12.40	12.40	12.40	12.40	12.41	12.41	12.41	12.42	12.42	
Depth	1.25	2.71	2.82	2.65	2.50	2.36	2.18	1.95	1.58	1.01	0.35	
Area	15.6	33.6	35.0	32.8	31.0	29.3	27.0	24.2	19.5	12.5	4.4	
KM 203	99.7 **cms**			9.25 **l/sec** remaining								
Conc.	72	77	80	81	82	78	79	82	82	79	75	12.4
Vel.	0.30	0.50	0.52	0.49	0.48	0.46	0.43	0.40	0.35	0.26	0.13	
W.P.	12.60	12.41	12.41	12.41	12.41	12.41	12.41	12.41	12.42	12.42	12.42	
Depth	1.26	2.71	2.83	2.65	2.50	2.36	2.18	1.95	1.58	1.01	0.35	
Area	15.6	33.6	35.1	**32.9**	31.0	29.3	27.0	24.2	19.6	12.5	4.4	
KM 204	100.0 **cms**			9.08 **l/sec** remaining								
Conc.	71	75	78	80	80	77	77	80	80	77	73	12.4
Vel.	0.30	0.50	0.52	0.49	0.48	0.46	0.43	0.40	0.35	0.26	0.13	
W.P.	12.61	12.42	12.41	12.41	12.41	12.41	12.41	12.41	12.42	12.42	12.43	
Depth	1.26	2.71	2.83	2.65	2.50	2.37	2.18	1.95	1.58	1.01	0.35	
Area	15.6	33.7	35.1	32.9	31.0	29.4	27.0	24.2	19.6	12.6	4.4	
KM 205	100.3 **cms**			8.92 **l/sec** remaining								
Conc.	69	74	76	78	79	75	76	**79**	**79**	76	72	12.4
Vel.	0.30	0.50	0.52	0.50	0.48	0.46	0.44	0.41	0.35	0.26	0.13	
W.P.	12.61	12.42	12.41	12.41	12.41	12.41	12.42	12.42	12.42	12.43	12.43	
Depth	1.26	2.72	2.83	2.65	2.50	2.37	2.18	1.95	1.58	1.01	0.35	

W.P.	**12.62**	**12.42**	**12.42**	**12.42**	**12.42**	**12.42**	**12.42**	**12.42**	**12.43**	**12.43**	12.43	
Depth	**1.26**	**2.72**	**2.83**	**2.66**	**2.50**	**2.37**	**2.18**	**1.96**	**1.58**	**1.01**	**0.35**	
Area	**15.6**	**33.7**	**35.2**	**33.0**	**31.1**	**29.4**	**27.1**	**24.3**	**19.6**	**12.6**	**4.4**	
KM 207	**100.8**	**cms**		8.60 **l/sec** remaining								
Conc.	**66**	**71**	**73**	**75**	**76**	**72**	**72**	**76**	**75**	**73**	**69**	**12.4**
Vel.	**0.30**	**0.50**	**0.52**	**0.50**	**0.48**	**0.46**	**0.44**	**0.41**	**0.35**	**0.26**	**0.13**	
W.P.	12.62	12.43	12.42	12.42	12.42	12.42	12.42	12.42	12.43	12.43	12.44	
Depth	1.26	2.72	2.83	2.66	2.51	2.37	2.18	1.96	1.58	1.02	0.35	
Area	15.6	33.8	35.2	33.0	31.1	29.5	27.1	24.3	19.7	12.6	**4.4**	
KM **208**	**101.1**	**cms**		**8.45 l/sec remaining**								
Conc.	**65**	**69**	**72**	**73**	**75**	**70**	**71**	**74**	**74**	**71**	**67**	**12.4**
Vel.	**0.30**	**0.51**	**0.52**	**0.50**	**0.48**	**0.46**	**0.44**	**0.41**	**0.35**	**0.26**	0.13	
W.P.	12.62	12.43	12.42	12.42	12.42	12.42	12.43	12.43	12.43	12.44	12.44	
Depth	1.26	2.72	2.84	2.66	2.51	2.37	2.19	1.96	1.58	1.02	0.35	
Area	15.7	33.8	35.2	33.1	31.2	29.5	27.2	24.3	19.7	12.6	4.4	
KM 209	101.3	**cms**		8.28 **l/sec** remaining								
Conc.	58	63	66	69	69	64	70	80	82	82	79	15.2
Vel.	0.21	0.34	0.36	0.39	0.42	0.43	0.44	0.45	0.47	0.46	0.29	
W.P.	15.25	15.19	15.19	15.19	15.19	15.19	15.19	15.19	15.19	15.19	15.33	
Depth	0.66	1.35	1.46	1.65	1.84	1.94	1.99	2.06	2.16	2.14	1.03	
Area	10.0	20.5	22.2	25.0	27.9	29.5	30.2	31.3	32.8	32.4	15.7	
KM 210	101.6	**cms**		8.11 **l/sec** remaining								
Conc.	66	70	72	68	65	58	58	56	61	63	65	15.5
Vel.	0.29	0.46	0.45	0.43	0.41	0.38	0.32	0.23	0.22	0.21	0.11	
W.P.	15.84	15.55	15.55	15.55	15.55	15.55	15.56	15.56	15.56	15.56	15.56	
Depth	1.57	3.16	3.08	2.89	2.71	2.41	1.86	1.13	1.02	0.98	0.34	
Area	24.5	49.2	47.9	45.0	42.1	37.5	29.0	17.6	15.9	15.3	5.3	
KM 211	101.9	**cms**		7.96 **l/sec** remaining								
Conc.	69	73	75	69	64	60	59	57	58	60	62	17.7
Vel.	0.34	0.52	0.50	0.48	0.43	0.39	0.37	0.37	0.33	0.26	0.13	
W.P.	17.83	17.66	17.66	17.66	17.66	17.66	17.66	17.66	17.66	17.67	**17.67**	
Depth	1.23	2.33	2.21	2.05	1.77	1.53	1.41	1.37	1.16	0.79	0.29	
Area	21.7	41.2	39.0	36.3	31.3	27.0	25.0	24.2	20.5	13.9	5.2	
KM 212	102.2	**cms**		7.81 **l/sec** remaining								
Conc.	57	61	63	65	67	60	67	67	65	63	60	12.3
Vel.	0.22	0.40	0.48	0.52	0.52	0.48	0.43	0.37	0.33	0.26	0.13	
W.P.	12.47	12.37	12.35	12.33	12.33	12.34	12.35	12.34	12.34	12.35	12.36	
Depth	0.87	2.17	2.88	3.25	3.25	2.92	2.42	1.95	1.61	1.14	0.41	
Area	10.7	26.7	35.5	40.1	40.1	36.1	29.8	24.1	19.9	14.1	5.1	
KM 213	102.4	**cms**		7.66 **l/sec** remaining								
Conc.	56	60	62	64	65	58	66	65	64	61	58	12.3
Vel.	0.21	0.38	0.45	0.49	0.49	0.46	0.41	0.35	0.31	0.25	0.13	
W.P.	12.47	12.37	12.35	12.34	12.34	12.35	12.35	12.35	12.34	12.36	12.37	
Depth	0.92	2.29	3.05	3.44	3.44	3.09	2.56	2.06	1.71	1.21	0.43	
Area	11.3	28.3	37.6	42.5	42.4	38.2	31.5	25.5	21.0	14.9	5.4	
KM 214	102.7	**cms**		7.51 **l/sec** remaining								
Conc.	55	58	61	62	64	57	64	64	62	60	57	12.3
Vel.	0.21	0.38	0.46	0.49	0.49	0.46	0.41	0.35	0.31	0.25	0.13	
W.P.	12.48	12.38	12.36	12.35	12.35	12.35	12.36	12.35	12.35	12.36	12.38	
Depth	0.92	2.29	3.05	3.45	3.44	3.09	2.56	2.06	1.71	1.21	0.43	
Area	11.3	28.3	37.7	42.5	42.4	38.2	31.6	25.5	21.1	14.9	5.3	
KM 215	103.0	**cms**		7.40 **l/sec** remaining								
Conc.	59	62	63	63	53	49	47	48	45	47	52	15.2
Vel.	0.39	0.62	0.60	0.57	0.55	0.51	0.46	0.35	0.18	0.17	0.17	
W.P.	15.44	15.22	15.22	15.22	15.22	15.22	15.22	15.23	15.24	15.23	15.23	
Depth	1.33	2.63	2.50	2.32	2.16	1.95	1.64	1.11	0.39	0.36	0.35	
Area	20.3	40.1	38.0	35.3	32.9	29.7	24.9	16.9	5.9	5.4	5.4	
KM 216	103.3	**cms**		7.29 **l/sec** remaining								
Conc.	59	62	63	59	53	49	47	45	45	46	51	15.2
Vel.	0.40	0.64	0.62	0.59	0.56	0.52	0.47	0.36	0.18	0.17	0.17	
W.P.	15.44	15.22	15.22	15.22	15.22	15.22	15.23	15.24	15.24	15.24	15.24	
Depth	1.30	2.57	2.44	2.27	2.11	1.90	1.60	1.09	0.38	0.35	0.35	

W.P.	15.45	15.23	15.23	15.23	15.23	15.23	15.23	15.24	15.25	15.24	15.24	
Depth	1.30	2.58	2.45	2.27	2.11	1.91	1.60	1.09	0.38	0.35	0.35	
Area	19.8	39.2	37.2	34.6	32.2	29.0	24.4	16.6	5.9	5.4	5.3	
KM 218	103.9 **cms**			7.07 **l/sec** remaining								
Conc.	57	**59**	**61**	57	51	47	46	43	43	44	49	15.2
Vel.	0.41	0.64	0.62	0.59	0.56	0.53	0.47	0.36	0.18	0.17	0.17	
W.P.	15.45	15.23	15.23	15.23	15.23	15.23	15.24	15.25	15.25	15.25	15.25	
Depth	1.30	2.58	2.45	2.27	2.12	1.91	1.60	1.09	0.39	0.36	0.35	
Area	19.9	39.3	37.3	34.6	32.2	29.1	24.4	16.6	5.9	5.4	5.3	
KM 219	104.3 **cms**			6.96 **l/sec** remaining								
Conc.	56	58	60	56	50	46	45	43	42	44	49	15.2
Vel.	0.41	0.64	0.62	0.59	0.56	0.53	0.47	0.36	0.19	0.18	0.17	
W.P.	15.46	15.24	15.24	15.24	15.24	15.24	15.24	15.25	15.25	15.25	15.25	
Depth	1.31	2.58	2.45	2.27	2.12	1.91	1.60	1.09	0.39	0.36	0.35	
Area	19.9	39.3	37.3	34.7	32.3	29.1	24.4	16.6	5.9	5.5	5.3	
KM 220	104.6 **cms**			6.72 **l/sec** remaining								
Conc.	51	53	55	54	46	43	40	44	44	46	48	21.4
Vel.	0.13	0.24	0.27	0.27	0.25	0.22	0.19	0.13	0.09	0.08	0.05	
W.P.	21.49	21.39	21.37	21.37	21.38	21.37	21.39	21.39	21.37	21.37	21.38	
Depth	1.57	3.79	4.74	4.81	4.11	3.42	2.64	1.46	0.84	0.78	0.37	
Area	33.5	81.1	101.3	102.7	87.8	73.0	56.5	31.2	17.9	16.7	7.8	
KM 221	104.9 **cms**			6.55 **l/sec** remaining								
Conc.	54	56	51	52	43	43	41	40	37	41	42	21.4
Vel.	0.18	0.33	0.38	0.38	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.49	21.40	21.38	21.38	21.39	21.38	21.39	21.39	21.38	21.38	21.38	
Depth	1.13	2.73	3.41	3.46	2.96	2.46	1.90	1.05	0.60	0.57	0.26	
Area	24.1	58.4	72.9	73.9	63.2	52.6	40.7	22.5	12.9	12.1	5.6	
KM 222	105.2 **cms**			6.38 **l/sec** remaining								
Conc.	52	54	50	50	42	42	39	39	36	39	41	21.4
Vel.	0.18	0.33	0.38	0.38	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.50	21.40	21.38	21.38	21.39	21.38	21.40	21.40	21.38	21.38	21.39	
Depth	1.13	2.73	3.41	3.46	2.96	2.46	1.90	1.05	0.60	0.57	0.26	
Area	24.1	58.4	73.0	74.0	63.2	52.6	40.7	22.5	12.9	12.1	5.7	
KM 223	105.6 **cms**			6.22 **l/sec** remaining								
Conc.	51	53	48	49	41	41	38	38	35	38	40	21.4
Vel.	0.18	0.33	0.38	0.39	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.51	21.41	21.39	21.39	21.40	21.39	21.40	21.40	21.39	21.39	21.39	
Depth	1.13	2.73	3.41	3.46	2.96	2.46	1.90	1.05	0.61	0.57	0.27	
Area	24.2	58.5	73.0	74.0	63.3	52.6	40.7	22.5	13.0	12.2	5.7	
KM 224	105.9 **cms**			6.07 **l/sec** remaining								
Conc.	49	51	47	47	40	40	37	37	34	37	39	21.4
Vel.	0.18	0.33	0.38	0.39	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.51	21.41	21.40	21.39	21.40	21.39	21.41	21.41	21.39	21.39	21.40	
Depth	1.13	2.73	3.42	3.46	2.96	2.46	1.90	1.05	0.61	0.57	0.27	
Area	24.2	58.5	73.1	74.1	63.3	52.7	40.7	22.5	13.0	12.2	5.7	
KM 225	106.2 **cms**			5.92 **l/sec** remaining								
Conc.	48	50	46	46	39	39	36	36	33	36	38	21.4
Vel.	0.19	0.33	0.38	0.39	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.52	21.42	21.40	21.40	21.41	21.40	21.41	21.42	21.40	21.40	21.40	
Depth	1.13	2.74	3.42	3.46	2.96	2.46	1.90	1.05	0.61	0.57	0.27	
Area	24.2	58.6	73.1	74.1	63.3	52.7	40.7	22.5	13.0	12.2	5.7	
KM 226	106.5 **cms**			5.77 **l/sec** remaining								
Conc.	46	48	44	45	38	37	35	35	32	35	37	21.4
Vel.	0.19	0.33	0.38	0.39	0.35	0.31	0.26	0.18	0.12	0.12	0.07	
W.P.	21.52	21.42	21.41	21.40	21.41	21.40	21.42	21.42	21.40	21.40	21.41	
Depth	1.13	2.74	3.42	3.47	2.96	2.46	1.90	1.05	0.61	0.57	0.27	
Area	24.2	58.6	73.2	74.2	63.4	52.7	40.8	22.6	13.1	12.3	5.7	
KM 227	106.8 **cms**			5.63 **l/sec** remaining								
Conc.	45	47	43	44	37	36	34	34	31	34	36	21.4
Vel.	0.19	0.33	0.39	0.39	0.35	0.31	0.26	0.18	0.12	-0.12	0.07	
W.P.	**21.53**	21.43	21.41	21.41	21.42	21.41	21.42	21.43	21.41	**21.41**	**21.41**	
Depth	1.13	2.74	3.42	3.47	2.96	2.47	1.90	1.05	0.61	0.57	0.27	

W.P.	**21.53**	21.43	21.42	21.42	21.42	21.41	21.43	21.43	21.41	21.41	21.42	
Depth	1.13	2.74	3.42	3.47	2.96	2.47	1.91	1.06	0.61	0.58	0.27	
Area	24.3	58.7	73.3	74.3	63.4	52.8	40.8	22.6	13.2	12.3	5.7	
KM 229	107.5 **cms**			5.35 **l/sec** remaining								
Conc.	43	45	41	41	35	34	32	32	30	32	34	21.4
Vel.	0.19	0.33	0.39	0.39	0.35	0.31	0.26	0.18	0.13	0.12	0.07	
W.P.	21.54	21.44	21.42	21.42	21.43	21.42	21.43	21.44	21.42	21.42	21.42	
Depth	1.13	2.74	3.43	3.47	2.96	2.47	1.91	1.06	0.62	0.58	0.27	
Area	24.3	58.8	73.4	74.4	63.5	52.9	40.8	22.6	13.2	12.4	5.8	
KM 230	107.8 **cms**			5.21 **l/sec** remaining								
Conc.	29	32	34	36	38	40	41	41	41	40	38	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.33	0.34	0.35	0.37	0.34	0.19	
W.P.	14.51	14.52	14.52	14.52	14.52	14.50	14.50	14.51	14.50	14.56	14.84	
Depth	0.25	0.83	1.58	2.40	3.16	3.66	3.82	4.05	4.35	3.80	1.58	
Area	3.6	12.1	22.9	34.8	45.9	53.0	55.4	58.8	63.1	55.2	22.9	
KM 231	108.1 **cms**			5.08 **l/sec** remaining								
Conc.	28	31	33	35	37	39	40	40	40	39	37	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.33	0.34	0.35	0.37	0.34	0.19	
W.P.	14.51	14.52	14.53	14.53	14.52	14.51	14.50	14.51	14.51	14.56	14.84	
Depth	0.25	0.83	1.58	2.40	3.16	3.66	3.82	4.06	4.35	3.81	1.58	
Area	3.6	12.1	22.9	34.8	45.9	53.0	55.5	58.8	63.1	55.2	22.9	
KM 232	108.5 **cms**			4.95 **l/sec** remaining								
Conc.	28	30	32	34	36	37	39	39	39	38	36	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.33	0.34	0.36	0.37	0.34	0.19	
W.P.	14.52	14.52	14.53	14.53	14.52	14.51	14.51	14.51	14.51	14.56	14.85	
Depth	0.25	0.83	1.58	2.40	3.16	3.66	3.82	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.8	45.9	53.0	55.5	58.8	63.2	55.2	22.9	
KM 233	108.8 **cms**			4.83 **l/sec** remaining								
Conc.	27	30	31	33	35	36	37	38	38	37	35	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.33	0.34	0.36	0.37	0.34	0.19	
W.P.	14.52	14.53	14.53	14.53	14.53	14.51	14.51	14.52	14.51	14.57	14.85	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.8	45.9	53.1	55.5	58.9	63.2	55.2	22.9	
KM 234	109.1 **cms**			4.71 **l/sec** remaining								
Conc.	26	29	30	32	34	35	36	37	36	36	34	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.33	0.34	0.36	0.37	0.34	0.19	
W.P.	14.52	14.53	14.54	14.54	14.53	14.52	14.51	14.52	14.52	14.57	14.85	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.8	45.9	53.1	55.5	58.9	63.2	55.2	22.9	
KM 235	109.4 **cms**			4.59 **l/sec** remaining								
Conc.	25	28	29	31	33	34	35	36	35	35	33	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	**0.33**	0.34	0.36	0.38	0.34	0.19	
W.P.	14.53	14.53	14.54	14.54	14.54	14.52	14.52	14.52	14.52	14.58	14.86	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.8	46.0	53.1	55.6	58.9	63.3	55.3	22.9	
KM 236	109.8 **cms**			4.48 **l/sec** remaining								
Conc.	25	27	29	30	32	33	34	35	34	34	32	14.5
Vel.	0.06	0.13	0.19	0.25	0.30	0.34	0.35	0.36	0.38	0.34	0.19	
W.P.	14.53	14.54	14.54	14.54	14.54	14.52	14.52	14.53	14.52	14.58	14.86	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.9	46.0	53.1	55.6	59.0	63.3	55.3	**22.9**	
XM 237	110.1 **cms**			4.36 **l/sec** remaining								
Conc.	24	26	28	29	31	32	33	34	34	33	31	14.5
Vel.	0.06	0.13	0.19	0.25	0.31	0.34	0.35	0.36	0.38	0.34	0.19	
W.P.	14.53	14.54	14.55	14.55	14.54	14.53	14.53	14.53	14.53	14.58	14.86	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.9	46.0	53.2	55.6	59.0	63.3	55.3	22.9	
KM 238	110.4 **cms**			4.26 **l/sec** remaining								
Conc.	23	26	**27**	**28**	**30**	**32**	**32**	**33**	**33**	**32**	**30**	**14.5**
Vel.	**0.06**	**0.13**	**0.19**	**0.26**	**0.31**	**0.34**	**0.35**	**0.36**	**0.38**	**0.35**	**0.19**	
W.P.	**14.54**	**14.54**	**14.55**	**14.55**	**14.55**	**14.53**	**14.53**	**14.53**	**14.53**	**14.59**	**14.87**	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	

W.P.	14.54	14.55	14.56	14.56	14.55	14.54	14.53	14.54	14.53	14.59	14.87	
Depth	0.25	0.83	1.58	2.40	3.17	3.66	3.83	4.06	4.36	3.81	1.58	
Area	3.7	12.1	22.9	34.9	46.0	53.2	55.7	59.0	63.4	55.3	22.9	
KM 240	111.0 **cms**			4.07 **l/sec** remaining								
Conc.	29	31	32	33	34	34	34	33	32	31	30	**9.8**
Vel.	0.23	0.40	0.44	0.44	0.43	0.42	0.41	0.41	0.39	0.35	0.19	
W.P.	10.25	9.80	9.76	9.76	9.76	9.76	9.76	9.76	9.76	9.81	10.04	
Depth	1.39	3.20	3.64	3.65	3.54	3.41	3.30	3.21	3.07	2.52	1.05	
Area	13.6	31.2	35.6	35.6	34.6	33.3	32.2	31.4	29.9	24.6	10.2	
KM 241	111.6 **cms**			3.98 **l/sec** remaining								
Conc.	29	30	31	32	33	33	33	32	31	30	29	**9.8**
Vel.	0.20	0.36	0.39	0.39	0.39	0.38	0.37	0.36	0.35	0.31	0.17	
W.P.	10.26	9.80	9.76	9.76	9.76	9.76	9.76	9.76	9.76	9.81	10.04	
Depth	1.57	3.61	4.12	4.12	4.00	3.86	3.73	3.63	3.47	2.05	1.18	
Area	15.4	35.2	40.2	40.2	39.1	37.6	36.4	35.5	33.8	27.8	11.5	
KM 242	112.2 **cms**			3.89 **l/sec** remaining								
Conc.	28	30	31	31	32	32	32	31	30	29	28	**9.8**
Vel.	0.20	0.36	0.39	0.39	0.39	0.38	0.37	0.36	0.35	0.31	0.17	
W.P.	10.26	9.81	9.76	9.76	9.76	9.76	9.76	9.76	9.77	9.81	10.04	
Depth	1.58	3.61	4.12	4.12	4.00	3.86	3.73	3.64	3.47	2.85	1.18	
Area	15.4	35.2	40.2	40.2	39.1	37.7	36.4	35.5	33.9	27.9	11.5	
KM 243	112.8 **cms**			3.80 **l/sec** remaining								
Conc.	27	29	30	30	31	31	31	30	30	29	27	**9.8**
Vel.	0.20	0.36	0.40	0.40	0.39	0.38	0.37	0.37	0.35	0.31	0.17	
W.P.	10.26	9.81	9.76	9.76	9.76	9.76	9.76	9.76	9.77	9.81	10.05	
Depth	1.58	3.61	4.12	4.12	4.01	3.86	3.73	3.64	3.47	2.86	1.18	
Area	15.4	35.3	40.2	40.3	39.1	37.7	36.5	35.5	33.9	27.9	11.5	
KM 244	113.4 **cms**			3.72 **l/sec** remaining								
Conc.	27	28	29	30	30	30	30	30	29	28	26	**9.8**
Vel.	0.21	0.36	0.40	0.40	0.39	0.38	0.37	0.37	0.36	0.31	0.17	
W.P.	10.26	9.81	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.81	10.05	
Depth	1.58	3.61	4.12	4.13	4.01	3.86	3.74	3.64	3.47	2.86	1.18	
Area	15.4	35.3	40.3	40.3	39.2	37.7	36.5	35.6	33.9	27.9	11.6	
KM 245	114.0 **cms**			3.64 **l/sec** remaining								
Conc.	26	27	28	29	29	29	29	**29**	28	27	26	**9.8**
Vel.	0.21	0.37	0.40	0.40	0.39	0.38	0.38	0.37	0.36	0.31	0.17	
W.P.	10.26	9.81	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.82	10.05	
Depth	1.58	3.61	4.13	4.13	4.01	3.87	3.74	3.64	3.47	2.86	1.18	
Area	15.4	35.3	40.3	40.3	39.2	37.8	36.5	35.6	33.9	27.9	11.6	
KM 246	114.6 **cms**			3.56 **l/sec** remaining								
Conc.	25	26	27	28	28	29	29	28	27	26	25	**9.8**
Vel.	0.21	0.37	0.40	0.40	0.39	0.39	0.38	0.37	0.36	0.31	0.17	
W.P.	10.26	9.81	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.82	10.05	
Depth	1.58	3.62	4.13	4.13	4.01	3.87	3.74	3.65	3.48	2.86	1.18	
Area	15.4	35.3	40.3	40.4	39.2	37.8	36.6	35.6	34.0	27.9	11.6	
KM 247	115.2 **cms**			3.48 **l/sec** remaining								
Conc.	25	26	27	27	28	28	28	27	27	26	25	**9.8**
Vel.	0.21	0.37	0.40	0.40	0.40	0.39	0.38	0.37	0.36	0.32	0.17	
W.P.	10.27	9.81	9.77	9.77	9.77	9.77	9.77	9.77	9.77	9.82	10.05	
Depth	1.58	3.62	4.13	4.13	4.02	3.87	3.74	3.65	3.48	2.86	1.19	
Area	15.4	35.3	40.4	40.4	39.2	37.8	36.6	35.6	34.0	28.0	11.6	
KM 248	115.8 **cms**			3.41 **l/sec** remaining								
Conc.	24	25	26	27	27	27	27	27	26	25	24	9.8
Vel.	0.21	0.37	0.41	0.41	0.40	0.39	0.38	0.37	0.36	0.32	0.18	
W.P.	10.27	9.82	9.77	9.77	9.77	9.77	9.77	9.77	9.78	9.82	10.06	
Depth	1.58	3.62	4.13	4.14	4.02	3.87	3.75	3.65	3.48	2.86	1.19	
Area	15.4	35.4	40.4	40.4	39.3	37.9	36.6	35.7	34.0	28.0	11.6	
KM 249	116.4 **cms**			3.33 **l/sec** remaining								
Conc.	23	24	25	26	26	26	26	26	25	24	23	**9.8**
Vel.	0.21	0.37	0.41	0.41	0.40	0.39	0.38	0.38	0.36	0.32	0.18	
W.P.	10.27	9.82	9.77	9.77	9.77	9.77	9.77	9.77	9.78	9.82	10.06	
Depth	1.58	3.62	4.14	4.14	4.02	3.88	3.75	3.65	3.48	2.87	1.19	

W.P.	11.46	11.39	11.39	11.41	11.40	11.39	11.39	11.39	11.43	11.45	11.49	
Depth	0.49	1.08	1.31	1.69	2.12	2.38	2.54	2.70	2.41	1.59	0.57	
Area	5.5	12.3	14.9'	19.2	24.1	27.1	28.9	30.7	27.4	18.1	6.5	
KM 251	117.1	**cms**		3.24 **l/sec** remaining								
Conc.	lg	20	21	22	23	24	24	24	24	23	22	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.46	11.39	11.39	**11.41**	**11.40**	**11.39**	**11.39**	**11.39**	11.43	11.45	11.49	
Depth	0.70	1.55	1.88	2.43	3.04	3.42	3.65	3.87	3.45	2.28	0.81	
Area	7.9	17.6	21.5	27.6	34.7	39.0	41.6	44.1	39.3	25.9	9.3	
KM 252	117.2	**cms**		3.18 **l/sec** remaining								
Conc.	19	20	21	22	23	23	24	24	23	23	21	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.39	11.40	11.41	11.40	11.39	11.39	11.39	11.43	11.45	11.49	
Depth	0.70	1.55	1.89	2.43	3.04	3.42	3.65	3.87	3.45	2.28	0.81	
Area	8.0	17.6	21.5	27.6	34.7	39.0	41.6	44.1	39.4	25.9	9.3	
KM 253	117.3	**cms**		3.12 **l/sec** remaining								
Conc.	18	20	21	21	22	23	23	23	23	22	21	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.39	11.40	11.41	11.40	11.39	11.39	11.39	11.43	11.46	11.49	
Depth	0.70	1.55	1.89	2.43	3.04	3.42	3.65	3.88	3.46	2.28	0.81	
Area	8.0	17.6	21.5	27.7	34.7	39.0	41.6	44.1	39.4	25.9	9.3	
KM 254	117.4	**cms**		3.07 **l/sec** remaining								
Conc.	18	19	20	21	22	23	23	23	23	22	21	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.40	11.40	11.41	11.40	11.39	11.39	11.39	11.44	11.46	11.49	
Depth	0.70	1.55	1.89	2.43	3.05	3.42	3.65	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.5	27.7	34.7	39.0	41.6	44.2	39.4	25.9	9.3	
KM 255	117.4	**cms**		3.02 **l/sec** remaining								
Conc.	18	19	20	20	21	22	23	23	22	21	20	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.40	11.40	11.41	11.40	11.40	11.40	11.40	11.44	11.46	11.49	
Depth	0.70	1.55	1.89	2.43	3.05	3.43	3.65	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.5	27.7	34.7	39.0	41.6	44.2	39.4	26.0	9.3	
KM 256	117.5	**cms**		2.96 **l/sec** remaining								
Conc.	17	19	20	20	21	22	22	22	22	21	20	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.40	11.40	11.41	11.40	11.40	11.40	11.40	11.44	11.46	11.50	
Depth	0.70	1.55	1.89	2.43	3.05	3.43	3.65	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.5	27.7	34.7	39.0	41.6	44.2	39.4	26.0	9.3	
KM 257	117.6	**cms**		2.91 **l/sec** remaining								
Conc.	17	18	19	20	21	21	22	22	21	21	20	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.40	11.40	11.41	11.41	11.40	11.40	11.40	11.44	11.46	11.50	
Depth	0.70	1.55	1.89	2.43	3.05	3.43	3.66	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.5	27.7	34.7	39.1	41.7	44.2	39.4	26.0	9.3	
KM 258	117.7	**cms**		2.86 **l/sec** remaining								
Conc.	17	18	19	19	20	21	21	21	21	20	19	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	**0.20**	
W.P.	11.47	11.40	11.40	11.42	11.41	11.40	11.40	11.40	11.44	11.46	11.50	
Depth	0.70	1.56	1.89	2.43	3.05	3.43	3.66	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.6	27.7	34.8	39.1	41.7	44.2	39.5	26.0	**9.3**	
KM 259	117.8	**cms**		2.81 **l/sec** remaining								
Conc.	16	18	18	19	**20**	21	21	21	21	20	19	11.4
Vel.	0.18	0.30	0.34	0.40	0.47	0.50	0.53	0.55	0.51	0.38	0.20	
W.P.	11.47	11.40	11.40	11.42	11.41	11.40	11.40	11.40	11.44	11.46	11.50	
Depth	0.70	1.56	1.89	2.43	3.05	3.43	3.66	3.88	3.46	2.28	0.81	
Area	8.0	17.7	21.6	27.7	34.8	39.1	41.7	44.3	39.5	26.0	9.3	
KM 260	117.9	**cms**		2.74 **l/sec** remaining								
Conc.	19	20	20	21	22	22	22	21	21	20	19	10.9
Vel.	0.20	0.33	0.34	**0.35**	**0.36**	**0.37**	**0.37**	**0.36**	**0.32**	**0.29**	**0.18**	
W.P.	**11.28**	**10.90**	**10.90**	**10.90**	**10.90**	**10.90**	**10.90**	**10.90**	**10.94**	**10.90**	**11.16**	
Depth	**1.69**	**3.46**	**3.61**	**3.76**	**3.91**	**4.05**	**4.12**	**4.01**	**3.35**	**2.80**	**1.40**	

W.P.	11.28	10.90	10.90	10.90	10.90	10.90	10.90	10.90	**10.94**	10.90	11.16	
Depth	1.45	2.97	3.10	3.23	3.36	3.48	3.54	3.44	2.87	2.40	1.20	
Area	15.8	32.3	33.8	35.2	36.6	37.9	38.5	37.5	31.3	26.2	13.1	
KM 262	118.0 **cms**			2.63 **l/sec** remaining								
Conc.	17	18	**19**	20	21	21	21	21	20	19	18	10.9
Vel.	0.24	0.39	0.40	0.41	0.42	0.43	0.43	0.43	0.38	0.34	0.21	
W.P.	11.28	10.90	10.90	10.90	10.90	10.90	10.90	10.90	10.94	10.90	11.17	
Depth	1.45	2.97	3.10	3.23	3.36	3.48	3.54	3.44	2.87	2.40	1.20	
Area	15.8	32.4	33.8	35.2	36.6	37.9	38.6	37.6	31.3	26.2	13.1	
KM 263	118.1 **cms**			2.58 **l/sec** remaining								
Conc.	17	18	19	20	20	20	20	20	20	19	18	10.9
Vel.	0.24	0.39	0.40	0.41	0.42	0.43	0.43	0.43	0.38	0.34	0.21	
W.P.	11.28	10.90	10.90	10.90	10.90	10.90	10.90	10.90	10.94	10.90	11.17	
Depth	1.45	2.97	3.10	3.23	3.36	3.48	3.54	3.45	2.87	2.40	1.21	
Area	15.8	32.4	33.8	35.2	36.6	37.9	38.6	37.6	31.3	26.2	13.1	
KM 264	118.2 **cms**			2.53 **l/sec** remaining								
Conc.	17	18	19	19	20	20	20	20	**19**	19	18	10.9
Vel.	0.24	0.39	0.40	0.41	0.42	0.43	0.43	0.43	0.38	0.34	0.21	
W.P.	11.28	10.90	10.90	10.90	10.90	10.90	10.90	10.91	10.95	10.90	11.17	
Depth	1.45	2.97	3.10	3.23	3.36	3.48	3.54	3.45	2.87	2.40	1.21	
Area	15.8	32.4	33.8	35.2	36.6	37.9	38.6	37.6	31.3	26.2	13.2	
KM 265	118.3 **cms**			2.44 **l/sec** remaining								
Conc.	14	15	16	17	17	18	19	19	19	19	18	18.4
Vel.	0.08	0.15	0.18	0.20	0.22	0.23	0.25	0.27	0.26	0.25	0.16	
W.P.	18.41	18.38	18.37	18.37	18.37	18.37	18.37	18.37	18.38	18.37	18.65	
Depth	0.74	1.81	2.42	2.90	3.24	3.52	3.89	4.39	4.19	3.85	1.99	
Area	13.6	33.2	44.4	53.3	59.5	64.6	71.4	80.6	77.0	70.8	36.6	
KM 266	118.4 **cms**			2.37 **l/sec** remaining								
Conc.	13	14	15	16	17	15	17	19	19	**19**	18	18.4
Vel.	0.10	0.18	0.22	0.25	0.27	0.29	0.31	0.33	0.32	0.30	0.20	
W.P.	18.42	18.38	18.38	18.38	18.38	18.38	18.38	18.38	18.39	18.38	18.66	
Depth	0.60	1.47	1.96	2.36	2.63	2.86	3.16	3.57	3.41	3.13	1.62	
Area	11.1	27.0	36.1	43.3	48.4	52.5	58.1	65.5	62.6	57.5	29.7	
KM 267	118.5 **cms**			2.30 **l/sec** remaining								
Conc.	13	14	15	15	16	14	17	18	19	18	18	18.4
Vel.	0.10	0.18	0.22	0.25	0.27	0.29	0.31	0.33	0.32	0.30	0.20	
W.P.	18.42	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.40	18.39	18.67	
Depth	0.60	1.47	1.96	2.36	2.63	2.86	3.16	3.57	3.41	3.13	1.62	
Area	11.1	27.0	36.1	43.3	48.4	52.6	58.1	65.6	62.7	57.6	29.8	
KM 268	118.7 **cms**			2.24 **l/sec** remaining								
Conc.	12	14	14	15	16	14	16	18	18	18	17	18.4
Vel.	0.10	0.18	0.22	0.25	0.27	0.29	0.31	0.33	0.32	0.30	0.20	
W.P.	18.43	18.40	18.40	18.39	18.39	18.39	18.40	18.40	18.41	18.39	18.68	
Depth	0.60	1.47	1.96	2.36	2.63	2.86	3.16	3.57	3.41	3.14	1.62	
Area	11.1	27.0	36.1	43.4	48.5	52.6	58.1	65.6	62.7	57.7	29.8	
KM 269	118.8 **cms**			2.18 **l/sec** remaining								
Conc.	12	13	14	15	15	14	16	17	18	17	17	18.4
Vel.	0.10	0.18	0.22	0.25	0.27	0.29	0.31	0.33	0.32	0.30	0.20	
W.P.	18.44	18.41	18.41	18.40	18.40	18.40	18.40	18.40	18.42	18.40	18.68	
Depth	0.60	1.47	1.96	2.36	2.64	2.86	3.16	3.57	3.41	3.14	1.62	
Area	11.1	27.0	36.2	43.4	48.5	52.7	58.2	65.7	62.8	57.7	29.8	
KM 270	118.9 **cms**			2.13 **l/sec** remaining								
Conc.	15	15	15	13	12	11	10	9	8	7	7	25.9
Vel.	0.24	0.40	0.41	0.38	0.35	0.28	0.23	0.17	0.12	0.08	0.03	
W.P.	26.07	25.95	25.94	25.94	25.95	25.95	25.94	25.94	25.94	25.94	25.94	
Depth	1.48	3.25	3.30	3.03	2.64	1.92	1.34	0.90	0.54	0.25	0.07	
Area	38.3	84.3	85.5	78.7	68.4	49.8	34.9	23.5	13.9	6.5	1.8	
KM 271	119.1 **cms**			2.08 **l/sec** remaining								
Conc.	15	16	14	13	12	11	9	8	7	6	6	26.0
Vel.	0.27	0.45	0.46	0.43	0.40	0.32	0.25	0.20	0.14	0.08	0.04	
W.P.	26.08	25.96	25.95	25.95	25.96	25.96	25.95	25.95	25.95	25.95	25.95	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	1.19	0.80	0.47	0.22	0.06	

W.P.	26.09	25.97	25.96	25.96	**25.97**	**25.97**	25.96	25.96	25.96	25.96	25.96	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	**1.19**	0.80	0.47	0.22	0.06	
Area	34.0	74.8	75.8	69.8	60.6	44.1	30.9	20.8	12.3	5.7	1.6	
KM 273	119.3	**cms**		2.00 **l/sec** remaining								
Conc.	14	15	13	12	**11**	**10**	9	8	7	6	6	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.25	0.20	0.14	0.08	0.04	
W.P.	26.10	25.98	25.98	25.97	25.98	25.98	25.98	25.97	25.97	25.97	25.97	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	1.19	0.80	0.47	0.22	0.06	
Area	34.0	74.8	75.9	69.8	60.6	44.1	30.9	20.8	12.3	5.7	1.6	
KM 274	119.5	**cms**		1.96 **l/sec** remaining								
Conc.	14	15	13	12	11	10	9	a	7	6	6	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.25	0.20	0.14	0.08	0.04	
W.P.	26.11	25.99	25.99	25.98	25.99	25.99	25.99	25.98	25.98	25.98	25.98	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	1.19	0.80	0.47	0.22	0.06	
Area	34.0	74.9	75.9	69.9	60.6	44.1	30.9	20.8	12.3	5.7	1.6	
KM 275	119.6	**cms**		1.92 **l/sec** remaining								
Conc.	14	14	12	12	11	10	9	a	6	6	5	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.26	0.20	0.14	0.08	0.04	
W.P.	26.12	26.00	26.00	25.99	26.00	26.00	26.00	25.99	25.99	25.99	25.99	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	1.19	0.80	0.47	0.22	0.06	
Area	34.1	74.9	76.0	69.9	60.6	44.1	30.9	20.7	12.3	5.7	1.6	
KM 276	119.7	**cms**		1.88 **l/sec** remaining								
Conc.	13	14	12	11	11	9	8	a	6	6	5	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.26	0.20	0.14	0.08	0.04	
W.P.	26.14	26.01	26.01	26.00	26.01	26.01	26.01	26.01	26.01	26.00	26.00	
Depth	1.31	2.88	2.92	2.69	2.33	1.70	1.19	0.80	0.47	0.22	0.06	
Area	34.1	75.0	76.0	70.0	60.6	44.1	30.9	20.7	12.2	5.7	1.6	
KM 277	119.9	**cms**		1.84 **l/sec** remaining								
Conc.	13	14	12	11	10	9	a	7	6	6	5	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.26	0.20	0.14	0.08	0.04	
W.P.	26.15	26.02	26.02	26.01	26.02	26.02	26.02	26.02	26.02	26.01	26.01	
Depth	1.31	2.88	2.92	2.69	2.33	1.69	1.19	0.80	0.47	0.22	0.06	
Area	34.1	75.0	76.1	70.0	60.6	44.1	30.9	20.7	12.2	5.7	1.6	
KM 278	120.0	**cms**		1.80 **l/sec** remaining								
Conc.	13	13	12	11	10	9	8	7	6	6	5	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.26	0.20	0.14	0.08	0.04	
W.P.	26.16	26.03	26.03	26.02	26.03	26.03	26.03	26.03	26.03	26.03	26.02	
Depth	1.31	2.88	2.92	2.69	2.33	1.69	1.19	0.80	0.47	0.22	0.06	
Area	34.2	75.1	76.1	70.1	60.6	44.1	30.8	20.7	12.2	5.7	1.6	
KM 279	120.1	**cms**		1.77 **l/sec** remaining								
Conc.	13	13	11	11	10	9	8	7	6	5	5	26.0
Vel.	0.27	0.46	0.46	0.44	0.40	0.32	0.26	0.20	0.14	0.08	0.04	
W.P.	26.17	26.04	26.04	26.04	26.04	26.04	26.04	26.04	26.04	26.04	26.04	
Depth	1.31	2.89	2.93	2.69	2.33	1.69	1.18	0.80	0.47	0.22	0.06	
Area	34.2	75.1	76.2	70.1	60.7	44.1	30.8	20.7	12.2	5.7	1.6	
KM 280	120.3	**cms**		1.76 **l/sec** remaining								
Conc.	10	11	11	11	10	9	9	9	9	9	9	7.4
Vel.	0.96	1.75	1.83	1.65	1.36	1.03	0.75	0.59	0.44	0.30	0.15	
W.P.	8.49	7.46	7.42	7.50	7.50	7.50	7.43	7.42	7.42	7.42	7.42	
Depth	1.42	3.10	3.30	2.86	2.12	1.39	0.85	0.58	0.38	0.21	0.07	
Area	10.5	23.0	24.5	21.2	15.8	10.3	6.3	4.3	2.8	1.5	0.5	
KM 281	120.4	**cms**		1.74 **l/sec** remaining								
Conc.	10	10	10	11	10	10	10	10	10	9	9	7.4
Vel.	0.66	1.20	1.25	1.13	0.93	0.70	0.51	0.40	0.30	0.20	0.10	
W.P.	8.50	7.46	7.42	7.50	7.50	7.50	7.44	7.43	7.43	7.42	7.42	
Depth	2.07	4.52	4.80	4.16	3.09	2.02	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.5	35.6	30.9	22.9	15.0	9.2	6.3	4.1	2.2	0.7	
KM 282	120.5	**cms**		1.73 **l/sec** remaining								
Conc.	10	10	10	10	10	10	9	10	10	9	9	7.4
Vel.	0.66	1.20	1.25	1.13	0.93	0.70	0.52	0.40	0.30	0.20	**0.10**	
W.P.	8.50	7.46	7.43	7.50	7.50	7.50	7.44	7.43	7.43	7.43	7.43	
Depth	2.07	4.52	4.80	4.16	3.09	2.02	1.24	0.85	0.55	0.30	0.10	

W.P.	8.50	7.47	7.43	7.50	7.50	7.50	7.44	7.43	7.43	7.43	7.43	
Depth	2.07	4.52	4.80	4.16	3.09	2.02	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.6	35.7	30.9	23.0	15.0	9.2	6.3	4.1	2.2	0.7	
KM 284	120.8 **cms**			1.70 **l/sec** remaining								
Conc.	10	10	10	10	**10**	9	9	10	**9**	**9**	**9**	7.4
Vel.	0.66	1.20	1.25	1.13	0.93	0.71	0.52	0.40	0.30	0.21	0.10	
W.P.	8.50	7.47	7.43	7.51	7.51	7.51	7.44	7.43	7.43	7.43	7.43	
Depth	2.07	4.52	4.80	4.16	3.09	**2.02**	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.6	35.7	30.9	23.0	15.0	9.2	6.3	4.1	2.2	0.7	
KM 285	120.9 **cms**			1.69 **l/sec remaining**								
Conc.	10	10	**10**	10	9	9	9	10	**9**	**9**	8	7.4
Vel.	0.66	1.20	1.26	1.14	0.93	0.71	0.52	0.40	0.30	0.21	**0.10**	
W.P.	8.51	7.47	7.43	7.51	7.51	7.51	7.45	7.44	7.44	7.43	7.43	
Depth	2.07	4.53	4.80	4.16	3.09	2.02	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.6	35.7	30.9	23.0	15.0	9.2	6.3	4.1	2.3	0.8	
KM 286	121.1 **cms**			1.67 **l/sec** remaining								
Conc.	9	10	10	10	9	9	9	10	**9**	**9**	8	7.4
Vel.	0.66	1.20	1.26	1.14	0.93	0.71	0.52	0.40	0.30	0.21	0.10	
W.P.	8.51	7.47	7.44	7.51	7.51	7.51	7.45	7.44	7.44	7.44	7.44	
Depth	2.07	4.53	4.80	4.16	3.09	2.01	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.7	35.7	30.9	23.0	15.0	9.2	6.3	4.1	2.3	0.8	
KM 287	121.2 **cms**			1.66 **l/sec** remaining								
Conc.	9	10	10	10	9	9	9	**9**	**9**	**9**	8	7.4
Vel.	0.66	1.21	1.26	1.14	0.93	0.71	0.52	0.40	0.30	0.21	0.10	
W.P.	8.51	7.48	7.44	7.51	7.51	7.51	7.45	7.44	7.44	7.44	7.44	
Depth	2.07	4.53	4.81	4.16	3.09	2.01	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.7	35.7	31.0	23.0	15.0	9.2	6.3	4.1	2.3	0.8	
KM 288	121.3 **cms**			1.64 **l/sec** remaining								
Conc.	9	10	10	10	9	9	9	**9**	**9**	**9**	8	7.4
Vel.	0.66	1.21	1.26	1.14	0.94	0.71	0.52	0.40	0.30	0.21	0.10	
W.P.	8.52	7.48	7.44	7.52	7.52	7.52	7.45	7.44	7.44	7.44	7.44	
Depth	2.07	4.53	4.81	4.16	3.09	2.01	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.7	35.7	31.0	23.0	15.0	9.2	6.3	4.1	2.3	0.8	
KM 289	121.5 **cms**			1.63 **l/sec** remaining								
Conc.	9	9	10	10	9	9	9	**9**	**9**	**9**	8	7.4
Vel.	0.66	1.21	1.26	**1.14**	0.94	0.71	0.52	0.40	0.30	0.21	0.10	
W.P.	8.52	7.48	7.44	7.52	7.52	7.52	7.46	7.45	7.45	7.44	7.44	
Depth	2.07	4.53	4.81	4.16	3.09	2.01	1.24	0.85	0.55	0.30	0.10	
Area	15.4	33.7	35.8	31.0	23.0	15.0	9.2	6.3	4.1	2.3	0.8	
KM 290	121.6 **cms**			1.58 **l/sec** remaining								
Conc.	10	10	11	11	11	11	11	11	10	10	10	8.6
Vel.	0.13	0.24	0.28	0.31	0.30	0.27	0.24	0.20	0.16	0.11	0.06	
W.P.	9.64	8.70	8.67	8.59	8.61	8.66	8.66	8.66	8.65	8.65	8.65	
Depth	3.19	7.40	9.33	10.43	10.14	8.81	7.12	5.46	3.88	2.33	0.78	
Area	27.4	63.5	80.1	89.5	87.1	75.7	61.1	46.9	33.3	20.0	6.7	
KM 291	121.7 **cms**			1.55 **l/sec** remaining								
Conc.	10	10	10	11	11	11	10	10	10	10	**9**	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	0.29	0.23	0.17	0.08	
W.P.	9.64	8.70	8.67	8.59	8.61	8.66	8.56	8.66	8.65	8.65	8.65	
Depth	2.19	5.09	6.41	7.17	6.97	6.06	4.89	3.75	2.66	1.61	0.54	
Area	18.8	43.7	55.0	61.5	59.8	52.0	42.0	32.2	22.9	13.8	4.6	
KM 292	121.9 **cms**			1.51 **l/sec** remaining								
Conc.	10	10	10	10	10	10	10	10	10	**9**	**9**	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	0.29	0.23	0.17	0.08	
W.P.	9.64	8.70	8.68	8.59	8.61	8.66	8.66	8.66	8.65	8.65	8.65	
Depth	2.19	5.09	6.41	7.17	6.97	6.06	4.90	3.75	2.67	1.61	0.54	
Area	18.8	43.7	55.0	61.5	59.9	52.0	42.0	32.2	22.9	13.8	4.6	
KM 293	122.0 **cms**			1.48 **l/sec** remaining								
Conc.	9	10	10	10	10	10	10	10	**9**	**9**	**9**	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	0.29	0.23	0.17	0.08	
W.P.	9.64	8.70	8.68	8.59	8.61	8.67	8.67	8.66	8.65	8.65	8.65	
Depth	2.19	5.09	6.41	7.17	6.97	6.06	4.90	3.76	2.67	1.61	0.54	

W.P.	9.65	0.70	8.60	8.59	**8.61**	8.67	8.67	8.66	8.65	8.65	8.66	
Depth	2.20	5.09	6.42	7.17	6.98	6.06	4.90	3.76	2.67	1.61	0.54	
Area	18.9	43.7	55.1	61.6	59.9	52.1	42.1	32.3	22.9	13.8	4.6	
KM 295	122.3	**cms**		**1.42 l/sec** remaining								
Conc.	9	9	9	10	10	10	9	**9**	**9**	**9**	**8**	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	**0.29**	0.23	0.17	0.08	
W.P.	9.65	0.70	8.68	8.59	8.62	8.67	0.67	8.66	8.65	8.65	8.66	
Depth	2.20	5.10	6.42	7.18	6.98	6.07	4.90	3.76	2.67	1.61	0.54	
Area	18.9	43.8	55.1	61.6	60.0	52.1	42.1	32.3	23.0	13.9	4.7	
KM 296	122.4	**cms**		1.39 **l/sec** remaining								
Conc.	9	9	9	9	9	9	9	**9**	**9**	**9**	a	0.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	**0.29**	0.23	**0.17**	0.08	
W.P.	9.65	8.70	8.68	8.59	8.62	0.67	8.67	**8.66**	8.66	8.66	8.66	
Depth	2.20	5.10	6.42	7.18	6.98	6.07	4.91	3.76	2.67	1.62	0.54	
Area	18.9	43.8	55.2	61.7	60.0	52.1	42.1	32.3	23.0	13.9	4.7	
KM 297	122.5	**cms**		1.36 **l/sec** remaining								
Conc.	9	9	9	9	9	9	9	**9**	**9**	a	a	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	**0.29**	0.23	0.17	0.08	
W.P.	9.65	**8.71**	8.68	8.60	8.62	0.67	0.67	8.66	0.66	8.66	8.66	
Depth	2.20	5.10	6.43	7.18	6.99	6.07	4.91	3.77	2.68	1.62	0.54	
Area	18.9	43.8	55.2	**61.7**	60.0	52.2	42.2	32.4	23.0	13.9	4.7	
KM 298	122.7	**cms**		1.33 **l/sec** remaining								
Conc.	a	9	9	9	9	9	9	**9**	a	a	**8**	0.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	**0.29**	0.23	b.17	0.08	
W.P.	9.66	8.71	8.68	8.60	8.62	8.67	8.67	8.67	8.66	8.66	8.66	
Depth	2.20	5.10	6.43	7.19	6.99	6.07	4.91	3.77	2.68	1.62	0.55	
Area	18.9	43.9	55.2	61.8	60.1	52.2	42.2	32.4	23.0	13.9	4.7	
KM 299	122.8	**cms**		1.30 **l/sec** remaining								
Conc.	8	**8**	9	9	9	9	9	**9**	**8**	**8**	**8**	8.6
Vel.	0.19	0.36	0.42	0.45	0.44	0.40	0.35	**0.29**	0.24	0.17	0.08	
W.P.	9.66	8.71	8.68	8.60	8.62	8.67	8.67	8.67	8.66	8.66	8.66	
Depth	2.20	5.11	6.43	7.19	6.99	6.08	4.91	3.77	2.68	1.62	0.55	
Area	18.9	43.9	55.3	61.8	60.1	52.2	42.2	32.4	23.0	13.9	4.7	
KM 300	123.0	**cms**		1.25 **l/sec** remaining								
Conc.	8	a	a	8	8	9	9	**9**	**9**	10	10	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.25	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.70	33.80	
Depth	0.83	1.67	1.64	1.49	1.63	1.96	2.52	3.07	3.05	2.29	0.81	
Area	20.2	56.3	55.4	50.4	55.0	66.0	84.9	103.5	102.9	77.4	27.3	
KM 301	123.1	**cms**		1.20 **l/sec** remaining								
Conc.	7	**8**	7	a	8	**8**	8	**9**	**9**	**9**	10	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.25	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.78	33.80	
Depth	0.84	1.67	1.64	1.49	1.63	1.96	2.52	3.07	3.05	2.29	0.81	
Area	28.2	56.4	55.4	50.4	55.0	66.0	85.0	103.5	102.9	77.4	27.3	
KM 302	123.2	**cms**		1.15 **l/sec** remaining								
Conc.	7	7	7	7	8	**8**	8	a	**8**	**9**	**9**	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.25	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.79	33.80	
Depth	0.84	1.67	1.64	1.50	1.63	1.96	2.52	3.07	3.05	2.29	0.81	
Area	20.2	56.4	55.4	50.5	55.0	66.1	85.0	103.6	103.0	77.5	27.3	
KM 303	123.4	**cms**		1.11 **l/sec** remaining								
Conc.	7	7	7	7	7	a	8	8	8	**9**	**9**	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.25	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.79	33.80	
Depth	0.84	1.67	1.64	1.50	1.63	1.96	2.52	3.07	3.05	2.30	0.81	
Area	28.2	56.5	55.5	50.5	55.1	66.1	85.1	103.6	103.0	77.5	27.3	
KM 304	123.5	**cms**		1.07 **l/sec** remaining								
Conc.	6	7	6	7	7	7	7	a	a	**8**	**9**	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.25	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.79	33.80	
Depth	0.84	1.67	1.64	1.50	1.63	1.96	2.52	3.07	3.05	2.30	0.81	

W.P.	33.80	33.76	33.76	33.76	33.76	33.76	33.77	33.76	33.76	33.79	33.80	
Depth	0.84	1.67	1.65	1.50	1.63	1.96	2.52	3.07	3.05	2.30	0.81	
Area	28.3	56.5	55.6	50.6	55.2	66.2	85.2	103.7	103.1	77.6	27.4	
KM 306	123.8 cms			0.99 l/sec remaining								
Conc.	6	6	6	6	6	7	7	7	7	8	8	33.0
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.26	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.77	33.76	33.78	33.76	33.76	33.79	33.80	
Depth	0.84	1.68	1.65	1.50	1.64	1.96	2.52	3.07	3.06	2.30	0.81	
Area	28.3	56.6	55.6	50.6	55.2	66.3	85.2	103.8	103.2	77.7	27.4	
KM 307	123.9 cms			0.95 l/sec remaining								
Conc.	6	6	6	6	6	7	7	7	7	7	8	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.26	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.77	33.76	33.78	33.76	33.76	33.79	33.80	
Depth	0.84	1.68	1.65	1.50	1.64	1.96	2.53	3.07	3.06	2.30	0.81	
Area	28.3	56.6	55.6	50.7	55.3	66.3	85.3	103.8	103.2	77.7	27.4	
KM 308	124.0 cms			0.91 l/sec remaining								
Conc.	5	6	5	6	6	6	6	6	7	7	7	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.26	0.25	0.21	0.11	
W.P.	33.80	33.76	33.76	33.76	33.77	33.76	33.78	33.76	33.76	33.79	33.80	
Depth	0.84	1.68	1.65	1.50	1.64	1.96	2.53	3.08	3.06	2.30	0.81	
Area	28.3	56.7	55.7	50.7	55.3	66.3	85.3	103.8	103.2	77.7	27.5	
KM 309	124.2 cms			0.88 l/sec remaining								
Conc.	5	6	5	6	6	6	6	6	6	7	7	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.26	0.25	0.21	0.11	
W.P.	33.81	33.76	33.76	33.76	33.77	33.76	33.78	33.76	33.76	33.79	33.80	
Depth	0.84	1.68	1.65	1.50	1.64	1.97	2.53	3.08	3.06	2.30	0.81	
Area	28.4	56.7	55.7	50.8	55.3	66.4	85.4	103.9	103.3	77.8	27.5	
KM 310	124.3 cms			0.84 l/sec remaining								
Conc.	5	5	5	5	5	6	6	6	6	7	7	33.8
Vel.	0.11	0.17	0.17	0.16	0.17	0.19	0.22	0.26	0.25	0.21	0.11	
W.P.	33.81	33.76	33.76	33.77	33.77	33.77	33.78	33.76	33.77	33.79	33.80	
Depth	0.84	1.68	1.65	1.50	1.64	1.97	2.53	3.08	3.06	2.31	0.81	
Area	28.4	56.8	55.8	50.8	55.4	66.4	85.4	103.9	103.3	77.8	27.5	

8D – SCENARIO #4

Spill site: River Km 119 E Spill rate 16.67 l/s

CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	a	9	10	East Bank 11	Panel Width (m)
KM 119	122.7 cms			16.67 l/sec remaining								
Conc.	0	0	0	0	0	0	0	0	0	0	6509	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.58	0.32	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.12	6.35	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.16	1.32	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	22.4	19.2	8.0	
KM 119.1	113	117	121	125	128	131	133	135	136	137	136	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.58	0.32	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.12	6.35	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.16	1.32	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	22.4	19.2	8.0	
KM 119.2	121	125	128	130	132	132	132	131	129	126	122	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.58	0.32	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.12	6.35	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.16	1.32	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	22.4	19.2	8.0	
KM 119.3	121	125	128	131	132	132	132	131	128	125	121	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.58	0.32	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	6.08	6.12	6.35	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.16	1.32	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	22.4	19.2	8.0	
KM 119.4	121	125	128	131	132	132	132	131	128	125	121	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.58	0.32	

Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.58**	**0.32**	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.12**	**6.35**	
Depth	1.32	3.16	3.68	'3.68	3.68	3.68	3.68	3.68	**3.68**	**3.16**	**1.32**	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	**22.4**	**19.2**	**8.0**	
KM 119.6	121	125	128	131	132	132	132	131	**128**	**125**	**121**	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.58**	**0.32**	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.12**	**6.35**	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	**3.68**	**3.16**	**1.32**	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	**22.4**	**19.2**	**8.0**	
KM 119.7	121	125	128	131	132	132	132	131	**128**	**125**	**121**	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.58**	**0.32**	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.12**	**6.35**	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	**3.68**	**3.16**	**1.32**	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	**22.4**	**19.2**	**8.0**	
KM 119.8	121	125	128	131	132	132	132	131	**128**	**125**	**121**	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.58**	**0.32**	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.12**	**6.35**	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	**3.68**	**3.16**	**1.32**	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	**22.4**	**19.2**	**8.0**	
KM 119.9	121	125	128	131	132	132	132	131	**128**	**125**	**121**	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.58**	**0.32**	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.12**	**6.35**	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	3.68	**3.68**	**3.16**	**1.32**	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	22.4	**22.4**	**19.2**	**8.0**	
KM 120	122.7 **cms**		16.67 **l/sec** remaining									
Conc.	121	125	128	131	132	132	132	**131**	**128**	125	121	6.1
Vel.	0.32	0.58	0.65	0.65	0.65	0.65	0.65	**0.65**	**0.65**	0.58	0.32	
W.P.	6.35	6.12	6.08	6.08	6.08	6.08	6.08	**6.08**	**6.08**	6.12	6.35	
Depth	1.32	3.16	3.68	3.68	3.68	3.68	3.68	**3.68**	**3.68**	3.16	1.32	
Area	8.0	19.2	22.4	22.4	22.4	22.4	22.4	**22.4**	**22.4**	19.2	8.0	
KM 121	124.1 **cms**		16.67 **l/sec** remaining									
Conc.	116	122	126	129	131	132	132	130	**127**	**122**	**117**	6.1
Vel.	0.47	0.85	0.95	0.95	0.95	0.95	0.95	0.95	**0.95**	**0.85**	**0.47**	
W.P.	6.35	6.13	6.09	6.09	6.09	6.09	6.09	6.09	**6.09**	**6.13**	**6.35**	
Depth	0.91	2.18	2.54	2.54	2.54	2.54	2.54	2.54	**2.54**	**2.18**	**0.91**	
Area	5.6	13.3	15.5	15.5	15.5	15.5	15.5	15.5	**15.5**	**13.3**	**5.6**	
KM 122	124.9 **cms**		16.67 **l/sec** remaining									
Conc.	116	121	125	128	131	131	131	129	126	**122**	117	6.1
Vel.	0.47	0.86	0.95	0.95	0.95	0.95	0.95	0.95	0.95	**0.86**	0.47	
W.P.	6.35	6.13	6.09	6.09	6.09	6.09	6.09	6.09	6.09	**6.13**	6.35	
Depth	0.91	2.18	2.54	2.54	2.54	2.54	2.54	**2.54**	2.54	**2.18**	0.91	
Area	5.6	13.3	15.5	15.5	15.5	15.5	15.5	**15.5**	15.5	**13.3**	5.6	
KM 123	125.6 **cms**		16.67 **l/sec** remaining									
Conc.	115	120	124	128	130	131	130	128	125	**121**	**116**	6.1
Vel.	0.47	0.86	0.96	0.96	0.96	0.96	0.96	0.96	0.96	**0.86**	**0.47**	
W.P.	6.36	6.13	6.09	6.09	6.09	6.09	6.09	6.09	6.09	**6.13**	**6.36**	
Depth	0.91	2.19	2.55	2.55	2.55	2.55	2.55	2.55	2.55	**2.19**	**0.91**	
Area	5.6	13.3	15.5	15.5	15.5	15.5	15.5	15.5	15.5	**13.3**	**5.6**	
KM 124	126.3 **cms**		16.67 **l/sec** remaining									
Conc.	114	119	124	127	129	130	129	128	124	**120**	115	6.1
Vel.	0.47	0.86	0.96	0.96	0.96	0.96	0.96	0.96	0.96	**0.86**	0.47	
W.P.	6.36	6.13	6.09	6.09	6.09	6.09	6.09	6.09	6.09	**6.13**	6.36	
Depth	0.91	2.19	2.55	2.55	2.55	2.55	2.55	2.55	2.55	**2.19**	0.91	
Area	5.6	13.3	15.5	15.5	15.5	15.5	15.5	15.5	15.5	**13.3**	5.6	
KM 125	127.0 **cms**		16.67 **l/sec** remaining									
Conc.	113	119	123	126	128	129	129	127	124	120	114	6.1
Vel.	0.47	0.87	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.87	0.47	
W.P.	6.36	6.13	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.13	6.36	
Depth	0.91	2.19	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.19	0.91	
Area	5.6	13.3	15.5	15.5	15.5	15.5	15.5	15.5	15.5	13.3	5.6	
KM 126	127.8 **cms**		16.67 **l/sec** remaining									
Conc.	113	118	122	126	128	128	128	126	**123**	**119**	114	6.1

KM 127 128.5 **cms** 16.66 **l/sec** remaining

Conc.	112	117	122	125	127	128	127	125	122	118	113	6.1
Vel.	0.48	0.88	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.88	0.48	
W.P.	6.36	6.14	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.14	6.36	
Depth	0.91	2.19	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.19	0.91	
Area	5.6	13.4	15.6	15.6	15.6	15.6	15.6	15.6	15.6	13.4	5.6	

KM 128 129.2 **cms** 16.66 **l/sec** remaining

Conc.	111	117	121	124	126	127	127	125	122	117	112	6.1
Vel.	0.48	0.88	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.88	0.48	
W.P.	6.36	6.14	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.14	6.36	
Depth	0.91	2.19	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.19	0.91	
Area	5.6	13.4	15.6	15.6	15.6	15.6	15.6	15.6	15.6	13.4	5.6	

KM 129 130.0 **cms** 16.66 **l/sec** remaining

Conc.	111	116	120	123	126	126	126	124	121	117	112	6.1
Vel.	0.48	0.88	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.88	0.48	
W.P.	6.37	6.14	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.14	6.37	
Depth	0.91	2.19	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.19	0.91	
Area	5.6	13.4	15.6	15.6	15.6	15.6	15.6	15.6	15.6	13.4	5.6	

KM 130 130.7 **cms** 16.66 **l/sec** remaining

Conc.	110	115	120	123	125	126	125	123	120	116	111	6.1
Vel.	0.48	0.89	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.89	0.48	
W.P.	6.37	6.14	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.14	6.37	
Depth	0.91	2.20	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.20	0.91	
Area	5.6	13.4	15.6	15.6	15.6	15.6	15.6	15.6	15.6	13.4	5.6	

KM 131 131.4 **cms** 16.66 **l/sec** remaining

Conc.	109	114	119	122	124	125	124	123	120	115	110	6.1
Vel.	0.49	0.89	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.89	0.49	
W.P.	6.37	6.14	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.14	6.37	
Depth	0.92	2.20	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.20	0.92	
Area	5.6	13.4	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.4	5.6	

KM 132 132.2 **cms** 16.66 **l/sec** remaining

Conc.	109	114	118	121	124	124	124	122	119	115	110	6.1
Vel.	0.49	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.49	
W.P.	6.37	6.15	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.15	6.37	
Depth	0.92	2.20	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.20	0.92	
Area	5.6	13.4	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.4	5.6	

KM 133 132.9 **cms** 16.66 **l/sec** remaining

Conc.	108	113	117	121	123	124	123	121	118	114	109	6.1
Vel.	0.49	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.49	
W.P.	6.37	6.15	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.15	6.37	
Depth	0.92	2.20	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.20	0.92	
Area	5.6	13.4	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.4	5.6	

KM 134 133.6 **cms** 16.66 **l/sec** remaining

Conc.	107	112	117	120	122	123	122	121	118	113	108	6.1
Vel.	0.49	0.90	1.01	1.01	1.01	1.01	1.01	1.01	1.01	0.90	0.49	
W.P.	6.37	6.15	6.10	6.10	6.10	6.10	6.10	6.10	6.10	6.15	6.37	
Depth	0.92	2.20	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.20	0.92	
Area	5.6	13.4	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.4	5.6	

KM 135 134.4 **cms** 16.66 **l/sec** remaining

Conc.	107	112	116	119	122	122	122	120	117	113	108	6.1
Vel.	0.49	0.91	1.01	1.01	1.01	1.01	1.01	1.01	1.01	0.91	0.49	
W.P.	6.38	6.15	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.15	6.38	
Depth	0.92	2.20	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.20	0.92	
Area	5.6	13.5	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.5	5.6	

KM 136 135.1 **cms** 16.66 **l/sec** remaining

Conc.	106	111	116	119	121	122	121	119	116	112	107	6.1
Vel.	0.50	0.91	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.91	0.50	
W.P.	6.38	6.15	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.15	6.38	
Depth	0.92	2.21	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.21	0.92	
Area	5.6	13.5	15.7	15.7	15.7	15.7	15.7	15.7	15.7	13.5	5.6	

KM 137 135.8 **cms** 16.66 **l/sec** remaining

Conc.	105	111	115	118	120	121	120	119	116	111	106	6.1

KM 138 136.6 cms 16.66 l/sec remaining

Conc.	104	109	114	117	119	120	120	118	116	112	107	6.1
Vel.	0.50	0.92	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.92	0.50	
W.P.	6.38	6.16	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.16	6.38	
Depth	0.92	2.21	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.21	0.92	
Area	5.6	13.5	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.5	5.6	

KM 139 137.3 cms 16.66 l/sec remaining

Conc.	104	109	113	116	119	120	119	118	115	111	106	6.1
Vel.	0.50	0.92	1.03	1.03	1.03	1.03	1.03	1.03	1.03	0.92	0.50	
W.P.	6.38	6.16	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.16	6.38	
Depth	0.92	2.21	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.21	0.92	
Area	5.6	13.5	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.5	5.6	

KM 140 138.0 cms 16.66 l/sec remaining

Conc.	103	108	112	116	118	119	119	117	114	110	105	6.1
Vel.	0.50	0.93	1.03	1.03	1.03	1.03	1.03	1.03	1.03	0.93	0.50	
W.P.	6.38	6.16	6.11	6.11	6.11	6.11	6.11	6.11	6.11	6.16	6.38	
Depth	0.92	2.21	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.21	0.92	
Area	5.6	13.5	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.5	5.6	

KM 141 138.8 cms 16.66 l/sec remaining

Conc.	103	108	112	115	117	118	118	117	114	110	105	6.1
Vel.	0.50	0.93	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.93	0.50	
W.P.	6.38	6.16	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.16	6.38	
Depth	0.92	2.21	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.21	0.92	
Area	5.6	13.5	15.8	15.8	15.8	15.8	15.8	15.8	15.8	13.5	5.6	

KM 142 139.5 cms 16.66 l/sec remaining

Conc.	102	107	111	115	117	118	118	116	113	109	104	6.1
Vel.	0.51	0.93	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.93	0.51	
W.P.	6.39	6.16	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.16	6.39	
Depth	0.92	2.21	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.21	0.92	
Area	5.6	13.5	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.5	5.6	

KM 143 140.2 cms 16.66 l/sec remaining

Conc.	101	106	111	114	116	117	117	115	112	108	103	6.1
Vel.	0.51	0.94	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.94	0.51	
W.P.	6.39	6.17	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.17	6.39	
Depth	0.92	2.22	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.22	0.92	
Area	5.6	13.6	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.6	5.6	

KM 144 141.0 cms 16.66 l/sec remaining

Conc.	101	106	110	113	116	117	116	115	112	108	103	6.1
Vel.	0.51	0.94	1.05	1.05	1.05	1.05	1.05	1.05	1.05	0.94	0.51	
W.P.	6.39	6.17	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.17	6.39	
Depth	0.92	2.22	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.22	0.92	
Area	5.6	13.6	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.6	5.6	

KM 145 141.7 cms 16.66 l/sec remaining

Conc.	100	105	109	113	115	116	116	114	111	107	102	6.1
Vel.	0.51	0.94	1.06	1.06	1.06	1.06	1.06	1.06	1.06	0.94	0.51	
W.P.	6.39	6.17	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.17	6.39	
Depth	0.92	2.22	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.22	0.92	
Area	5.6	13.6	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.6	5.6	

KM 146 142.4 cms 16.66 l/sec remaining

Conc.	100	105	109	112	114	115	115	114	111	107	102	6.1
Vel.	0.51	0.95	1.06	1.06	1.06	1.06	1.06	1.06	1.06	0.95	0.51	
W.P.	6.39	6.17	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.17	6.39	
Depth	0.92	2.22	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.22	0.92	
Area	5.6	13.6	15.9	15.9	15.9	15.9	15.9	15.9	15.9	13.6	5.6	

KM 147 143.1 cms 16.66 l/sec remaining

Conc.	99	104	108	112	114	115	115	113	110	106	101	6.1
Vel.	0.52	0.95	1.06	1.06	1.06	1.06	1.06	1.06	1.06	0.95	0.52	
W.P.	6.39	6.17	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.17	6.39	
Depth	0.92	2.22	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.22	0.92	
Area	5.6	13.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	13.6	5.6	

KM 148 143.9 cms 16.66 l/sec remaining

Conc.	99	104	108	111	113	114	114	112	110	106	101	6.1

KM 149	144.6 cms				16.66 l/sec remaining							
Conc.	98	103	107	111	113	114	113	112	109	105	100	6.1
Vel.	0.52	0.96	1.07	1.07	1.07	1.07	1.07	1.07	1.07	0.96	0.52	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.22	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.22	0.92	
Area	5.6	13.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	13.6	5.6	
KM 150	145.3 cms				16.66 l/sec remaining							
Conc.	97	102	107	110	112	113	113	111	108	104	100	6.1
Vel.	0.52	0.96	1.08	1.08	1.08	1.08	1.08	1.08	1.08	0.96	0.52	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.23	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.23	0.92	
Area	5.6	13.6	16.0	16.0	16.0	16.0	16.0	16.0	16.0	13.6	5.6	
KM 151	146.1 cms				16.66 l/sec remaining							
Conc.	97	102	106	109	112	113	112	111	108	104	99	6.1
Vel.	0.52	0.97	1.08	1.08	1.08	1.08	1.08	1.08	1.08	0.97	0.52	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.23	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.23	0.92	
Area	5.6	13.7	16.0	16.0	16.0	16.0	16.0	16.0	16.0	13.7	5.6	
KM 152	146.8 cms				16.66 l/sec remaining							
Conc.	96	101	105	109	111	112	112	110	107	103	98	6.1
Vel.	0.53	0.97	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.97	0.53	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.23	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.23	0.92	
Area	5.6	13.7	16.0	16.0	16.0	16.0	16.0	16.0	16.0	13.7	5.6	
KM 153	147.5 cms				16.66 l/sec remaining							
Conc.	96	101	105	108	110	112	111	110	107	103	98	6.1
Vel.	0.53	0.97	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.97	0.53	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.23	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.23	0.92	
Area	5.6	13.7	16.1	16.1	16.1	16.1	16.1	16.1	16.1	13.7	5.6	
KM 154	148.3 cms				16.66 l/sec remaining							
Conc.	95	100	104	108	110	111	111	109	106	102	97	6.1
Vel.	0.53	0.98	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.98	0.53	
W.P.	6.40	6.18	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.18	6.40	
Depth	0.92	2.23	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.23	0.92	
Area	5.6	13.7	16.1	16.1	16.1	16.1	16.1	16.1	16.1	13.7	5.6	
KM 155	149.0 cms				16.66 l/sec remaining							
Conc.	95	100	104	107	109	110	110	109	106	102	97	6.1
Vel.	0.53	0.98	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.98	0.53	
W.P.	6.41	6.19	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.19	6.41	
Depth	0.92	2.23	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.23	0.92	
Area	5.6	13.7	16.1	16.1	16.1	16.1	16.1	16.1	16.1	13.7	5.6	
KM 156	149.7 cms				16.66 l/sec remaining							
Conc.	94	99	103	107	109	110	110	108	105	101	96	6.1
Vel.	0.53	0.99	1.10	1.10	1.10	1.10	1.10	1.10	1.10	0.99	0.53	
W.P.	6.41	6.19	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.19	6.41	
Depth	0.92	2.23	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.23	0.92	
Area	5.7	13.7	16.1	16.1	16.1	16.1	16.1	16.1	16.1	13.7	5.7	
KM 157	150.5 cms				16.66 l/sec remaining							
Conc.	94	99	103	106	108	109	109	108	105	101	96	6.1
Vel.	0.53	0.99	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.99	0.53	
W.P.	6.41	6.19	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.19	6.41	
Depth	0.92	2.24	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.24	0.92	
Area	5.7	13.7	16.1	16.1	16.1	16.1	16.1	16.1	16.1	13.7	5.7	
KM 158	151.2 cms				16.66 l/sec remaining							
Conc.	93	98	102	106	108	109	109	107	104	100	95	6.1
Vel.	0.54	0.99	1.11	1.11	1.11	1.11	1.11	1.11	1.11	0.99	0.54	
W.P.	6.41	6.19	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.19	6.41	
Depth	0.92	2.24	2.63	2.63	2.63	2.63	2.63	2.63	2.63	2.24	0.92	
Area	5.7	13.7	16.2	16.2	16.2	16.2	16.2	16.2	16.2	13.7	5.7	
KM 159	151.9 cms				16.66 l/sec remaining							
Conc.	93	98	102	105	107	108	108	106	104	100	95	6.1

KM 160 152.7 cms 16.66 l/sec remaining

Conc.	87	92	97	99	101	102	103	103	100	97	92	7.5
Vel.	0.45	0.79	0.94	1.17	1.30	1.16	0.97	0.86	0.80	0.78	0.48	
W.P.	7.58	7.49	7.50	7.53	7.48	7.52	7.49	7.48	7.48	7.48	7.60	
Depth	0.75	1.70	2.21	3.08	3.55	3.01	2.29	1.91	1.72	1.65	0.82	
Area	5.6	12.7	16.6	23.0	26.6	22.5	17.2	14.3	12.9	12.3	6.1	

KM 161 153.4 cms 16.66 l/sec remaining

Conc.	86	93	97	102	103	88	105	105	103	100	95	7.5
Vel.	0.57	0.99	1.18	1.46	1.61	1.44	1.21	1.07	1.00	0.97	0.60	
W.P.	7.58	7.49	7.50	7.54	7.48	7.52	7.50	7.49	7.48	7.48	7.60	
Depth	0.60	1.37	1.78	2.48	2.86	2.43	1.85	1.54	1.39	1.33	0.66	
Area	4.5	10.3	13.3	18.5	21.4	18.2	13.8	11.5	10.4	9.9	4.9	

KM 162 154.1 cms 16.66 l/sec remaining

Conc.	86	92	97	101	103	88	104	104	103	100	95	7.5
Vel.	0.57	0.99	1.18	1.46	1.62	1.45	1.21	1.07	1.00	0.97	0.60	
W.P.	7.58	7.49	7.50	7.54	7.49	7.52	7.50	7.49	7.49	7.48	7.60	
Depth	0.60	1.37	1.79	2.48	2.86	2.43	1.85	1.54	1.39	1.33	0.66	
Area	4.5	10.3	13.4	18.6	21.4	18.2	13.9	11.5	10.4	10.0	4.9	

KM 163 154.9 cms 16.66 l/sec remaining

Conc.	86	92	96	101	102	87	104	104	102	99	94	7.5
Vel.	0.57	0.99	1.18	1.47	1.62	1.45	1.21	1.07	1.00	0.98	0.61	
W.P.	7.58	7.49	7.50	7.54	7.49	7.52	7.50	7.49	7.49	7.49	7.60	
Depth	0.60	1.38	1.79	2.48	2.86	2.43	1.86	1.54	1.39	1.34	0.66	
Area	4.5	10.3	13.4	18.6	21.4	18.2	13.9	11.6	10.4	10.0	5.0	

KM 164 155.6 cms 16.66 l/sec remaining

Conc.	85	91	96	100	102	87	103	104	102	99	94	7.5
Vel.	0.57	1.00	1.19	1.47	1.63	1.45	1.22	1.08	1.01	0.98	0.61	
W.P.	7.58	7.50	7.50	7.54	7.49	7.52	7.50	7.49	7.49	7.49	7.60	
Depth	0.61	1.38	1.79	2.48	2.87	2.44	1.86	1.55	1.40	1.34	0.66	
Area	4.5	10.3	13.4	18.6	21.5	18.2	13.9	11.6	10.5	10.0	5.0	

KM 165 156.3 cms 16.66 l/sec remaining

Conc.	85	91	95	100	101	87	103	103	102	98	94	7.5
Vel.	0.57	1.00	1.19	1.48	1.63	1.46	1.22	1.08	1.01	0.98	0.61	
W.P.	7.59	7.50	7.50	7.54	7.49	7.52	7.50	7.49	7.49	7.49	7.61	
Depth	0.61	1.38	1.79	2.49	2.87	2.44	1.86	1.55	1.40	1.34	0.67	
Area	4.5	10.3	13.4	18.6	21.5	18.3	13.9	11.6	10.5	10.0	5.0	

KM 166 157.1 cms 16.66 l/sec remaining

Conc.	84	91	95	99	101	86	102	103	101	98	93	7.5
Vel.	0.58	1.00	1.19	1.48	1.63	1.46	1.22	1.08	1.01	0.99	0.61	
W.P.	7.59	7.50	7.51	7.54	7.49	7.53	7.50	7.49	7.49	7.49	7.61	
Depth	0.61	1.38	1.80	2.49	2.87	2.44	1.86	1.55	1.40	1.34	0.67	
Area	4.6	10.4	13.5	18.7	21.5	18.3	14.0	11.6	10.5	10.1	5.0	

KM 167 157.8 cms 16.66 l/sec remaining

Conc.	84	90	94	99	100	86	102	102	101	97	93	7.5
Vel.	0.58	1.01	1.20	1.48	1.64	1.47	1.23	1.09	1.02	0.99	0.61	
W.P.	7.59	7.50	7.51	7.55	7.49	7.53	7.50	7.49	7.49	7.49	7.61	
Depth	0.61	1.39	1.80	2.49	2.88	2.44	1.87	1.56	1.41	1.35	0.67	
Area	4.6	10.4	13.5	18.7	21.5	18.3	14.0	11.7	10.5	10.1	5.0	

KM 168 158.5 cms 16.66 l/sec remaining

Conc.	83	90	94	98	100	85	101	102	100	97	92	7.5
Vel.	0.58	1.01	1.20	1.49	1.64	1.47	1.23	1.09	1.02	0.99	0.62	
W.P.	7.59	7.50	7.51	7.55	7.49	7.53	7.51	7.50	7.49	7.49	7.61	
Depth	0.61	1.39	1.80	2.50	2.88	2.45	1.87	1.56	1.41	1.35	0.67	
Area	4.6	10.4	13.5	18.7	21.6	18.3	14.0	11.7	10.6	10.1	5.0	

KM 169 159.3 cms 16.66 l/sec remaining

Conc.	83	89	93	98	100	85	101	101	100	97	92	7.5
Vel.	0.58	1.01	1.20	1.49	1.65	1.47	1.23	1.09	1.02	1.00	0.62	
W.P.	7.59	7.50	7.51	7.55	7.50	7.53	7.51	7.50	7.50	7.49	7.61	
Depth	0.61	1.39	1.81	2.50	2.88	2.45	1.87	1.56	1.41	1.35	0.67	
Area	4.6	10.4	13.5	18.7	21.6	18.4	14.0	11.7	10.6	10.2	5.0	

KM 170 160.0 cms 16.66 l/sec remaining

Conc.	83	89	93	97	99	85	101	101	99	96	91	7.5

KM 171 162.9 **cms** 16.66 **l/sec** remaining

Conc.	81	87	**91**	96	97	83	99	**99**	**98**	**95**	**90**	7.5
Vel.	0.59	1.03	1.22	1.51	1.67	1.49	1.25	**1.11**	1.04	**1.01**	0.63	
W.P.	7.60	7.51	7.52	7.56	7.50	7.54	7.51	7.50	7.50	7.50	7.62	
Depth	0.62	1.41	1.82	2.51	2.90	2.47	1.89	1.58	1.43	1.37	0.68	
Area	4.6	10.6	13.6	18.8	21.7	18.5	14.2	11.8	10.7	10.3	5.1	

KM 172 165.8 **cms** 16.66 **l/sec** remaining

Conc.	79	86	90	94	96	82	97	98	96	93	88	7.5
Vel.	0.60	1.04	1.23	1.52	1.68	1.51	1.27	1.12	1.05	1.03	0.64	
W.P.	7.61	7.51	7.52	7.56	7.51	7.54	7.52	7.51	7.51	7.51	7.63	
Depth	0.62	1.42	1.83	2.52	2.91	2.48	1.90	1.59	1.44	1.38	0.69	
Area	4.7	10.6	13.7	18.9	21.8	18.6	14.3	11.9	10.8	10.4	5.2	

KM 173 168.7 **cms** 16.66 **l/sec** remaining

Conc.	78	84	88	92	94	81	96	96	95	92	87	7.5
Vel.	0.60	1.05	1.25	1.54	1.70	1.52	1.28	1.14	1.07	1.04	0.64	
W.P.	7.62	7.52	7.53	7.57	7.51	7.55	7.52	7.52	7.51	7.51	7.64	
Depth	0.63	1.43	1.84	2.53	2.92	2.49	1.91	1.60	1.45	1.40	0.69	
Area	4.7	10.7	13.8	19.0	21.9	18.7	14.4	12.0	10.9	10.5	5.2	

KM 174 171.6 **cms** 16.66 **l/sec** remaining

Conc.	78	84	88	92	89	81	91	96	95	92	**88**	7.5
Vel.	0.61	1.07	1.26	1.55	1.71	1.54	1.29	1.15	1.08	1.05	0.65	
W.P.	7.62	7.53	7.53	7.57	7.52	7.55	7.53	7.52	7.52	7.52	7.65	
Depth	0.63	1.44	1.85	2.54	2.93	2.50	1.93	1.61	1.46	1.41	0.70	
Area	4.8	10.8	13.9	19.1	22.0	18.8	14.5	12.1	11.0	10.6	5.3	

KM 175 174.5 **cms** 16.66 **l/sec** remaining

Conc.	77	83	87	90	88	79	89	94	93	91	87	7.5
Vel.	0.62	1.08	1.27	1.56	1.73	1.55	1.31	1.16	1.09	1.06	0.66	
W.P.	7.63	7.53	7.54	7.58	7.52	7.56	7.54	7.53	7.52	7.52	7.66	
Depth	0.64	1.45	1.86	2.55	2.94	2.51	1.94	1.63	1.48	1.42	0.71	
Area	4.8	10.9	14.0	19.2	22.1	18.9	14.6	12.2	11.1	10.7	5.3	

KM 176 177.4 **cms** 16.66 **l/sec** remaining

Conc.	75	81	86	89	87	78	88	93	92	89	a5	7.5
Vel.	0.62	1.09	1.28	1.58	1.74	1.56	1.32	1.17	1.10	1.08	0.67	
W.P.	7.64	7.54	7.54	7.58	7.53	7.56	7.54	7.53	7.53	7.53	7.66	
Depth	0.64	1.46	1.87	2.56	2.95	2.53	1.95	1.64	1.49	1.43	0.71	
Area	4.8	11.0	14.1	19.3	22.2	19.0	14.7	12.3	11.2	10.8	5.4	

KM 177 180.3 **cms** 16.66 **l/sec** remaining

Conc.	74	80	85	87	86	77	86	92	91	88	84	7.5
Vel.	0.63	1.10	1.30	1.59	1.75	1.58	1.33	1.19	1.12	1.09	0.68	
W.P.	7.65	7.54	7.55	7.59	7.54	7.57	7.55	7.54	7.54	7.53	7.67	
Depth	0.65	1.47	1.88	2.57	2.96	2.54	1.96	1.65	1.50	1.45	0.72	
Area	4.9	11.1	14.2	19.4	22.3	19.1	14.8	12.4	11.3	10.9	5.4	

KM 178 183.2 **cms** 16.66 **l/sec** remaining

Conc.	74	79	84	87	85	75	81	91	90	87	83	7.5
Vel.	0.64	1.11	1.31	1.60	1.77	1.59	1.35	**1.20**	1.13	1.10	0.68	
W.P.	7.65	7.55	7.55	7.60	7.54	7.57	7.55	7.54	7.54	7.54	7.68	
Depth	0.65	1.48	1.89	2.58	2.97	2.55	1.98	1.66	1.51	1.46	0.73	
Area	4.9	11.2	14.3	19.5	22.4	19.2	14.9	12.5	11.4	11.0	5.5	

KM 179 186.1 **cms** 16.66 **l/sec** remaining

Conc.	73	79	a4	86	81	76	77	91	90	87	83	7.5
Vel.	0.64	1.12	1.32	1.62	1.78	1.61	1.36	1.21	1.14	1.11	0.69	
W.P.	7.66	7.55	7.56	7.60	7.55	7.58	7.56	7.55	7.55	7.55	7.69	
Depth	0.66	1.49	1.90	2.59	2.98	2.56	1.99	1.67	1.52	1.47	0.73	
Area	5.0	11.3	14.4	19.6	22.5	19.3	15.0	12.6	11.5	11.1	5.5	

KM 180 189.0 **cms** 16.66 **l/sec** remaining

Conc.	73	78	81	85	83	78	80	89	88	85	81	8.8
Vel.	0.49	0.88	1.03	1.09	1.08	1.01	0.94	0.89	0.84	0.76	0.43	
W.P.	9.00	8.87	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.85	8.96	
Depth	0.95	2.28	2.85	3.13	3.08	2.77	2.49	2.29	2.12	1.80	0.79	
Area	8.4	20.2	25.2	27.7	27.2	24.5	22.0	20.3	10.7	16.0	7.0	

KM 181 435.0 **cms** 16.66 **l/sec** remaining

Conc.	37	40	38	33	32	33	31	31	35	36	42	10.2

KM 182 435.3 cms 16.66 l/sec remaining

Conc.	38	39	37	34	33	33	32	32	34	35	39	10.2
Vel.	0.64	1.22	1.45	1.51	1.55	1.58	1.61	1.52	1.16	0.68	0.28	
W.P.	10.50	10.32	10.24	10.23	10.23	10.23	10.23	10.27	10.41	10.31	10.25	
Depth	1.18	3.04	3.91	4.17	4.32	4.45	4.58	4.23	2.85	1.27	0.32	
Area	12.1	31.1	40.0	42.7	44.2	45.5	46.9	43.2	29.1	13.0	3.3	

KM 183 435.5 cms 16.66 l/sec remaining

Conc.	37	39	37	34	33	33	32	32	34	35	39	10.2
Vel.	0.64	1.22	1.45	1.51	1.55	1.58	1.61	1.52	1.16	0.68	0.28	
W.P.	10.50	10.32	10.24	10.23	10.23	10.23	10.23	10.27	10.41	10.31	10.25	
Depth	1.18	3.04	3.91	4.17	4.32	4.45	4.58	4.23	2.85	1.27	0.32	
Area	12.1	31.1	40.0	42.7	44.2	45.5	46.9	43.3	29.1	13.0	3.3	

KM 184 435.7 cms 16.65 l/sec remaining

Conc.	37	39	37	34	33	33	32	32	34	35	39	10.2
Vel.	0.64	1.22	1.45	1.51	1.55	1.58	1.61	1.52	1.16	0.68	0.28	
W.P.	10.50	10.32	10.24	10.23	10.23	10.23	10.23	10.27	10.41	10.31	10.25	
Depth	1.18	3.04	3.91	4.17	4.32	4.45	4.58	4.23	2.85	1.27	0.32	
Area	12.1	31.1	40.0	42.7	44.2	45.5	46.9	43.3	29.1	13.0	3.3	

KM 185 435.9 cms 16.65 l/sec remaining

Conc.	28	30	31	33	36	37	38	37	36	37	36	16.4
Vel.	0.32	0.68	0.97	1.09	1.07	1.05	1.01	0.95	0.88	0.80	0.48	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.41	16.41	16.41	16.54	
Depth	0.62	1.97	3.36	3.96	3.84	3.73	3.55	3.23	2.87	2.50	1.16	
Area	10.2	32.4	55.1	65.0	63.0	61.2	58.3	53.1	47.0	41.0	19.0	

KM 186 436.8 cms 16.65 l/sec remaining

Conc.	27	29	32	35	36	38	37	36	35	33	34	16.4
Vel.	0.36	0.77	1.10	1.23	1.21	1.18	1.15	1.08	0.99	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.41	16.41	16.41	16.54	
Depth	0.55	1.75	2.97	3.51	3.40	3.30	3.15	2.86	2.54	2.21	1.03	
Area	9.0	28.7	48.8	57.6	55.8	54.2	51.7	47.0	41.7	36.3	16.9	

KM 187 437.7 cms 16.65 l/sec remaining

Conc.	27	29	32	35	36	38	37	36	35	33	34	16.4
Vel.	0.36	0.77	1.10	1.23	1.21	1.18	1.15	1.08	0.99	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.41	16.41	16.41	16.54	
Depth	0.55	1.75	2.98	3.51	3.40	3.31	3.15	2.87	2.54	2.22	1.03	
Area	9.0	28.7	48.8	57.6	55.9	54.3	51.7	47.0	41.7	36.4	16.9	

KM 188 438.6 cms 16.65 l/sec remaining

Conc.	27	28	32	35	36	38	37	36	35	33	34	16.4
Vel.	0.36	0.77	1.10	1.23	1.21	1.19	1.15	1.08	0.99	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.41	16.41	16.41	16.54	
Depth	0.55	1.75	2.98	3.51	3.41	3.31	3.15	2.87	2.54	2.22	1.03	
Area	9.1	28.7	48.9	57.6	55.9	54.3	51.7	47.1	41.7	36.4	16.9	

KM 189 439.6 cms 16.65 l/sec remaining

Conc.	27	28	32	34	36	38	37	36	35	32	34	16.4
Vel.	0.36	0.78	1.11	1.24	1.21	1.19	1.15	1.08	1.00	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.42	16.42	16.41	16.54	
Depth	0.55	1.75	2.98	3.51	3.41	3.31	3.15	2.87	2.54	2.22	1.03	
Area	9.1	28.8	48.9	57.7	55.9	54.3	51.8	47.1	41.8	36.4	16.9	

KM 190 440.5 cms 16.65 l/sec remaining

Conc.	27	28	32	34	36	38	37	36	35	32	34	16.4
Vel.	0.36	0.78	1.11	1.24	1.21	1.19	1.15	1.08	1.00	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.42	16.42	16.42	16.54	
Depth	0.55	1.75	2.98	3.52	3.41	3.31	3.16	2.87	2.55	2.22	1.03	
Area	9.1	28.8	48.9	57.7	56.0	54.3	51.8	47.1	41.8	36.5	16.9	

KM 191 441.4 cms 16.65 l/sec remaining

Conc.	27	28	32	34	36	38	37	36	35	32	33	16.4
Vel.	0.36	0.78	1.11	1.24	1.21	1.19	1.15	1.08	1.00	0.91	0.54	
W.P.	16.45	16.46	16.45	16.41	16.41	16.41	16.41	16.42	16.42	16.42	16.54	
Depth	0.55	1.76	2.98	3.52	3.41	3.31	3.16	2.87	2.55	2.22	1.03	
Area	9.1	28.8	49.0	57.7	56.0	54.4	51.8	47.2	41.8	36.5.	16.9	

KM 192 442.3 cms 16.65 l/sec remaining

Conc.	27	28	32	34	36	38	37	36	34	32	33	16.4

KM 193 443.2 **cms** 16.65 **l/sec** remaining

Conc.	27	28	32	34	36	37	37	36	34	32	33	16.4
Vel.	0.36	0.78	1.11	1.24	1.22	1.19	1.16	1.09	1.00	0.92	0.55	
W.P.	16.45	16.47	16.46	16.41	16.42	16.41	16.42	16.42	16.42	16.42	16.54	
Depth	0.56	1.76	2.99	3.52	3.42	3.32	3.16	2.88	2.55	2.23	1.03	
Area	9.1	28.9	49.0	57.8	56.1	54.4	51.9	47.2	41.9	36.6	17.0	

KM 194 444.1 **cms** 16.65 **l/sec** remaining

Conc.	27	28	32	34	36	37	37	36	34	32	33	16.4
Vel.	0.36	0.78	1.11	1.24	1.22	1.20	1.16	1.09	1.00	0.92	0.55	
W.P.	16.45	16.47	16.46	16.42	16.42	16.42	16.42	16.42	16.42	16.42	16.55	
Depth	0.56	1.76	2.99	3.52	3.42	3.32	3.16	2.88	2.55	2.23	1.03	
Area	9.1	28.9	49.0	57.8	56.1	54.5	51.9	47.3	41.9	36.6	17.0	

KM 195 445.0 **cms** 16.65 **l/sec** remaining

Conc.	35	37	35	30	30	29	29	27	26	29	27	11.6
Vel.	0.57	1.19	1.57	1.64	1.50	1.25	1.02	0.86	0.70	0.53	0.27	
W.P.	11.84	11.84	11.63	11.58	11.61	11.66	11.59	11.58	11.58	11.58	11.59	
Depth	1.34	4.01	5.98	6.36	5.56	4.23	3.10	2.43	1.79	1.16	0.42	
Area	15.5	46.4	69.1	73.6	64.3	48.9	35.8	28.0	20.7	13.4	4.9	

KM 196 445.4 **cms** 16.65 **l/sec** remaining

Conc.	34	36	35	30	30	29	29	27	26	27	26	11.6
Vel.	0.60	1.26	1.66	1.74	1.58	1.32	1.07	0.91	0.75	0.56	0.28	
W.P.	11.84	11.84	11.63	11.58	11.61	11.66	11.59	11.58	11.58	11.58	11.59	
Depth	1.27	3.80	5.66	6.03	5.27	4.00	2.94	2.30	1.69	1.10	0.40	
Area	14.6	43.9	65.5	69.7	60.9	46.3	34.0	26.6	19.6	12.7	4.6	

KM 197 445.8 **cms** 16.65 **l/sec** remaining

Conc.	34	36	35	30	30	29	29	27	26	27	26	11.6
Vel.	0.60	1.26	1.66	1.74	1.59	1.32	1.08	0.91	0.75	0.56	0.28	
W.P.	11.84	11.84	11.63	11.58	11.62	11.66	11.59	11.58	11.58	11.58	11.59	
Depth	1.27	3.80	5.66	6.03	5.27	4.01	2.94	2.30	1.69	1.10	0.40	
Area	14.6	43.9	65.5	69.7	60.9	46.3	34.0	26.6	19.6	12.7	4.6	

KM 198 446.2 **cms** 16.65 **l/sec** remaining

Conc.	34	36	35	30	30	29	28	27	26	27	26	11.6
Vel.	0.61	1.26	1.66	1.74	1.59	1.32	1.08	0.91	0.75	0.56	0.28	
W.P.	11.84	11.84	11.63	11.58	11.62	11.66	11.59	11.58	11.58	11.58	11.60	
Depth	1.27	3.80	5.66	6.03	5.27	4.01	2.94	2.30	1.70	1.10	0.40	
Area	14.6	43.9	65.5	69.7	60.9	46.3	34.0	26.6	19.6	12.7	4.6	

KM 199 446.6 **cms** 16.65 **l/sec** remaining

Conc.	34	36	35	30	30	29	28	27	26	27	26	11.6
Vel.	0.61	1.26	1.66	1.74	1.59	1.32	1.08	0.91	0.75	0.56	0.28	
W.P.	11.84	11.84	11.63	11.58	11.62	11.66	11.59	11.58	11.58	11.58	11.60	
Depth	1.27	3.80	5.66	6.03	5.27	4.01	2.94	2.30	1.70	1.10	0.40	
Area	14.6	43.9	65.5	69.8	61.0	46.4	34.0	26.6	19.6	12.7	4.6	

KM 200 447.0 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	37	35	33	31	27	24	22	22	16.7
Vel.	0.80	1.29	1.27	1.23	1.18	1.12	1.00	0.81	0.74	0.71	0.39	
W.P.	17.05	16.69	16.69	16.69	16.69	16.69	16.70	16.71	16.69	16.70	16.73	
Depth	1.87	3.78	3.69	3.49	3.29	3.03	2.57	1.86	1.64	1.54	0.63	
Area	31.2	63.0	61.5	58.2	54.9	50.6	42.9	31.0	27.4	25.7	10.5	

KM 201 448.3 **cms** 16.65 **l/sec** remaining

Conc.	38	37	37	36	35	33	31	28	25	23	23	16.7
Vel.	0.76	1.23	1.21	1.16	1.12	1.06	0.95	0.76	0.71	0.67	0.37	
W.P.	17.06	16.69	16.69	16.69	16.69	16.69	16.70	16.71	16.70	16.70	16.73	
Depth	1.98	3.99	3.90	3.69	3.48	3.21	2.72	1.97	1.74	1.63	0.66	
Area	33.0	66.6	65.1	61.5	58.1	53.5	45.3	32.8	29.0	27.1	11.1	

KM 202 449.5 **cms** 16.65 **l/sec** remaining

Conc.	38	37	37	36	35	33	30	27	25	23	23	16.7
Vel.	0.76	1.23	1.21	1.16	1.12	1.06	0.95	0.77	0.71	0.68	0.37	
W.P.	17.06	16.69	16.69	16.69	16.69	16.70	16.70	16.71	16.70	16.70	16.73	
Depth	1.98	3.99	3.90	3.69	3.48	3.21	2.72	1.97	1.74	1.63	0.67	
Area	33.0	66.7	65.1	61.6	58.1	53.6	45.4	32.9	29.1	27.2	11.1	

KM 203 450.7 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	36	35	33	30	27	24	22	22	16.7

KM 204 451.9 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	36	35	33	30	27	24	22	22	16.7
Vel.	0.76	1.23	1.21	1.17	1.12	1.06	0.95	0.77	0.71	0.68	0.37	
W.P.	17.06	16.70	16.70	16.70	16.70	16.70	16.71	16.71	16.70	16.70	16.74	
Depth	1.98	4.00	3.91	3.70	3.49	3.22	2.72	1.98	1.75	1.64	0.67	
Area	33.1	66.8	65.2	61.7	58.3	53.7	45.5	33.0	29.2	27.3	11.2	

KM 205 453.2 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	36	35	33	30	27	24	22	22	16.7
Vel.	0.76	1.23	1.21	1.17	1.13	1.07	0.95	0.77	0.71	0.68	0.37	
W.P.	17.06	16.70	16.70	16.70	16.70	16.70	16.71	16.71	16.70	16.70	16.74	
Depth	1.98	4.00	3.91	3.70	3.49	3.22	2.73	1.98	1.75	1.64	0.67	
Area	33.1	66.8	65.3	61.8	58.3	53.7	45.5	33.1	29.3	27.4	11.2	

KM 206 454.4 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	36	35	33	30	27	24	22	22	16.7
Vel.	0.76	1.23	1.22	1.17	1.13	1.07	0.96	0.77	0.71	0.68	0.37	
W.P.	17.06	16.70	16.70	16.70	16.70	16.70	16.71	16.71	16.70	16.71	16.74	
Depth	1.98	4.00	3.91	3.70	3.50	3.22	2.73	1.98	1.76	1.64	0.67	
Area	33.1	66.9	65.3	61.8	58.4	53.8	45.6	33.1	29.3	27.4	11.2	

KM 207 455.6 **cms** 16.65 **l/sec** remaining

Conc.	37	37	37	36	35	33	30	27	24	22	22	16.7
Vel.	0.76	1.24	1.22	1.17	1.13	1.07	0.96	0.77	0.71	0.68	0.38	
W.P.	17.06	16.70	16.70	**16.70**	16.70	16.70	16.71	16.71	16.70	16.71	**16.74**	
Depth	1.98	4.01	3.92	3.71	3.50	3.22	2.73	1.99	1.76	1.65	0.67	
Area	33.1	66.9	65.4	61.9	58.4	53.8	45.7	33.2	29.4	27.5	11.2	

KM 208 456.8 **cms** 16.65 **l/sec** remaining

Conc.	36	37	37	36	35	33	30	27	24	22	22	16.7
Vel.	0.76	1.24	1.22	1.17	1.13	1.07	0.96	0.78	0.72	0.68	0.38	
W.P.	17.06	16.70	16.70	16.70	16.70	16.70	16.71	16.71	16.70	16.71	16.74	
Depth	1.99	4.01	3.92	3.71	3.50	3.23	2.74	1.99	1.76	1.65	0.68	
Area	33.2	66.9	65.5	61.9	58.5	53.9	45.7	33.2	29.4	27.5	11.3	

KM 209 458.1 **cms** 16.65 **l/sec** remaining

Conc.	30	30	32	34	36	37	37	37	36	34	34	15.5
Vel.	0.68	1.10	1.14	1.20	1.27	1.30	1.32	1.34	1.37	1.31	0.78	
W.P.	15.67	15.54	15.54	15.54	15.54	15.54	15.54	15.54	15.54	15.54	15.74	
Depth	1.00	2.05	2.17	2.36	2.55	2.66	2.71	2.78	2.88	2.70	1.24	
Area	15.6	31.8	33.7	36.7	39.6	41.3	42.0	43.3	44.7	41.9	19.2	

KM 210 459.3 **cms** 16.65 **l/sec** remaining

Conc.	37	37	35	35	34	33	32	29	27	26	26	15.9
Vel.	0.69	1.16	1.18	1.14	1.10	1.04	0.93	0.77	0.74	0.73	0.41	
W.P.	16.34	15.91	15.91	15.91	15.91	15.91	15.92	15.93	15.92	15.92	15.99	
Depth	1.94	4.08	4.17	3.98	3.79	3.49	2.94	2.19	2.10	2.05	0.85	
Area	30.9	64.9	66.3	63.3	60.3	55.5	46.7	34.9	33.4	32.6	13.5	

KM 211 460.5 **cms** 16.65 **l/sec** remaining

Conc.	35	36	37	37	36	33	29	25	22	20	18	20.3
Vel.	0.88	1.38	1.33	1.26	1.16	1.11	1.08	1.00	0.85	0.64	0.32	
W.P.	20.59	20.33	20.33	20.33	20.33	20.33	20.33	20.33	20.33	20.33	20.34	
Depth	1.62	3.13	2.97	2.75	2.43	2.25	2.18	1.94	1.51	0.99	0.35	
Area	32.9	63.6	60.4	55.9	49.3	45.8	44.3	39.5	30.7	20.1	7.2	

KM 212 461.7 **cms** 16.65 **l/sec** remaining

Conc.	33	34	32	34	34	34	33	31	30	30	32	13.5
Vel.	0.55	1.05	1.27	1.37	1.38	1.30	1.18	1.07	0.98	0.81	0.42	
W.P.	13.69	13.55	13.50	13.48	13.48	13.49	13.49	13.48	13.48	13.52	13.57	
Depth	1.12	2.91	3.88	4.32	4.36	4.01	3.45	2.97	2.63	1.98	0.74	
Area	15.1	39.2	52.3	58.3	58.8	54.1	46.5	40.1	35.5	26.7	10.0	

KM 213 463.0 **cms** 16.65 **l/sec** remaining

Conc.	34	34	32	34	34	33	33	31	30	30	32	13.5
Vel.	0.52	0.99	1.21	1.30	1.31	1.23	1.12	1.01	0.93	0.77	0.40	
W.P.	13.69	13.55	13.50	13.48	13.48	13.49	13.50	13.49	13.48	13.52	13.57	
Depth	1.19	3.08	4.11	4.57	4.61	4.24	3.65	3.15	2.78	2.09	0.79	
Area	16.0	41.5	55.3	61.7	62.2	57.2	49.2	42.4	37.5	28.2	10.6	

KM 214 464.2 **cms** 16.65 **l/sec** remaining

Conc.	33	34	32	34	34	33	**33**	**31**	**30**	**30**	**32**	**13.5**

KM 215 465.4 **cms** 16.65 **l/sec** remaining

Conc.	36	36	36	35	34	32	30	26	23	22	21	16.7
Vel.	0.85	1.38	1136	1.31	1.26	1.19	1.07	0.87	0.80	0.77	0.42	
W.P.	17.07	16.70	16.71	16.70	16.71	16.71	16.71	16.72	16.71	16.71	16.75	
Depth	1.81	3.65	3.58	3.38	3.20	2.95	2.50	1.83	1.62	1.52	0.62	
Area	30.2	61.0	59.7	56.5	53.4	49.3	41.8	30.5	27.0	25.3	10.4	

KM 216 466.9 **cms** 16.65 **l/sec** remaining

Conc.	36	36	36	35	34	32	30	26	23	21	21	16.7
Vel.	0.87	1.41	1.39	1.34	1.29	1.22	1.10	0.89	0.82	0.79	0.43	
W.P.	17.07	16.71	16.71	16.71	16.71	16.71	16.72	16.72	**16.71**	16.71	16.75	
Depth	1.77	3.57	3.49	3.31	3.13	2.88	2.45	1.79	1.58	1.48	0.61	
Area	29.5	59.6	58.4	55.2	52.2	48.1	40.9	29.8	26.5	24.8	10.2	

KM 217 468.3 **cms** 16.65 **l/sec** remaining

Conc.	36	36	36	35	34	32	30	26	23	21	21	16.7
Vel.	0.87	1.41	1.39	1.34	1.29	1.23	1.10	0.89	0.82	0.79	0.43	
W.P.	17.08	16.71	16.71	16.71	16.71	16.71	16.72	16.72	16.71	16.71	16.75	
Depth	1.77	3.57	3.50	3.31	3.13	2.89	2.45	1.79	1.59	1.49	0.61	
Area	29.5	59.7	58.4	55.3	52.3	48.2	41.0	29.9	26.5	24.8	10.2	

KM 218 469.8 **cms** 16.65 **l/sec** remaining

Conc.	35	36	36	35	34	32	29	26	23	21	21	16.7
Vel.	0.87	1.42	1.40	1.35	1.30	1.23	1.10	0.89	0.83	0.79	0.44	
W.P.	17.08	16.71	16.71	16.71	16.71	16.71	16.72	16.72	16.71	16.72	16.75	
Depth	1.77	3.58	3.50	3.31	3.13	2.89	2.45	1.79	1.59	1.49	0.61	
Area	29.5	59.7	58.5	55.4	52.3	48.3	41.0	29.9	26.6	24.9	10.2	

KM 219 471.2 **cms** 16.65 **l/sec** remaining

Conc.	35	35	35	35	34	32	29	26	23	21	21	16.7
Vel.	0.87	1.42	1.40	1.35	1.30	1.23	1.10	0.90	0.83	0.79	0.44	
W.P.	17.08	16.71	16.71	16.71	16.71	16.71	16.72	16.72	16.71	16.72	16.75	
Depth	1.77	3.58	3.51	3.32	3.14	2.89	2.46	1.80	1.59	1.49	0.61	
Area	29.6	59.8	58.6	55.4	52.4	48.3	41.1	30.0	26.6	24.9	10.3	

KM 220 472.7 **cms** 16.65 **l/sec** remaining

Conc.	34	33	33	33	33	30	28	25	22	20	20	24.4
Vel.	0.32	0.57	0.64	0.64	0.57	0.52	0.43	0.34	0.34	0.29	0.16	
W.P.	24.64	24.42	24.40	24.40	24.41	24.40	24.44	24.40	24.40	24.40	24.42	
Depth	2.39	5.49	6.52	6.48	5.54	4.82	3.64	2.59	2.53	2.04	0.80	
Area	58.3	133.9	159.0	158.0	135.0	117.6	88.8	63.1	61.8	49.7	19.5	

KM 221 474.2 **cms** 16.65 **l/sec** remaining

Conc.	31	32	34	34	33	31	26	22	20	18	17	24.4
Vel.	0.45	0.79	0.89	0.89	0.80	0.73	0.60	0.48	0.47	0.41	0.22	
W.P.	24.64	24.42	24.41	24.41	24.42	24.40	24.45	24.40	24.40	24.41	24.43	
Depth	1.72	3.95	4.69	4.66	3.98	3.47	2.62	1.86	1.82	1.47	0.57	
Area	42.0	96.4	114.5	113.8	97.2	84.7	63.9	45.5	44.5	35.8	14.0	

KM 222 475.6 **cms** 16.65 **l/sec** remaining

Conc.	30	32	34	34	33	30	26	22	20	18	17	24.4
Vel.	0.45	0.79	0.89	0.89	0.80	0.73	0.60	0.48	0.48	0.41	0.22	
W.P.	24.65	24.43	24.41	24.41	24.42	24.41	24.45	24.41	24.41	24.42	24.43	
Depth	1.72	3.96	4.70	4.67	3.99	3.47	2.62	1.87	1.83	1.47	0.58	
Area	42.0	96.5	114.6	113.9	97.3	84.7	64.0	45.6	44.6	35.9	14.0	

KM 223 477.1 **cms** 16.65 **l/sec** remaining

Conc.	30	32	34	34	33	30	26	22	20	18	17	24.4
Vel.	0.45	0.80	0.89	0.89	0.80	0.73	0.60	0.48	0.48	0.41	0.22	
W.P.	24.66	24.44	24.42	24.42	24.43	24.41	24.46	24.41	24.41	24.42	24.44	
Depth	1.72	3.96	4.70	4.67	3.99	3.47	2.62	1.87	1.83	1.47	0.58	
Area	42.1	96.6	114.7	114.0	97.4	84.8	64.1	45.7	44.7	35.9	14.1	

KM 224 478.5 **cms** 16.65 **l/sec** remaining

Conc.	30	32	34	34	33	30	26	22	20	18	17	24.4
Vel.	0.46	0.80	0.89	0.89	0.80	0.73	0.61	0.48	0.48	0.41	0.22	
W.P.	24.66	24.44	24.42	24.43	24.43	24.42	24.47	24.42	24.42	24.43	24.45	
Depth	1.72	3.96	4.70	4.67	3.99	3.48	2.63	1.87	1.83	1.47	0.58	
Area	42.1	96.8	114.8	114.1	97.5	84.9	64.1	45.8	44.8	36.0	14.1	

KM 225 480.0 **cms** 16.65 **l/sec** remaining

Conc.	30	32	34	34	33	30	26	22	20	**18**	**16**	**24.4**

KM 226 481.5 cms 16.65 l/sec remaining

Conc.	30	32	34	34	33	30	26	22	20	18	16	24.4
Vel.	0.46	0.80	0.90	**0.89**	0.80	0.73	0.61	0.49	0.48	0.41	0.22	
W.P.	24.68	24.45	24.44	24.44	24.45	24.43	24.48	24.43	24.43	24.44	24.46	
Depth	1.73	3.97	4.71	4.68	4.00	3.48	2.63	1.88	1.84	1.48	0.58	
Area	42.2	97.0	115.1	114.3	97.8	85.1	64.3	46.0	45.0	36.2	14.2	

KM 227 482.9 cms 16.65 l/sec remaining

Conc.	30	31	34	34	32	30	26	22	19	18	16	24.4
Vel.	0.46	0.80	0.90	0.89	0.81	0.73	0.61	0.49	0.48	0.42	0.22	
W.P.	24.68	24.46	24.44	24.44	24.45	24.44	24.48	24.44	24.44	24.45	24.47	
Depth	1.73	3.97	4.71	4.68	4.00	3.48	2.63	1.89	1.85	1.48	0.58	
Area	42.3	97.1	115.2	114.4	97.9	85.1	64.4	46.1	45.1	36.2	14.2	

KM 228 484.4 cms 16.65 l/sec remaining

Conc.	30	31	33	34	32	30	26	22	19	18	16	24.4
Vel.	0.46	0.80	0.90	0.90	0.81	0.74	0.61	0.49	0.48	0.42	0.22	
W.P.	24.69	24.47	24.45	24.45	24.46	24.45	24.49	24.45	24.45	24.45	24.47	
Depth	1.73	3.98	4.72	4.68	4.01	3.49	2.64	1.89	1.85	1.49	0.58	
Area	42.3	97.2	115.3	114.5	98.0	85.2	64.4	46.2	45.2	36.3	14.2	

KM 229 485.8 cms 16.65 l/sec remaining

Conc.	30	31	33	34	32	30	26	21	19	18	16	24.5
Vel.	0.46	0.80	0.90	0.90	0.81	0.74	0.61	0.49	0.48	0.42	0.22	
W.P.	24.70	24.47	24.46	24.46	24.47	24.45	24.50	24.45	24.45	24.46	24.48	
Depth	1.73	3.98	4.72	4.69	4.01	3.49	2.64	1.89	1.85	1.49	0.58	
Area	42.4	97.3	115.4	114.6	98.1	85.3	64.5	46.3	45.3	36.4	14.2	

KM 230 487.3 cms 16.65 l/sec remaining

Conc.	12	13	15	17	22	25	28	30	31	31	34	19.7
Vel.	0.17	0.29	0.40	0.57	0.76	0.94	1.05	1.11	1.16	1.04	0.55	
W.P.	19.67	19.66	19.67	19.68	19.69	19.69	19.66	19.66	19.67	19.77	19.98	
Depth	0.30	0.68	1.10	1.86	2.85	3.92	4.67	5.02	5.38	4.60	1.78	
Area	6.0	13.4	21.6	36.6	55.9	77.1	91.9	98.7	105.9	90.4	35.0	

KM 231 488.8 cms 16.65 l/sec remaining

Conc.	12	13	14	17	22	25	28	30	31	31	33	19.7
Vel.	0.17	0.29	0.40	0.57	0.76	0.94	1.06	1.11	1.16	1.04	0.55	
W.P.	19.67	19.66	19.67	19.68	19.69	19.69	19.67	19.66	19.67	19.77	19.98	
Depth	0.30	0.69	1.10	1.87	2.85	3.92	4.68	5.02	5.39	4.60	1.78	
Area	6.0	13.5	21.7	36.7	56.0	77.2	91.9	98.8	105.9	90.5	35.0	

KM 232 490.2 cms 16.65 l/sec remaining

Conc.	12	13	14	17	22	25	28	30	31	31	33	19.7
Vel.	0.17	0.30	0.40	0.57	0.76	0.94	1.06	1.11	1.16	1.04	0.55	
W.P.	19.67	19.66	19.67	19.68	19.69	19.69	19.67	19.66	19.67	19.77	19.98	
Depth	0.31	0.69	1.11	1.87	2.85	3.93	4.68	5.03	5.39	4.60	1.78	
Area	6.0	13.6	21.8	36.8	56.1	77.2	92.0	98.8	106.0	90.5	35.1	

KM 233 491.7 cms 16.65 l/sec remaining

Conc.	12	13	14	17	21	25	28	30	31	31	33	19.7
Vel.	0.17	0.30	0.41	0.58	0.76	0.94	1.06	1.11	1.16	1.04	0.55	
W.P.	19.67	19.66	19.67	19.68	19.69	19.69	19.67	19.66	19.67	19.77	19.98	
Depth	0.31	0.69	1.11	1.87	2.86	3.93	4.68	5.03	5.39	4.61	1.78	
Area	6.1	13.6	21.8	36.8	56.1	77.3	92.1	98.9	106.1	90.6	35.1	

KM 234 493.1 cms 16.65 l/sec remaining

Conc.	12	12	14	17	21	25	28	30	31	31	32	19.7
Vel.	0.17	0.30	0.41	0.58	0.76	0.94	1.06	1.11	1.17	1.05	0.55	
W.P.	19.67	19.66	19.68	19.68	19.70	19.69	19.67	19.67	19.67	19.77	**19.99**	
Depth	0.31	0.70	1.11	1.88	2.86	3.93	4.69	5.03	5.40	4.61	1.78	
Area	6.1	13.7	21.9	36.9	56.2	77.4	92.1	99.0	106.1	90.6	35.1	

KM 235 494.6 cms 16.65 l/sec remaining

Conc.	11	12	14	17	21	25	28	30	31	31	31	19.7
Vel.	0.17	0.30	0.41	0.58	0.76	0.95	1.06	1.12	1.17	1.05	0.55	
W.P.	19.67	19.67	19.68	19.68	19.70	19.69	19.67	19.67	19.67	19.77	**19.99**	
Depth	0.31	0.70	1.12	1.88	2.86	3.94	4.69	5.04	5.40	4.61	1.79	
Area	6.1	13.8	22.0	37.0	56.3	77.4	92.2	99.0	106.2	90.7	35.1	

KM 236 496.1 cms 16.65 l/sec remaining

Conc.	11	12	**14**	**17**	**21**	**25**	**28**	**30**	**31**	**30**	**31**	**19.7**

KM 237 497.5 **cms** 16.64 **l/sec** remaining

Conc.	11	12	14	17	21	25	28	30	31	30	31	19.7
Vel.	0.18	0.30	0.41	0.58	0.77	0.95	1.07	1.12	1.17	1.05	0.55	
W.P.	19.68	19.67	19.68	19.69	19.70	19.69	19.67	19.67	19.67	19.78	19.99	
Depth	0.31	0.71	1.12	1.89	2.87	3.94	4.70	5.04	5.41	4.62	1.79	
Area	6.2	13.9	22.1	37.1	56.4	77.6	92.4	99.2	106.4	90.8	35.2	

KM 238 499.0 **cms** 16.64 **l/sec** remaining

Conc.	11	12	14	17	21	25	27	30	31	30	31	19.7
Vel.	0.18	0.30	0.41	0.58	0.77	0.95	1.07	1.12	1.17	1.05	0.56	
W.P.	19.68	19.67	19.68	19.69	19.70	19.70	19.67	19.67	19.67	19.78	19.99	
Depth	0.32	0.71	1.13	1.89	2.87	3.95	4.70	5.05	5.41	4.62	1.79	
Area	6.2	14.0	22.2	37.2	56.5	77.6	92.4	99.3	106.4	90.8	35.2	

KM 239 500.4 **cms** 16.64 **l/sec** remaining

Conc.	11	12	14	17	21	25	27	29	31	30	31	19.7
Vel.	0.18	0.30	0.41	0.58	0.77	0.95	1.07	1.12	1.18	1.05	0.56	
W.P.	19.68	19.67	19.68	19.69	19.70	19.70	19.68	19.67	19.68	19.78	19.99	
Depth	0.32	0.71	1.13	1.89	2.87	3.95	4.70	5.05	5.41	4.62	1.79	
Area	6.3	14.0	22.2	37.2	56.5	77.7	92.5	99.3	106.5	90.9	35.2	

KM 240 501.9 **cms** 16.64 **l/sec** remaining

Conc.	31	32	34	30	28	29	29	31	34	36	38	10.5
Vel.	0.60	1.15	1.34	1.36	1.34	1.32	1.30	1.28	1.23	1.05	0.56	
W.P.	11.06	10.70	10.55	10.55	10.55	10.55	10.55	10.55	10.55	10.64	10.95	
Depth	1.47	3.73	4.66	4.76	4.66	4.54	4.42	4.32	4.10	3.27	1.31	
Area	15.5	39.4	49.2	50.2	49.1	47.8	46.6	45.6	43.2	34.5	13.8	

KM 241 504.6 **cms** 16.64 **l/sec** remaining

Conc.	30	32	34	31	28	28	29	32	32	34	38	10.5
Vel.	0.54	1.02	1.19	1.21	1.19	1.17	1.15	1.14	1.09	0.94	0.50	
W.P.	11.06	10.70	10.55	10.55	10.55	10.55	10.55	10.55	10.56	10.65	10.96	
Depth	1.66	4.22	5.27	5.38	5.26	5.13	5.00	4.89	4.63	3.69	1.48	
Area	17.5	44.5	55.6	56.8	55.5	54.1	52.7	51.6	48.9	39.0	15.7	

KM 242 507.3 **cms** 16.64 **l/sec** remaining

Conc.	31	32	33	31	27	28	29	32	33	34	38	10.6
Vel.	0.54	1.02	1.20	1.22	1.20	1.18	1.16	1.14	1.10	0.94	0.50	
W.P.	11.06	10.70	10.56	10.55	10.55	10.55	10.55	10.55	10.56	10.65	10.96	
Depth	1.66	4.22	5.28	5.39	5.27	5.14	5.01	4.90	4.64	3.70	1.49	
Area	17.5	44.6	55.7	56.9	55.6	54.2	52.8	51.7	48.9	39.0	15.7	

KM 243 510.0 **cms** 16.64 **l/sec** remaining

Conc.	30	32	33	31	27	28	29	32	32	34	38	10.6
Vel.	0.54	1.03	1.20	1.22	1.20	1.18	1.16	1.15	1.10	0.94	0.50	
W.P.	11.07	10.71	10.56	10.56	10.56	10.56	10.56	10.56	10.56	10.66	10.97	
Depth	1.66	4.22	5.28	5.39	5.28	5.14	5.01	4.90	4.64	3.70	1.49	
Area	17.6	44.6	55.8	56.9	55.7	54.3	52.9	51.8	49.0	39.1	15.7	

KM 244 512.7 **cms** 16.64 **l/sec** remaining

Conc.	30	32	32	31	27	28	28	31	32	34	38	10.6
Vel.	0.54	1.03	1.21	1.23	1.21	1.19	1.17	1.15	1.11	0.95	0.51	
W.P.	11.07	10.71	10.56	10.56	10.56	10.56	10.56	10.56	10.57	10.66	10.97	
Depth	1.66	4.23	5.29	5.40	5.28	5.15	5.02	4.91	4.65	3.71	1.49	
Area	17.6	44.6	55.9	57.0	55.8	54.4	53.0	51.8	49.1	39.1	15.7	

KM 245 515.4 **cms** 16.64 **l/sec** remaining

Conc.	30	32	32	30	27	28	28	31	32	34	38	10.6
Vel.	0.54	1.03	1.21	1.23	1.21	1.19	1.17	1.15	1.11	0.95	0.51	
W.P.	11.07	10.72	10.57	10.56	10.56	10.56	10.56	10.56	10.57	10.66	10.98	
Depth	1.66	4.23	5.30	5.41	5.29	5.16	5.03	4.92	4.65	3.71	1.49	
Area	17.6	44.7	56.0	57.1	55.9	54.5	53.1	51.9	49.2	39.2	15.7	

KM 246 518.1 **cms** 16.64 **l/sec** remaining

Conc.	30	32	32	30	26	28	28	31	32	34	37	10.6
Vel.	0.54	1.04	1.22	1.23	1.22	1.20	1.18	1.16	1.12	0.95	0.51	
W.P.	11.08	10.72	10.57	10.57	10.57	10.57	10.57	10.57	10.58	10.67	10.98	
Depth	1.66	4.23	5.30	5.41	5.30	5.16	5.03	4.92	4.66	3.71	1.49	
Area	17.6	44.7	56.0	57.2	56.0	54.5	53.2	52.0	49.2	39.3	15.8	

KM 247 520.8 **cms** 16.64 **l/sec** remaining

Conc.	30	32	32	30	26	28	28	31	32	**33**	**37**	**10.6**

KM 248 523.5 **cms** 16.64 **l/sec** remaining

Conc.	29	31	32	30	26	27	28	31	32	33	37	10.6
Vel.	0.55	1.04	1.23	1.24	1.23	1.21	1.18	1.17	1.13	0.96	0.51	
W.P.	11.08	10.73	10.58	10.57	10.57	10.57	10.57	10.57	10.58	10.68	10.99	
Depth	1.66	4.24	5.32	5.43	5.31	5.17	5.04	4.94	4.67	3.72	1.49	
Area	17.6	44.8	56.2	57.4	56.1	54.7	53.3	52.2	49.4	39.4	15.8	

KM 249 526.2 **cms** 16.64 **l/sec** remaining

Conc.	29	31	32	30	26	27	28	31	31	33	37	10.6
Vel.	0.55	1.05	1.23	1.25	1.23	1.21	1.19	1.17	1.13	0.97	0.52	
W.P.	11.09	10.74	10.58	10.58	10.58	10.58	10.58	10.58	10.59	10.68	10.99	
Depth	1.66	4.24	5.32	5.43	5.32	5.18	5.05	4.94	4.68	3.73	1.50	
Area	17.6	44.9	56.3	57.5	56.2	54.8	53.4	52.3	49.5	39.4	15.8	

KM 250 528.9 **cms** 16.64 **l/sec** remaining

Conc.	27	29	27	29	29	30	30	30	29	**29**	34	12.2
Vel.	0.70	1.16	1.23	1.34	1.47	1.54	1.58	1.63	1.53	1.23	0.64	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.25	2.56	2.78	3.20	3.64	3.92	4.09	4.26	3.92	2.83	1.08	
Area	15.2	31.2	33.9	39.0	44.4	47.7	49.8	51.8	47.7	34.4	13.1	

KM 251 529.3 **cms** 16.64 **l/sec** remaining

Conc.	28	30	31	27	27	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.85	0.94	1.02	1.07	1.10	1.13	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.59	5.23	5.62	5.87	6.11	5.62	4.05	1.55	
Area	21.8	44.8	48.7	56.0	63.7	68.5	71.5	74.4	68.5	49.4	18.8	

KM 252 529.7 **cms** 16.64 **l/sec** remaining

Conc.	28	30	31	27	27	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.85	0.94	1.02	1.07	1.10	1.13	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.59	5.23	5.62	5.87	6.11	5.62	4.06	1.55	
Area	21.8	44.8	48.7	56.0	63.7	68.5	71.5	74.4	68.5	49.4	18.9	

KM 253 530.0 **cms** 16.64 **l/sec** remaining

Conc.	28	30	31	27	26	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.02	1.07	1.11	1.14	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.59	5.23	5.63	5.87	6.11	5.62	4.06	1.55	
Area	21.8	44.8	48.7	56.0	63.7	68.5	71.5	74.4	68.5	49.4	18.9	

KM 254 530.4 **cms** 16.64 **l/sec** remaining

Conc.	28	30	30	27	26	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.02	1.08	1.11	1.14	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.60	5.23	5.63	5.87	6.11	5.62	4.06	1.55	
Area	21.8	44.8	48.7	56.0	63.7	68.5	71.5	74.4	68.5	49.4	18.9	

KM 255 530.8 **cms** 16.64 **l/sec** remaining

Conc.	28	30	30	27	26	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.02	1.08	1.11	1.14	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.60	5.23	5.63	5.87	6.11	5.62	4.06	1.55	
Area	21.8	44.8	48.7	56.0	63.7	68.5	71.5	74.4	68.5	49.4	18.9	

KM 256 531.2 **cms** 16.64 **l/sec** remaining

Conc.	28	30	30	27	26	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.03	1.08	1.11	1.14	1.07	0.86	0.45	
W.P.	12.63	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.60	5.23	5.63	5.87	6.11	5.62	4.06	1.55	
Area	21.9	44.8	48.7	56.0	63.8	68.5	71.5	74.4	68.5	49.4	18.9	

KM 257 531.5 **cms** 16.64 **l/sec** remaining

Conc.	28	30	30	26	26	28	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.03	1.08	1.11	1.14	1.07	0.86	0.45	
W.P.	12.64	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.60	5.23	5.63	5.87	6.11	5.62	4.06	1.55	
Area	21.9	44.8	48.7	56.0	63.8	68.6	71.5	74.4	68.5	49.4	18.9	

KM 258 531.9 **cms** 16.64 **l/sec** remaining

Conc.	28	**30**	30	**26**	**26**	**28**	**28**	**29**	**33**	**35**	**39**	**12.2**

KM 259	532.3 **cms**			16.64 **l/sec** remaining								
Conc.	28	30	30	26	26	27	28	**29**	33	35	39	12.2
Vel.	0.49	0.81	0.86	0.94	1.03	1.08	1.11	1.14	1.07	0.86	0.45	
W.P.	12.64	12.18	12.19	12.20	12.19	12.18	12.18	12.18	12.23	12.31	12.52	
Depth	1.79	3.68	4.00	4.60	5.24	5.63	5.87	6.11	5.63	4.06	1.55	
Area	21.9	44.8	48.7	56.0	63.8	68.6	71.5	74.5	68.5	49.5	18.9	
KM 260	532.7 **cms**			16.64 **l/sec** remaining								
Conc.	30	31	31	29	27	28	28	30	31	34	36	12.0
Vel.	0.54	0.94	1.00	1.02	1.04	1.06	1.07	1.02	0.92	0.79	0.44	
W.P.	12.58	12.06	12.04	12.04	12.04	12.04	12.04	12.05	12.06	12.07	12.33	
Depth	2.13	4.66	5.12	5.27	5.44	5.58	5.64	5.33	4.57	3.62	1.56	
Area	25.6	56.1	61.7	63.4	65.4	67.2	68.0	64.1	55.0	43.6	18.8	
KM 261	533.0 **cms**			16.64 **l/sec** remaining								
Conc.	30	31	30	29	29	29	29	**29**	30	31	34	12.0
Vel.	0.63	1.09	1.16	1.19	1.21	1.23	1.24	1.19	1.08	0.92	0.52	
W.P.	12.58	12.06	12.04	12.04	12.04	12.04	12.04	12.05	12.06	12.07	12.33	
Depth	1.83	4.00	4.39	4.52	4.66	4.79	4.84	4.57	3.92	3.11	1.34	
Area	22.0	48.1	52.9	54.4	56.2	57.6	58.3	55.0	47.2	37.4	16.1	
KM 262	533.4 **cms**			16.64 **l/sec** remaining								
Conc.	30	31	30	29	29	29	29	**29**	30	31	34	12.0
Vel.	0.63	1.09	1.17	1.19	1.21	1.23	1.24	1.19	1.08	0.92	0.52	
W.P.	12.58	12.06	12.04	12.04	12.04	12.04	12.04	12.05	12.06	12.07	12.33	
Depth	1.83	4.00	4.39	4.52	4.67	4.79	4.84	4.57	3.92	3.11	1.34	
Area	22.0	48.1	52.9	54.5	56.2	57.7	58.3	55.0	47.2	37.4	16.1	
KM 263	533.8 **cms**			16.64 **l/sec** remaining								
Conc.	30	31	30	29	29	29	29	**29**	30	31	34	12.0
Vel.	0.63	1.09	1.17	1.19	1.21	1.23	1.24	1.20	1.08	0.92	0.52	
W.P.	12.58	12.06	12.04	12.04	12.04	12.04	12.04	12.05	12.07	12.07	12.33	
Depth	1.83	4.00	4.40	4.52	4.67	4.79	4.84	4.57	3.92	3.11	1.34	
Area	22.0	48.2	52.9	54.5	56.2	57.7	58.3	55.0	47.2	37.4	16.1	
KM 264	534.2 **cms**			16.64 **l/sec** remaining								
Conc.	30	31	29	29	29	29	29	**29**	30	31	34	12.0
Vel.	0.63	1.09	1.17	1.19	1.21	1.23	1.24	1.20	1.08	0.92	0.52	
W.P.	12.58	12.06	12.04	12.04	12.04	12.04	12.04	12.06	12.07	12.07	12.34	
Depth	1.83	4.00	4.40	4.52	4.67	4.79	4.85	4.57	3.92	3.11	1.34	
Area	22.0	48.2	52.9	54.5	56.2	57.7	58.4	55.1	47.2	37.4	16.1	
KM 265	534.5 **cms**			16.64 **l/sec** remaining								
Conc.	18	19	20	23	26	28	30	31	32	33	33	20.8
Vel.	0.18	0.39	0.52	0.58	0.63	0.66	0.69	0.74	0.74	0.71	0.43	
W.P.	20.84	20.85	20.82	20.81	20.81	20.81	20.81	20.82	20.82	20.81	21.24	
Depth	0.70	2.17	3.31	3.98	4.49	4.84	5.17	5.71	5.72	5.31	2.62	
Area	14.5	45.2	68.9	82.7	93.3	100.7	107.7	118.9	118.9	110.5	54.5	
KM 266	535.1 **cms**			16.64 **l/sec** remaining								
Conc.	17	18	20	23	27	29	30	31	31	30	32	20.8
Vel.	0.22	0.48	0.64	0.72	0.78	0.82	0.85	0.91	0.91	0.87	0.54	
W.P.	20.84	20.85	20.82	20.82	20.81	20.81	20.81	20.82	20.82	20.81	21.24	
Depth	0.57	1.76	2.69	3.23	3.64	3.93	4.20	4.64	4.64	4.31	2.13	
Area	11.8	36.7	56.0	67.2	75.8	81.8	87.5	96.6	96.6	89.7	44.3	
KM 267	535.8 **cms**			16.64 **l/sec** remaining								
Conc.	17	18	20	23	27	29	30	31	31	30	32	20.8
Vel.	0.23	0.48	0.64	0.72	0.78	0.82	0.86	0.91	0.91	0.87	0.54	
W.P.	20.84	20.85	20.82	20.82	20.81	20.81	20.81	20.82	20.82	20.81	21.24	
Depth	0.57	1.76	2.69	3.23	3.65	3.93	4.21	4.64	4.64	4.31	2.13	
Area	11.8	36.7	56.0	67.2	75.9	81.9	87.5	96.6	96.6	89.8	44.3	
KM 268	536.4 **cms**			16.64 **l/sec** remaining								
Conc.	17	18	20	23	27	29	30	31	31	30	32	20.8
Vel.	0.23	0.48	0.64	0.72	0.78	0.82	0.86	0.91	0.91	0.87	0.54	
W.P.	20.84	20.85	20.82	20.82	20.81	20.81	20.81	20.82	20.82	20.81	21.24	
Depth	0.57	1.77	2.69	3.23	3.65	3.93	4.21	4.64	4.65	4.31	2.13	
Area	11.8	36.7	56.1	67.3	75.9	81.9	87.5	96.6	96.7	89.8	44.3	
KM 269	537.0 **cms**			16.64 **l/sec** remaining								
Conc.	17	18	20	23	27	29	30	31	31	30	32	20.8

KM 270 537.6 cms 16.64 l/sec remaining

Conc.	27	28	30	30	28	24	21	19	17	15	15	31.8
Vel.	0.58	0.92	0.91	0.85	0.73	0.62	0.53	0.46	0.40	0.38	0.23	
W.P.	32.03	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.80	
Depth	2.24	4.45	4.37	3.97	3.19	2.49	1.97	1.56	1.29	1.17	0.57	
Area	71.2	141.4	138.9	126.2	101.5	79.0	62.5	49.7	41.1	37.3	18.3	

KM 271 538.2 cms 16.64 l/sec remaining

Conc.	27	29	31	30	27	23	20	17	15	14	13	31.8
Vel.	0.65	1.03	1.02	0.96	0.83	0.70	0.60	0.52	0.45	0.43	0.26	
W.P.	32.03	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.80	
Depth	1.99	3.94	3.87	3.52	2.83	2.20	1.74	1.39	1.15	1.04	0.51	
Area	63.1	125.2	123.0	111.8	90.0	70.0	55.4	44.0	36.4	3.3.0	16.2	

KM 272 538.8 cms 16.64 l/sec remaining

Conc.	27	29	31	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.02	0.96	0.83	0.70	0.60	0.52	0.45	0.43	0.26	
W.P.	32.03	31.79	31.79	31.79	31.80	31.79	31.79	31.79	31.79	31.79	31.80	
Depth	1.99	3.94	3.87	3.52	2.83	2.20	1.74	1.39	1.15	1.04	0.51	
Area	63.1	125.2	123.1	111.8	90.0	70.0	55.4	44.1	36.5	33.1	16.2	

KM 273 539.4 cms 16.64 l/sec remaining

Conc.	27	29	31	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.02	0.96	0.83	0.70	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.79	31.80	31.79	31.79	31.79	31.79	31.79	31.80	
Depth	1.99	3.94	3.87	3.52	2.83	2.20	1.74	1.39	1.15	1.04	0.51	
Area	63.1	125.3	123.1	111.9	90.0	70.1	55.4	44.1	36.5	33.1	16.2	

KM 274 540.0 cms 16.64 l/sec remaining

Conc.	27	29	31	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.02	0.96	0.83	0.70	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.79	31.79	31.79	31.79	31.79	31.81	
Depth	1.99	3.94	3.87	3.52	2.83	2.21	1.75	1.39	1.15	1.04	0.51	
Area	63.2	125.3	123.1	111.9	90.1	70.1	55.5	44.2	36.5	33.2	16.2	

KM 275 540.6 cms 16.64 l/sec remaining

Conc.	27	29	31	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.02	0.96	0.83	0.70	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.79	31.79	31.79	31.79	31.79	31.81	
Depth	1.99	3.94	3.88	3.52	2.83	2.21	1.75	1.39	1.15	1.04	0.51	
Area	63.2	125.4	123.2	111.9	90.1	70.1	55.5	44.2	36.6	33.2	16.3	

KM 276 541.2 cms 16.64 l/sec remaining

Conc.	27	29	30	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.03	0.96	0.83	0.70	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.79	31.79	31.79	31.79	31.79	31.81	
Depth	1.99	3.94	3.88	3.52	2.84	2.21	1.75	1.39	1.15	1.05	0.51	
Area	63.2	125.4	123.2	112.0	90.2	70.2	55.6	44.2	36.6	33.2	16.3	

KM 277 541.8 cms 16.64 l/sec remaining

Conc.	27	29	30	30	27	23	20	17	15	13	12	31.8
Vel.	0.65	1.04	1.03	0.96	0.83	0.70	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.80	31.79	31.79	31.79	31.79	31.81	
Depth	1.99	3.95	3.88	3.52	2.84	2.21	1.75	1.39	1.15	1.05	0.51	
Area	63.2	125.4	123.3	112.0	90.2	70.2	55.6	44.3	36.6	33.3	16.3	

KM 278 542.4 cms 16.64 l/sec remaining

Conc.	27	29	30	30	27	23	19	17	15	13	12	31.8
Vel.	0.65	1.04	1.03	0.96	0.83	0.71	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.80	31.79	31.79	31.79	31.79	31.81	
Depth	1.99	3.95	3.88	3.52	2.84	2.21	1.75	1.39	1.15	1.05	0.51	
Area	63.2	125.5	123.3	112.1	90.2	70.3	55.6	44.3	36.7	33.3	16.3	

KM 279 543.0 cms 16.64 l/sec remaining

Conc.	27	29	30	30	27	23	19	17	15	13	12	31.8
Vel.	0.65	1.04	1.03	0.96	0.83	0.71	0.60	0.52	0.46	0.43	0.27	
W.P.	32.04	31.79	31.79	31.80	31.80	31.80	31.80	31.79	31.79	31.79	31.81	
Depth	1.99	3.95	3.88	3.53	2.84	2.21	1.75	1.39	1.16	1.05	0.51	
Area	63.2	125.5	123.4	112.1	90.3	70.3	55.7	44.3	36.7	33.4	16.3	

KM 280 543.6 cms 16.64 l/sec remaining

Conc.	29	28	26	24	21	17	15	13	12	12	11	13.6

KM 281 544.2 **cms** 16.64 **l/sec** remaining

Conc.	28	29	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.79	2.42	1.83	1.44	1.23	1.07	0.93	0.88	0.94	0.61	
W.P.	14.89	13.59	13.73	13.66	13.60	13.59	13.59	13.59	13.59	13.59	13.65	
Depth	3.04	5.97	4.87	3.19	2.22	1.75	1.42	1.16	1.06	1.16	0.62	
Area	41.3	81.1	66.2	43.4	30.2	23.8	19.3	15.7	14.4	15.8	8.4	

KM 282 544.8 **cms** 16.64 **l/sec** remaining

Conc.	28	29	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.79	2.42	1.83	1.45	1.24	1.07	0.94	0.88	0.94	0.62	
W.P.	14.89	13.59	13.73	13.66	13.60	13.60	13.60	13.59	13.59	13.59	13.65	
Depth	3.04	5.97	4.87	3.19	2.22	1.76	1.42	1.16	1.06	1.16	0.62	
Area	41.4	81.1	66.2	43.4	30.2	23.9	19.3	15.7	14.4	15.8	8.4	

KM 283 545.4 **cms** 16.64 **l/sec** remaining

Conc.	28	29	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.79	2.42	1.84	1.45	1.24	1.07	0.94	0.88	0.94	0.62	
W.P.	14.90	13.60	13.74	13.67	13.61	13.60	13.60	13.60	13.60	13.60	13.65	
Depth	3.04	5.97	4.87	3.20	2.22	1.76	1.42	1.16	1.06	1.16	0.62	
Area	41.4	81.2	66.2	43.4	30.2	23.9	19.3	15.7	14.5	15.8	8.4	

KM 284 546.0 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.79	2.42	1.84	1.45	1.24	1.07	0.94	0.89	0.94	0.62	
W.P.	14.90	13.60	13.74	13.67	13.61	13.60	13.60	13.60	13.60	13.60	13.66	
Depth	3.05	5.97	4.87	3.20	2.23	1.76	1.42	1.16	1.06	1.17	0.62	
Area	41.4	81.2	66.2	43.5	30.3	23.9	19.4	15.8	14.5	15.9	8.5	

KM 285 546.6 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.79	2.42	1.84	1.45	1.24	1.07	0.94	0.89	0.94	0.62	
W.P.	14.90	13.61	13.74	13.67	13.61	13.61	13.61	13.61	13.60	13.60	13.66	
Depth	3.05	5.97	4.87	3.20	2.23	1.76	1.42	1.16	1.07	1.17	0.62	
Area	41.4	81.3	66.3	43.5	30.3	23.9	19.4	15.8	14.5	15.9	8.5	

KM 286 547.2 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.80	2.42	1.84	1.45	1.24	1.08	0.94	0.89	0.94	0.62	
W.P.	14.91	13.61	13.75	13.68	13.62	13.61	13.61	13.61	13.61	13.61	13.66	
Depth	3.05	5.97	4.87	3.20	2.23	1.76	1.43	1.16	1.07	1.17	0.62	
Area	41.5	81.3	66.3	43.5	30.3	24.0	19.4	15.8	14.5	15.9	8.5	

KM 287 547.9 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.80	2.42	1.84	1.45	1.24	1.08	0.94	0.89	0.94	0.62	
W.P.	14.91	13.61	13.75	13.68	13.62	13.62	13.61	13.61	13.61	13.61	13.67	
Depth	3.05	5.98	4.87	3.20	2.23	1.76	1.43	1.16	1.07	1.17	0.62	
Area	41.5	81.3	66.3	43.5	30.3	24.0	19.4	15.8	14.6	16.0	8.5	

KM 288 548.5 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.80	2.42	1.84	1.45	1.24	1.08	0.94	0.89	0.94	0.62	
W.P.	14.92	13.62	13.76	13.68	13.62	13.62	13.62	13.62	13.61	13.61	13.67	
Depth	3.05	5.98	4.87	3.20	2.23	1.76	1.43	1.16	1.07	1.17	0.63	
Area	41.5	81.4	66.4	43.6	30.4	24.0	19.4	15.8	14.6	16.0	8.5	

KM 289 549.1 **cms** 16.64 **l/sec** remaining

Conc.	28	28	25	22	20	18	16	14	13	14	13	13.6
Vel.	1.68	2.80	2.42	1.84	1.45	1.24	1.08	0.94	0.89	0.95	0.62	
W.P.	14.92	13.62	13.76	13.69	13.63	13.62	13.62	13.62	13.62	13.62	13.67	
Depth	3.05	5.98	4.88	3.20	2.23	1.76	1.43	1.16	1.07	1.18	0.63	
Area	41.5	81.4	66.4	43.6	30.4	24.0	19.5	15.9	14.6	16.0	8.5	

KM 290 549.7 **cms** 16.64 **l/sec** remaining

Conc.	25	26	27	28	27	25	25	28	27	26	25	9.9
Vel.	0.37	0.71	0.81	0.86	0.82	0.74	0.65	0.56	0.47	0.35	0.17	
W.P.	11.69	9.99	9.97	9.86	9.91	9.95	9.95	9.94	9.94	9.98	10.01	
Depth	4.57	10.32	12.53	13.53	12.77	11.08	9.15	7.30	5.53	3.55	1.23	
Area	45.1	101.8	123.6	133.5	126.0	109.3	90.2	72.0	54.5	35.0	12.1	

KM 291 550.3 **cms** 16.64 **l/sec** remaining

Conc.	26	28	29	29	26	23	24	25	25	28	27	9.9

KM 292	**550.9 cms**			16.63 **l/sec remaining**								
Conc.	26	28	29	29	26	23	24	25	25	28	27	9.9
Vel.	0.54	1.03	1.18	1.25	**1.20**	1.09	0.96	0.82	0.68	0.51	0.25	
W.P.	11.70	10.00	9.97	9.87	9.92	9.96	9.96	9.94	9.94	9.98	10.01	
Depth	3.14	7.09	8.61	9.30	8.77	7.61	6.28	5.01	3.80	2.43	0.84	
Area	31.0	69.9	85.0	91.7	86.6	75.1	62.0	49.5	37.5	24.0	8.3	
KM 293	551.5 **cms**			16.63 **l/sec** remaining								
Conc.	26	28	29	29	26	23	24	25	25	28	27	9.9
Vel.	0.54	1.03	1.18	1.25	1.20	1.09	0.96	0.82	0.68	0.51	0.25	
W.P.	11.70	10.00	9.97	9.87	9.92	9.96	9.96	9.94	9.94	9.98	10.01	
Depth	3.14	7.09	8.61	9.30	8.77	7.61	6.28	5.01	3.80	2.43	0.84	
Area	31.0	70.0	85.0	91.8	86.6	75.1	62.0	49.5	37.5	24.0	8.3	
KM 294	552.1 **cms**			16.63 **l/sec** remaining								
Conc.	26	28	29	29	26	23	24	25	25	28	27	9.9
Vel.	0.54	1.03	1.18	1.25	1.20	1.09	0.96	0.82	0.68	0.51	0.25	
W.P.	11.70	10.00	9.97	9.87	9.92	9.96	9.96	9.95	9.95	9.99	10.01	
Depth	3.14	7.09	8.61	9.30	8.78	7.61	6.28	5.01	3.80	2.43	0.84	
Area	31.0	70.0	85.0	91.8	86.6	75.1	62.0	49.5	37.5	24.0	8.3	
KM 295	552.7 **cms**			16.63 **l/sec** remaining								
Conc.	26	28	28	29	26	23	24	25	25	28	27	9.9
Vel.	0.54	1.04	1.18	1.25	1.20	1.09	0.96	0.82	0.69	0.51	0.25	
W.P.	11.70	10.00	9.98	9.87	9.92	9.96	9.96	9.95	9.95	9.99	10.01	
Depth	3.14	7.09	8.62	9.30	8.78	7.61	6.28	5.01	3.80	2.43	0.84	
Area	31.0	70.0	85.1	91.8	86.6	75.2	62.0	49.5	37.5	24.0	8.2	
KM 296	553.3 **cms**			16.63 **l/sec** remaining								
Conc.	26	28	28	29	26	23	24	25	25	28	27	9.9
Vel.	0.54	1.04	1.18	1.25	1.20	1.09	0.96	0.83	0.69	0.51	0.25	
W.P.	11.71	10.01	9.98	9.87	9.92	9.96	9.96	9.95	9.95	9.99	10.01	
Depth	3.14	7.10	8.62	9.30	8.78	7.61	6.28	5.01	3.80	2.43	0.83	
Area	31.0	70.1	85.1	91.9	86.7	75.2	62.1	49.5	37.5	24.0	8.2	
KM 297	553.9 **cms**			16.63 **l/sec** remaining								
Conc.	26	27	28	29	26	23	24	24	25	28	27	9.9
Vel.	0.54	1.04	1.18	1.25	1.20	1.09	0.96	0.83	0.69	0.51	0.25	
W.P.	11.71	10.01	9.98	9.88	9.93	9.97	9.96	9.95	9.95	9.99	10.02	
Depth	3.14	7.10	8.62	9.31	8.78	7.61	6.28	5.02	3.80	2.43	0.83	
Area	31.1	70.1	85.1	91.9	86.7	75.2	62.1	49.5	37.5	24.0	8.2	
KM 298	554.5 **cms**			16.63 **l/sec** remaining								
Conc.	26	27	28	29	26	23	24	24	25	28	27	9.9
Vel.	0.54	1.04	1.18	1.25	1.20	1.09	0.96	0.83	0.69	0.51	0.25	
W.P.	11.71	10.01	9.98	9.88	9.93	9.97	9.97	9.95	9.95	10.00	10.02	
Depth	3.15	7.10	8.62	9.31	8.78	7.61	6.29	5.02	3.80	2.42	0.83	
Area	31.1	70.1	85.2	91.9	86.7	75.2	62.1	49.5	37.5	24.0	8.2	
KM 299	555.1 **cms**			16.63 **l/sec** remaining								
Conc.	26	27	28	29	26	23	24	24	25	28	27	9.9
Vel.	0.54	1.04	1.19	1.26	1.20	1.09	0.96	0.83	0.69	0.51	0.25	
W.P.	11.71	10.01	9.98	9.88	9.93	9.97	9.97	9.95	9.95	10.00	10.02	
Depth	3.15	7.10	8.62	9.31	8.78	7.62	6.29	5.02	3.80	2.42	0.83	
Area	31.1	70.1	85.2	92.0	86.7	75.2	62.1	49.6	37.5	23.9	8.2	
KM 300	555.7 **cms**			16.63 **l/sec** remaining								
Conc.	22	23	25	26	29	31	32	31	29	27	24	34.3
Vel.	0.31	0.49	0.48	0.47	0.48	0.52	0.59	0.64	0.64	0.56	0.31	
W.P.	34.37	34.26	34.26	34.26	34.26	34.26	34.28	34.26	34.26	34.28	34.38	
Depth	1.39	2.78	2.75	2.61	2.74	3.07	3.67	4.20	4.15	3.45	1.41	
Area	47.6	95.2	94.3	89.4	93.9	105.1	125.6	143.9	142.0	118.2	48.3	
KM 301	556.3 **cms**			16.63 **l/sec** remaining								
Conc.	22	23	24	26	29	31	32	31	30	27	25	34.3
Vel.	0.31	0.49	0.48	0.47	0.48	0.52	0.59	0.64	0.64	0.56	0.31	
W.P.	34.37	34.26	34.26	34.26	34.26	34.26	34.28	34.26	34.26	34.28	34.38	
Depth	1.39	2.78	2.75	2.61	2.74	3.07	3.67	4.20	4.15	3.45	1.41	
Area	47.6	95.2	94.3	89.4	94.0	105.1	125.6	144.0	142.0	118.3	48.4	
KM 302	556.9 **cms**			16.63 **l/sec** remaining								
Conc.	22	23	24	26	28	31	32	31	30	27	25	34.3

8E - SCENARIO #5

Spill site: River Km 189 E Spill rate 16.67 l/s
CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Panel Width (m)
t:.M 189	'356. 0 cms			16.65 1/sec remaining								
Conc.	0	0	0	0	0	0	0	0	0	0	1038	16.13
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.F.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63. 0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 18'3. 1	0	0	3	'3	14	20	27	34	41	47	49	16.8
Vel.	0.4'3	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.'34	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 189. 2	3	5	8	13	18	'23	27	31	33	34	34	16.8
Vel.	0.43	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 189.3	7	8	12	16	20	23	26	28	28	28	28	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.'34	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 18'3.4	10	11	14	18	2	1	24	25	26	[illegible]	25	24	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.'34	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 183.5	12	13	16	19	22	24	25	25	24	23	[illegible]	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.31	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 18'3.6	13	14	17	20	2	2	24	24	24	22	21	21	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	(3.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 183.7	14	15	18	20	23	24	24	23	22	20	20	16.8
Vel.	0.4'j	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.41	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0. 94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67. 3	62.4	56.7	51.2	24.2	
KM 189. 8	15	16	18	21	[illegible]	24	24	23	21	20	19	16.8
Vel.	0.43	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.34	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67. 3	62.4	56.7	51.2	24.2	
KM 183. 3	15	16	19	21	[illegible]	[illegible]	[illegible]	24	[illegible]	21	19	18	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	
W.P.	16.91	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 190	956.0 cms			16.46 l/sec remaining								
Conc.	15	16	13	21	23	[illegible]	23	[illegible]	20	19	18	16.8
Vel.	0.49	0.99	1.34	1.50	1.47	1.45	1.41	1.33	1.24	1.16	0.66	

W.P.	16.'31	16.85	16.86	16.81	16.81	16.81	16.81	16.81	16.81	16.81	17.05	
Depth	0.94	2.48	3.75	4.37	4.27	4.17	4.00	3.71	3.38	3.05	1.44	
Area	15.7	41.6	63.0	73.5	71.7	70.0	67.3	62.4	56.7	51.2	24.2	
KM 13 1	960.0 cms				16.26 l/sec remaining							
Conc.	15	16	19	21	23	23	23	22	20	18	17	16.8
Vel.	0.49	1.00	1.34	1.50	1.48	1.45	1.41	1.34	1.25	1.16	0.67	
W.P.	16.92	16.86	16.87	16.81	16.81	16.81	16.82	16.82	16.82	16.82	17.06	
Depth	0.94	2.48	3.75	4.38	4.27	4.17	4.01	3.72	3.38	3.05	1.44	
Area	15.8	41.6	63.1	73.6	71.	970.2	67.4	62.5	56.8	51.3	24.3	
KM 192	'362.0 cms				16.07 1 /sec remaining							
Conc.	15	16	19	21	22	[illegible]	23	22	19	18	17	16.8
Vel.	0.4'3	1.00	1.34	1.51	1.48	1.45	1.41	1.34	1.25	1.16	0.67	
W.P.	16.92	16.86	16.87	16.82	16.82	16.82	16.82	16.82	16.82	16.82	17.06	
Depth	0.94	[illegible]	3.75	4.38	4.28	4. 18	4 .01	3.72	3.38	3.05	1.44	
Area	15.8	41.7	63.1	73.7	71.9	70.2	67.5	62.5	56.9	51.3	24.3	
KM 193	964.0 cms				15.88 l/sec remaining							
Conc.	15	16	18	20	22	[illegible]	[illegible]	21	19	18	17	16.8
Vel.	0.49	1.00	1. 35	1. 51	1.48	1.46	1.42	1.34	1.25	1.16	0.67	
W.P.	16.92	16.86	16.87	16.82	16.82	16.82	16.82	16.82	16.82	16.82	17.06	
Depth	0.94	2.48	3.75	4.39	4 .28	4. 18	4.02	3.72	3.39	3.06	1.45	
Area	15.8	41.7	63.1	73.7	72.0	70.3	67.5	62.6	56.9	51.4	24.3	
KM 194	965.9 cms				15.68 l/sec remaining							
Conc.	15	16	18	20	22	22	22	21	19	17	17	16.8
Vel.	0.49	1.00	1.35	1.51	1.48	1.46	1.42	1.34	1.25	1.16	0.67	
W.P.	16.92	16.86	16.87	16.82	16.82	16.82	16.82	16.82	16.82	16.82	17.07	
Depth	0.94	2.48	3.75	4.39	4. 28	4. 18	4.02	3.72	3.39	3.06	1.45	
Area	15.8	41.7	63.2	73.8	72.0	70.3	67.6	62.6	57.0	51.4	24.3	
KM 195	967.'3 cins				15.52 l/sec remaining							
Conc.	19	19	18	19	19	18	17	17	15	15	15	12.3
Vel.	0.65	1.41	1.89	2.01	1.85	1.56	1.31	1.15	0.98	0.80	0.42	
W.P.	12.66	12.57	12.37	12.29	12.33	12.38	12.30	12.30	12.30	12.30	12.39	
Depth	1.61	4.64	6.84	7.43	6.65	5.24	4.0'3	3.41	2.74	2.07	0.87	
Area	19.8	57.0	84.1	91.3	81.6	64.4	50. 3	41.9	33.6	25.4	10.6	
KM 136	968.8 cms				15.37 l/sec remaining							
Conc.	19	19	18	19	19	18	17	16	15	14	15	12.3
Vel.	0.69	1.49	1.'39	2.12	1 . '35	1.64	1.38	1.21	1.03	0.84	0.44	
W.P.	12.66	12.57	12.37	12.29	12.33	12.38	12.30	12.30	12.30	12.30	12.39	
Depth	1.53	4.39	6.48	7.04	6.2'3	4. '37	3.88	3.23	2.59	1.'36	0.82	
Area	18.7	54.0	79.6	86.5	77.3	61.0	47.6	39.7	31.8	24.1	10.1	
KM 197	969.7 cms				15.22 l/sec remaining							
Conc.	18	19	18	18	18	18	17	16	15	14	14	12.3
Vel.	0.69	1.49	1.39	2.12	1 .95	1.64	1.38	1.21	1.03	0.84	0.44	
W.P.	12.66	12.57	12.37	12.29	12.33	12.38	12.30	12.30	12.30	12.30	12.39	
Depth	1.53	4.40	6.48	7.04	6.30	4.97	3.88	3.23	2.54	1.36	0.82	
Area	18.7	54.0	79.6	86.5	77.3	61.6	47.6	39.7	31.9	24.1	10.1	
KM 198	970.6 cms				15.08 l/sec remaining							
Conc.	18	18	18	18	18	18	17	15	15	14	14	12.3
Vel.	0.69	1.49	1.9'3	2.12	1.95	1.65	1.38	1.21	1.04	0.84	0.44	
W.P.	12.66	12.57	12.37	12.29	12.34	12.38	12.30	12.30	12.30	12.30	12.39	
Depth	1.53	4.40	6.48	7.04	6.30	4.97	3.88	3.23	2.60	1.'36	0.82	
Area	18.8	54.0	7'3.6	86.5	77.4	61.0	47.6	39.7	31.9	24.1	10.1	
KM 1'39	'371.4 cms				14.93 l/sec remaining							
Conc.	18	18	18	18	18	17	16	15	14	14	13	12.3
Vel.	0.69	1.4'3	1.99	[illegible]	1.96	1.65	1.38	1.22	1.04	0.85	0.44	
W.P.	12.66	12.58	12.37	12.29	12.34	12.38	12.30	12.30	12.30	12.30	12.40	
Depth	1.53	4.40	6.48	7.04	6. 30	4.97	3.88	3.24	2.60	1.96	0.82	
Area	18.8	54.0	79.7	86.5	77.4	61.1	47.7	39.8	31.9	24.1	10.1	
KM 200	972.3 cms				14.74 1 /sec remaining							
Conc.	19	1'3	20	21	20	19	18	16	14	13	13	16.9
Vel.	0.84	1.45	1.46	1.42	1.37	1.31	1 .20	1.03	0.97	0.94	0.52	
W.P.	17.45	16.93	16.93	16.92	16.92	16.93	16.93	16.94	16.93	16.93	17.06	
Depth	[illegible]	4.70	4.75	4.55	4.35	4.09	3.63	2.92	2.70	2.58	1.14	
Area	38.3	79.6	80.5	77.0	73.6	6'3.2	61.4	49.3	45.7	43.7	1'3.3	
KM 201	'375.0 cms				14.54 1/sec remaining							
Conc.	19	19	20	20	20	1 '3	18	16	14	13	13	16.9
Vel.	0.80	1.38	1.39	1.35	1 .30	1.25	1.14	0.98	0.92	0.89	0.49	

W.F.	17.45	16.93	16.93	16.92	16.'33	16.93	16.'53	16.94	16.93	16.93	17.06	
Depth	2.39	4.97	5.03	4.81	4.60	4.33	3.84	3.08	2.86	2.73	1.21	
Area	40.5	84.1	'85.1	81.4	77.8	73.2	64.9	52.2	48.3	46.2	20.4	
KM 202	977.6 cms			14.35 l/sec remaining								
Conc.	19	19	20	20	19	19	17	15	14	13	13	16.9
Vel.	0.80	1.38	1.39	1.35	1.31	1.25	1.15	0.98	0.93	0.90	0.49	
W.F.	17.45	16.93	16.93	16.93	16.93	16.93	16.94	16.94	16.93	16.93	17.06	
Depth	2.40	4.98	5.03	4.81	4.60	4.33	3.84	3.09	2.86	2.73	1.21	
Area	40.6	84.2	85.1	81.5	77.9	73.3	65.0	52.3	48.4	-16.3	20.5	
KM 203	980.3 cms			14.16 l/sec remaining								
Conc.	1'3	18	1	'3	13	1	'3	18	17	15	14	13	12	16.9
Vel.	0.80	1.38	1.39	1.35	1.31	1.25	1.15	0.98	0.93	0.90	0.49	
W.F.	17.45	16.93	16.93	16.93	16.93	16.93	16.94	16.94	16.93	16.94	17.06	
Depth	2.40	4.98	5.03	4.82	4.61	-1.33	3.84	3.09	2.86	2.74	1.21	
Area	40.6	84.3	85.2	81.5	78.0	73.4	65.1	52.3	48.5	46.4	20.5	
KM 204	'383.0 cms			13.9'7 1 /sec remaining								
Conc.	18	18	19	19	1'3	18	17	15	13	13	12	16.9
Vel.	0.80	1.38	1.40	1.35	1.31	1.25	1.15	0.98	0.93	0.90	0.49	
W.F.	17.45	16.33	16.33	16.93	16.93	16.93	16.94	16.94	16.93	16.94	17.06	
Depth	2.40	4.98	5.04	4.82	4.61	4.34	3.85	3.10	2.87	2.74	1.21	
Area	40.6	84.4	85.3	81.6	78.1	73.4	65.1	52.4	48.6	46.4	20.5	
KM 205	985.6 cms			13.79 1 /sec remaining								
Conc.	18	18	19	19	18	18	17	15	13	12	12	16.9
Vel.	0.80	1.39	1.40	1.35	1.31	1.26	1.15	0.98	0.93	0.90	0.50	
W.F.	17.45	16.93	16.93	16.93	16.93	16.93	16.34	16.94	16.93	16.94	17.06	
Depth	2.40	4.39	5.04	4.83	4.62	4.34	3.85	3.10	2.87	2.75	1.22	
Area	40.7	84.4	85.4	81.7	78.2	73.5	65.2	52.5	48.6	46.5	20.6	
KM 206	988.3 cms			13.60 l/sec remaining								
Conc.	18	18	18	19	18	18	16	14	13	12	12	16.9
Vel.	0.80	1.39	1.40	1.36	1.31	1.26	1.15	0.99	0.93	0.90	0.50	
W.F.	17.45	16.33	16.93	16.93	16.93	16.33	16.34	16.94	16.93	16.94	17.06	
Depth	2.40	4.99	5.05	4.83	4.62	4.35	3.86	3.11	'2.88	2.75	1.22	
Area	40.7	84.5	85.5	81.8	78.2	73.6	65.3	52.6	48.7	46.6	20.6	
KM 207	990.9 cms			13.42 1 /sec remaining								
Conc.	17	17	18	18	18	17	16	14	13	12	12	16.9
Vel.	0.80	1.3'3	1.40	1.36	1.32	1.26	1.16	0.99	0.34	0.91	0.50	
W.F.	17.46	16.33	16.93	16.33	16.33	16.93	16.94	16.35	16.93	16.34	17.07	
Depth	2.41	5.00	5.05	4.83	4.63	4.35	3.86	3.11	2.88	2.76	1.22	
Area	40.7	84.6	85.5	81.8	78.3	73.7	65.4	52.6	48.8	46.7	20.7	
KM 208	993.6 cms			13.25 l/sec remaining								
Conc.	17	17	18	18	18	17	16	14	13	12	12	16.9
Vel.	0.80	1.39	1.40	1.36	1.32	1.26	1.16	0.99	0.94	0.91	0.50	
W.F.	17.46	16.33	16.33	16.93	16.93	16.93	16.94	16.95	16.93	16.94	17.07	
Depth	2.41	5.00	5.06	4.84	4.63	4.36	3.87	3.11	2.83	2.76	1.22	
Area	40.7	84.6	85.6	81.9	78.4	73.8	65.5	52.7	48.9	46.7	20.7	
KM 209	3'36.3 cms			13.10 l/sec remaining								
Conc.	15	15	16	18	18	18	18	16	14	12	11	16.9
Vel.	0.79	1.34	1.40	1.46	1.49	1.51	1.54	1.56	1.33	1.02	0.48	
W.F.	17.24	16.33	16.93	16.93	16.93	16.33	16.33	16.93	16.37	16.38	17.01	
Depth	1.61	3.29	3.47	3.6'3	3.81	3.87	3.96	4.04	3.47	2.24	0.81	
Area	2"7.3	55.7	58.8	62.5	64.5	65.5	67.0	68.5	58.7	37.9	13.7	
KM 210	998.9 cms			12.94 1 /sec remaining								
Conc.	17	16	17	17	17	17	15	14	12	12	11	16.0
Vel.	0.85	1.49	1.53	1.49	1.45	1.38	1.25	1.06	1.04	1.02	0.55	
W.F.	16.61	16.05	16.04	16.04	16.04	16.05	16.06	16.06	16.05	16.06	16.21	
Depth	2.24	4.76	4.94	4.74	4.56	4.26	3.70	2.96	2.86	2.80	1.22	
Area	36.0	76.4	7'3.2	76.1	73.1	68.3	59.4	47.4	45.9	44.9	1'3.6	
KM 211	1001.6 cms			12.77 1 /sec remaining								
Conc.	16	17	17	18	18	17	15	14	12	11	10	20.6
Vel.	0.91	1.49	1.45	1.39	1.30	1.25	1.23	1.15	1.02	0.88	0.48	
W.F.	21.00	20.58	20.58	20.58	20.58	20.58	20.58	20.58	20.58	20.58	20.65	
Depth	2.09	4.07	3.91	3.68	3.36	3.18	3.11	2.86	2.42	1.'36	0.87	
Area	43.1	83.7	80.4	75.8	69.1	65.5	63.9	58.8	49.7	40.3	18.0	
KM 212	1004.3 cms			12.65 l/sec remaining								
Conc.	14	14	16	16	17	16	15	14	13	12	11	13.7
Vel.	0.75	1.50	1.82	1.95	1.'36	1.86	1.68	1.53	1.42	1.18	0.59	

W.F.	13.93	13.73	13.67	13.66	13.65	13.66	13.67	13.66	13.66	13.70	13.80	
Depth	1.[illegible]	[illegible]3.33	4.34	4.79	4.83	4.48	3.91	3.43	3.09	2.40	0.94	
Area	18.0	45.5	59.2	65.4	66.0	61.1	53.4	46.8	42.1	[illegible]8	12.9	
KM 213	1006.9 cms			12.52 l /sec remaining								
Conc.	14	14	15	16	16	16	15	14	13	12	11	13.7
Vel.	0.72	1.42	1.72	1.85	1.86	1.76	1	.60	1.46	1.35	1.13	0.56
W.P.	13.94	13.73	13.67	13.66	13.66	13.66	13.67	13.66	13.66	13.70	13.80	
Depth	1.40	3.53	4.59	5.07	5.12	4.74	4.14	3.63	3.27	2.55	1.00	
Area	19.1	48.1	62.7	64.2	6'3.8	64.7	56.5	4'3.6	44.6	34.8	13.6	
KM 214	1009.6 cms			12.40 l /sec remaining								
Conc.	14	14	15	16	16	16	15	14	13	12	11	13.7
Vel.	0.72	1.42	1.73	1.85	1.87	1.77	1	.60	1.46	1.35	1.13	0.57
W.F.	13.94	13.73	13.67	13.66	13.66	13.67	13.67	13.66	13.66	13.70	13.80	
Depth	1.40	3.53	4.60	5.08	5.12	4.75	4.14	3.64	3.28	2.55	1.00	
Area	13.1	48.2	62.8	63.3	63.'3	64.8	56.6	43.7	44.7	34.8	13.7	
KM 215	1012.2 cms			12.25 l/sec remaining								
Conc.	15	15	16	17	16	16	15	13	12	11	10	16.9
Vel.	0.89	1.54	1.56	1.51	1.46	1.40	1.28	1.10	1.04	1.01	0.55	
W.P.	17.47	16.34	16.34	16.94	16.34	16.94	16.95	16.95	16.94	16.94	17.08	
Depth	2.19	4.56	4.61	4.42	4.23	3.98	3.53	2.85	2.65	2.53?	1.12	
Area	37.2	77.2	78.2	74.8	71.6	67.4	59.'3	48.3	44.8	42.9	19.0	
KM 216	1015.4 cms			12.11 l/sec remaining								
Conc.	15	15	16	16	16	15	14	13	12	10	10	16.9
Vel.	0.91	1.58	1.5'3	1.54	1.50	1.43	1.32	1.13	1.07	1.03	0.57	
W.P.	17.47	16.34	16.94	16.94	16.94	16.94	16.95	16.35	16.94	16.95	17.08	
Depth	2.14	4.46	4.51	4.32	4.13	3.8'3	3.46	2.79	[illegible]	2.48	1.10	
Area	36.3	75.5	76.4	73.1	70.0	65.'3	58.5	47.2	43.8	41.9	18.6	
KM 217	1018.6 cms			11.97 l/sec remaining								
Conc.	14	15	16	16	16	15	14	13	11	10	10	16.9
Vel.	0.91	1.58	1.60	1.55	1	.50	1.44	1.32	1.13	1.07	1.04	0.57
W.P.	17.47	16.94	16.94	16.44	16.94	16.94	16.95	16.95	16.44	16.95	17.08	
Depth	2.15	4.46	4.51	4.32	4.14	3.8'3	3.46	2.7'3	2.5'3	2.48	1.10	
Area	36.3	75.5	76.5	73.2	70.1	66.0	58.6	47.3	43.3	42.0	18.6	
KM 218	1021.8 cms			11.83 l/sec remaining								
Conc.	14	15	15	16	16	15	14	12	11	10	10	16.4
Vel.	0.91	1.59	1.60	1.55	1.50	1.44	1.32	1.13	1.07	1.04	0.57	
W.P.	17.47	16.94	16.94	16.94	16.34	16.94	16.95	16.95	16.94	16.95	17.08	
Depth	2.15	4.46	4.52	4.33	4.14	3.90	3.46	2.80	2.60	2.49	1.10	
Area	36.4	75.6	76.6	73.3	70.2	66.0	58.7	47.4	44.0	42.1	18.7	
KM 219	1024.9 cms			11.63 l/sec remaining								
Conc.	14	15	15	16	15	15	14	12	11	10	10	16.3
Vel.	0.32	1.53	1.60	1.55	1.51	1.44	1.32	1.13	1.08	1.04	0.57	
W.P.	17.48	16.94	16.94	16.94	16.94	16.94	16.95	16.56	16.94	16.95	17.08	
Depth	2.15	4.47	4.52	4.33	4.15	3.90	3.47	2.80	2.60	2.4'3	1.10	
Area	36.4	75.7	76.6	73.4	70.2	66.1	58.8	47.5	44.1	42.2	18.7	
KM 220	1028.1 cms			11.41 l/sec remaining								
Conc.	13	13	14	14	14	12	11	9	7	7	6	27.3
Vel.	0.40	0.71	0.77	0.76	0.70	0.60	0.51	0.48	0.44	0.31	0.13	
W.P.	27.65	27.28	27.27	27.27	27.27	27.2'3	27.27	27.27	27.27	27.30	27.28	
Depth	3.18	7.05	7.96	7.74	6.90	5.62	4.43	4.08	3.5'3	2.25	(3.67	
Area	86.6	132.1	216.9	211.1	188.0	153.1	120.9	111.2	37.3	61.3	18.3	
KM 221	1031.3 cms			11.20 l/sec remaining								
Conc,	12	13	14	15	14	12	10	8	7	6	5	27.3
Vel.	0.54	0.'37	1.06	1.04	0.'36	0.82	0.70	0.66	0.60	0.42	0.17	
W.P.	27.66	27.30	27.28	27.23	27.29	27.31	27.28	27.28	27.29	27.31	27.30	
Depth	2.29	5.07	5.73	5.57	4.36	4.04	3.1'3	2.'34	2.5'3	1.62	0.48	
Area	62.4	138.4	156.3	152.0	135.4	11(j.3	87.1	80.1	70.6	44.1	13.2	
KM 222	1034.5 cms			11.00 1 /sec remaining								
Conc.	12	13	14	14	14	12	10	8	7	6	5	27.3
Vel.	0.54	0.97	1.06	1.04	0.'36	0.83	0.70	0.66	0.60	0.42	0.17	
W.P.	27.68	27.31	27.30	27.30	27.30	27.32	27.30	27.29	27.30	27.32	27.31	
Depth	2.29	5.08	5.73	5.58	4.'37	4.05	3.20	2.'34	2.5'3	1.62	0.48	
Area	62.5	138.6	156.5	152.2	135.6	110.4	87.2	80.3	70.7	44.1	13.2	
KM 223	1037.6 cms			10.80 1 /sec remaining								
Conc.	11	13	14	14	13	12	10	8	7	6	5	27.3
Vel.	0.54	0.97	1.06	1.04	0.96	0.83	0.70	0.66	0.60	0.43	0.17	

W.P.	27.69	27.33	27.31	27.31	27.31	27.34	27.31	27.31	27.32	27.34	27.32	
Depth	2.29	5.08	5.74	5.58	4.97	4.05	3.20	2.95	2.59	1.62	0.48	
Area	62.7	138.9	156.7	152.4	135.8	110.6	87.4	80.5	70.9	44.2	13.1	
KM 224	1040.8	cms			10.61 l/sec remaining							
Conc.	11	12	13	14	13	11	1	0	8	7	6	5 27.3
Vel.	0.54	0.98	1.06	1.04	0.96	0.83	0.70	0.66	0.60	0.43	0.17	
W.P.	27.71	27.34	27.32	27.33	27.33	27.35	27.33	27.32	27.33	27.35	27.34	
Depth	2.30	5.09	5.74	5.53	4.98	4.05	3.20	2.95	2.60	1.62	0.48	
Area	62.8	139.1	157.0	152.6	136.0	110.7	87.5	80.7	71.0	44.2	13.1	
KM 226	1044.0	cms			10.42 l/sec remaining							
Conc.	11	12	13	13	13	11	3	8	6	5	5 27.3	
Vel.	0.55	0.98	1.07	1.04	0.96	0.83	0.70	0.66	0.60	0.43	0.17	
W.P.	27.72	27.35	27.34	27.34	27.34	27.37	27.34	27.34	27.34	27.37	27.35	
Depth	2.30	5.10	5.75	5.59	4.90	4.06	3.21	2.96	2.60	1.62	0.48	
Area	62.9	139.3	157.2	152.8	136.2	110.9	87.6	80.3	71.1	44.2	13.1	
KM 228	1047.2	cms			10.24 l/sec remaining							
Conc.	11	12	13	13	1	3	11	9	8	6	5	5 27.4
Vel.	0.55	0.98	1.07	1.05	0.96	0.83	0.70	0.66	0.60	0.43	0.17	
W.P.	27.74	27.37	27.35	27.36	27.36	27.38	27.35	27.35	27.36	27.38	27.37	
Depth	2.30	5.10	5.76	5.59	4.99	4.06	3.21	2.97	2.61	1.62	0.48	
Area	63.0	139.6	157.4	153.0	136.4	111.0	87.8	81.1	71.3	44.3	13.1	
KM 227	1050.3	cms			10.06 l/sec remaining							
Conc.	10	12	13	13	12	11	9	7	6	5	5 27.4	
Vel.	0.55	0.98	1.07	1.05	0.96	0.83	0.70	0.66	0.60	0.43	0.17	
W.P.	27.74	27.37	27.36	27.36	27.36	27.39	27.36	27.36	27.36	27.39	27.37	
Depth	2.31	5.11	5.76	5.60	4.99	4.06	3.21	2.97	2.61	1.62	0.48	
Area	63.1	139.7	157.6	153.2	136.6	111.2	87.9	81.3	71.4	44.4	13.1	
KM 228	1053.5	cms			9.88 l/sec remaining							
Conc.	10	11	12	13	12	11	9	7	6	5	5 27.4	
Vel.	0.55	0.98	1.07	1.05	0.97	0.83	0.70	0.67	0.61	0.43	0.17	
W.P.	27.75	27.38	27.36	27.37	27.37	27.39	27.36	27.36	27.37	27.39	27.38	
Depth	2.31	5.11	5.77	5.61	5.00	4.07	3.22	2.98	2.62	1.63	0.48	
Area	63.2	139.9	157.8	153.4	136.7	111.4	88.1	81.4	71.6	44.5	13.2	
KM 229	1056.7	cms			9.70 l/sec remaining							
Conc.	10	11	12	12	12	3	10	9	7	6	5	5 27.4
Vel.	0.55	0.98	1.07	1.05	0.97	0.83	0.71	0.67	0.61	0.43	0.17	
W.P.	27.75	27.38	27.36	27.37	27.37	27.39	27.37	27.36	27.37	27.40	27.38	
Depth	2.31	5.12	5.77	5.61	5.00	4.08	3.23	2.98	2.62	1.63	0.48	
Area	63.3	140.1	158.0	153.5	136.9	111.5	88.3	81.6	71.7	44.6	13.3	
KM 230	1059.9	cms			9.57 l/sec remaining							
Conc.	5	6	6	7	9	10	11	12	11	10	10	20.1
Vel.	0.31	0.54	0.63	0.78	0.97	1.16	1.28	1.34	1.40	1.22	0.60	
W.P.	20.13	20.06	20.07	20.08	20.09	20.09	26.07	20.06	20.07	20.23	20.47	
Depth	0.81	1.70	2.11	2.86	3.85	4.95	5.71	6.07	6.41	5.35	2.03	
Area	16.3	34.2	42.3	57.3	77.2	99.2	114.5	121.7	128.7	107.3	40.7	
KM 231	1063.0	cms			9.44 l/sec remaining							
Conc.	5	5	6	7	9	10	11	11	11	10	9	20.1
Vel.	0.31	0.54	0.63	0.78	0.97	1.16	1.23	1.34	1.40	1.22	0.60	
W.P.	20.13	20.06	20.07	20.08	20.10	20.09	20.07	20.07	20.07	20.23	20.47	
Depth	0.82	1.71	2.11	2.86	3.85	4.95	5.71	6.07	6.42	5.35	2.03	
Area	16.4	34.3	42.4	57.4	77.3	99.3	114.6	121.8	128.8	107.4	40.8	
KM 232	1066.2	cms			9.31 l/sec remaining							
Conc.	5	5	6	7	9	10	11	11	11	10	9	20.1
Vel.	0.31	0.54	0.63	0.78	0.97	1.16	1.29	1.35	1.40	1.22	0.60	
W.P.	20.13	20.07	20.08	20.08	20.10	20.09	20.07	20.07	20.07	20.23	20.47	
Depth	0.82	1.71	2.12	2.87	3.86	4.96	5.72	6.08	6.42	5.36	2.03	
Area	16.4	34.4	42.5	57.5	77.4	99.4	114.7	121.3	128.9	107.5	40.8	
KM 233	1069.4	cms			9.18 l/sec remaining							
Conc.	5	5	6	7	3	1	0	11	11	10	10	9 20.1
Vel.	0.31	0.54	0.63	0.79	0.97	1.17	1.29	1.35	1.40	1.23	0.60	
W.P.	20.13	20.07	20.08	20.08	20.10	20.09	20.07	20.07	20.07	20.23	20.47	
Depth	0.82	1.72	2.12	2.87	3.86	4.96	5.72	6.08	6.43	5.36	2.03	
Area	16.4	34.5	42.6	57.6	77.5	99.5	114.8	122.0	129.0	107.6	40.8	
KM 234	1072.6	cms			9.05 l/sec remaining							
Conc.	5	5	6	7	9	1	0	1	0	11	10	10	9 20.1
Vel.	0.31	0.54	0.63	0.73	0.98	1.17	1.29	1.35	1.41	1.23	0.60	

W.P.	20.13	20.07	20.08	20.08	20.10	20.09	20.07	20.07	20.07	20.23	20.48
Depth	0.82	1.72	2.13	2.88	3.87	4.97	5.73	6.09	6.43	5.36	2.04
Area	16.5	34.6	42.7	57.7	77.6	99.6	114.9	122.1	129.1	107.6	40.9

KM 235 1075.7 cms 8.33 l/sec remaining

Conc.	5	5	6	7	8	10	10	11	10	9	3	20.1
Vel.	0.32	0.55	0.64	0.79	0.38	1.17	1.30	1.35	1.41	1.23	0.61	
W.P.	20.14	20.07	20.08	20.09	20.10	20.10	20.07	20.07	20.07	20.23	20.48	
Depth	0.82	1.73	2.13	2.88	3.87	4.97	5.73	6.09	6.44	5.37	2.04	
Area	16.5	34.7	42.8	57.8	77.7	99.7	115.0	122.2	123.2	107.7	40.3	

KM 236 1078.9 cms 8.81 l/sec remaining

Conc.	5	5	6	7	8	3	10	10	10	9	9	20.1
Vel	0.32	0.55	0.64	0.73	0.38	1.17	1.30	1.36	1.41	1.23	0.61	
W.P.	20.14	20.07	20.08	20.09	20.10	20.10	20.07	20.07	20.07	20.23	20.48	
Depth	0.83	1.73	2.14	2.88	3.88	4.97	5.74	6.10	6.44	5.37	2.04	
Area	16.6	34.8	42.9	57.3	77.8	99.8	115.1	122.3	123.3	107.8	40.9	

KM 237 1082.1 cms 8.69 l/sec remaining

Conc.	5	5	6	7	8	9	10	10	10	9	8	20.1
Vel.	0.32	0.55	0.64	0.79	0.98	1.17	1.30	1.36	1.41	1.23	0.61	
W.P.	20.14	20.07	20.08	20.09	20.10	20.10	20.08	20.07	20.07	20.24	20.48	
Depth	0.83	1.74	2.14	2.89	3.88	4.98	5.74	6.10	6.45	5.38	2.04	
Area	16.6	34.9	43.0	58.0	77.4	99.9	115.2	122.4	129.4	107.9	41.6	

KM 238 1085.3 cms 8.57 l/sec remaining

Conc.	5	5	5	6	8	3	10	10	10	3	8	20.1
Vel.	0.32	0.55	0.64	0.80	0.98	1.18	1.30	1.36	1.42	1.24	0.61	
W.P.	20.14	20.07	20.08	20.09	20.10	20.10	20.08	20.07	20.08	20.24	20.48	
Depth	0.83	1.74	2.15	2.83	3.88	4.98	5.75	6.10	6.45	5.38	2.04	
Area	16.7	35.0	43.1	58.1	78.0	100.0	115.3	122.5	129.5	108.0	41.0	

KM 23'3 1088.4 cms 8.45 l/sec remaining

Conc.	4	5	5	6	8	9	10	10	9	9	8	20.1
Vel.	0.32	0.55	0.64	0.80	0.38	1.18	1.30	1.36	1.42	1.24	0.61	
W.P.	20.14	20.07	20.08	20.09	20.10	20.10	20.08	20.07	20.08	20.24	20.48	
Depth	(j.83	1.75	2.15	2.90	3.89	4.99	5.75	6.11	6.46	5.38	2.04	
Area	16.7	35.0	43.2	58.2	78.1	100.1	115.4	122.6	129.6	108.0	41.0	

KM 240 1091.6 cms 8.37 l/sec remaining

Conc.	9	9	8	9	9	9	10	9	9	10	10	11.2
Vel.	0.66	1.42	1.79	1.83	1.80	1.78	1.75	1.72	1.65	1.37	0.68	
W.P.	11.65	11.49	11.17	11.16	11.16	11.16	11.16	11.16	11.18	11.32	11.69	
Depth	1.48	4.17	5.59	5.75	5.65	5.53	5.41	5.31	5.01	3.92	1.54	
Area	16.5	46.5	62.4	64.2	63.1	61.7	60.4	59.2	55.3	43.8	17.2	

KM 241 1097.5 cms 8.28 l/sec remaining

Conc.	9	9	9	9	9	9	9	9	9	10	10	11.2
Vel.	0.59	1.27	1.60	1.63	1.61	1.59	1.56	1.54	1.48	1.23	0.61	
W.P.	11.66	11.50	11.18	11.17	11.17	11.17	11.17	11.17	11.18	11.33	11.70	
Depth	1.67	4.71	6.32	6.51	6.39	6.26	6.12	6.00	5.67	4.44	1.74	
Area	18.7	52.6	70.6	72.7	71.4	69.8	68.3	67.0	63.3	49.5	19.5	

KM 242 1103.4 cms 8.19 l/sec remaining

Conc.	9	9	9	8	9	9	9	9	9	10	10	11.2
Vel.	0.60	1.27	1.61	1.64	1.62	1.53	1.57	1.55	1.48	1.23	(j.61	
W.P.	11.66	11.50	11.18	11.17	11.17	11.17	11.17	11.17	11.19	11.33	11.70	
Depth	1.67	4.71	6.33	6.52	6.40	6.26	6.13	6.01	5.68	4.44	1.75	
Area	18.7	52.7	70.7	72.8	71.5	70.0	68.4	67.2	63.4	49.6	19.5	

KM 243 1109.3 cms 8.10 l/sec remaining

Conc.	9	9	8	8	8	9	9	9	9	10	10	11.2
Vel.	0.60	1.28	1.61	1.65	1.62	1.60	1.58	1.55	1.4'3	1.24	0.62	
W.P.	11.66	11.51	11.19	11.18	11.18	11.18	11.18	11.18	11.19	11.34	11.71	
Depth	1.67	4.72	6.34	6.53	6.41	6.27	6.14	6.02	5.69	4.45	1.75	
Area	18.7	52.7	70.8	72.9	71.6	70.1	68.6	67.3	63.6	49.7	19.5	

KM 244 1115.1 cms 8.01 l/sec remaining

Conc.	9	9	8	8	8	9	9	9	9	10	10	11.2
Vel.	0.60	1.28	1.62	1.65	1.63	1.61	1.58	1.56	1.50	1.24	0.62	
W.P.	11.67	11.52	11.19	11.18	11.18	11.18	11.18	11.18	11.20	11.34	11.72	
Depth	1.67	4.72	6.35	6.54	6.42	6.28	6.15	6.03	5.70	4.46	1.75	
Area	18.7	52.8	71.0	73.1	71.8	70.2	68.7	67.4	63.7	43.8	19.6	

KM 245 1121.0 cms 7.93 l/sec remaining

Conc.	8	3	8	8	8	9	3	9	9	9	9	11.2
Vel.	0.60	1.29	1.62	1.66	1.64	1.61	1.53	1.57	1.50	1.25	0.62	

W.P.	11.67	11.52	11.20	11.13	11.19	11.19	11.13	11.13	11.20	11.35	11.72	
Depth	1.67	4.73	6.36	6.54	6.43	6.29	6.15	6.04	5.70	4.46	1.75	
Area	18.7	52.9	71.1	73.2	71.9	70.4	68.8	67.5	63.8	49.9	13.6	
KM 246	1126.9 cms			7.84 1 /sec remaining								
Conc.	8	9	8	8	8	8	9	9	9		13	11.2
Vel.	0.60	1.29	1.63	1.66	1.64	1.62	1.59	1.57	1.51	1.25	0.62	
W.P.	11.68	11.53	11.20	11.19	11.19	11.19	11.13	11.13	11.21	11.35	11.73	
Depth	1.67	4.73	6.36	6.55	6.44	6.30	6.16	6.05	5.71	4.47	1.76	
Area	18.7	52.9	71.2	73.3	72.0	70.5	69.0	67.7	63.9	50.0	19.6	
KM 247	1132.8 cms			7.76 1/sec remaining								
Conc.	8	3	7	8	8	8	8	9	8	9	9	11.2
Vel.	0.60	1.29	1.63	1.67	1.65	1.62	1.60	1.58	1.51	1.26	0.62	
W.P.	11.68	11.54	11.21	11.20	11.20	11.20	11.20	11.20	11.21	11.36	11.73	
Depth	1.67	4.73	6.37	6.56	6.44	6.31	6.17	6.06	5.72	4.47	1.76	
Area	18.7	53.0	71.3		2	70.6	6'3.1	67.8	6-I.0	50.1	19.7	
KM 248	1138.7 cms			73.5 . 72.c remaining								
Conc.	8	8	7	7.6781 /se8		8	8	8	8	9	'3	11.2
Vel.	0.60	1.30	1.64	1.68	1.65	1.63	1.60	1.58	1.52	1.26	0.63	
W.P.	11.63	11.54	11.21	11.20	11.20	11.20	11.X)	11.20	11.22	11.37	11.7-I	
Depth	1.67	4.74	6.38	6.57	72.3	6.32	6.18	6.07	5.73	4.48	1.76	
Area	18.7	53.1	71.5	73.6	1/sec	70.8	69.2	67.9	64.2	50.2	1'3.7	
KM 249	1144.5 cms			7.59	c remaining							
Conc.	8	8	7	8	8	8	8	8	8	9	'3	11.2
Vel.	0.61	1.30	1.65	1.68	1.66	1.64	1.61	1.5'3	1.52	1.26	0.63	
W.P.	11.69	11.55	11.22	11.21	11.21	11.21	11.21	11.21	11.22	11.37	11.75	
Depth	1.67	4.74	6.33	6.58	6.46	6.33	6.1'3	6.07	5.74	4.49	1.76	
Area	18.7	53.1	71.6	73.7	72.4	70.9	69.4	68.1	64.3	50.3	13.7	
KM 250	1150.4 cms			7.53 1 /sec remaining								
Conc.	7	7	7	8	8	9	I-	d	8	8	7	7	12.4
Vel.	0.91	1.60	1.70	1.85	2.01	2.11	2.17	2.22	2.11	1.72	0.87	
W.P.	13.04	12.40	12.41	12.41	12.41	12.40	12.40	12.40	12.45	12.53	12.35	
Depth	1.50	3.10	3.38	3.81	4.26	4.55	4.73	4.90	4.56	3.46	1.3'3	
Area	18.6	38.4	41.9	47.2	52.8	56.4	58.6	60.7	56.5	42.9	17.3	
KM 251	1151.2 cms			7.44 1 /sec remaining								
Conc.	7	7	7	8	8	8	8	8	8	8	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.22	0.62	
W.P.	13.04	12.40	12.41	12.41	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.45	4.85	5.46	6.11	6.54	6.78	7.03	6.54	4.97	2.00	
Area	26.8	55.2	60.1	67.7	75.8	81.C)	84.1	87.1	81.1	61.6	24.8	
KM 252	1152.0 cms			7.35 1 /sec remaining								
Conc.	7	7	7	7	8	8	8	8	8	8	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.22	0.62	
W.P.	13.04	12.40	12.41	12.41	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.45	4.85	5.46	6.11	6.54	6.78	7.03	6.55	4.97	2.00	
Area	26.8	55.2	60.1	67.7	75.8	81.0	84.1	87.1	81.1	61.6	24.8	
KM 253	1152.8 cms			7.27 1/sec remaining								
Conc.	7	7	7	7	8	8	8	8	8	8	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.22	0.62	
W.P.	13.04	12.40	12.41	12.41	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.49	4.85	5.46	6.11	6.54	6.78	7.03	6.55	4.97	2.00	
Area	26.8	55.2	60.1	67.7	75.8	81.0	84.1	87.1	81.2	61.6	24.8	
KM 254	1153.7 cms			7.18 1 /sec remaining								
Conc.	7	7	7	7	8	8	8	8	8	8	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.22	0.62	
W.P.	13.04	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.45	4.85	5.47	6.12	6.54	6.79	7.03	6.55	4.97	2.00	
Area	26.8	55.2	GC). 1	67.8	75.8	81.1	84.1	87.2	81.2	61.6	24.8	
KM 255	1154.5 cms			7.10 1 /sec remaining								
Conc.	7	7	7	7	7	8	8	8	7	8	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.22	0.62	
W.P.	13.04	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.45	4.85	5.47	6.12	6.54	6.79	7.03	6.55	4.97	2.00	
Area	26.8	55.2	60.1	67.8	75.8	81.1	84.1	87.2	81.2	61.6	24.8	
KM 256	1155.3 cms			7.01 1 /sec remaining								
Conc.	7	7	7	7	7	8	8	7	7	7	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.23	0.62	

W.P.	13.04	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95
Depth	2.16	4.46	4.85	5.47	6.12	6.54	6.79	7.03	6.55	4.97	2.00
Area	26.8	55.2	60.2	67.8	75.8	81.1	84.1	87.2	81.2	61.6	24.8

KM 257 1156.1 cms 6.93 l /sec remaining

Conc.	7	7	7	7	7	7	7	7	7	7	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.23	0.62	
W.P.	13.04	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.46	4.85	5.47	6.12	6.54	6.79	7.03	6.55	4.97	2.00	
Area	26.8	55.2	60.2	67.8	75.8	81.1	84.2	87.2	81.2	61.7	24.8	

KM 258 1156.9 cms 6.85 1 /sec remaining

Conc.	6	7	7	7	7	7	7	7	7	7	8	12.4
Vel.	0.65	1.14	1.21	1.32	1.43	1.50	1.54	1.58	1.50	1.23	0.62	
W.P.	13.0-I	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.46	4.85	5.47	6.12	6.54	6.7'3	7.03	6.55	4.97	2.00	
Area	16.8	55.3	60.2	67.8	75.9	81.1	84.2	87.2	81.2	61.7	24.8	

KM 259 1157.7 cms 6.77 1 /sec remarning

Conc.	6	7	6	7	7	7	7	7	7	7	8	12.4
Vel.	0.65	1.14	1.22	1.32	1.43	1.50	1.55	1.58	1.50	1.23	0.62	
W.P.	13.04	12.40	12.41	12.42	12.41	12.40	12.40	12.40	12.45	12.53	12.95	
Depth	2.16	4.46	4.85	5.47	6.12	6.5-I	6.73	7.03	6.55	4.97	2.00	
Area	26.8	55.3	60.2	67.8	75.9	81.1	84.2	87.2	82.2	61.7	24.8	

KM 260 1158.5 cms 6.69 l/sec remaining

Conc.	7	7	7	7	7	7	7	7	7	7	7	12.3
Vel.	0.71	1.30	1.39	1.42	1.44	1.47	1.48	1.42	1.30	1.09	0.56	
W.P.	13.02	12.28	12.25	12.25	12.25	12.25	12.25	12.27	12.27	12.32	12.64	
Depth	2.57	5.62	6.15	6.30	6.47	6.61	6.68	6.33	5.57	4.39	1.81	
Area	31.5	68.3	75.4	77.2	79.2	81.0	81.8	77.5	68.2	53.8	22.2	

KM 261 1159.3 cms 6.62 l/sec remaining

Conc.	7	7	7	7	7	7	7	7	7	6	7	12.3
Vel.	0.82	1.51	1.61	1.64	1.67	1.70	1.71	1.64	1.50	1.26	0.65	
W.P.	13.02	12.28	12.25	12.25	12.25	12.25	12.25	12.27	12.27	12.32	12.64	
Depth	2.21	4.W	5.28	5.40	5.55	5.67	5.73	5.43	4.78	3.77	1.55	
Area	27.1	59.1	64.7	66.2	68.0	69.5	70.2	66.5	58.6	46.2	19.0	

KM 262 1160.2 cms 6.55 1 /sec remaining

Conc.	7	7	7	7	7	7	7	7	7	6	7	12.3
Vel.	0.82	1.51	1.61	1.64	1.67	1.70	1.71	1.65	1.50	1.26	0.65	
W.P.	13.02	12.28	12.25	12.25	12.25	12.25	12.25	12.27	12.27	12.32	12.64	
Depth	2.21	4.82	5.28	5.41	5.55	5.68	5.73	5.43	4.78	3.77	1.55	
Area	27.1	59.1	64.7	66.2	68.0	69.5	70.2	66.5	58.6	46.2	19.0	

KM 263 1161.0 cms 6.48 l/sec remaining

Conc.	7	7	7	7	7	7	7	7	6	6	6	12.3
Vel.	0.82	1.51	1.62	1.64	1.67	1.70	1.71	1.65	1.50	1.26	0.65	
W.P.	13.02	12.28	12.25	12.25	12.25	12.25	12.25	12.27	12.27	12.32	12.64	
Depth	2.21	4.83	5.28	5.41	5.55	5.68	5.73	5.43	4.78	3.77	1.55	
Area	27.1	53.1	64.7	66.2	68.0	6'3.5	70.3	66.5	58.6	46.2	19.0	

KM 264 1161.8 cms 6.41 l/sec remaining

Conc.	7	7	7	7	7	7	7	7	6	6	6	12.3
Vel.	0.82	1.51	1.62	1.64	1.68	1.70	1.71	1.65	1.50	1.26	0.65	
W.P.	13.02	12.28	12.25	12.25	12.25	12.25	12.25	12.27	12.27	12.32	12.64	
Depth	2.21	4.83	5.28	5.41	5.55	5.68	5.73	5.43	4.78	3.77	1.55	
Area	27.1	59.1	64.7	66.2	68.0	63.6	70.2	66.6	58.6	46.2	19.1	

KM 265 1162.6 cms 6.29 1 /sec remaining

Conc.	4	4	5	6	6	7	7	7	7	7	6	21.3
Vel.	0.28	0.56	0.70	0.78	0.84	0.88	0.91	0.97	0.96	0.91	0.53	
W.P.	21.40	21.34	21.32	21.31	21.31	21.31	21.31	21.32	21.32	21.31	21.8	8
Depth	1.22	3.22	4.36	5.05	5.60	5.96	6.30	6.85	6.80	6.25	3.05	
Area	26.1	68.5	93.0	107.7	11'3.3	127.1	134.3	145.3	144.9	133.2	64.4	

KM 266 1163.9 cms 6.20 l/sec remaining

Conc.	4	4	5	5	6	7	7	7	7	7	6	21.3
Vel.	0.34	0.68	0.85	0.95	1.02	1.07	1.11	1.ta	1.17	1.11	0.65	
W.F.	21.40	21.35	21.32	21.31	21.31	21.31	21.31	21.32	21.32	21.31	21.88	
Depth	1.00	2.61	3.55	4.11	4.55	-1.85	5.12	5.56	5.53	5.08	2.47	
Area	21.2	55.7	75.6	87.5	96.9	103.3	109.1	118.6	117.7	108.2	52.7	

KM 267 1165.3 cms 6.10 l/sec remaining

Conc.	4	4	5	5	6	7	7	7	7	6	6	21.3
Vel.	0.34	0.63	0.86	0.95	1.02	1.07	1.11	1.18	1.18	1.11	0.65	

W.P.	21.40	21.35	21.32	21.32	21.31	21.31	21.31	21.32	21.32	21.31	21.88
Depth	1.00	2.61	3.55	4.11	4.55	4.85	5.12	5.57	5.53	5.08	2.47
Area	21.2	55.7	75.6	87.5	96.9	103.3	109.1	118.6	117.8	108.2	52.7

KM 268 1166.6 cms 6.01 l/sec remaining

Conc.	4	4	5	5	6	7	7	7	7	6	6	21.[illegible]
Vel.	0.34	0.69	0.86	0.95	1.02	1.07	1.11	1.18	1.18	1.11	0.65	
W.P.	21.40	21.35	21.32	21.32	21.31	21.31	21.31	21.32	21.32	21.31	21.88	
Depth	1.00	2.62	3.55	4.11	4.55	4.85	5.12	5.57	5.53	5.08	2.48	
Area	21.2	55.7	75.6	87.6	97.0	103.3	109.2	118.6	117.8	108.3	52.7	

KM 269 1167.9 cms 5.91 l/sec remaining

Conc.	4	4	5	5	6	7	7	7	7	6	6	21.[illegible]
Vel.	0.34	0.69	0.86	0.95	1.02	1.07	1.12	1.18	1.18	1.11	0.65	
W.P.	21.40	21.35	21.32	21.32	21.31	21.31	21.31	21.32	21.32	21.31	21.88	
Depth	1.00	2.62	3.55	4.11	4.55	4.85	5.12	5.57	5.53	5.08	2.48	
Area	21.3	55.8	75.6	87.6	97.0	103.3	109.2	118.7	117.8	108.3	52.8	

KM 270 1169.2 cms 5.81 l/sec remaining

Conc.	5	6	7	7	6	6	5	5	4	4	4	32.4
Vel.	0.65	1.09	1.09	1.02	0.90	0.78	0.69	0.62	0.57	0.55	0.33	
W.P.	32.69	32.37	32.37	32.37	32.37	32.37	32.37	32.37	32.37	32.37	32.41	
Depth	2.60	5.24	5.21	4.79	4.01	3.30	2.77	2.37	2.11	2.00	0.99	
Area	84.3	169.4	168.7	155.2	129.7	106.6	89.7	76.8	68.4	64.9	32.2	

KM 271 1170.5 cms 5.71 l/sec remaining

Conc.	6	6	7	7	6	5	5	4	4	3	3	32.4
Vel.	0.73	1.22	1.22	1.15	1.01	0.88	0.77	0.69	0.64	0.61	0.37	
W.P.	32.69	32.37	32.37	32.37	32.38	32.37	32.37	32.37	32.37	32.37	32.42	
Depth	2.31	4.64	4.62	4.25	3.55	2.92	2.46	2.10	1.87	1.78	0.88	
Area	74.7	150.1	149.5	137.5	114.9	94.5	79.5	68.1	60.6	57.5	28.5	

KM 272 1171.8 cms 5.62 l/sec remaining

Conc.	6	6	7	7	6	5	5	4	3	3	3	32.4
Vel.	0.73	1.22	1.22	1.15	1.01	0.88	0.77	0.69	0.64	0.61	0.37	
W.P.	32.70	32.37	32.37	32.38	32.38	32.37	32.37	32.37	32.37	32.37	32.42	
Depth	2.31	4.64	4.62	4.25	3.55	2.92	2.46	2.10	1.87	1.78	0.88	
Area	74.7	150.1	149.5	137.5	114.9	94.5	79.6	68.1	60.6	57.5	28.6	

KM 273 1173.2 cms 5.53 l/sec remaining

Conc.	5	6	7	7	6	5	5	4	3	3	3	32.4
Vel.	0.73	1.23	1.22	1.15	1.01	0.88	0.78	0.69	0.64	0.61	0.37	
W.P.	32.70	32.37	32.37	32.38	32.38	32.38	32.37	32.37	32.37	32.37	32.42	
Depth	2.31	4.64	4.62	4.25	3.55	2.92	2.46	2.11	1.87	1.78	0.88	
Area	74.7	150.2	149.6	137.6	114.9	94.6	79.6	68.2	60.7	57.6	28.6	

KM 274 1174.5 cms 5.45 l/sec remaining

Conc.	5	6	7	7	6	5	5	4	3	3	3	32.4
Vel.	0.74	1.23	1.22	1.15	1.01	0.88	0.78	0.69	0.64	0.61	0.37	
W.P.	32.70	32.37	32.37	32.38	32.38	32.38	32.38	32.37	32.37	32.37	32.42	
Depth	2.31	4.64	4.62	4.25	3.55	2.92	2.46	2.11	1.88	1.78	0.88	
Area	74.7	150.2	149.6	137.6	115.0	94.6	79.6	68.2	60.7	57.6	28.6	

KM 275 1175.8 cms 5.36 l/sec remaining

Conc.	5	6	6	6	6	5	4	4	3	3	3	32.4
Vel.	0.74	1.23	1.22	1.15	1.01	0.88	0.78	0.69	0.64	0.61	0.37	
W.P.	32.70	32.38	32.38	32.38	32.38	32.38	32.38	32.38	32.38	32.38	32.42	
Depth	2.31	4.64	4.62	4.25	3.55	2.92	2.46	2.11	1.88	1.78	0.88	
Area	74.8	150.3	149.7	137.7	115.0	94.7	79.7	68.3	60.8	57.7	28.6	

KM 276 1177.1 cms 5.28 l/sec remaining

Conc.	5	6	6	6	6	5	4	4	3	3	3	32.4
Vel.	0.74	1.23	1.22	1.15	1.01	0.88	0.78	0.69	0.64	0.61	0.37	
W.P.	32.71	32.38	32.38	32.38	32.39	32.38	32.38	32.38	32.38	32.38	32.43	
Depth	2.31	4.64	4.62	4.25	3.55	2.93	2.46	2.11	1.88	1.78	0.88	
Area	74.8	150.3	149.7	137.7	115.1	94.7	79.7	68.3	60.8	57.7	28.7	

KM 277 1178.4 cms 5.19 l/sec remaining

Conc.	5	6	6	6	6	5	4	4	3	3	3	32.4
Vel.	0.74	1.23	1.22	1.15	1.01	0.88	0.78	0.69	0.64	0.61	0.37	
W.P.	32.71	32.38	32.38	32.39	32.39	32.38	32.38	32.38	32.38	32.38	32.43	
Depth	2.31	4.64	4.63	4.25	3.56	2.93	2.46	2.11	1.88	1.78	0.89	
Area	74.8	150.4	149.8	137.8	115.1	94.8	79.8	68.4	60.9	57.8	28.7	

KM 278 1179.7 cms 5.11 l/sec remaining

Conc.	5	6	6	6	5	5	4	4	3	3	3	32.4
Vel.	0.74	1.23	1.23	1.15	1.01	0.88	0.78	0.70	0.64	0.62	0.37	

W.P.	32.71	32.38	32.38	32.39	32.39	32.39	32.38	32.38	32.38	32.38	32.43	
Depth	2.31	4.65	4.63	4.26	3.56	2.93	2.47	2.11	1.88	1.79	0.89	
Area	74.8	150.4	149.8	137.8	115.2	94.8	79.8	68.4	60.9	57.8	28.7	
KM 279	1181.1 cms			5.03 l/sec remaining								
Conc.	5	5	6	6	5	5	4	4	3	3	3	32.4
Vel.	0.74	1.23	1.23	1.15	1.01	0.88	0.78	0.70	0.64	0.62	0.37	
W.P.	32.71	32.38	32.38	32.39	32.39	32.39	32.39	32.38	32.38	32.38	32.43	
Depth	2.31	4.65	4.63	4.26	3.56	2.93	2.47	2.11	1.88	1.79	0.89	
Area	74.9	150.5	149.9	137.9	115.2	94.8	79.9	68.4	61.0	57.9	28.7	
KM 280	1182.4 cms			5.01 l/sec remaining								
Conc.	5	5	5	5	4	3	3	2	2	1	1	16.6
Vel.	2.84	4.72	3.82	2.93	2.51	2.23	2.04	2.02	1.66	0.86	0.26	
W.P.	18.10	16.65	16.79	16.64	16.63	16.63	16.63	16.63	16.66	16.64	16.63	
Depth	2.46	4.58	3.45	2.36	1.91	1.62	1.44	1.42	1.09	0.45	0.10	
Area	40.9	76.2	57.3	39.3	31.8	27.0	23.9	23.6	18.1	7.5	1.6	
KM 281	1183.7 cms			4.97 l/sec remaining								
Conc.	5	5	5	4	4	3	3	2	2	1	1	16.6
Vel.	1.99	3.30	2.68	2.06	1.77	1.57	1.44	1.42	1.17	0.61	0.19	
W.P.	18.10	16.66	16.80	16.65	16.64	16.63	16.63	16.63	16.67	16.65	16.63	
Depth	3.58	6.68	5.02	3.44	2.79	2.36	2.10	2.07	1.59	0.66	0.14	
Area	59.5	111.0	83.4	57.2	46.4	39.3	34.9	34.5	26.4	11.0	2.3	
KM 282	1185.0 cms			4.94 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.6
Vel.	1.99	3.30	2.68	2.06	1.77	1.57	1.44	1.43	1.17	0.61	0.19	
W.P.	18.11	16.66	16.80	16.65	16.64	16.64	16.63	16.63	16.67	16.65	16.64	
Depth	3.58	6.68	5.02	3.44	2.79	2.36	2.10	2.07	1.59	0.66	0.14	
Area	59.5	111.1	83.5	57.3	46.4	39.3	34.9	34.5	26.4	11.0	2.3	
KM 283	1186.3 cms			4.91 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.6
Vel.	1.99	3.30	2.68	2.06	1.77	1.57	1.44	1.43	1.17	0.61	0.19	
W.P.	18.11	16.67	16.80	16.66	16.65	16.64	16.64	16.64	16.67	16.65	16.64	
Depth	3.58	6.68	5.02	3.44	2.79	2.37	2.10	2.08	1.59	0.66	0.14	
Area	59.6	111.1	83.5	57.3	46.5	39.4	35.0	34.5	26.5	11.0	2.4	
KM 284	1187.6 cms			4.87 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.6
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.44	1.43	1.17	0.62	0.19	
W.P.	18.12	16.67	16.81	16.66	16.65	16.65	16.64	16.64	16.68	16.66	16.64	
Depth	3.58	6.68	5.02	3.45	2.79	2.37	2.10	2.08	1.59	0.66	0.14	
Area	59.6	111.2	83.6	57.4	46.5	39.4	35.0	34.6	26.5	11.0	2.4	
KM 285	1188.9 cms			4.84 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.6
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.44	1.43	1.17	0.62	0.19	
W.P.	18.12	16.67	16.81	16.66	16.65	16.65	16.65	16.65	16.68	16.66	16.65	
Depth	3.58	6.68	5.02	3.45	2.79	2.37	2.11	2.08	1.59	0.66	0.14	
Area	59.6	111.2	83.6	57.4	46.5	39.4	35.1	34.6	26.5	11.0	2.4	
KM 286	1190.3 cms			4.81 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.6
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.44	1.43	1.18	0.62	0.19	
W.P.	18.13	16.68	16.81	16.67	16.66	16.65	16.65	16.65	16.69	16.67	16.65	
Depth	3.58	6.68	5.02	3.45	2.80	2.37	2.11	2.08	1.59	0.66	0.14	
Area	59.7	111.3	83.7	57.4	46.6	39.5	35.1	34.7	26.5	11.1	2.4	
KM 287	1191.6 cms			4.78 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.7
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.44	1.43	1.18	0.62	0.19	
W.P.	18.13	16.68	16.82	16.67	16.66	16.66	16.65	16.65	16.69	16.67	16.66	
Depth	3.58	6.68	5.03	3.45	2.80	2.37	2.11	2.08	1.60	0.67	0.14	
Area	59.7	111.3	83.7	57.5	46.6	39.5	35.1	34.7	26.6	11.1	2.4	
KM 288	1192.9 cms			4.75 l/sec remaining								
Conc.	5	5	5	4	4	3	2	2	2	1	1	16.7
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.44	1.43	1.18	0.62	0.19	
W.P.	18.14	16.69	16.82	16.68	16.67	16.66	16.66	16.66	16.69	16.67	16.66	
Depth	3.59	6.69	5.03	3.45	2.80	2.37	2.11	2.09	1.60	0.67	0.15	
Area	59.7	111.4	83.7	57.5	46.6	39.5	35.2	34.8	26.6	11.1	2.4	
KM 289	1194.2 cms			4.71 l/sec remaining								
Conc.	5	5	5	4	3	3	2	2	2	1	1	16.7
Vel.	1.99	3.31	2.68	2.06	1.77	1.57	1.45	1.43	1.18	0.62	0.19	

W.P.	tn. 14	16.69	16.83	16.68	16.67	16.67	16.66	16.66	16.70	16.68	16.66	
Depth	3.59	6.69	5.03	3.45	2.80	2.37	2. 11	2.09	1.60	06 7	0.15	
Area	59.8	111.4	83.8	57.5	46.7	39.6	35.2	34.8	26.6	11.1	2.4	
KM 290	1195.5 cms			4.63 l/sec remaining								
Conc.	4	4	5	5	4	4	4	4	4	4	4	10.7
Vel.	0.45	0.93	1.08	1.15	1.10	1.00	0.89	0.77	0.65	0.47	0.21	
W.P.	12.81	10.93	10.81	10.69	10.75	10.79	10.78	10.77	10.77	10.92	10.89	
Depth	5.14	11.94	14.75	15.88	15.04	13.17	11.10	9.12	7.20	4.62	1.50	
Area	54.9	127.6	157.7	169.8	160.8	1-IO.8	118.7	137.5	77.0	49.4	16.1	
KM 291	1136.8 cms			4.58 l/sec remaining								
Conc.	5	5	5	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.65	1.58	1.44	1.27	1.11	0.94	0.67	0.30	
W.P.	12.81	10.93	10.81	10.69	10.75	10.79	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.20	10.13	10.91	10.33	9.05	7.62	6.27	4.95	3.18	1.03	
Area	37.7	87.7	108.3	116.6	110.5	96.7	81.5	67.0	52.9	34.0	11.1	
KM 292	1138.2 cms			4.52 l/sec remaining								
Conc.	5	5	5	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.65	1.59	1.44	1.27	1.11	0.94	0.67	0.30	
W.P.	12.81	10.93	10.81	10.63	10.75	10.73	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.20	10.14	10.91	10.33	9.05	7.63	6.27	4.95	3.18	1.03	
Area	37.7	87.7	108.4	116.6	110.5	96.8	81.5	67.0	52.9	34.0	11.1	
KM 293	1199.5 cms			4.47 l/sec remaining								
Conc.	5	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.65	1.53	1.44	1.28	1.11	0.94	0.68	0.30	
W.P.	12.81	10.94	10.81	10.69	10.75	10.79	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.20	10.14	10.91	10.34	9.05	7.63	6.27	4.95	3.18	1.04	
Area	37.7	87.7	108.4	116.7	110.5	96.8	81.6	67.0	52.9	34.0	11.1	
KM 294	1200.8 cms			4.42 l/sec remaining								
Conc.	5	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.66	1.53	1.44	1.28	1.11	0.94	0.68	0.30	
W.P.	12.81	10.34	10.81	16.63	10.75	10.79	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.21	10.14	10.91	10.34	9.05	7.63	6.27	4.95	3.18	1.04	
Area	37.7	87.7	108.4	116.7	110.6	96.8	81.6	67.1	53.0	34.0	11.1	
KM 295	1202.1 cms			4.36 l/sec remaining								
Conc.	5	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.66	1.53	1.44	1.28	1.11	0.94	0.68	0.30	
W.P.	12.81	10.34	10.81	10.63	10.75	10.73	10.78	10.77	10.77	10.92	10.83	
Depth	3.53	8.21	10.14	10.92	10.34	9.06	7.63	6.27	4.96	3.19	1.04	
Area	37.8	87.8	108.4	116.7	110.6	96.8	81.6	67.1	53.0	34.1	11.1	
KM 296	1203.4 cms			4.31 l/sec remaining								
Conc.	5	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.66	1.59	1.44	1.28	1.11	0.94	0.68	0.30	
W.P.	12.82	10.94	10.81	10.63	10.75	10.73	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.21	10.14	10.92	10.34	9.06	7.63	6.28	4.96	3.19	1.04	
Area	37.8	87.8	108.5	116.8	110.6	96.3	81.6	67.1	53.0	34.1	11.1	
KM 297	1204.7 cms			4.26 l/sec remaining								
Conc.	4	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.66	1.59	1.44	1.28	1.11	0.94	0.68	0.30	
W.P.	12.82	10.34	10.81	10.69	10.75	10.79	10.78	10.77	10.77	10.92	10.89	
Depth	3.53	8.21	10.15	10.92	10.35	9.06	7.64	6.28	4.96	3.13	1.04	
Area	37.8	87.8	108.5	116.8	110.6	96.3	81.7	67.1	53.0	34.1	11.1	
KM 298	1206.0 cms			4.21 l/sec remaining								
Conc.	4	5	4	4	4	4	4	4	4	4	4	10.7
Vel.	0.65	1.33	1.56	1.66	1.59	1.45	1.28	1.11	0.94	0.68	0.30	
W.P.	12.82	10.94	10.81	10.69	10.75	10.73	10.78	10.78	10.78	10.92	10.90	
Depth	3.53	8.21	10.15	10.92	10.35	9.06	7.64	6.28	4.96	3.13	1.04	
Area	37.8	87.8	108.5	116.8	110.7	96.9	81.7	67.2	53.1	34.1	11.1	
KM 299	1207.4 cms			4.16 l/sec remaining								
Conc.	4	5	4	4	4	4	4	4	3	4	4	10.7
Vel.	0.65	1.34	1.57	1.66	1.53	1.45	1.28	1.12	0.94	0.68	0.30	
W.P.	12.82	10.94	10.81	10.69	10.75	10.79	10.79	10.78	10.78	10.92	10.90	
Depth	3.53	8.22	10.15	10.93	10.35	9.06	7.64	6.28	4.96	3.19	1.04	
Area	37.8	87.9	168.6	116.8	110.7	96.9	81.7	67.2	53.1	34.1	11.1	
KM 300	1208.7 cms			4.06 l/sec remaining								
Conc.	4	4	4	4	4	5	5	5	4	4		10.7
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.83	0.82	0.74	0.45	

W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.47	[illegible]	[illegible]	[illegible]	[illegible]	
Depth	1.78	[illegible]	3.53	3.38	3.52	3.85	4.48	5.00	4.91	4.25	1.80	
Area	61.2	122.5	121.6	116.5	121.2	132.5	154.2	172.3	169.2	146.6	[illegible]	
KM 301	1210.0 cms			3.97 l /sec remaining								
Conc.	3	4	4	4	4	4	5	5	4	4	3	34.0
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.83	0.82	0.74	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.47	34.46	34.46	34.48	34.65	
Depth	1.78	3.56	3.53	3.38	3.52	3.85	4.48	5.00	4.91	4.26	1.83	
Area	61.3	122.5	121.6	116.6	121.2	132.5	154.3	172.3	169.3	146.6	63.0	
KM 302	1211.3 cms			3.88 l/sec remaining								
Conc.	3	3	4	4	4	4	5	5	4	4	3	34.5
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.83	0.82	0.74	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.47	34.46	34.46	34.48	34.65	
Depth	1.73	3.56	3.53	3.38	[illegible]	3.85	4.48	5.00	4.91	4.26	1.83	
Area	61.3	122.6	121.7	116.6	121.3	132.6	154.3	172.4	169.3	1-1.5.7	63.0	
KM 303	1212.6 cms			3.80 l/sec remaining								
Conc.	3	3	4	4	4	4	4	4	4	4	3	3 -1.5
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.83	0.82	0.74	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.47	34.46	34.46	34.48	34.65	
Depth	1.78	3.56	3.53	3.39	[illegible]	3.85	4.48	5.00	4.92	4.26	1.83	
Area	61.3	122.6	121.7	116.7	121.3	132.6	154.4	172.5	169.4	146.7	63.0	
KM 304	1213.9 cms			3.71 l/sec remaining								
Conc.	3	[illegible]	3	4	4	4	4	4	4	3	3	34.5
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.84	0.82	0.74	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.56	3.53	[illegible]	3.52	3.85	4.48	5.01	4.92	4.26	1.83	
Area	61.3	122.7	121.8	116.7	121.4	132.7	154.4	172.5	16'3.4	146.8	63.0	
KM 305	1215.2 cms			3.63 1 /secremaining								
Conc.	3	3	3	4	4	4	4	4	4	3	3	34.5
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.74	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	24.46	34.46	34.48	34.65	
Depth	1.78	3.56	3.54	3.3	[illegible]	3.52	3.85	4.48	5.01	4.92	4.26	1.83
Area	61.4	122.8	121.8	116.8	121.4	132.7	154.5	172.6	163.5	146.8	63.1	
KM 306	1216.6 cms			3.55 l/secremaining								
Conc.	3	3	3	3	4	4	4	4	4	3	3	34.5
Vel.	0.39	0.65	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.74	0.40	
W.P.	34.64	34.46	34.46	34.40	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.56	3.54	3.39	3.53	3.85	4.48	5.01	4.92	4.26	1.83	
Area	61.4	122.8	121.9	116.8	121.5	132.8	154.5	172.6	169.6	146.3	63.1	
KM 307	1217.9 cms			3.47 l/sec remaining								
Conc.	3	3	3	3	4	4	4	4	4	[illegible]	3	34.5
Vel.	0.40	0.66	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.75	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.57	3.54	3.3'3	3.53	3.86	4.43	5.01	4.92	4.26	1.83	
Area	61.4	122.9	121.3	116.9	121.5	132.8	154.6	172.7	16'3.6	137.0	63.1	
KM 308	1219.2 cms			3.3'3 l/sec remaining								
Conc.	3	3	3	3	4	4	4	4	4	3	3	34.5
Vel.	0.40	0.66	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.75	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.57	3.54	3.39	3.53	3.86	4.49	5.01	4.92	4.27	1.83	
Area	61.5	[illegible]	122.0	116.3	121.6	132.9	154.6	172.7	16'3.7	147.0	63.2	
KM 309	1220.5 cms			3.32 l/sec remaining								
Conc.	3	3	3	[illegible]	[illegible]	4	4	4	4	3	3	34.5
Vel.	0.40	0.66	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.75	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.57	3.54	3.39	[illegible]	3.86	4.49	5.01	4.92	4.27	1.83	
Area	61.5	123.0	122.0	117.0	121.6	133.0	154.7	172.8	169.7	147.1	63.2	
KM 310	1221.a cms			3.24 l/sec remaining								
Conc.	3	3	3	3	3	4	4	4	3	3	3	34.5
Vel.	0.40	0.66	0.65	0.63	0.65	0.69	0.77	0.84	0.83	0.75	0.40	
W.P.	34.64	34.46	34.46	34.46	34.46	34.46	34.48	34.46	34.46	34.48	34.65	
Depth	1.78	3.57	3.dc.4	3.40	3.53	3.86	4.49	5.02	4.93	4.27	1.83	
Area	61.5	123.0	122.1	117.0	121.7	133.0	154.8	172.8	169.8	147.1	63.2	

8F - SCENARIO #6

Spill site: River Km 119 W Spill rate 7.67 l/s

CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Panel Width (m)
KM 119	47.5 cms			7.67 l/sec remaining								
Conc.	4805	0	0	0	0	0	0	0	0	0	0	5.6
Vel.	0.23	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 119.1	150	152	152	151	143	148	146	143	141	138	135	5.6
Vel.	0.23	0.38	0.39	0.3'3	0.39	0.3'3	0.39	0.33	0.3'3	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 113.2	142	144	146	147	148	148	148	147	146	144	141	5.6
Vel.	0.23	0.38	0.39	0.39	0.39	0.39	0.39.	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 119.3	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.3'3	0.3'3	0.39	0.3'3	0.3'3	0.33	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 119.4	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.3	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 119.5	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.33	0.33	0.39	0.3'3	0.39	0.3'3	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 11'3.6	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.3	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.3	6.8	
KM 119.7	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.39	0.3'3	0.33	0.3'3	0.3'3	0.3'3	0.3'3	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.3	6.8	
KM 119.8	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.9	6.8	
KM 119.9	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.23	0.38	0.3'3	0.3'3	0.34	0.3'3	0.3'3	0.39	0.39	0.38	0.23	
W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	'2.48	2.53	2.53	2.53	2.53	2.53	2.53	2.53	2.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.4	6.8	
EM 120	47.5 cms			7.67 l/sec remaining								
Conc.	142	144	146	147	148	148	148	147	146	144	142	5.6
Vel.	0.'23	0.38	0.39	0.3'3	0.3'3	0.33	0.39	0.3'3	0.39	0.38	0.23	

W.P.	5.85	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.85	
Depth	1.22	2.48	2.53	1.53	2.53	2.53	2.53	2.53	2.53	1.48	1.22	
Area	6.8	13.9	14.2	14.2	14.2	14.2	14.2	14.2	14.2	13.3	6.8	
KM 121	48.1 cms			7.67 l/sec remaining								
Conc.	137	141	143	145	147	147	147	145	143	141	137	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.86	5.61	5.61	5.61	5.61	5.61	5.61	5.61	5.61	5.61	5.86	
Depth	0.84	1.72	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.72	0.84	
Area	4.7	9.7	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.7	4.7	
KM 122	48.4 cms			7.67 l/sec remaining								
Conc.	137	140	143	145	146	146	146	145	143	140	137	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.86	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.86	
Depth	0.84	1.73	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.73	0.84	
Area	4.7	9.7	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.7	4.7	
KM 123	48.7 cms			7.67 l/sec remaining								
Conc.	136	139	142	144	145	145	145	144	142	133	136	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.87	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.87	
Depth	0.84	1.73	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.73	0.84	
Area	4.7	9.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.7	4.7	
KM 124	48.9 cms			7.67 l/sec remaining								
Conc.	135	138	141	143	144	144	144	143	141	138	135	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.87	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.62	5.87	
Depth	0.84	1.73	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.73	0.84	
Area	4.7	9.7	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.7	4.7	
KM 125	4'3.2 cms			7.67 l/sec remaining								
Conc.	134	137	140	142	143	144	143	142	140	137	134	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.88	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.88	
Depth	0.84	1.74	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.74	0.84	
Area	4.8	9.8	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.8	4.8	
KM 126	49.5 cms			7.67 l/sec remaining								
Conc.	133	137	139	141	142	143	142	141	133	137	133	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.88	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.88	
Depth	0.84	1.74	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.74	0.84	
Area	4.8	9.8	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.8	4.8	
EM 127	49.8 cms			7.67 l/sec remaining								
Conc.	133	136	138	140	141	142	141	140	138	136	133	5.6
Vel.	0.34	0.56	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.56	0.34	
W.P.	5.88	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.88	
Depth	0.85	1.75	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.75	0.85	
Area	4.8	9.8	10.1	10.1	10.1	10.1	10.1	10.1	10.1	9.8	4.8	
KM 128	50.1 cms			7.67 l/sec remaining								
Conc.	132	135	138	140	141	141	141	140	138	135	132	5.6
Vel.	0.34	0.56	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.56	0.34	
W.P.	5.89	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.89	
Depth	0.85	1.75	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.75	0.85	
Area	4.8	9.9	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.9	4.8	
KM 129	50.4 cms			7.66 l/sec remaining								
Conc.	131	134	137	139	140	140	140	139	137	134	131	5.6
Vel.	0.34	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.34	
W.P.	5.89	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.64	5.89	
Depth	0.85	1.75	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.75	0.85	
Area	4.8	9.9	10.2	10.2	10.2	10.2	10.2	10.2	10.2	9.'3	4.8	
KM 130	50.6 cms			7.66 l/sec remaining								
Conc.	130	133	136	138	139	139	139	138	136	133	130	5.6
Vel.	0.34	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.34	
W.P.	5.89	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.89	
Depth	0.85	1.75	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.75	0.85	
Area	4.8	9.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	3.4	4.8	
KM 131	50.'3 cms			7.66 l/sec remaining								
Conc.	129	133	135	137	138	139	138	137	135	133	129	5.6
Vel.	0.34	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.57	0.34	

W.P.	5.90	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.90	
Dep th	0.85	1.76	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1. 76	0.85	
Area	4.8	3.9	10.3	10.3	10.3	10.3	10.3	10.3	10.3	9.3	4.8	
KM 132	51.2	cms		7.66 l/sec remaining								
Conc.	129	132	134	136	138	138	138	136	134	132	129	5.7
Vel.	0.34	0.57	0.58	0 . 58	0.58	0 . 58	0.58	0.58	0.58	0.57	0.34	
W.P.	5.40	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.65	5.90	
Depth	0.85	1.76	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.76	0.85	
Area	4.8	10.0	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.0	4.8	
KM 133	51.5	cms		7.66 l/sec remaining								
Conc.	128	131	134	136	137	137	137	136	134	131	128	5.7
Vel .	0.34	0.57	0.58	0.58	0.58	0. 58	0.58	0.58	0.58	0.57	0.34	
W.P.	5.90	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.90	
Depth	0.85	1.76	1.83	1.83	1.83	1.83	1.83	1.83	1.83	1.76	0.85	
Area	4.8	10.0	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.0	4.8	
KM 134	51.8	cms		7.66 l/sec remaining								
Conc.	127	130	133	135	136	136	136	135	133	130	127	5.7
Vel .	0.34	0.57	0.53	0. 53	0.53	0. 53	0.59	0.53	0.53	0.57	0.34	
W.P.	5.91	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.91	
Depth	0.85	1.77	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.77	0.85	
Area	4.8	10.0	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.0	4.8	
KM 135	52.1	cms		7.66 l/sec remaining								
Conc.	126	130	132	134	135	136	135	134	132	130	126	5.7
Vel .	0.34	0.57	0.[illegible]	0.59	0.59	0.53	0.54	0.54	0.59	0.57	0.34	
W.P.	5.91	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.91	
Depth	0.85	1.77	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.77	0.85	
Area	4.8	10.0	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.0	4.8	
KM 136	52.4	cms		7.66 l/sec remaining								
Conc.	126	129	131	133	134	135	134	133	131	129	126	5.7
Vel .	0.34	0.57	0.53	0. 53	0.53	0.59	0.59	0.59	0.53	0.57	0.34	
W.P.	5.91	5.67	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.67	5.91	
Depth	0.85	1.77	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.77	0.85	
Area	4.8	10.0	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.0	4.8	
KM 137	52.6	cms		7.66 l/sec remaining								
Conc.	125	128	131	133	134	134	134	133	131	128	125	5.7
Vel.	0.35	0.58	0.53	0.53	0.59	0. 53	0.53	0.53	0.53	0.58	0.35	
W.P.	5.92	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.92	
Depth	0.85	1.78	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.78	0.85	
Area	4.8	10.1	10.5	16.5	10.5	10.5	10.5	10.5	10.5	10.1	4.8	
KM 138	52.9	cms		7.66 l/sec remaining								
Conc.	124	127	130	132	133	133	133	132	130	127	124	5.7
Vel.	0.35	0.58	0.59	0.53	0.53	0.53	0.59	0.59	0.53	0.58	0.35	
W.P.	5.32	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.32	
Depth	0.85	1.78	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.78	0.85	
Area	4.8	10.1	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.1	4.8	
KM 13'3	53.2	cms		7.66 l/sec remaining								
Conc.	124	127	129	131	132	133	132	131	129	127	124	5.7
Vel .	0.35	0.58	0.59	0.59	0.59	0.53	0.53	0.59	0.59	0.58	0.35	
W.P.	5.92	5.68	5.67	5.67	5.67	5.67	5.67	5.67	5.67	5.68	5.92	
Depth	0.85	1.78	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.78	0.85	
Area	4.8	10.1	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.1	4.8	
KM 140	53.5	cms		7.66 l/sec remaining								
Conc.	123	126	129	130	132	132	132	130	129	126	123	5.7
Vel.	0.35	0.58	0.60	0.60	0.60	0 . 60	0 . 60	0.60	0.60	0.58	0.35	
W.P.	5.93	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.33	
Depth	0.85	1.73	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.73	0.85	
Area	4.8	10.1	10.6	10.6	10.6	10. 6	10. 6	10.6	10.6	10.1	4.8	
KM 141	53.8	cms		7.66 l/sec remaining								
Conc.	122	125	128	130	131	131	131	130	128	125	122	5.7
Vel.	0.35	0.58	0.60	0.60	0.60	0 . 60	0.60	0.60	0.60	0.58	0.35	
W.P.	5.33	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.93	
Depth	0.85	1.73	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.79	0.85	
Area	4.8	10.2	10.6	10.6	10. 6	10.6	10.6	10.6	10.6	10.2	4.8	
KM 142	54.1	cms		7.66 l/sec remaining								
Conc.	122	125	127	129	130	131	130	123	127	125	122	5.7
Vel.	0.35	(I.58	0.60	0. 60	0. 60	0. 60	0. 60	0.60	0.60	0.58	0.35	

W.P.	5.93	5.6'3	5.68	5.68	5.68	5.68	5.68	5.68	5.68	5.63	5.93	
Depth	0.85	1.79	1.88	1. Y8	1.88	1.88	1.88	1.88	1.88	1.79	0.85	
Area	4.8	10.2	10.7	1 O. 7	10.7	10. 7	10.7	10.7	10.7	10.2	4.8	
KM 143	54.3 cms			7.66 l/sec remaining								
Conc.	121	124	127	128	129	130	1 29	128	127	124	121	5.7
Vel.	0.35	0.58	0.60	0.60	0.60	0. 60	0.60	0.60	0.60	0.58	0.35	
W.F.	5.94	5.63	5.69	5. 6'3	5.69	5. 69	5. 69	5. 69	5.6'3	5.69	5.94	
Depth	0.85	1.79	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.73	0.85	
Area	4.9	10.2	10.7	10. 7	10. 7	10.7	10.7	10.7	10.7	10.2	4.9	
KM 144	54.6 cms			7.66 l/sec remaining								
Conc.	120	1 23	126	128	129	129	129	128	126	123	120	5.7
Vel.	0.35	0.58	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.58	0.35	
W.P.	5.54	5.6'3	5.69	5.63	5.69	5.6'3	5.6'3	5.63	5.69	5.69	5.94	
Depth	0.85	1.80	1.89	1 .89	1.83	1 . 89	1 . 89	1.89	1.89	1.80	0.85	
Area	4.5	100.2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.2	4.9	
KM 145	54.9 cms			7.66 l/sec remaining								
Conc.	120	123	125	127	128	12'3	128	127	125	123	120	5.7
Vel.	0.35	0.58	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.58	0.35	
W.P.	5.44	5.70	5.6'3	5.63	5.6'3	5.6'3	5.69	5.69	5.6'3	5.70	5.34	
Depth	0.85	1.80	1.89	1 .89	1.89	1.89	1 .89	1.89	1.89	1.80	0.85	
Area	4.9	10.3	10.8	10. 8	10.8	10. 8	10.8	10.8	10.8	10.3	4.9	
KM 146	55.2 cms			7.66 1 /sec remaining								
Conc.	119	122	125	126	127	128	127	126	125	122	119	5.7
Vel.	0.35	0.58	0.61	0.61	0.61	0.61	0. 6 1	0.61	0.61	0.58	0.35	
W.P.	5.95	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.95	
Depth	0.85	1.80	1.90	1 .90	1.90	1 .90	1.90	1.30	1.90	1.80	0.85	
Area	4.9	10.3	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.3	4.9	
KM 147	55.5 cms			7.66 l/sec remaining								
Conc.	118	121	124	126	127	127	127	126	124	121	118	5.7
Vel.	0.35	0. 5'3	0.61	0. 6 1	0.61	0.61	0.61	0.61	0.61	0.59	0.35	
W.P.	5.95	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.70	5.95	
Depth	0.85	1.81	1.90	1 . 90	1.90	1 . 90	1.90	1.90	1.30	1.81	0.85	
Area	4.9	10.3	10.9	10.9	10.9	10.9	10.3	10.9	10.9	10.3	4.'3	
KM 148	55.7 cms			7.66 l/sec remaining								
Conc.	118	121	123	125	126	127	126	125	123	121	118	5.7
Vel.	0.35	0.5'3	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.5'3	0.35	
W.P.	5.95	5.71	5.76	5.70	5.70	5.70	5.70	5.70	5.70	5.71	5.95	
Depth	0.86	1.81	1.31	1.91	1.31	1.91	1.91	1.91	1.91	1.81	0.86	
Area	4.3	10.3	10.9	10.9	10.9	10.9	10.4	10.9	10.9	10.3	4.3	
KM 14'3	56.0 cms			7.66 1 /sec remaining								
Conc.	117	120	123	124	126	126	126	124	123	120	117	5.7
Vel.	0.35	0.5'3	0.61	0.61	0.61	0. 6 1	0.61	0.61	0.61	0.59	0.35	
W.P.	5.36	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.96	
Depth	0.86	1.81	1.92	1.92	1.32	1.92	1.92	1.32	1.32	1.81	0.86	
Area	4.9	10.3	10.9	10.9	10.3	10.9	10.3	10.9	10.9	10.3	4.9	
KM 150	56.3 cms			7.66 l/sec remaining								
Conc.	116	119	122	124	125	125	125	124	122	119	116	5.7
Vel.	0.35	0.5'3	0.61	0.61	0.61	0. 6 1	0.61	0.61	0.61	0.59	0.35	
W.P.	5.96	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.36	
Depth	0.86	1.82	1.'32	1. 92	1.92	1. '32	1 . '32	1.92	1.32	1.82	0.86	
Area	4.3	10.4	11.0	11.0	11.0	11.0	11.0	11.0	11.0	10.4	4.9	
KM 151	56.6 cms			7.66 l/sec remaining								
Conc.	116	119	121	123	124	125	124	123	121	119	116	5.7
Vel.	0.35	0.59	0.61	0.6 1	0.61	0.61	0.61	0.61	0.61	0.5'3	0.35	
W.P.	5.36	5.72	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.72	5.36	
Depth	0.86	1.82	1.93	1.33	1.93	1.93	1.93	1.93	1.'33	1.82	0.86	
Area	4.3	10.4	11.0	1 1.0	11.0	11.0	11.0	11.0	11.0	10.4	4.'3	
KM 152	56.9 cms			7.66 l/sec remaining								
Conc.	115	118	121	122	124	124	124	122	121	118	115	5.7
Vel.	0.35	0.53	0.61	0. 6 1	0.61	0. 6 1	0. 6 1	0.61	0.61	0.59	0.35	
W.P.	5.37	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.97	
Depth	0.86	1. 82	1.33	1.93	1.93	1.93	1 .93	1.93	1.'33	1.8';'	0.86	
Area	4.9	10.4	11.0	11.0	1 1.0	11.0	1 1.0	11.0	11.0	10.4	4.9	
KM 153	57.2 cms			7.66 l/sec remaining								
Conc.	115	118	120	122	123	123	123	122	120	118	115	5.7
Vel.	0.35	0.59	0.62	0. 6 2	0.62	0.62	0.62	0.62	0.62	0.59	0.35	

W.P.	5.97	5.72	5.72	5.72	5.72	5.7,	5.72	5.72	5.72	5.72	5.'37	
Depth	0.86	1.83	1.94	1.94	1.94	1.'34	1.94	1.94	1.94	1.83	0.86	
Area	4.'3	10.4	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.4	4.'3	
KM 154	57.5 cms			7.66 l/sec remaining								
Conc.	114	117	119	121	122	123	122	121	119	117	114	5.7
Vel.	0.35	0.52	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.59	0.35	
W.P.	5.97	5.73	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.73	5.37	
Depth	0.86	1.83	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.83	0.86	
Area	4.9	10.5	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.5	4.9	
KM 155	57.7 cms			7.66 l/sec remaining								
Conc.	113	116	119	121	122	122	122	121	113	116	113	5.7
Vel.	0.35	0.5'3	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.5'3	0.35	
W.P.	5.28	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.98	
Depth	0.86	1.83	1.95	1.95	1.95	1.95	1.95	1.'35	1.'35	1.83	0.86	
Area	4.9	10.5	11.1	11.1	11.1	11.1	11.1	11.1	11.1	10.5	4.9	
KM 156	58.0 cms			7.66 l/sec remaining								
Conc.	113	116	118	120	121	122	121	120	118	116	113	5.7
Vel.	0.35	0.5'3	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.59	0.35	
W.P.	5.98	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.98	
Depth	0.86	1.84	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.84	0.86	
Area	4.9	10.5	11.2	11.2	11.2	11.2	11.2	11.2	11.2	10.5	4.9	
KM 157	58.3 cms			7.66 l/sec remaining								
Conc.	112	115	118	119	121	121	121	119	118	115	112	5.7
Vel.	0.35	0.60	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.35	
W.P.	5.98	5.74	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.74	5.98	
Depth	0.86	1.84	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.84	0.86	
Area	4.2	10.5	11.2	11.2	11.2	11.2	11.2	11.2	11.2	10.5	4.2	
KM 158	58.6 cms			7.66 l/sec remaining								
Conc.	112	115	117	119	120	120	120	112	117	115	112	5.7
Vel.	0.35	0.60	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.35	
W.P.	5.22	5.74	5.73	5.73	5.73	5.73	5.73	5.73	5.73	5.74	5.99	
Depth	0.86	1.84	1.96	1.26	1.96	1.96	1.26	1.96	1.46	1.84	0.86	
Area	4.9	10.6	11.3	11.3	11.3	11.3	11.3	11.3	11.3	10.6	4.9	
KM 15'3	58.9 cms			7.66 l/sec remaining								
Conc.	111	114	116	118	112	120	119	118	116	114	111	5.7
Vel.	0.35	0.60	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.35	
W.P.	5.99	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.99	
Depth	0.86	1.84	1.97	1.97	1.97	1.97	1.97	1.97	1.97	1.84	0.86	
Area	4.9	10.6	11.3	11.3	11.3	11.3	11.3	11.3	11.3	10.6	4.9	
KM 160	5'3.2 cms			7.66 l/sec remaining								
Conc.	28	102	105	107	108	108	107	105	103	99	95	7.1
Vel.	0.25	0.44	0.55	0.72	0.80	0.70	0.55	0.47	0.42	0.39	0.24	
W.P.	7.18	7.13	7.16	7.17	7.13	7.17	7.14	7.13	7.13	7.13	7.17	
Depth	0.52	1.1'3	1.72	2.60	3.01	2.45	1.71	1.33	1.14	1.01	0.48	
Area	3.7	8.5	12.3	18.5	21.4	17.4	12.2	9.5	8.2	7.2	3.4	
EM 161	52.4 cms			7.66 l/sec remaining								
Conc.	26	100	102	105	107	108	107	105	103	99	94	7.1
Vel.	0.32	0.54	0.69	0.90	1.00	0.87	0.69	0.59	0.53	0.49	0.30	
W.P.	7.18	7.14	7.16	7.17	7.13	7.17	7.14	7.13	7.13	7.13	7.17	
Depth	0.42	0.96	1.39	2.0'3	2.42	1.97	1.38	1.07	0.92	0.82	0.38	
Area	3.0	6.8	2.9	14.9	17.3	14.0	9.8	7.7	6.6	5.8	2.7	
KM 162	52.7 cms			7.66 l/sec remaining								
Conc.	25	99	102	105	107	107	107	105	102	98	94	7.1
Vel.	0.32	0.55	0.69	0.91	1.00	0.87	0.62	0.5'3	0.53	0.43	0.30	
W.P.	7.18	7.14	7.16	7.18	7.13	7.17	7.15	7.14	7.13	7.13	7.17	
Depth	0.42	0.'36	1.[illegible]	2.09	2.42	1.97	1.38	1.08	0.92	0.82	0.3'3	
Area	3.0	6.8	2.9	14.9	17.3	14.1	9.8	7.7	6.6	5.8	2.7	
KM 163	60.0 cms			7.66 l/sec remaining								
Conc.	'35	99	102	104	106	107	106	104	102	98	93	7.1
Vel.	0.32	0.55	0.70	0.'3	1 1.01	0.88	0.6'3	0.59	0.53	0.43	0.30	
W.P.	7.18	7.14	7.16	7.18	7.14	7.18	7.15	7.14	7.14	7.14	7.18	
Depth	0.42	0.'36	1.39	2.0'3	2.42	1.97	1.38	1.08	0.'33	0.82	0.39	
Area	3.0	6.9	9.9	14.9	17.3	14.1	2.2	7.7	6.6	5.8	2.8	
KM 164	60.3 cms			7.66 l/sec remaining								
Conc.	94	98	101	104	106	106	106	104	101	97	93	7.1
Vel.	0.32	0.55	0.70	0.91	1.01	0.88	0.70	0.59	0.54	0.50	0.30	

W.P.	7. 1'3	7.14	7.16	7. 18	7. 14	7.18	7.15	7.14	7.14	7.1-J	7. 18	
Depth	0.42	0.96	1.39	2 , 09	2.42	1.97	1.38	1.08	0.93	0.82	0.39	
Area	3. 0	6.9	9.9	14.9	17.3	14. 1	9. '3	7.7	6.6	5. '3	2.8	
KM 165	60.6 cms			7.66 l/sec remaining								
Conc.	94	'38	101	103	105	106	105	104	101	'37	92	7.1
Vel.	0.32	0.55	0.70	0 . 92	1 . 0 1	0 . 88	0 . 70	0.60	0.54	0.50	0.30	
W.P.	7.19	7.14	7.16	7.18	7.14	7.18	7.15	7.14	7.14	7.14	7.18	
Depth	0.42	0.96	1.39	2.10	2.43	1.98	1.38	1.08	0.93	0.82	0.39	
Area	3. 0	6.9	9. '3	1 5 . 0	17.3	14.1	'3. 9	7.7	6.6	5.9	2.8	
KM 166	60.9 cms			7.66 l/sec remaining								
Conc.	93	'38	100	103	105	105	105	103	100	'37	92	7.1
Vel .	0.[illegible]	0.55	0.70	0 . 92	1.01	0 . 88	0 . 70	0.60	0.54	0.50	0.31	
W.P.	7. 1'3	7.14	7.17	7.18	7.14	7.18	7.15	7.14	7.1-I	7.14	7. 18	
Depth	(3.42	0.97	1.39	2.10	2.43	1 .98	1. 39	1.08	0.93	0.83	0.39	
Area	3. 0	6.9	1C).0	15.0	17.3	14.1	4. '3	7.7	6.6	5.9	2.8	
KM 167	61.1 cms			7.66 l/sec remaining								
Conc.	93	'37	100	102	104	165	104	103	100	'36	92	7.1
Vel .	0.32	0.56	0.71	C). 92	1 .02	0. 89	0. 7 0	0.60	0.54	0.50	0.31	
W.P.	7.13	7.15	7.17	7.19	7.14	7.18	7.15	7.14	7.14	7.14	7.1'3	
Depth	0.42	0. '37	1.40	2.10	2.43	1.98	1 .39	1.08	0.'33	0.83	0.3'3	
Area	3.0	6.9	10.0	15.0	17.3	14.1	9. '3	7.7	6.7	5.9	2.8	
KM 168	61.4 cms			7.66 l/sec remaining								
Conc.	92	97	'3'3	102	104	104	104	102	99	'36	91	7.1
Vel.	0.32	0.56	0.71	0.92	1.02	0. 8'3	0.71	0.CO	0.54	0.50	0.31	
W.P.	7.19	7.15	7.17	7.19	7.15	7.18	7.16.	7.15	7.15	7.14	7.19	
Depth	0.42	0.97	1.40	2 .10	2.43	1. 98	1 .39	1.09	0.'33	0.83	0.3'3	
Area	3.0	6.9	10.0	15.0	17.4	14.2	9.9	7.8	6.7	5.9	2.8	
KM 169	61.7 cms			7.66 l/sec remaining								
Conc.	92	36	39	102	103	104	103	102	99	95	91	7.1
Vel.	0.32	3.56	0.71	0.93	1. 02	0. 8'3	0. 7 1	0.60	0.55	0.51	0.31	
W.P.	7.20	7.15	7.17	7.13	7.15	7. 19	7.16	7.15	7.15	7.15	7.13	
Depth	0.42	0.37	1.40	2.10	2.43	1. '38	1 .39	1.09	0.94	0.83	0.3'3	
Area	3.0	6.9	10.0	15.0	17.4	14.2	9.9	7.8	6.7	5.9	2.8	
KM 170	62.0 cms			7.66 l/sec remaining								
Conc.	92	36	38	101	103	103	103	101	99	95	90	7.1
Vel .	0.33	0.56	0.71	0. '33	1.03	0.89	0.71	0.61	0.55	0.51	0.31	
W.P.	7.20	7.15	7.17	7.19	7.15	7.19	7.16	7.15	7.15	7.15	7.19	
Depth	0.42	0.97	1.40	2 . 10	'2.43	1 . '38	1 .39	1.09	0.'34	0.83	0.39	
Area	3. 0	6.9	10.0	15.0	17.4	14.2	10.0	7.8	6.7	6.0	2.8	
KM 171	63.1 cms			7.66 l/sec remaining								
Conc.	90	94	'37	99	101	102	10 1	100	97	93	8'3	7.2
Vel .	0.33	0.57	0.72	0.94	1.04	0.90	0. 72	0.61	0.56	0.52	0.32	
W.P.	,. 3		7.18	7.20	7.16	7.20	7.17	7.16	7. 16	7.16	7.20	
Depth	0.7 53 1	7.16 0.98	1.41	2.11	2.44	1 . 99	1 .40	1.10	0.94	0.84	0.40	
Area	3. 0	7. 0	10.1	15.1	17.5	14.2	10. 0	7.8	6.8	6.0	2.8	
KM 172	64.2 cms			7.66 l/sec remaining								
Conc.	88	92	95	98	99	100	100	'38	95	92	87	7.2
Vel.	0.33	0.58	0.73	0. '35	1. 05	0.92	0. 73	0.62	0.56	0.52	0.[illegible]	
W.P.	7.21	7.17	7.13	7.21	7.16	7.20	7.18	7.17	7.16	7.16	7.[illegible]	
Depth	0.43	0.98	1.41	2.11	2.45	2.00	1.41	1.10	0.35	0.85	0.40	
Area	3.1	7.0	10.1	15.1	17.5	14.3	10. 1	7.9	6.8	6. 1	2. 3	
EM 173	65.4 cms			7.66 1 /sec remaining								
Conc.	87	91	'34	'36	'38	'33	98	'37	94	90	86	7.2
Vel.	0.34	0.58	0.74	0. '36	1.06	0.93	0 . 74	0.63	0.57	0.53	0.33	
W.P.	7.[illegible]	7.17	7.20	7.22	7.17	7.21	7.18	7.17	7.17	7.17	7.22	
Depth	0.43	0.99	1.42	2.12	2.45	2 . 00	1.41	1.11	(3. '36	0.86	0.41	
Area	3.1	7.1	10.1	15.2	17.6	14.4	10. 1	8.0	6.9	6. 1	2.9	
KM 174	66.5 cms			7.66 l/sec remaining								
Conc.	85	89	92	'34	36	97	96	95	93	89	85	7.2
Vel .	0.34	0.59	0.75	0. '37	1 .07	0 . '34	0.75	0.64	0.58	0.54	0.33	
W.P.	7.23	7.18	7.20	7.22	7.18	7.22	7. 13	7. 18	7. 18	7.18	7.22	
Depth	0.43	0.99	1.42	2.12	2.46	2.01	1.42	1.11	0.'36	5). 86	0.41	
Area	3.1	7.1	10.2	15.2	17.6	14.4	10.2	8.0	6.'3	6.2	2.'3	
KM 175	67.6 cms			7.66 l/sec remaining								
Conc.	84	88	'31	92	94	36	95	'34	92	88	84	7.2
Vel .	0.35	0.60	0.75	0. '38	1 .08	0. '35	0. 76	0.65	0.59	5).55	0.34	

W.P.	7.24	7.19	7.21	7.23	7.19	7.22	7.20	7.19	7.1'3	7.1'3	7.23	
Depth	0.43	1.00	1.43	2.13	2.46	2.02	1.43	1.12	0.'37	0.87	0.41	
Area	3.1	7.2	10.2	15.3	17.7	14.5	10.3	8.1	7.0	6.3	3.0	
KM 176	68.7 cms			7.66 l/sec remaining								
Conc.	83	86	89	'3	1	93	'34	'34	93	90	87	83	7.2
Vel.	0.35	0.61	0.76	0.99	1.09	0.'36	0.76	0.65	0.59	0.55	0.34	
W.P.	7.25	7.20	7.22	7.24	7.1'3	7.23	7.21	7.20	7.1'3	7.19	7.24	
Depth	0.44	1.00	1.43	2.13	2.47	2.02	1.43	1.13	0.98	0.88	0.42	
Area	3.1	7.2	10.3	15.3	17.8	14.6	10.3	8.1	7.0	6.3	3.0	
KM 177	69.9 cms			7.66 l/sec remaining								
Conc.	81	85	88	90	92	3	93	92	31	83	86	81	7.3
Vel.	0.35	Q.61	0.77	1.00	1.10	0.97	0.77	0.66	0.60	0.56	0.35	
W.P.	7.25	7.20	7.22	7.25	7.20	7.24	7.21	7.20	7.20	7.20	7.25	
Depth	0.44	1.01	1.44	2.14	2.48	2.03	1.44	1.14	0.'38	0.8'3	0.42	
Area	3.2	7.3	10.3	15.4	17.8	14.6	10.4	8.2	7.1	6.4	3.0	
KM 178	71.0 cms			7.66 l/sec remaining								
Conc.	80	84	87	88	90	91	'3	1	90	88	84	80	7.2
Vel.	0.36	Q.62	0.78	1.0	1.11	0.37	0.78	0.67	0.61	0.57	0.35	
W.P.	7.26	7.21	7.23	7.25	7.21	7.25	7.22	7.21	7.21	7.21	7.26	
Depth	0.44	1.02	1.44	2.14	2.48	2.04	1.45	1.14	0.99	0.8'3	0.43	
Area	3.2	7.3	10.4	15.4	17.9	14.7	10.4	8.2	7.1	6.4	3.1	
KM 179	72.1 cms			7.66 l/sec remaining								
Conc.	79	82	85	87	83	90	90	89	86	83	79	7.2
Vel.	0.36	0.63	0.79	1.02	1.12	0.98	0.73	0.68	0.62	0.58	0.36	
W.P.	7.27	7.22	7.24	7.26	7.22	7.25	7.23.	7.22	7.22	7.21	7.27	
Depth	0.44	1.02	1.45	2.15	2.4'3	2.04	1.46	1.15	1.00	0.90	0.43	
Area	3.2	7.4	10.4	15.5	17.9	14.7	10.5	8.3	7.2	6.5	3.1	
KM 180	73.2 cms			7.66 l/sec remaining								
Conc.	82	86	89	91	93	'33	93	32	89	86	82	8.6
Vel.	0.25	0.47	0.56	0.60	0.60	0.55	0.50	0.47	0.44	0.39	0.22	
W.P.	8.73	8.67	8.65	8.64	8.64	8.65	8.64	8.64	8.64	8.65	8.70	
Depth	0.70	1.77	2.32	2.53	2.55	2.25	1.'37	1.78	1.61	1.32	0.56	
Area	6.1	15.3	20.1	22.4	22.0	19.5	17.0	15.3	13.9	11.4	4.8	
KM 181	168.6 cms			7.66 l/sec remaining								
Conc.	33	35	37	38	39	40	41	40	33	38	36	8.9
Vel.	0.32	0.5'3	0.68	0.72	0.73	0.75	0.77	0.78	0.70	0.4'3	0.22	
W.P.	3.18	9.00	8.95	8.95	8.95	8.95	8.95	8.95	3.03	9.09	9.01	
Depth	[illegible]	2.63	3.30	3.55	3.69	3.81	3.93	4.05	3.47	1.99	0.58	
Area	168.9.57	23.5	29.5	31.7	33.0	34.1	35.2	36.2	31.0	17.8	5.2	
KM 182		cms		7.66 l/sec remaining								
Conc.	33	35	37	38	33	40	41	40	40	38	36	8.3
Vel.	0.33	0.60	0.70	0.74	0.76	0.77	0.7'3	0.81	0.72	0.50	0.22	
W.P.	9.18	9.00	8.95	8.95	8.95	8.95	8.45	8.95	9.03	9.09	9.02	
Depth	1.03	2.55	3.13	3.44	3.58	3.63	3.81	3.93	3.36	1.33	0.56	
Area	9.2	[illegible]	28.6	30.8	32.0	33.0	34.1	35.1	30.1	17.3	5.0	
KM 183	168.7 cms			7.66 l/sec remaining								
Conc.	33	35	37	38	39	40	41	40	40	38	36	8.'3
Vel.	0.33	0.60	0.70	0.74	0.76	0.78	0.79	0.81	0.72	0.50	0.22	
W.P.	4.18	9.00	8.95	8.95	8.95	8.95	8.95	8.95	9.03	9.09	9.02	
Depth	1.03	2.55	3.20	3.44	3.58	3.63	3.81	3.93	3.36	1.33	0.56	
Area	9.2	22.8	28.6	30.8	32.0	33.0	34.1	35.1	30.1	17.3	5.0	
KM 184	168.8 cms			7.66 l/sec remaining								
Conc.	33	35	37	38	39	40	41	40	40	38	36	8.3
Vel.	0.33	0.61	0.70	0.74	0.76	0.78	0.79	0.81	0.72	0.50	0.22	
W.P.	9.18	9.00	8.95	8.95	8.95	8.95	8.95	8.95	9.03	9.09	9.02	
Depth	1.03	2.55	3.20	3.44	3.58	3.63	3.81	3.93	3.36	1.'33	0.56	
Area	9.2	22.8	28.6	30.8	32.0	33.0	34.1	35.1	30.1	17.3	5.0	
KM 185	168.9 cms			7.66 l/sec remaining								
Conc.	37	40	42	38	36	37	37	3'3	39	44	46	15.4
Vel.	0.17	0.44	0.59	0.60	0.58	0.57	0.55	0.50	0.45	0.40	0.24	
W.P.	15.46	15.54	15.44	15.43	15.43	15.43	15.44	15.44	15.44	15.44	15.50	
Depth	0.48	1.38	3.13	3.19	3.06	2.36	2.78	2.45	2.11	1.76	0.80	
Area	7.4	30.6	48.3	49.2	47.2	45.7	42.8	37.3	32.5	27.2	12.3	
KM 186	169.3 cms			7.66 l/sec remaining								
Conc.	37	40	41	38	35	37	38	40	41	40	45	15.4
Vel.	0.20	0.49	0.67	0.68	0.66	0.64	0.62	0.57	0.52	0.46	0.27	

W. F'.	15.46	15.54	15.44	15.44	15.44	15.44	15.44	15. 44	15.44	15.44	15.50	
Dep t h	0.43	1.75	2.77	2.82	2.71	2.62	2.46	2. 17	1.87	1.56	0.71	
Area	6.6	27.1	42.8	43.6	41.8	40.5	38.0	33. 6	L8.8	24.1	1 0.9	
KM 187	16'3.6	cms		7.66	l/sec remaining							
Conc.	37	40	41	38	35	37	38	40	41	40	44	15.4
Vel .	0.20	0.49	0.67	0.68	0.66	0.65	0.62	0.57	0.52	0.46	0.27	
W.P.	15.46	15.55	15.44	15.44	15.44	15.44	15.44	15.44	15.44	15.44	15.51	
Depth	0.43	1.75	2. 77	2.82	2 . 7 1	2.63	2.46	2. 18	1.87	1.56	0.71	
Area	6 . 6	27.1	4 2.8	43.6	41.8	40.5	38. 0	33. 6	28.8	24.1	I0.9	
KM 188	170. 0	cms		7 . 6 6	l/sec remaining							
Conc.	37	40	38	39	36	38	39	40	39	41	45	15.4
Vel .	0.20	0.49	0.67	0. 68	0. 66	0. 65	0.62	0.57	0.52	0.46	0.27	
W.P.	15.47	15.55	15.45	15.44	15.44	15. 44	15.45	15.45	15.45	15.45	15.51	
Depth	0.43	1.75	2.77	2.83	2.71	2.63	2.46	2.18	1.87	1.57	0.71	
Area	6.6	27. 1	42.8	43.6	41.9	40. 6	38.0	33. 6	28.9	24.2	1 0 9	
KM 189	170.3	cms		7.66	l/sec remaining							
Conc.	37	40	38	39	36	38	39	40	39	41	45	15.4
Vel .	0 . 20	0. 4'3	0.67	0.68	0. 66	0. 65	0.62	0.57	0.52	0.46	0.27	
W.P.	15.47	15.55	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.51	
Dept h	0.43	1.75	2.77	2.83	2.71	63	2.46	2.18	1.87	1.57	0.71	
Ar ea	6.6	27.1	42.8	43.7	41.9	40. 6	38.1	33.7	28.9	24.2	10.9	
KM 190	170.7	cms		7.66	l/sec remaining							
Conc.	37	40	38	39	36	37	39	40	39	40	45	15.5
Vel .	0.20	0.49	0.67	0. 68	0.66	0. 65	0. 62	0.57	0.52	0.46	0.27	
W.P.	15.47	15.55	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.45	15.52	
Depth	0.43	1.75	2.77	2.83	2.71	2.63	2.47	2.18	1.87	1.57	0.71	
Ayea	6.6	27.0	42.8	43.7	41.9	40.6	38.1	33. 7	28.9	24.2	10.9	
KM 191	171.0	cms		7.66	l/sec remaining							
Conc.	37	40	38	38	36	37	38	40	39	40	45	15.5
Vel .	0.20	0.49	0.67	0. 68	0.56	0. 65	0. 62	0.57	0.52	0.46	0.27	
W.P.	15.48	15.56	15.46	15.45	15.45	15.45	15.46	15.46	15.46	15.46	15.52	
Depth	0.43	1.75	2.77	2.83	2.72	2.63	2.47	2.18	1.87	1.57	0.71	
Area	6.6	27.0	42.8	43.7	42.0	40. 7	38.1	33.7	29.0	24.3	11.0	
KM 192	171.4	cms		7.66	l/sec remaining							
Conc.	37	39	38	38	35	37	38	40	39	40	45	15.5
Vel .	0.20	0.49	(3.67	0. 68	0.66	0.65	0.62	0.57	0.52	0.46	0.27	
W.P.	15.48	15.56	15.46	15.46	15.46	15.46	15.46	15.46	15.46	15.46	15.52	
Depth	(j.43	1.75	2.77	2.83	2.72	2.63	2.47	2.18	1.88	1.57	0.71	
Ay ea	6.6	27.0	42.8	4 3 . 8	42.0	40.7	3 8 . 2	33.8	29.0	24.3	11.0	
KM 193	171.7	cms		7.66	l/sec remaining							
Conc.	37	39	38	38	35	37	38	40	39	40	45	15.5
Vel.	0.20	0.49	0.67	0.68	0.66	0.65	0.62	0.58	0.52	0.46	0.27	
W.P.	15.48	15.56	15.46	15.46	15.46	15.46	15.46	15.46	15.46	15.46	15.53	
Depth	0.43	1.75	2.77	2.83	2.72	2.64	2.47	2. 19	1.88	1.57	0.71	
Area	6.6	27.0	42. 8	4 3 . 8	42.0	4 0 . 7	38.2	33. 8	29.0	24.3	11.0	
KM 194	172.1	cms		7.66	l/sec remaining							
Conc.	37	39	38	38	35	37	38	40	39	40	44	15.5
Vel .	0.20	0.50	0.67	0. 68	0. 66	0.65	0.62	0.58	0.52	0.46	0.28	
W.P.	15.49	15.57	15.47	15.46	15.46	15.46	1 5.47	15.47	15.47	15.47	15.53	
Depth	0.43	1.75	2.77	2.84	2.72	64	2.47	2. 19	1.88	1.57	0.71	
Ay ea	6.6	27.0	42.8	4 3 . 8	42.1	40. 8	38.2	33. 8	29.1	24.3	11.0	
KM 195	172.4	cms		7.66	l/sec remaining							
Conc.	33	35	36	36	32	32	30	36	35	34	32	9. 'Ti
Vel .	0.33	0.68	0.89	0. 93	0. 87	0. 75	0.59	0.47	0.37	0.27	0.13	
W.P.	10. 14	10. 14	9.95	9.91	9.92	9. 98	9. '36	9.92	9.92	9.92	9.92	
Depth	1.14	3.43	5.07	5.33	4 .90	3.91	2.71	1.90	1.36	0.81	0.27	
Area	11.3	34.0	50.2	53.4	48.5	38.7	26. 9	18.9	13.4	8.0	2.7	
KM 196	172.6	cms		7.66	l/sec remaining							
Conc.	33	35	36	37	32	30	3 0	34	35	34	32	9. 7
Vel.	0.35	0.72	0.'34	0.98	0.92	0 . 73	0.62	0.49	0.40	0.28	0.14	
W.P.	10. 14	10. 14	9.95	9. 9 1	9.92	9.98	9. 96	'3.92	9.92	9.92	'3.92	
Depth	1.08	3.25	4.80	5.11	4.6-I	3.70	2.0 "7	1.80	1.28	0.77	0.26	
Area	10.7	32.2	-17.6	50. 6	45. 9	36.7	26.4	17.9	12.7	7.6	2.3	
KM 197	172.8	cms		7.66	l/sec remaining							
Conc.	33	35	36	37	32	3 0	30	34	35	34	32	9.
Vel .	0.35	0.72	0.94	0. '38	0.92	0.79	0.62	0.49	0.40	0.28	0.14	

W.P.	10.14	10. 14	9.95	9.91	9.93	9.99	9.96	9.92	9.92	9.92	'3.92	
Depth	1.08	3.25	4.80	5.11	4.64	3 . 70	2.57	1.80	1.28	0.77	0.26	
Area	10.7	32.2	47.6	50 , 6	45.9	36.7	25.4	17.9	12.7	7.6	2.5	
KM 1'38	172.9	cms		7.66	1/sec	remaining						
Conc.	33	35	36	37	32	3	0 30	34	35	34	32	9.9
Vel.	0.35	0.72	0.94	0.98	0.92	0.	7'3	0.62	0.49	0.40	0.28	0.14
W.P.	10.14	10. 14	9.95	9.91	9.93	9.9'3	9.96	9.92	9.92	'3.92	9.92	
Depth	1.08	3.25	4.80	5.11	4.64	3 . 70	2.5 '7	1.80	1.28	0.77	0.26	
Area	10.7	[illegible]	47.6	50.6	45. 9	36.7	25.4	17.9	12.7	7.6	2.5	
KM 1'39	173.1	cms		7.66	1/sec	remaining						
Conc.	33	35	36	37	32	30	30	34	35	34	32	9.9
Vel.	0.35	0.72	0.'34	0.98	0 . 92	0. 73	0 . 62	0.50	0.40	0.28	0.14	
	10.14	10.14	9.95	9.91	3.93	9.99	9.46	9.92	9.92	9.92	'3.92	
Depth	1.08	3, 25	4.80	5.11	4.64	3.70	2.57	1.80	1.28	Cl.77	0.26	
Area	1C).7	32.2	47.6	50.6	46.0	36.7	25.5	17.9	12.7	7.6	2.5	
KM 200	17 3.2	cms		7.66	1/sec	remaining						
Conc.	40	42	41	35	34	32	31	[illegible]	28	27	28	15.8
Vel.	0.52	(I.83	0.80	0.76	0. 73	0.68	0. 6 1	0.47	[illegible]	0.32	[illegible]	
W.P.	16.04	15.78	15.78	15.78	15.78	15.78	15.79	15.79	15.78	15.78	15.80	
Depth	1.53	3.03	2.83	2.63	2.52	2.28	1 .90	1.28	0.75	0.70	0.40	
Area	24.2	47.3	45.5	42.5	39.7	36.0	29.9	20.2	11.9	11.0	6.4	
KM 201	173.7	cms		7.66	1/sec	remaining						
Conc.	40	42	41	35	3. 4	32	31	2'3	28	28	29	15.8
Vel.	0.49	(3.78	(5.76	0. 72	0. 63	0.65	0.57	(3.44	0.31	0.30	0.21	
W.P.	16.04	15.78	15.78	15.78	15.78	15.78	1 5.79	15.80	15.78	15.78	15.80	
Depth	1.62	3.21	3.05	2.85	2.66	2.41	2.00	1.36	0.80	0.74	0.43	
Area	25.6	50.6	48.1	44.9	42.0	38.0	31.6	21.4	12.6	11.7	6.7	
KM 202	174.2	cms		7.65	1/sec	remaining						
Conc.	40	41	41	35	34	32	31	23	28	28	23	15.8
Vel.	0.50	0.78	0.76	0.72	0.69	0.65	0.58	0.45	0.31	0.30	0.21	
W.P.	16.04	15.78	15.79	15.73	15.79	15.79	15.79	15.80	15.79	15.7'3	15.80	
Depth	1.62	3.21	3.05	2.85	2.66	2.41	2.01	1.36	0.80	0.74	0.43	
Area	25. 6	50.6	48.2	45.0	42.0	38.1	31.7	21.4	12.6	11.7	6.7	
KM 203	174.7	cms		7.65	1/sec	remaining						
Conc.	40	41	41	35	34	32	31	29	28	28	29	15.8
Vel.	0.50	0.78	0.76	0.73	0. 69	0.65	0. 58	0.45	0.32	0.30	0.21	
W.P.	16.05	15.73	15.79	15.79	15.79	15.79	15.79	15.80	15.79	15.79	15.81	
Depth	1.62	3.21	3.05	2.85	2.66	2.41	2.01	1.36	0.80	0.74	0.43	
Area	25.6	50.7	48.2	45.0	42.0	38.1	31.7	21.4	12.6	11.7	6.8	
KM 204	175.1	cms		7.65	1/sec	remaining						
Conc.	40	41	41	35	34	32	31	29	[illegible]	28	29	15.8
Vel.	0.50	0.7'3	0.76	0.73	0.70	0.65	0.58	0.45	0.32	0.30	0.21	
W.P.	16.05	15.79	15.79	15.7'3	15.79	15.79	15.80	15.81	15.79	15.79	15.81	
Depth	1.62	3.21	3.06	2.85	2.66	2.41	2 .0 1	1.36	0.80	0.74	0.43	
Area	25.6	50.7	48.2	45.0	42.1	38.1	31.7	21.4	12.7	11.8	6.8	
KM 205	175.6	cms		7.65	1/sec	remaining						
Conc.	40	41	41	35	34	3 2	31	29	28	28	29	15.8
Vel.	0.50	0.73	0.76	0.73	0.70	0.65	0.58	0.45	0.32	0.30	0.21	
W.P.	16.05	15.79	15.79	15.79	15.79	15.80	15.80	15.81	15.80	15.73	15.81	
Depth	1.62	3.21	3.06	2.85	2.67	'2.42	2.01	1.36	0.80	0.75	0.43	
Area	25.7	50.7	48.3	45.1	42.1	38.1	31.7	21.5	12.7	11.8	6.8	
KM 206	176.1	cms		7.65	1/sec	remaining						
Conc.	33	41	40	35	33	32	31	28	28	28	29	15.8
Vel.	(3.50	(3. 73	0.76	0.73	0.70	0.65	0.58	0.45	0.32	0.30	0.21	
W.P.	16.06	15.80	15.80	15.80	15.80	1 5.80	15.80	15.81	15.80	15.80	15.81	
Depth	1.63	3.21	3.06	2.86	2.67	2.42	2.01	1.36	0.81	0.75	0.43	
Area	25.7	50.8	48.3	45.1	4 2.1	38.2	31.8	21.5	12.7	11.8	6.8	
KM 207	176.5	cms		7.65	1 /sec	remaining						
Conc.	39	41	40	35	33	32	31	28	28	28	28	15.8
Vel.	0.50	0.7'3	0.76	C). 73	0 . 7 0	0. 66	C). 58	0.45	0.32	0.30	0.21	
W.P.	16.06	15.80	15.80	15.80	15.80	15.80	15.81	1 5.81	15.80	15.80	15.82	
Depth	2.63	3.22	3.06	2.86	2.67	2.42	2.01	1.36	0.81	0.75	0.43	
Area	177.70	cms 50.8	48.3	7.65	45.1 1/sec	42.2	38.2 31.8	21.5	12.8	11.3	6.8	
KM 208						remaining						
Conc.	39	41	40	3. 4	33	3 2	31	28	28	28	28	15.8
Vel .	0.50	0.7'3	0.77	0.73	0.70	0.66	0.58	0.45	0.32	0.31	0.21	

W.P.	16.06	15.80	15.80	15.80	15.80	15.80	15.81	15.82	15.80	15.80	15.82	
Depth	1.63	3.22	3.06	2.86	2.67	2.42	2.01	1.36	0.81	0.75	0.43	
Area	25.7	50.8	48.4	45.2	42.2	38.2	31.8	21.5	12.8	11.9	6.8	
KM 209	177.5 cms			7.65 l/sec remaining								
Conc.	30	[illegible]	31	34	35	37	38	39	41	42	48	14.6
Vel.	0.47	0.75	0.81	0.91	1.00	1.04	1.06	1.09	1.13	1.16	0.73	
W.P.	14.65	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.63	14.73	
Depth	0.44	0.91	1.03	1.22	1.40	1.49	1.54	1.61	1.71	1.75	0.88	
Area	6.4	13.3	15.0	17.8	20.4	21.9	[illegible]	23.5	24.9	25.7	12.8	
KM 210	178.0 cms			7.65 l/sec remaining								
Conc.	40	42	42	36	33	33	[illegible]	33	33	37	39	11.0
Vel.	0.70	1.20	1.27	[illegible]	1.17	1.13	1.08	0.38	0.84	0.61	0.30	
W.P.	11.20	11.05	11.05	11.05	11.05	11.05	11.05	11.05	11.05	11.06	11.06	
Depth	0.38	2.19	2.37	2.24	2.11	2.00	1.85	1.61	1.26	0.78	0.26	
Area	10.8	24.2	26.2	24.7	23.3	22.0	20.4	17.8	13.9	8.6	2.9	
KM 211	178.4 cms			7.65 l/sec remaining								
Conc.	41	42	39	38	36	[illegible]	30	27	25	24	23	16.8
Vel.	0.81	[illegible]	1.17	1.12	1.01	0.83	0.82	0.81	0.73	0.55	0.28	
W.P.	16.35	16.82	16.81	16.82	16.82	16.82	16.81	16.81	16.82	16.82	16.82	
Depth	1.05	1.36	1.84	1.71	1.45	1.21	1.07	1.04	0.90	0.58	0.20	
Area	17.6	33.0	30.9	28.7	24.4	20.3	17.9	17.5	15.1	9.7	3.4	
KM 212	178.3 cms			7.65 l/sec remaining								
Conc.	39	41	39	34	34	33	33	32	31	34	35	10.4
Vel.	0.71	1.26	1.51	1.66	1.66	1.56	1.36	1.10	0.87	0.63	0.38	
W.P.	10.46	10.33	10.39	10.38	10.38	10.38	10.33	10.39	10.38	10.38	10.39	
Depth	0.64	1.51	1.99	2.28	2.30	2.08	1.63"	1.22	0.86	0.61	0.24	
Area	6.6	15.7	20.6	23.7	23.8	21.6	17.5	12.6	8.9	6.3	2.5	
KM 213	173.4 cms			7.65 l/sec remaining								
Conc.	38	41	41	33	33	33	32	31	33	33	38	10.4
Vel.	0.68	1.20	1.43	1.57	1.57	1.48	1.28	1.04	0.83	0.66	0.36	
W.P.	10.47	10.33	10.33	10.38	10.38	10.39	10.33	10.39	10.39	10.39	10.39	
Depth	0.67	1.60	2.10	2.42	2.43	2.21	1.78	1.29	0.91	0.64	0.25	
Area	7.0	16.6	21.8	25.1	25.3	22.Y	18.5	13.4	9.5	6.7	2.6	
KM 214	173.9 cms			7.65 l/sec remaining								
Conc.	38	41	40	33	33	33	32	31	33	33	38	10.4
Vel.	0.68	1.20	1.43	1.57	1.57	1.48	1.28	1.04	0.83	0.66	0.36	
W.P.	10.48	10.40	10.40	10.39	10.39	10.33	10.40	10.40	10.39	10.39	10.40	
Depth	0.67	1.60	2.11	2.42	2.44	2.21	1.74	1.29	0.31	0.64	0.25	
Area	7.0	16.7	21.5	25.2	25.3	23.0	18.6	13.4	9.5	6.7	2.6	
KM 215	180.3 cms			7.65 l/sec remaining								
Conc.	33	41	38	34	33	31	23	28	27	27	25	15.8
Vel.	0.56	0.88	0.86	0.82	0.78	0.73	0.65	0.50	0.36	0.34	0.24	
W.P.	16.08	15.82	15.82	15.82	15.82	15.83	15.83	15.84	15.83	15.82	15.84	
Depth	1.48	2.33	2.73	2.60	2.43	2.20	1.83	1.24	0.75	0.69	0.33	
Area	23.4	46.3	44.1	41.2	38.5	34.9	29.0	13.6	11.8	11.0	6.2	
KM 216	180.9 cms			7.65 l/sec remaining								
Conc.	39	41	38	35	33	31	29	28	27	25	18	15.8
Vel.	0.57	0.91	0.88	0.84	0.80	0.75	0.67	0.52	0.37	0.35	0.24	
W.P.	16.09	15.83	15.83	15.83	15.83	15.83	15.83	15.84	15.83	15.83	15.84	
Depth	1.45	2.86	2.72	2.54	2.38	2.15	1.73	1.21	0.73	0.68	0.38	
Area	22.9	45.3	43.1	40.2	37.6	34.1	28.3	19.1	11.6	10.7	6.0	
KM 217	181.5 cms			7.65 l/sec remaining								
Conc.	39	41	37	35	33	31	23	28	27	25	24	15.8
Vel.	0.58	0.91	0.88	0.84	0.81	0.75	0.67	0.52	0.37	0.36	0.24	
W.P.	16.09	15.83	15.83	15.83	15.83	15.83	15.84	15.85	15.83	15.83	15.85	
Depth	1.45	2.86	2.72	[illegible]	2.38	2.15	1.79	1.21	0.73	0.68	0.38	
Area	22.3	45.3	43.1	40.3	37.6	34.1	28.3	19.2	11.6	10.8	6.0	
KM 218	182.0 cms			7.65 l/sec remaining								
Conc.	39	41	37	34	33	31	23	28	27	25	24	15.8
Vel.	0.58	0.91	0.88	0.84	0.81	0.76	0.67	0.52	0.37	0.36	0.24	
W.P.	16.10	15.83	15.84	15.83	15.83	15.84	15.84	15.85	15.84	15.83	15.85	
Depth	1.45	2.86	2.73	2.55	2.38	2.15	1.73	1.21	0.73	0.68	0.38	
Area	22.1	45.3	43.1	40.3	37.7	34.1	28.4	13.2	11.6	10.8	6.0	
KM 219	182.6 cms			7.65 l/sec remaining								
Conc.	39	40	37	34	33	31	29	28	27	24	24	15.8
Vel.	0.58	0.91	0.88	0.85	0.81	0.76	0.67	0.52	0.37	0.36	0.24	

W.P.	16.10	15.84	15.84	15.84	15.84	15.84	15.84	15.85	15.84	15.84	15.86	
Depth	1.45	2.87	2.73	2.55	2.38	2.16	1.79	1.21	0.74	0.68	0.38	
Area	22.3	45.4	43.2	40.3	37.7	34.2	28.4	19.2	11.7	10.8	6.0	
KM 220	183.2 cms			7.65 l/sec remaining								
Conc.	36	38	37	33	31	30	&j	2	7	26	26	29 22.7
Vel.	0.19	0.34	0.39	0.39	0.34	0.31	0.26	0.18	0.16	0.14	0.08	
W.P.	22.82	22.68	22.67	22.67	22.68	22.66	22.70	22.67	22.66	22.67	22.68	
Depth	1.84	4.34	5.34	5.35	4.40	3.77	2.84	1.66	1.37	1.16	0.48	
Area	41.8	98.4	121.0	121.2	99.8	85.4	64.4	37.7	31.1	26.3	11.0	
KM 221	183.7 cms			7.65 l/sec remaining								
Conc.	37	39	34	34	32	31	28	27	25	23	[illegible]	7
Vel.	0.27	0.48	0.54	0.55	0.48	0.43	0.36	0.25	0.22	0.20	0.11	
W.P.	[illegible].83	22.69	22.68	22.68	22.69	22.67	22.71	22.68	22.67	22.67	22.68	
Depth	1.33	3.13	3.84	3.85	3.17	2.71	2.05	1.20	0.99	0.84	0.35	
Area	30.1	70.9	87.1	87.3	71.9	61.5	46.4	27.1	22.4	19.0	7.9	
KM 222	184.3 cms			7.65 l/sec remaining								
Conc.	37	39	[illegible]	34	33	32	31	28	27	24	[illegible]	7
Vel.	0.27	0.48	0.55	0.55	0.48	0.43	0.36	0.25	0.22	0.20	0.11	
W.P.	[illegible].83	22.70	22.68	22.68	22.70	22.68	22.72	22.68	22.68	22.68	22.69	
Depth	1.33	3.13	3.84	3.85	3.17	2.71	2.05	1.20	0.99	0.84	0.35	
Area	30.1	71.0	87.2	87.4	71.9	61.6	46.5	27.2	22.5	19.0	7.9	
KM 223	184.9 cms			7.65 l/sec remaining								
Conc.	37	39	3	4	33	32	31	28	27	24	[illegible]	23 22.7
Vel.	0.27	0.48	0.55	(3.55	0.48	0.43	0.36	0.25	0.23	0.20	0.11	
W.P.	22.84	22.70	22.69	22.69	22.70	22.68	22.22	22.69	22.68	22.69	22.69	
Depth	1.33	3.13	3.85	3.85	3.17	2.72	2.05	1.20	0.99	0.84	0.35	
Area	30.1	71.1	87.3	87.4	72.0	61.6	46.5	27.2	22.6	19.1	7.9	
KM 224	185.4 cms			7.65 l/sec remaining								
Conc.	37	39	34	[illegible]	32	31	28	2 7	24	2 3	23	22.7
Vel.	0.27	0.48	0.55	0.55	0.48	0.44	0.36	0.26	0.23	0.20	0.11	
W.P.	22.84	22.71	22.69	22.69	22.71	22.69	22.73	22.69	22.69	22.69	22.70	
Depth	1.33	3.14	3.85	3.86	3.18	2.72	2.05	1.20	1.00	0.84	0.35	
Area	30.2	71.1	87.4	87.5	72.1	61.7	46.6	27.3	22.6	19.1	8.0	
KM 225	186.0 cms			7.65 l/sec remaining								
Conc.	37	39	33	33	32	31	28	27	24	22	[illegible]	7
Vel.	0.27	0.48	0.55	0.55	0.48	0.44	0.36	0.26	0.23	0.20	0.11	
W.P.	22.85	22.71	22.70	22.70	22.71	22.69	22.73	22.70	22.69	22.70	22.71	
Depth	1.33	3.14	3.85	3.86	3.18	2.72	2.06	1.20	1.00	0.85	0.35	
Area	30.2	71.2	87.4	87.6	72.1	61.8	46.6	27.3	22.7	19.2	8.0	
KM 226	186.6 cms			7.65 l/sec remaining								
Conc.	37	39	33	33	32	31	28	26	24	22	[illegible]	LL.7 [illegible]
Vel.	0.27	0.48	0.55	0.55	0.48	0.44	0.36	0.26	0.23	0.20	0.11	
W.P.	22.86	22.72	22.71	22.70	22.72	22.70	22.74	22.70	22.70	22.70	22.71	
Depth	1.33	3.14	3.86	3.86	3.18	2.72	2.06	1.21	1.00	0.85	0.35	
Area	30.3	71.3	87.5	87.7	72.2	61.8	46.7	27.4	22.8	19.2	8.0	
KM '227	187.1 cms			7.65 l/sec remaining								
Conc.	37	38	33	33	32	31	28	26	24	22	23	[illegible] 7
Vel.	0.27	0.48	0.55	0.55	0.48	0.44	0.36	0.26	0.23	0.20	0.11	
W.P.	22.86	22.73	22.71	22.71	22.72	22.71	22.74	22.71	22.71	22.71	22.72	
Depth	1.33	3.14	3.86	3.87	3.18	2.73	'2.06	1.21	1.01	0.85	0.35	
Area	30.3	71.4	87.6	87.8	72.3	61.9	46.7	27.4	22.8	19.3	8.0	
KM 228	187.7 cms			7.65 l/sec remaining								
Conc.	37	38	33	33	32	30	28	26	24	22	[illegible]	7
Vel.	0.27	0.48	0.55	0.55	0.49	0.44	0.36	0.26	0.23	0.20	0.12	
W.P.	22.87	22.73	22.72	22.72	22.73	22.71	22.75	22.71	22.71	22.71	22.72	
Depth	1.34	3.15	3.86	3.87	3.19	2.73	2.06	1.21	1.01	0.85	0.35	
Area	30.3	71.5	87.7	87.8	72.3	62.0	46.8	27.5	22.9	19.3	8.0	
KM 229	188.3 cms			7.65 l/sec remaining								
Conc.	37	38	33	33	31	30	28	26	24	[illegible]	[illegible]	7
Vel.	0.27	0.48	0.55	0.55	0.49	0.44	0.36	0.26	0.23	0.20	0.12	
W.P.	22.87	22.74	22.72	22.72	22.73	22.72	22.75	22.72	22.72	22.72	22.73	
Depth	1.34	3.15	3.86	3.87	3.13	2.73	2.06	1.21	1.01	0.85	0.35	
Area	30.4	71.5	87.8	87.9	72.4	62.0	46.9	27.5	23.0	19.4	8.0	
KM 230	188.8 cms			7.65 l/sec remaining								
Conc.	23	25	2	7	27	27	27	31	36	37	38	37 15.4
Vel.	0.09	0.19	0.29	0.39	0.47	0.53	0.55	0.57	0.60	0.53	0.29	

W.P.	15.41	15.41	15.42	15.42	15.42	15.41	15.40	15.41	15.40	15.43	15.70	
Depth	0.27	0.81	1.53	2.41	3.24	3.84	4.09	4.31	4.61	3.8'3	1.53	
Area	4.1	12.5	23.6	37.0	49.8	59.2	62.9	66.4	71.1	60.0	23.6	
KM 231	183.4 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	27	27	31	36	37	38	37	15.4
Vel.	0.09	0.19	0.29	0.39	0.48	0.53	0.55	0.57	0.60	0.53	0.29	
W.P.	15.42	15.42	15.43	15.43	15.43	15.41	15.41	15.41	15.41	15.49	15.71	
Depth	(3.27	0.81	1.53	2.41	3.24	3.85	4.09	4.32	4.62	3.8'3	1.53	
Area	4.1	12.6	23.6	37.1	49.9	59.2	63.0	66.5	71.1	60.0	23.6	
KM 232	190.0 cms			7.65 l/sec remaining								
Conc.	23	25	27	28	25	28	30	36	38	38	38	15.4
Vel.	0.09	0.19	0.23	0.39	0.48	0.53	0.56	0.58	0.60	0.54	0.29	
W.P.	15.42	15.42	15.44	15.44	15.43	15.42	15.41	15.42	15.41	15.50	15.72	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.09	4.32	4.62	3.89	1.53	
Area	4.1	12.6	23.6	37.1	49.9	59.3	63.1	66.6	71.2	60.0	23.6	
KM 233	190.5 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	25	27	30	36	37	38	37	15.4
Vel.	0.09	0.19	0.29	0.33	0.48	0.53	0.56	0.58	0.60	0.54	0.2'3	
W.P.	15.43	15.43	15.44	15.44	15.44	15.42	15.42	15.42	15.42	15.51	15.72	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.09	4.32	4.62	3.90	1.53	
Area	4.1	12.6	23.6	37.1	49.9	59.3	63.1	66.6	71.2	60.1	23.7	
KM 234	191.1 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	25	27	30	36	37	38	37	15.4
Vel.	0.09	0.19	0.29	0.39	0.48	0.54	0.56	0.58	0.60	0.54	0.29	
W.P.	15.43	15.44	15.45	15.45	15.45	15.43	15.43	15.43	15.43	15.51	15.73	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.09	4.32	4.62	3.30	1.53	
Area	4.1	12.6	23.6	37.1	SO.0	59.4	63.2	66.7	71.3	60.1	23.7	
KM 235	191.7 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	25	27	30	36	37	38	37	15.4
Vel.	0.09	0.19	0.29	0.39	0.48	0.54	0.56	0.58	0.61	0.54	0.29	
W.P.	15.44	15.44	15.46	15.46	15.45	15.44	15.43	15.44	15.43	15.52	15.73	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.10	4.32	4.62	3.90	1.53	
Area	4.1	12.6	23.6	37.1	so.0	s9.4	63.2	66.7	71.3	60.1	23.7	
KM 236	192.2 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	2s	27	30	36	37	38	37	15.4
Vel.	0.03	0.19	0.29	0.40	0.48	0.54	0.56	0.58	0.61	0.54	0.29	
W.P.	15.45	15.45	15.46	15.46	15.46	15.44	15.44	15.44	15.44	15.53	15.74	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.10	4.33	4.62	3.90	1.53	
Area	4.1	12.6	23.6	37.1	50.0	59.5	63.3	66.8	71.4	60.2	23.7	
KM 237	192.8 cms			7.65 l/sec remaining								
Conc.	23	25	26	27	24	27	30	36	37	38	37	15.4
Vel.	0.03	0.13	0.29	0.40	0.48	0.54	0.56	0.58	0.61	0.54	0.23	
W.P.	15.45	15.45	15.47	15.47	15.46	15.45	15.44	15.45	15.45	15.53	15.75	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.10	4.33	4.63	3.90	1.53	
Area	4.1	12.6	23.6	37.1	SO.0	59.5	63.3	66.8	71.5	60.2	23.7	
KM 238	193.4 cms			7.65 l/sec remaining								
Conc.	22	25	26	27	24	27	30	35	37	37	37	15.5
Vel.	0.03	0.20	0.29	0.40	0.48	0.54	0.56	0.58	0.61	0.54	0.29	
W.P.	15.46	15.46	15.48	15.48	lS.47	15.46	15.45	15.46	15.45	15.54	15.75	
Depth	0.27	0.81	1.53	2.41	3.24	3.85	4.10	4.33	4.63	3.90	1.53	
Area	4.1	12.6	23.6	37.2	50.1	59.6	63.4	66.9	71.5	60.2	23.7	
KM 233	193.9 cms			7.65 l/sec remaining								
Conc.	22	25	26	27	24	27	30	35	37	37	37	15.5
Vel.	0.09	0.20	0.30	0.40	0.48	0.54	0.57	0.59	0.61	0.54	0.29	
W.P.	15.47	15.47	15.48	15.48	15.48	15.46	15.46	15.46	15.46	15.55	15.76	
Depth	0.27	0.81	1.53	2.41	3.24	3.86	4.10	4.33	4.63	3.30	1.53	
Area	4.1	12.6	23.6	37.2	SO.1	59.6	63.4	66.9	71.6	60.3	23.7	
KM 240	194.5 cms			7.65 l/sec remaining								
Conc.	30	32	34	35	36	35	37	37	36	35	33	10.0
Vel.	0.35	0.63	0.70	0.70	0.6'3	0.68	0.66	0.65	0.63	0.55	0.30	
W.P.	10.48	10.05	9.99	9.98	9.99	9.39	3.98	9.98	9.99	10.05	10.30	
Depth	1.41	3.34	3.92	3.35	3.85	3.72	3.61	3.52	3.35	2.73	1.12	
Area	14.1	33.3	39.2	39.5	38.4	37.2	36.1	35.2	33.5	27.3	11.2	
KM 241	13s.5 cms			7.65 l/sec remaining								
Conc.	30	32	34	35	36	[illegible]	33	37	36	36	34	33	10.0
Vel.	0.31	0.56	0.62	0.62	0.61	0.60	0.59	0.58	0.56	0.49	0.27	

W.P.	10.48	10.05	9.99	9.99	9.99	9.99	9.99	9.99	9.99	10.05	10.30	
Depth	1.60	3.77	4.43	4.47	4.35	4.21	4.08	3.98	3.73	3.09	1.27	
Area	15.3	37.7	44.3	44.6	43.5	42.0	40.0	39.8	37.8	30.8	12.6	
KM 242	136.6 cms			7.65 l/sec remaining								
Conc.	30	32	33	35	35	35	37	36	36	34	32	10.0
Vel.	0.31	0.56	0.62	0.63	0.62	0.60	0.59	0.58	0.56	0.43	0.27	
W.P.	10.49	10.06	9.99	9.99	9.99	9.93	9.99	9.99	9.99	10.05	10.31	
Depth	1.60	3.77	4.44	4.47	4.36	4.21	4.09	3.33	3.73	3.09	1.27	
Area	15.9	37.7	44.3	44.7	43.5	42.1	40.8	39.8	37.9	30.3	12.7	
KM 243	197.6 cms			7.65 l/sec remaining								
Conc.	30	32	33	34	35	35	37	36	35	34	32	10.0
Vel.	0.31	0.56	0.63	0.63	0.62	0.61	0.59	0.58	0.56	0.49	0.27	
W.P.	10.49	10.06	9.99	3.99	9.99	9.99	9.99	9.99	10.00	10.05	10.31	
Depth	1.60	3.78	4.44	4.48	4.36	4.22	4.03	3.99	3.80	3.03	1.27	
Area	16.0	37.7	44.4	44.7	43.6	42.2	40.9	33.9	37.9	30.9	12.7	
KM 244	198.7 cms			7.65 l/sec remaining								
Conc.	30	31	33	34	35	34	36	36	35	34	32	10.0
Vel.	0.31	0.56	0.63	0.63	0.62	0.61	0.60	0.59	0.57	0.43	0.27	
W.P.	10.49	10.06	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.06	10.31	
Depth	1.60	3.78	4.45	4.48	4.36	4.22	4.10	3.93	3.80	3.10	1.27	
Area	16.0	37.8	44.4	44.8	43.6	42.2	40.9	39.9	38.0	30.9	12.7	
KM 245	193.7 cms			7.65 l/sec remaining								
Conc.	29	31	33	34	35	34	36	36	35	34	32	10.0
Vol.	0.31	0.56	0.63	0.63	0.62	0.61	0.60	0.59	0.57	0.50	0.27	
W.P.	10.50	10.07	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.06	10.32	
Depth	1.60	3.78	4.45	4.49	4.37	4.23	4.10	4.00	3.81	3.10	1.27	
Area	16.0	37.8	44.5	44.9	43.7	42.3	41.0	40.0	38.0	31.0	12.7	
KM 246	200.8 cms			7.65 l/sec remaining								
Conc.	29	31	33	34	35	34	36	36	35	34	32	10.0
Vel.	0.31	0.57	0.63	0.64	0.63	0.61	0.60	0.59	0.57	0.50	0.27	
W.P.	10.50	10.07	10.00	10.00	10.00	10.00	10.00	10.00	10.01	10.06	10.32	
Depth	1.60	3.78	4.45	4.49	4.37	4.23	4.10	4.00	3.81	3.10	1.27	
Area	16.0	37.8	44.5	44.9	43.7	42.3	41.0	40.0	38.1	31.0	12.7	
KM 247	201.8 cms			7.65 l/sec remaining								
Conc.	29	31	32	34	35	34	36	35	35	33	32	10.0
Vel.	0.31	0.57	0.64	0.64	0.63	0.62	0.60	0.59	0.57	0.50	0.27	
W.P.	10.50	10.07	10.00	10.00	lb.00	10.00	10.00	10.00	10.01	10.07	10.32	
Depth	1.60	3.78	4.46	4.49	4.38	4.23	4.11	4.01	3.81	3.10	1.27	
Area	16.0	37.9	44.6	44.9	43.8	42.4	41.1	40.1	38.1	31.0	12.7	
KM 248	202.9 cms			7.65 l/sac remaining								
Conc.	29	31	32	33	34	33	35	35	35	33	32	10.0
Vel.	0.32	0.57	0.64	0.64	0.63	0.62	0.61	0.60	0.58	0.50	0.28	
W.P.	10.50	10.07	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.07	10.32	
Depth	1.60	3.79	4.46	4.50	4.38	4.24	4.11	4.01	3.82	3.11	1.27	
Area	16.0	37.9	44.6	45.0	43.0	42.4	41.1	40.1	38.2	31.1	12.7	
KM 249	203.9 cms			7.65 l/sec remaining								
Conc.	29	31	32	33	34	33	35	35	34	33	31	10.0
Vel.	0.32	0.57	0.64	0.65	0.63	0.62	0.61	0.60	0.58	0.50	0.28	
W.P.	10.51	10.08	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.07	10.33	
Depth	1.60	3.79	4.46	4.50	4.38	4.24	4.11	4.01	3.82	3.11	1.27	
Area	16.0	37.9	44.7	45.0	43.9	42.4	41.2	40.2	38.2	31.1	12.7	
KM 250	205.0 cms			7.65 l/sec remaining								
Csnc.	27	30	31	31	29	28	31	35	38	38	37	11.8
Vel.	0.37	0.61	0.66	0.74	0.83	0.88	0.91	0.34	0.87	0.67	0.34	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	0.86	1.73	2.00	2.40	2.84	3.10	3.27	3.43	3.11	2.08	0.73	
Area	10.1	21.2	23.7	20.4	33.6	36.7	38.6	40.6	36.7	24.6	8.6	
KM 251	205.1 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	32	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0.46	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.23	2.57	2.88	3.45	4.07	4.45	4.63	4.32	4.46	2.93	1.05	
Area	14.6	30.4	34.0	40.8	48.2	52.7	55.5	58.2	52.7	35.3	12.4	
KM 252	205.2 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	32	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	9.63	0.65	0.61	0.46	0.23	

W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.23	2.57	2.88	3.45	4.08	4.45	4.6'3	4.92	4.46	2.99	1.05	
Area	14.6	30.4	34.0	40.8	48.2	52.7	55.5	58.2	52.8	35.3	12.4	
KM 253	295.4 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	32	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0. 47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.23	2.57	2.88	3.45	4.08	4.46	4.69	4.92	4.46	2.99	1.05	
Area	14.6	30.4	34.1	40.8	48.2	52.7	55.5	58.3	52.8	35.4	12.4	
KM 254	205.5 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	32	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.33	
Depth	1.23	2.57	2.88	3.45	4.08	4.46	4.63	4.93	4.46	2.99	1.05	
Area	14.6	30.4	34.1	40.8	48.2	52.7	55.5	58.3	52.8	35.4	12.4	
KM 255	205.7 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	31	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.23	2.57	2.88	3.45	4.08	4.46	4.69	4.93	4.46	2.99	1.05	
Area	14.6	30.4	34.1	40.9	48.3	52.7	55.5	58.3	52.8	39.4	12.4	
KM 256	205.8 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	31	11.8
Val.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.23	2.57	2.88	3.45	4.08	4.46	4.69	4.93	4.46	2.99	1.05	
Ayea	14.6	30.4	34.1	40.9	48.3	52.7	55.5	58.3	52.8	35.4	12.4	
KM 257	206.0 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	32	31	34	34	34	33	31	11.8
Vel.	0.26	0.42	0.46	0.51	0.57	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.39	
Depth	1.24	2.57	2.88	3.46	4.08	4.46	4.70	4.93	4.47	2.99	1.05	
Area	14.6	30.5	34.1	40.9	48.3	52.8	55.6	58.3	52.8	35.4	12.4	
KM 258	206.1 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	31	31	33	34	34	33	31	11.8
Vel.	0.26	0.42	0.46	0.52	0.57	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.39	
Depth	1.24	2.58	2.88	3.46	4.08	4.46	4.70	4.93	4.47	2.99	1.05	
Area	14.6	30.5	34.1	40.3	48.3	52.8	55.6	58.3	52.8	35.4	12.4	
KM 259	206.3 cms			7.65 l/sec remaining								
Conc.	26	28	30	31	31	31	33	34	34	33	31	11.8
Vel.	0.26	0.43	0.46	0.52	0.58	0.61	0.63	0.65	0.61	0.47	0.23	
W.P.	12.05	11.83	11.84	11.85	11.84	11.83	11.83	11.83	11.88	11.95	11.99	
Depth	1.24	2.58	2.89	3.46	4.08	4.46	4.70	4.93	4.47	3.00	1.05	
Area	14.6	30.5	34.1	40.9	48.3	52.8	55.6	58.3	52.9	35.4	12.4	
KM 260	206.4 cms			7.65 l/sec remaining								
Conc.	28	30	32	33	34	33	35	35	35	34	32	11.4
Vel.	0.28	0.47	0.48	0.50	0.51	0.52	0.52	0.50	0.45	0.41	0.26	
W.P.	11.87	11.38	11.38	11.38	11.38	11.38	11.38	11.39	11.42	11.38	11.77	
Depth	1.97	4.11	4.35	4.51	4.67	4.80	4.87	4.64	3.89	3.43	1.75	
Ayea	22.4	46.8	49.6	51.3	53.1	54.7	55.4	52.8	44.2	39.0	19.9	
KM 261	206.6 cms			7.65 1 /sec remaining								
Conc.	28	31	32	33	33	32	34	36	36	35	33	11.4
Vel.	0.33	0.54	0.57	0.58	0.59	0.60	0.61	0.53	0.52	0.48	0.30	
W.P.	11.87	11.38	11.38	11.38	11.38	11.38	11.38	11.39	11.42	11.38	11.77	
Depth	1.69	3.53	3.74	3.87	4.00	4.12	4.18	3.98	3.33	2.94	1.50	
Area	19.2	40.2	42.5	44.0	45.5	46.9	47.5	45.3	37.9	33.4	17.1	
KM 262	206.7 cms			7.65 1 /sec remaining								
Conc.	28	31	32	33	33	32	34	36	36	35	33	11.4
Vei.	0.33	0.54	0.57	0.58	0.59	0.60	0.61	0.5'3	0.52	0.48	0.30	
W.P.	11.87	11.38	11.38	11.38	11.38	11.38	11.38	11.39	11.42	11.38	11.77	
Depth	1.69	3.53	3.74	3.87	4.00	4.12	4.18	3.98	3.33	2.34	1.50	
Area	19.2	40.2	42.5	44.0	45.6	46.9	47.5	45.3	37.3	33.4	17.1	
KM 263	206.8 cms			7.65 l/sec remaining								
Conc.	28	31	32	33	33	32	34	36	36	34	33	11.4
Vel.	0.33	0.54	0.57	0.58	0.53	0.60	0.61	0.59	0.52	0.48	0.30	

W.P.	11.87	11.38	11.38	11.38	11.38	11.38	11.38	11.39	11.42	11.38	11.77	
Depth	1.69	3.93	3.74	3.87	4.00	4.12	4.18	3.98	3.33	2.94	1.50	
Area	19.2	40.2	42.5	44.0	4S.G	46.9	47.5	45.3	37.9	33.5	17.1	
KM 264	207.0 cms			7.65 l/sec remaining								
Conc.	28	31	32	33	33	32	34	36	36	34	33	11.4
Vel.	0.33	0.55	0.57	0.58	0.59	0.60	0.61	0.59	0.52	0.48	0.30	
W.P.	11.87	11.38	11.38	11.38	11.38	11.38	11.38	11.39	11.42	11.38	11.77	
Depth	1.69	3.53	3.74	3.87	4.00	4.12	4.18	3.99	3.34	2.94	1.50	
Area	19.2	40.2	42.5	44.0	45.6	46.9	47.5	45.3	38.0	33.5	17.1	
KM 265	207.1 cms			7.65 l/sec remaining								
Conc.	23	25	27	26	24	27	28	33	37	39	39	20.0
Vel.	0.07	0.18	0.26	0.30	0.32	0.34	0.36	0.39	0.39	0.37	0.23	
W.P.	20.04	20.07	20.04	20.04	20.04	20.03	20.04	20.04	20.04	20.03	20.38	
Depth	0.36	1.51	2.65	3.26	3.71	4.04	4.38	4.90	4.89	4.58	2.30	
Area	7.2	30.2	53.1	65.3	74.3	80.9	87.7	98.3	98.0	91.7	46.0	
KM 266	207.4 cms			7.65 l/sec remaining								
Conc.	22	25	25	25	26	28	30	32	34	39	41	20.0
Vel.	0.09	0.22	0.32	0.37	0.40	0.42	0.45	0.48	0.48	0.46	0.29	
W.P.	20.04	20.07	20.04	20.04	20.04	20.03	20.04	20.04	20.04	20.03	20.38	
Depth	0.29	1.23	2.15	2.65	3.01	3.28	3.56	3.98	3.97	3.72	1.87	
Area	5.9	24.5	43.2	53.1	60.4	65.7	71.3	79.8	79.6	74.5	37.4	
KM 267	207.6 cms			7.64 l/sec remaining								
Conc.	22	25	25	25	26	28	30	32	34	39	41	20.0
Vel.	0.09	0.22	0.32	0.37	0.40	0.42	0.45	0.48	0.48	0.46	0.29	
W.P.	20.04	20.07	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.03	20.38	
Depth	0.29	1.23	2.15	2.65	3.01	3.28	3.56	3.98	3.98	3.72	1.87	
Area	5.9	24.6	43.2	53.1	60.4	65.8	71.3	79.8	79.6	74.5	37.4	
KM 268	207.8 cms			7.64 l/sec remaining								
Conc.	22	25	25	25	26	28	30	32	34	39	41	20.0
Vel.	0.09	0.22	0.32	0.37	0.40	0.42	0.45	0.48	0.48	0.46	0.29	
W.P.	20.04	20.08	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.38	
Depth	0.29	1.23	2.15	2.65	3.01	3.28	3.56	3.99	3.98	3.72	1.87	
Area	5.9	24.6	43.2	53.1	60.4	65.8	71.3	79.8	79.7	74.5	37.4	
KM 269	208.1 cms			7.64 l/sec remaining								
Conc.	22	2s	25	2s	26	28	30	32	34	39	41	20.0
Vel.	0.09	0.22	0.32	0.37	0.40	0.42	0.45	0.48	0.48	0.46	0.29	
W.P.	20.04	20.08	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.38	
Depth	0.29	1.23	2.19	2.65	3.01	3.28	3.56	3.99	3.98	3.72	1.87	
Area	5.9	24.6	43.2	53.1	60.4	65.8	71.3	79.9	79.7	74.5	37.4	
KM 270	208.3 cms			7.64 l/sec remaining								
Conc.	31	30	29	27	24	20	16	13	11	10	10	30.7
Vel.	0.39	0.61	0.59	0.55	0.46	0.37	0.29	0.22	0.16	0.13	0.08	
W.P.	30.89	30.70	30.70	30.71	30.71	30.71	30.70	30.70	30.70	30.70	30.70	
Depth	1.91	3.69	3.34	3.17	2.42	1.71	1.20	0.79	0.50	0.35	0.16	
Area	58.6	113.4	108.6	97.3	74.4	52.6	36.8	24.2	15.3	10.9	4.8	
KM 271	208.5 cms			7.64 l/sec remaining								
Conc.	30	30	30	28	24	20	15	13	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.41	0.33	0.25	0.18	0.15	0.09	
W.P.	30.89	30.70	30.70	30.71	30.71	30.71	30.71	30.71	30.70	30.70	30.71	
Depth	1.69	3.27	3.13	2.81	2.15	1.52	1.06	0.70	0.44	0.31	0.14	
Area	51.9	100.5	96.2	86.2	65.9	46.6	32.6	21.4	13.6	9.7	4.3	
KM 272	208.8 cms			7.64 l/sec remaining								
Conc.	30	30	30	27	24	20	15	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	
W.P.	30.89	30.71	30.71	30.71	30.71	30.71	30.71	30.71	30.71	30.71	30.71	
Depth	1.69	3.27	3.13	2.81	2.15	1.52	1.06	0.70	0.44	0.32	0.14	
Area	51.9	100.5	96.2	86.2	69.9	46.6	32.6	21.5	13.6	9.7	4.3	
KM 273	209.0 cms			7.64 l/sec remaining								
Conc.	30	30	30	27	24	20	15	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	
W.P.	30.89	30.71	30.71	30.71	30.72	30.71	30.71	30.71	30.71	30.71	30.71	
Depth	1.69	3.27	3.13	2.81	2.15	1.52	1.06	0.70	0.44	0.32	0.14	
Area	51.9	100.5	96.2	86.3	65.9	46.7	32.6	21.5	13.6	9.7'	4.3	
KM 274	209.2 cms			7.64 l/sec remaining								
Conc.	30	30	29	27	24	20	15	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	

W.F.	30.90	30.71	30.71	30.72	30.72	30.71	30.71	30.71	30.71	30.71	30.71	
Depth	1.69	3.27	3.13	2.81	2.15	1.52	1.06	0.70	0.44	0.32	0.14	
Area	52.0	100.5	96.3	86.3	66.0	46.7	32.7	21.5	13.6	3.7	4.3	
KM 275	209.5 cms			7.64 l/sec remaining								
Conc.	30	30	29	27	24	20	15	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	
W.P.	30.90	30.71	30.71	30.72	30.72	30.72	30.71	30.71	30.71	30.71	30.71	
Depth	1.69	3.27	3.14	2.81	2.15	1.52	1.06	0.70	0.44	0.32	0.14	
Area	52.0	100.6	36.3	86.3	66.0	46.7	32.7	21.S	13.6	9.8	4.3	
KM 276	209.7 cm5			7.64 l/sec remaining								
Conc.	30	30	29	27	24	20	15	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	
W.F.	30.90	30.71	30.71	30.72	30.72	30.72	30.72	30.71	30.71	30.71	30.71	
Depth	1.69	3.28	3.14	2.81	2.15	1.52	1.06	0.70	0.45	0.32	0.14	
Area	52.0	100.6	96.3	86.3	66.0	46.7	32.7	21.6	13.7	9.8	4.3	
KM 277	203.9 cms			7.64 l/sec remaining								
Conc.	30	30	29	27	24	20	1s	12	10	9	8	30.7
Vel.	0.44	0.69	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.04	
W.P.	30.90	30.72	30.72	30.72	30.72	30.72	30.72	30.72	30.72	30.72	30.72	
Depth	1.69	3.28	3.14	2.81	2.15	1.52	1.07	0.70	0.45	0.32	0.14	
Area	52.0	100.6	96.3	86.4	66.0	46.8	32.7	21.6	13.7	9.8	4.4	
KM 278	210.2 cms			7.64 1 /sec remaining								
Conc.	30	30	29	27	24	20	15	12	10	9	8	30.7
Vel.	0.45	0.69	0.67	0.62	0.92	0.42	0.33	0.25	0.19	0.15	0.09	
W.P.	30.90	30.72	30.72	30.72	30.73	30.72	30.72	30.72	30.72	30.72	30.72	
Depth	1.69	3.28	3.14	2.81	2.15	1.52	1.07	0.70	0.45	0.32	0.14	
Area	52.0	100.7	96.4	86.4	66.1	46.8	32.7	21.6	13.7	9.8	4.4	
KM 273	210.4 cms			7.64 l/sec remaining								
Conc.	30	30	29	27	24	20	15	12	10	9	8	30.7
Vel.	0.45	0.63	0.67	0.62	0.52	0.42	0.33	0.25	0.19	0.15	0.09	
W.P.	30.90	30.72	30.72	30.72	30.73	30.72	30.72	30.72	30.72	30.72	30.72	
Depth	1.69	3.28	3.14	2.81	2.15	1.52	1.07	0.70	0.45	0.32	0.14	
Area	52.0	100.7	96.4	86.4	66.1	46.8	32.8	21.6	13.7	9.9	4.4	
KM 280	210.7 cms			7.64 l/sec remaining								
Conc.	24	23	21	17	14	12	9	7	7	6	6	12.8
Vel.	2.06	3.33	2.81	1.98	1.38	1.04	0.73	0.44	0.23	0.26	0.21	
W.P.	13.81	12.82	12.95	12.89	12.83	12.82	12.82	12.82	12.81	12.81	12.81	
Depth	1.77	3.43	2.68	1.57	0.30	0.58	0.34	0.16	0.06	0.07	0.05	
Area	22.7	44.0	34.4	20.1	11.5	7.4	4.3	2.0	0.7	0.9	0.7	
KM 281	210.3 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	9	9	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.50	0.30	0.16	0.18	0.15	
W.P.	13.82	12.82	12.95	12.89	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.91	2.28	1.31	0.84	0.49	0.23	0.09	0.10	0.08	
Area	33.1	64.0	SO.1	29.2	16.8	10.8	6.3	2.9	1.1	1.3	1.0	
KM 282	211.1 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	9	9	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.50	0.30	0.16	0.18	0.15	
W.P.	13.82	12.82	12.95	12.89	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.31	2.28	1.31	0.84	0.50	0.23	0.09	0.10	0.08	
Area	33.1	64.1	SO.1	29.2	16.8	10.8	6.3	2.9	1.1	1.3	1.0	
KM 283	211.4 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	9	9	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.35	0.71	0.50	0.30	0.16	0.18	0.15	
W.P.	13.82	12.82	12.95	12.83	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.91	2.28	1.31	0.84	0.50	0.23	0.09	0.11	0.08	
Area	33.1	64.1	so. 1	29.3	16.8	10.8	6.4	3.0	1.1	1.4	1.0	
KM 284	211.6 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	9	9	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.50	0.31	0.17	0.18	0.15	
W.P.	13.82	12.82	12.95	12.89	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.91	2.28	1.31	0.85	0.50	0.23	0.0'3	0.11	0.08	
Area	33.1	64.1	50.1	29.3	16.8	10.8	6.4	3.0	1.2	'1.4	1.0	
KM 285	211.8 cms			7.64 1 /sec remaining								
Conc.	23	23	22	18	15	13	11	9	9	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.50	0.31	o. 17	0.19	0.15	

W.P.	13.82	12.82	12.95	12.89	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.91	2.29	1.31	0.85	0.50	0.23	0.09	0.11	0.08	
Area	33.1	64.1	50.1	29.3	16.8	10.8	6.4	3.0	1.2	1.4	1.0	
KM 286	212.1 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	3	3	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.35	0.71	0.50	0.31	0.17	0.19	0.15	
W.P.	13.82	12.82	12.35	12.89	12.83	12.82	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.31	2.29	1.31	0.85	0.50	0.24	0.09	0.11	0.08	
Area	33.1	64.1	50.2	29.3	16.8	10.3	6.4	3.0	1.2	1.4	1.0	
KM 287	212.3 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	3	3	8	8	12.8
Vel.	1.41	2.28	1.33	1.36	0.35	0.71	0.50	0.31	0.17	0.19	0.15	
W.P.	13.82	12.82	12.35	12.30	12.83	12.83	12.82	12.82	12.82	12.82	12.82	
Depth	2.58	5.00	3.91	2.29	1.32	0.85	0.50	0.24	0.03	0.11	0.08	
Area	33.1	64.2	50.2	29.3	16.9	10.9	6.4	3.0	1.2	1.4	1.0	
KM 288	212.5 cms			7.64 l/sec remaining								
Conc.	23	23	22	18	15	13	11	9	3	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.51	0.31	0.17	0.13	0.15	
W.P.	13.82	12.82	12.95	12.90	12.83	12.83	12.82	12.82	12.82	12.82	12.82	
Depth	2.59	5.01	3.32	2.29'	1.32	0.85	0.50	0.24	0.10	0.11	0.08	
Area	33.1	64.2	50.2	23.3	16.9	10.9	6.4	3.0	1.2	1.4	1.0	
KM 283	212.8 cms			7.64 1 /sec remaining								
Conc.	23	23	22	18	15	13	11	9	3	8	8	12.8
Vel.	1.41	2.28	1.93	1.36	0.95	0.71	0.51	0.31	0.17	0.13	0.15	
W.P.	13.83	12.83	12.95	12.90	12.83	12.83	12.82	12.82	12.82	12.82	12.82	
Depth	2.59	5.01	3.92	2.29	1.32	0.85	0.50	0.24	0.10	0.11	0.08	
Area	33.2	64.2	50.2	29.4	16.9	10.9	6.5	3.1	1.2	1.5	1.0	
KM 290	213.0 cms			7.64 l/sec remaining								
Conc.	28	29	30	30	30	30	30	29	29	28	26	8.9
Vel.	0.19	0.36	0.41	0.44	0.43	0.40	0.35	0.30	0.25	0.19	0.10	
W.P.	10.28	9.05	9.02	8.93	8.96	9.01	9.01	9.00	9.00	9.00	3.07	
Depth	3.71	8.48	10.49	11.63	11.28	3.87	8.11	6.39	4.76	3.16	1.18	
Area	33.1	75.7	93.7	103.8	100.7	88.1	72.4	57.1	42.5	28.2	10.5	
KM 291	213.2 cms			7.64 l/sec remaining								
Conc.	27	29	29	30	30	31	30	30	29	28	26	8.9
Vel.	0.28	0.52	0.60	0.65	0.63	0.58	0.51	0.44	0.36	0.27	0.14	
W.P.	10.28	9.05	9.02	8.33	8.96	9.01	9.01	9.00	9.00	3.00	3.07	
Depth	2.55	5.83	7.21	7.98	7.75	6.78	5.57	4.39	3.27	2.17	0.81	
Area	22.8	52.0	64.3	71.3	69.2	60.5	43.7	33.2	29.2	19.4	7.2	
KM 232	213.5 cms			7.64 l/sec remaining								
Conc.	27	29	29	30	30	31	30	30	29	28	26	8.9
Vel.	0.28	0.52	0.60	0.65	0.64	0.58	0.51	0.44	0.36	0.27	0.14	
W.P.	10.28	9.05	9.02	8.93	8.96	9.01	9.01	9.00	9.00	9.00	9.07	
Depth	2.55	5.83	7.21	7.99	7.75	6.78	5.57	4.39	3.27	2.17	0.81	
Area	22.8	52.0	64.4	71.3	69.2	60.5	49.7	39.2	29.2	19.4	7.2	
KM 293	213.7 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	31	30	30	29	28	26	8.9
Vel.	0.28	0.52	0.60	0.65	0.64	0.58	0.51	0.44	0.36	0.27	0.14	
W.P.	10.28	9.05	9.02	8.93	8.96	9.01	9.01	9.00	9.00	9.00	9.07	
Depth	2.55	5.83	7.21	7.99	7.75	6.78	5.57	4.39	3.27	2.17	0.81	
Area	22.8	52.0	64.4	71.3	69.2	60.5	49.7	39.2	29.2	19.4	7.2	
KM 294	213.9 cms			7.64 1 /sec remaining								
Conc.	27	28	29	30	30	31	30	30	29	28	26	8.3
Vel.	0.28	0.52	0.60	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	
W.P.	10.28	9.05	9.02	8.33	8.36	9.01	3.01	3.00	9.00	9.00	9.07	
Depth	2.95	5.83	7.21	7.33	7.75	6.78	5.57	4.39	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.3	63.2	60.5	43.7	33.2	23.2	13.4	7.2	
KM 235	214.2 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	30	30	30	23	28	26	8.3
Vel.	0.28	0.52	0.60	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	
W.P.	10.28	9.05	9.02	8.93	8.96	9.01	9.01	3.00	9.00	3.00	9.08	
Depth	2.55	5.83	7.21	7.39	7.75	6.78	5.57	4.3'3	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.3	69.2	60.6	43.8	33.2	23.2	19.4	7.2	
KM 296	214.4 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	30	30	30	23	28	26	8.9
Vel.	0.28	0.53	0.61	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	

W.P.	10. 28	9.05	9.02	8.93	8.96	'3	.01	9.01	9.00	9.00	9.00	9.08
Depth	2.55	5.83	7.21	7.99	7.75	6.78	5.57	4.40	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.3	69.2	60. 6	49.8	39.3	29.2	19.4	7.2	
KM 297	214.6 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	30	30	30	29	28	26	8.9
Vel.	0.28	0 .53	0.61	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	
W.P.	10.23	5.05	9.02	8.93	8.96	9.01	9.01	9.00	9.00	9.00	9.08	
Depth	2 .55	5.83	7.21	7.99	7.75	6.78	5.57	4.40	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.4	69.2	60. 6	49.8	39.3	29.2	19.4	7.2	
KM 298	214.9 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	30	30	30	29	28	26	8.9
Vel.	0.28	0.53	0.61	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	
W.P.	10.29	9.05	9.02	8.33	8.96	9.01	9.01	9.00	9.00	9.00	'3.08	
Depth	2.55	5.83	7.21	7. 99	7. 75	6.78	5.57	4.40	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.4	69.2	60.6	49.8	33.3	29.2	13.4	7.2	
KM 239	215.1 cms			7.64 l/sec remaining								
Conc.	27	28	29	30	30	30	30	30	29	28	26	8.9
Vel.	0.28	0.53	0.61	0.65	0.64	0.58	0.51	0.44	0.36	0.28	0.14	
W.P.	10.23	9.05	9.03	8.93	8.96	9.01	9.01	9. 00	9.00	9. 00	9.08	
Depth	2 .55	5.83	7.21	7.99	7.75	6.78	5.58	4.40	3.27	2.17	0.81	
Area	22.8	52.1	64.4	71.4	69.3	60.6	49.8	39.3	29.2	19.4	7.2	
KM 300	215.3 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	33	34	33	32	31	31	34.0
Vel.	0.15	0.24	0.24	0.23	0.24	0.27	0.30	0.34	0.34	0.23	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.03	2.18	2.15	2.00	2.14	2.47	3.05	3.53	3.55	2.83	1.09	
Area	37.1	74.1	73.2	68.2	72.8	83.9	103.9	122.2	120.8	96.3	37.1	
KM 301	215.6 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	31	34.0
Vel.	0.16	0.24	0.24	0.23	0.24	0.27	0.31	0.34	0. 34	0. 29	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.09	2.18	2.15	2.00	2.14	2.47	3.05	3.59	3.55	2.83	1.09	
Area	37.1	74.1	73.2	68.2	72.8	83.9	103.9	122.3	120.8	96.3	37.1	
KM 302	215.8 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	31	34.0
Vel.	0.16	0.24	0.24	0.23	0.24	0.27	0.31	0.34	0.34	0.29	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.03	2.18	2.15	2.00	2.14	2.47	3.05	3.5'3	3.55	2.83	1.09	
Area	37.1	74.1	73.2	68.2	72.8	83.9	103.9	122.3	120.8	96.3	37.1	
KM 303	216.0 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	30	34.0
Vol.	0.16	0.25	0.24	0.23	0.24	0.27	0.31	0.34	0.34	0.29	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.09	2.18	2.15	2.00	2.14	2.47	3.05	3.59	3.55	2.83	1.09	
Area	37.1	74.2	73.2	68.2	72.8	83.9	103.9	122.3	120.8	96.3	37.1	
KM 304	216.3 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	30	34.0
Vel.	0.16	0.25	0.24	0.23	0.24	0.27	0.31	0.34	0.34	0.29	0.16	
W.P.	34.03	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.09	2.18	2.15	2.01	2.14	2.47	3.05	3.5'3	3.55	2.83	1.09	
Area	37.1	74.2	73.2	68.2	72.8	84.0	103.9	122.3	120.8	36.3	37.1	
KM 305	216.5 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	30	34.0
Vel.	0.16	0.25	0.24	0.23	0.24	0.27	0.31	0.34	0.34	0.29	0.16	
W.P.	34.03	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.03	2.18	2.15	2.01	2.14	2.47	3.05	3.60	3.55	2.83	1.09	
Area	37.1	74.2	73.2	68.2	72.8	84.0	103.9	122.3	120.8	'36.4	37.2	
KM 306	216.7 cms			7.64 l/sec remaining								
Conc.	27	26	27	30	31	32	34	33	32	31	30	3 40
Vel.	0.16	0.25	0.24	0.23	0.24	0.27	0.31	0.34	0. 34	0.29	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.09	2.18	2.15	2.01	2.14	2.47	3.06	3.60	3.55	2.83	1.09	
Area	37.1	74.2	73.2	68.3	72.8	84.0	103.9	122.3	120.8	96.4	37.1	
KM 307	217.0 cms			7.64 l/sec remaining								
Conc.	27	26	27	29	31	32	33	33	32	31	30	3-I.0
Vel.	0. 16	0.25	0.24	0.23	0.24	0.27	0.31	0.34	0.34	0.29	0.16	

W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34. 04	34.02	34.02	34. 05	34.09	
Depth	1.09	[illegible]	[illegible]	[illegible]	[illegible]	2.47	3.06	3.60	3.55	2.83	1.09	
Area	37.1	74.2	73.3	68.3	72.9	84.0	104.0	122.3	120.9	96.4	37.2	
KM 308	217.2	cms		7.64	1 /sec	remaining						
Conc.	27	26	27	29	31	[illegible]	33	33	[illegible]	31	30	34.0
Vel .	0.16	0.25	0.24	0. 23	0.24	0. 27	0. 3 1	0.34	0.34	0.29	0.16	
W.P.	34.03	34. 02	34.02	34.02	34. (j3	34. 02	34.04	34.02	34.02	34. 05	34.09	
Depth	1.09	2.18	2.15	2 .01	2.14	2.47	3 .06	3.60	3.55	2. 83	1.09	
Area	37.1	74.2	73.3	68.3	72.9	84. 0	104.0	122. 4	120.9	96.4	37.2	
KM 309	217.4	cms		7.64	1/sec	remaining						
Conc.	27	26	27	29	31	32	33	33	[illegible]	31	30	3-r.0
Vel.	0.16	0.25	0.24	0. 23	0. 24	0. 27	(j. 31	0.34	0.34	(j. 29	0.16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34. 02	34. 02	34. 05	34.09	
Depth	1.09	2.18	2.15	2.01	2.14	2.47	3 .06	3.60	3.55	2. 83	1.09	
Ar ed	37.1	74.2	73.3	68.3	72.3	84.0	104.0	122.4	120.9	36.4	37.2	
Kt-1310	217.7	cms		7.64	1/sec	remaining						
Conc.	26	26	27	29	31	32	33	33	[illegible]	31	30	34.0
Vel .	0.16	(3.25	0.24	0. 23	0.24	0.27	0.31	(j.34	0.34	0.29	(j. 16	
W.P.	34.09	34.02	34.02	34.02	34.03	34.02	34.04	34.02	34.02	34.05	34.09	
Depth	1.09	2.18	2.15	2.01	2.14	2.47	3.06	3.60	3.55	2.83	1.09	
Area	37.1	74.3	73.3	68.3	72.4	84.0	104.0	122.4	120.9	96.4	37.2	

8G -SCENARIO #7

Spill site: River Km 160 W Spill rate 7.67 l/s
CONCENTRATION ppm, VELOCITY m/s, WETTED PERIMETER m, DEPTH m, AREA m2

River KM	West Bank 1	2	3	4	5	6	7	8	9	10	East Bank 11	Panel Width (m)
KM 160	347.3 cms			7.67 l/sec remaining								
Conc.	1174	0	0	0	0	0	0	0	0	0	0	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.1	29	29	28	27	12	11	10	23	22	21	19	7.8
Vel.	0.98	1.73	1.38	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.2	20	21	22	21	18	18	17	19	19	22	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.3	19	20	21	20	17	18	18	19	20	22	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.2s	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.4	19	20	21	20	17	18	18	20	20	22	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.5	18	20	21	20	17	18	18	20	20	23	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.3';	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.6	18	20	21	20	17	18	18	20	20	23	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.2s	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.7	18	20	21	20	17	18	18	20	20	23	23	78.
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.8	18	20	21	20	17	18	18	20	20	23	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 160.9	18	20	21	20	17	18	18	20	20	23	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.79	1.12	
W.P.	7.99	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 161	347.5 cms			7.67 l/sec remaining								
Conc.	18	20	21	20	17	18	18	20	20	23	23	7.8
Vel.	0.98	1.73	1.98	2.32	2.54	2.35	2.07	1.89	1.81	1.7'3	1.12	

W.P.	7.93	7.83	7.82	7.88	7.81	7.84	7.83	7.81	7.81	7.81	8.08	
Depth	0.85	1.97	2.41	3.09	3.53	3.14	2.58	2.25	2.11	2.07	1.04	
Area	6.6	15.4	18.9	24.2	27.6	24.5	20.2	17.5	16.5	16.2	8.1	
KM 162	350.7 cms			7.67 l/sec remaining								
Conc.	18	20	21	19	17	18	18	20	20	23	24	7.8
Vel.	0.99	1.74	1.99	2.33	2.55	2.36	2.08	1.90	1.82	1.80	1.12	
W.P.	8.00	7.84	7.82	7.08	7.82	7.84	7.83	7.82	7.82	7.82	8.09	
Depth	0.85	1.98	2.42	3.10	3.54	3.15	2.59	2.26	2.12	2.08	1.04	
Area	6.7	15.4	18.9	24.3	27.7	24.6	20.2	17.6	16.5	16.3	8.2	
KM 163	352.3 cm5			7.67 l/sec remaining								
Conc.	18	20	21	19	17	18	18	20	20	22	23	7.8
Vel.	0.99	1.74	2.00	2.34	2.56	2.36	2.08	1.91	1.a3	1.81	1.12	
W.P.	8.00	7.84	7.83	7.88	7.82	7.85	7.83	7.82	7.82	7.82	8.0'3	
Depth	0.85	1.98	2.43	3.11	3.54	3.15	2.60	2.26	2.12	2.09	1.04	
Area	6.7	15.5	13.0	24.3	27.7	24.6	20.3	17.7	16.6	16.3	8.2	
KM 164	354.0 cm5			7.67 1 /sec remaining								
Conc.	18	20	21	19	17	18	18	1'3	20	22	23	7.8
Vel.	0.99	1.75	2.00	2.34	2.57	2.37	2.09	1.91	1.83	1.81	1.13	
W.P.	8.01	7.84	7.03	7.8'3	7.82	7.85	7.83	7.82	7.82	7.82	8.10	
Depth	0.86	1.98	2.43	3.11	3.55	3.16	2.60	2.27	2.13	2.09	1.05	
Area	6.7	15.5	19.0	24.3	27.8	24.7	20.3	17.7	16.6	16.4	8.2	
KM 165	355.7 cmm			7.67 1 /sec remaining								
Conc.	18	19	20	19	17	18	18	20	19	22	23	7.8
Vel.	1.00	1.75	2.01	2.35	2.57	2.38	2.10	1.92	1.84	1.82	1.13	
W.P.	8.01	7.84	7.83	7.89	7.83	7.85	7.84	7.83	7.82	7.82	8.10	
Depth	0.86	1.99	2.44	3.12	3.55	3.16	2.61	2.27	2.13	2.10	1.05	
Area	6.7	15.6	19.1	24.4	27.8	24.7	20.4	17.8	16.7	16.4	8.2	
KM 166	357.3 cms			7.67 l/sec remaining								
Conc.	18	19	20	19	17	18	18	20	19	22	23	7.8
Vel.	1.00	1.76	2.01	2.3'5	2.58	2.30	2.10	1.92	1.84	1.82	1.13	
W.P.	8.01	7.85	7.83	7.89	7.83	7.85	7.84	7.83	7.83	7.83	8.10	
Depth	0.86	1.99	2.44	3.12	3.56	3.17	2.61	2.28	2.14	2.10	1.05	
Area	6.7	15.6	19.1	24.4	27.8	24.8	20.4	17.8	16.7	16.4	8.2	
KM 167	359.0 cms			7.67 l/sec remaining								
Conc.	18	19	19	19	17	18	18	19	19	22	23	7.8
Vel.	1.00	1.76	2.02	2.36	2.58	2.39	2.11	1.93	1.85	1.83	1.13	
W.P.	8.02	7.85	7.04	7.89	7.83	7.86	7.84	7.83	7.03	7.83	8.11	
Depth	0.86	2.00	2.45	3.13	3.56	3.17	2.62	2.28	2.14	2.11	1.05	
Area	6.7	15.6	19.2	24.5	27.9	24.8	20.5	17.9	16.8	16.5	8.2	
KM 168	360.7 cms			7.67 l/sec remaining								
Conc.	18	13	19	19	17	17	18	19	19	22	23	7.8
Vel.	1.00	1.77	2.02	2.36	2.59	2.39	2.11	1.93	1.86	1.83	1.14	
W.P.	8.02	7.85	7.84	7.90	7.83	7.86	7.84	7.83	7.83	7.83	8.11	
Depth	0.86	2.00	2.45	3.13	3.57	3.18	2.62	2.29	2.15	2.11	1.05	
Area	6.8	15.7	19.2	24.5	27.9	24.9	20.5	17.3	16.8	16.5	8.3	
KM 169	362.3 cms			7.67 l/sec remaining								
Conc.	18	19	19	19	17	17	18	19	19	22	23	7.8
Vel.	1.01	1.77	2.03	2.37	2.99	2.40	2.12	1.94	1.86	1.84	1.14	
W.P.	8.02	7.05	7.04	7.90	7.83	7.86	7.85	7.84	7.83	7.83	8.11	
Depth	0.86	2.00	2.46	3.13	3.57	3.18	2.63	2.29	2.15	2.12	1.06	
Area	6.8	15.7	19.2	24.6	28.0	24.9	20.6	18.0	16.3	16.6	8.3	
KM 170	364.0 cms			7.67 l/sec remaining								
Conc.	18	19	19	19	17	17	17	19	19	22	23	7.8
Vel.	1.01	1.78	2.03	2.37	2.60	2.40	2.12	1.94	1.87	1.84	1.14	
W.P.	8.02	7.86	7.84	7.90	7.84	7.06	7.85	7.84	7.84	7.84	8.12	
Depth	0.87	2.01	2.46	3.14	3.58	3.19	2.63	2.30	2.16	2.12	1.06	
Area	6.8	15.7	19.3	24.6	28.0	25.0	20.6	18.0	16.9	16.6	8.3	
KM 171	370.6 cms			7.67 l/sec remaining								
Conc.	17	19	19	18	17	17	17	19	19	22	22	7.8
Vel.	1.02	1.79	2.05	2.33	2.62	2.43	2.14	1.96	1.89	1.86	1.15	
W.P.	8.04	7.87	7.85	7.91	7.85	7.87	7.86	7.85	7.85	7.85	a. 13	
Depth	0.87	2.03	2.48	3.16	3.60	3.21	2.65	2.32	2.18	2.14	1.06	
Area	6.8	13.9	19.4	24.8	28.2	25.2	20.8	18.2	17.1	16.8	8.4	
KM 172	377.2 cms			7.67 l/sec remaining								
Conc.	17	18	19	18	16	17	17	13	18	20	22	7.9
Vel.	1.63	1.81	2.07	2.41	2.64	2.45	2.16	1.38	1.91	1.88	1.16	

W.P.	8.05	7.88	7.86	7.92	7.86	7.88	7.87	7.86	7.86	7.85	8.14	
Depth	0.88	2.04	2.50	3.17	3.62	3.23	2.68	2.34	2.20	2.16	1.07	
Area	6.9	16.0	19.6	24.9	28.4	25.4	21.0	18.4	17.3	16.9		
KM 173	383.8 cms			7.67 l/sec remaining								
Conc.	17	18	18	17	16	17	17	18	18	20	22	7.9
Vel.	1.04	1.83	2.09	2.43	2.66	2.47	2.19	2.00	1.53	1.90	1.17	
W.P.	8.06	7.88	7.87	7.93	7.86	7.89	7.88	7.87	7.86	7.86	8.15	
Depth	0.88	2.06	2.51	3.19	3.64	3.25	2.69	2.36	2.22	2.17	1.08	
Area	6.9	16.2	19.8	25.1	28.6	25.5	21.2	18.5	17.5	17.1	8.5	
KM 174	390.4 cms			7.67 l/sec remaining								
Conc.	17	18	18	17	16	16	17	17	18	20	22	7.3
Vel.	1.05	1.85	2.11	2.45	2.69	2.49	2.21	2.03	1.95	1.92	1.18	
W.P.	8.07	7.89	7.88	7.94	7.87	7.90	7.89	7.87	7.87	7.87	8.17	
Depth	0.89	2.07	2.53	3.21	3.65	3.27	2.71	2.38	2.24	2.19	1.08	
Area	7.0	16.3	19.9	25.2	28.8	25.7	21.4	18.7	17.6	17.2	8.5	
KM 175	397.0 cms			7.67 l/sec remaining								
Conc.	17	18	17	17	15	16	16	17	18	20	22	7.3
Vel.	1.06	1.87	2.13	2.47	2.71	2.51	2.23	2.05	1.97	1.94	1.13	
W.P.	8.08	7.90	7.89	7.95	7.88	7.91	7.89	7.88	7.88	7.88	8.18	
Depth	0.90	2.09	2.55	3.22	3.67	3.29	2.73	2.39	2.26	2.20	1.09	
Area	7.1	16.4	20.1	25.4	28.9	25.9	21.5	18.9	17.8	17.4	8.6	
KM 176	403.6 cms			7.67 l/sec remaining								
Conc.	17	18	17	15	15	16	16	17	18	13	22	7.3
Vel.	1.07	1.88	2.15	2.49	2.73	2.53	2.25	2.07	1.99	1.96	1.20	
W.P.	8.09	7.91	7.90	7.96	7.89	7.92	7.90	7.89	7.89	7.89	8.19	
Depth	0.90	2.10	2.56	3.24	3.69	3.31	2.75	2.41	2.28	2.22	1.10	
Area	7.1	16.6	20.2	25.6	29.1	26.1	21.7	19.0	18.0	17.5	8.7	
KM 177	410.2 cms			7.67 l/sec remaining								
Conc.	16	17	17	15	15	16	16	16	17	19	21	7.3
Vel.	1.07	1.90	2.17	2.51	2.75	2.56	2.27	2.09	2.01	1.97	1.21	
W.P.	8.10	7.92	7.90	7.97	7.90	7.92	7.91	7.90	7.90	7.90	8.20	
Depth	0.91	2.12	2.58	3.26	3.71	3.33	2.77	2.43	2.30	2.24	1.10	
Area	7.2	16.7	20.4	25.7	29.3	26.3	21.9	19.2	18.1	17.7	8.7	
KM 178	416.8 cms			7.67 l/sec remaining								
Conc.	16	17	17	15	15	16	16	16	17	18	21	7.3
Vel.	1.08	1.92	2.19	2.53	2.77	2.58	2.29	2.11	2.03	1.39	1.22	
W.P.	8.11	7.93	7.91	7.97	7.91	7.93	7.92	7.91	7.91	7.91	8.21	
Depth	0.91	2.13	2.60	3.27	3.73	3.34	2.79	2.45	2.31	2.25	1.11	
Area	7.2	16.9	20.5	25.9	29.5	26.4	22.1	19.4	18.3	17.8	8.8	
KM 179	423.4 cms			7.67 l/sec remaining								
Conc.	16	17	17	14	15	16	16	16	17	18	21	7.3
Vel.	1.09	1.93	2.20	2.55	2.79	2.60	2.31	2.12	2.05	2.01	1.23	
W.P.	8.13	7.94	7.92	7.98	7.92	7.94	7.93	7.92	7.92	7.92	8.23	
Depth	0.92	2.15	2.61	3.29	3.74	3.36	2.81	2.47	2.33	2.27	1.12	
Area	7.3	17.0	20.7	26.0	29.6	26.6	22.2	19.5	18.5	18.0	8.8	
KM 180	430.0 cms			7.67 l/sec remaining								
Conc.	16	17	16	16	15	15	15	16	16	18	19	9.3
Vel.	0.90	1.57	1.78	1.89	1.87	1.76	1.67	1.60	1.52	1.39	0.82	
W.P.	9.59	9.34	9.32	9.31	9.31	9.32	9.31	9.31	9.31	9.32	9.52	
Depth	1.30	2.98	3.60	3.92	3.86	3.53	3.24	3.05	2.83	2.47	1.12	
Area	12.1	27.7	33.5	36.5	35.9	32.9	30.2	28.4	26.4	23.0	10.4	
KM 181	989.7 cms			7.67 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	4	3	3	11.9
Vel.	1.29	2.39	2.78	2.88	2.94	3.00	2.91	2.33	1.56	0.39	0.46	
W.P.	12.29	11.99	11.90	11.89	11.89	11.89	11.91	12.09	11.96	11.91	11.91	
Depth	1.60	4.00	5.00	5.28	5.44	5.60	5.36	3.89	2.09	1.04	0.32	
Area	19.1	47.6	59.4	62.8	64.7	66.6	63.7	46.3	24.8	12.3	3.3	
KM 182	990.2 cms			7.67 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	4	3	3	11.9
Vel.	1.33	2.47	2.87	2.98	3.04	3.10	3.01	2.41	1.61	1.02	0.48	
W.P.	12.29	11.99	11.90	11.89	11.89	11.89	11.91	12.09	11.96	11.91	11.91	
Depth	1.55	3.88	4.84	5.12	5.27	5.43	5.19	3.77	2.02	1.01	0.31	
Area	18.5	46.1	57.6	60.8	62.7	64.5	61.7	44.8	24.1	12.0	3.7	
KM 183	990.7 cms			7.67 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	4	3	3	11.9
Vel.	1.33	2.47	2.87	2.98	3.04	3.10	3.01	2.41	1.62	1.02	0.48	

W.P.	12.29	11.99	11.90	11.89	11.83	11.83	11.91	12.09	11.96	11.91	11.91	
Depth	1.55	3.88	4.84	5.12	5.27	5.43	5.14	3.77	2.02	1.01	0.31	
Area	18.5	46.1	57.6	60.9	62.7	64.5	61.7	44.9	24.1	12.0	3.7	
KM 184	991.2 cms			7.67 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	4	3	3	11.3
Vel.	1.33	2.47	2.87	2.98	3.04	3.10	3.01	2.41	1.62	1.02	0.48	
W.P.	12.29	11.99	11.90	11.83	11.89	11.89	11.91	12.09	11.96	11.91	11.91	
Depth	1.56	3.88	4.84	5.12	5.27	5.43	5.19	3.77	2.02	1.01	0.31	
Area	18.5	46.1	57.6	60.9	62.7	64.6	61.7	44.9	24.1	12.0	3.7	
KM 185	441.7 cms			7.67 l/sec remaining								
Conc.	5	5	6	7	7	8	7	7	6	6	6	16.8
Vel.	0.68	1.29	1.69	1.88	1.85	1.82	1.78	1.69	1.59	1.49	0.90	
W.P.	16.95	16.89	16.90	16.85	16.85	16.85	16.85	16.85	16.85	16.85	17.10	
Depth	1.07	2.81	4.26	5.00	4.88	4.76	4.58	4.25	3.87	3.49	1.65	
Area	18.1	47.4	71.8	84.2	82.1	80.2	77.1	71.5	65.2	58.9	27.9	
KM 186	993.8 cms			7.67 l/sec remaining								
Conc.	5	5	6	7	8	8	8	7	6	6	S	16.8
Vel.	0.77	1.46	1.92	2.13	2.10	2.07	2.01	1.92	1.80	1.69	1.02	
W.P.	16.96	16.89	16.91	16.85	16.85	16.85	16.85	16.85	16.85	16.85	17.10	
Depth	0.95	2.49	3.77	4.43	4.32	4.22	4.06	3.76	3.43	3.10	1.47	
Area	16.0	42.0	63.6	74.6	72.8	71.1	68.4	63.4	57.7	52.2	24.7	
KM 187	99S.8 cms			7.67 l/sec remaining								
Conc.	5	5	6	7	8	8	8	7	6	6	5	16.9
Vel.	0.78	1.46	1.92	2.13	2.10	2.07	2.02	1.92	1.80	1.69	1.02	
W.P.	16.96	16.89	16.91	16.85	16.85	16.85	16.85	16.85	16.85	16.85	17.11	
Depth	0.95	2.49	3.78	4.43	4.32	4.22	4.06	3.76	3.43	3.10	1.47	
Area	16.0	42.0	63.6	74.6	72.8	71.1	68.4	63.4	57.8	52.2	24.7	
KM 188	997.9 cms			7.67 l/sec remaining								
Conc.	5	S	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.46	1.92	2.14	2.10	2.07	2.02	1.92	1.81	1.69	1.02	
W.P.	16.96	16.90	16.91	16.85	16.85	16.85	16.86	16.86	16.86	16.86	17.11	
Depth	0.95	2.49	3.78	4.43	4.33	4.22	4.06	3.77	3.43	3.10	1.47	
Area	16.1	42.0	63.7	74.7	72.9	71.2	68.S	63.S	57.9	52.3	24.7	
KM 189	1000.0 cms			7.67 l/sec remaining								
Conc.	5	S	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.46	1.92	2.14	2.11	2.07	2.02	1.92	1.81	1.69	1.03	
W.P.	16.96	16.90	16.91	16.86	16.86	16.86	16.86	16.86	16.86	16.86	17.11	
Depth	0.95	2.50	3.78	4.43	4.33	4.23	4.07	3.77	3.44	3.10	1.47	
Area	16.1	42.1	63.7	74.7	73.0	71.3	68.9	63.6	57.9	52.3	24.8	
KM 190	1002.1 cms			7.67 l/sec remaining								
Conc.	S	S	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.47	1.92	2.14	2.11	2.08	2.02	1.93	1.81	1.69	1.03	
W.P.	16.97	16.90	16.32	16.86	16.86	16.86	16.86	16.86	16.86	16.86	17.11	
Depth	0.95	2.50	3.78	4.44	4.33	4.23	4.07	3.77	3.44	3.11	1.47	
Area	16.1	42.1	63.7	74.8	73.0	71.3	68.6	63.6	58.0	52.4	24.8	
KM 191	1004.1 cms			7.67 l/sec remaining								
Conc.	5	5	6	7	7	8	8	7	6	6	S	16.9
Vel.	0.78	1.47	1.93	2.14	2.11	2.08	2.03	1.93	1.81	1.70	1.03	
W.P.	16.97	16.90	16.92	16.86	16.86	16.86	16.86	16.86	16.86	16.86	17.12	
Depth	0.95	2.50	3.78	4.44	4.33	4.23	4.07	3.78	3.44	3.11	1.47	
Area	16.1	42.1	63.8	74.9	73.1	71.4	68.6	63.7	58.0	52.4	24.8	
KM 192	1006.2 cms			7.67 1 /sec remaining								
Conc.	5	5	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.47	1.93	2.15	2.11	2.08	2.03	1.93	1.82	1.70	1.03	
W.P.	16.97	16.90	16.92	16.86	16.86	16.86	16.86	16.87	16.87	16.87	17.12	
Depth	0.96	2.50	3.78	4.44	4.34	4.24	4.07	3.78	3.44	3.11	1.47	
Area	16.1	42.1	63.8	74.9	73.1	71.4	68.7	63.7	58.1	52.5	24.'3	
KM 193	1008.3 cms			7.67 l/sec remaining								
Conc.	5	S	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.47	1.93	2.15	2.12	2.08	2.03	1.93	1.82	1.70	1.03	
W.P.	16.97	16.91	16.92	16.86	16.87	16.86	16.87	16.87	16.87	16.87	17.12	
Depth	0.96	2.50	3.79	4.45	4.34	4.24	4.08	3.78	3.45	3.12	1.48	
Area	16.1	42.2	63.8	75.0	73.2	71.5	68.7	63.8	58.1	52.5	24.9	
KM 194	1010.3 cms			7.67 l/sec remaining								
Conc.	5	5	6	7	7	8	8	7	6	6	5	16.9
Vel.	0.78	1.47	1.93	2.15	2.12	2.04	2.03	1.94	1.82	1.70	1.03	

W.P.	16.98	16.91	16.93	16.87	16.87	16.87	10.87	16.97	16.87	16.87	17.1,::	
Depth	0.96	2.50	3.79	4.45	4.34	4.24	4.08	3.79	3.45	3.11	1.48	
Area	16.1	42.2	63.9	75.0	73.2	71.5	68.8	63.R	58.2	52.6	24.9	
KM 195	1012.4 cm5			7.67 l/sec remaining								
Conc.	6	6	6	7	7	6	6	5	5	4	4	12.3
Vel.	1.00	2.01	2.32	2.78	2.58	2.20	1.88	1.67	1.45	1.21	0.68	
W.P.	12.70	12.61	12.41	12.33	12.37	12.42	12.34	12.34	12.34	12.34	12.44	
Depth	1.63	4.69	6.91	7.50	6.71	5.31	4.16	3.47	2.80	2.12	0.89	
Area	20.1	57.8	85.1	92.4	02.7	65.4	51.2	42.8	34.5	26.2	11.0	
KM 196	1013.3 cms			7.67 l/sec remaining								
Conc.	6	6	6	7	7	6	6	5	4	4	4	12.3
Vel.	1.06	2.13	2.77	2.94	2.73	2.33	1.49	1.77	1.54	1.28	0.72	
W.P.	12.71	12.61	12.41	12.33	12.37	12.42	12.34	12.34	12.34	12.34	12.44	
Depth	1.55	4.44	6.54	7.10	6.36	5.03	3.94	3.29	2.65	2.01	0.85	
Area	19.1	54.7	80.6	87.5	78.3	61.9	48.5	40.5	32.6	24.8	10.4	
KM 197	1014.3 cms			7.67 l/sec remaining								
Conc.	6	6	6	7	7	6	6	5	4	4	4	12.3
Vel.	1.06	2.13	2.77	2.94	2.73	2.33	1.99	1.77	1.54	1.28	0.72	
W.P.	12.71	12.62	12.41	12.33	12.38	12.42	12.34	12.34	12.34	12.34	12.44	
Depth	1.55	4.44	6.54	7.10	6.36	5.03	3.94	3.29	2.65	2.01	0.85	
Area	19.1	54.8	80.6	87.6	78.4	62.0	48.5	40.6	32.7	24.8	10.5	
KM 198	1015.2 cms			7.67 l/sec remaining								
Conc.	6	6	6	7	7	6	6	5	4	4	4	12.3
Vel.	1.06	2.13	2.77	2.94	2.73	2.33	1.99	1.77	1.54	1.29	0.73	
W.P.	12.71	12.62	12.42	12.33	12.38	12.42	12.34	12.34	12.34	12.34	12.44	
Depth	1.55	4.44	6.54	7.11	6.36	5.03	3.94	3.29	2.65	2.01	0.85	
Area	19.1	54.8	80.6	87.6	78.4	62.0	48.5	40.6	32.7	24.8	10.5	
KM 199	1016.1 cms			7.67 l/sec remaining								
Conc.	6	6	6	7	7	6	6	5	4	4	4	12.3
Vel.	1.06	2.13	2.77	2.94	2.73	2.33	2.00	1.77	1.54	1.29	0.73	
W.P.	12.71	12.62	12.42	12.33	12.38	12.42	12.34	12.34	12.34	12.34	12.44	
Depth	1.55	4.44	6.54	7.11	6.36	5.03	3.94	3.29	2.65	2.02	0.85	
Area	19.1	54.8	80.6	87.6	78.4	62.0	48.6	40.6	32.7	24.8	10.5	
KM 200	1017.0 cms			7.66 l/sec remaining								
Conc.	6	7	7	7	8	7	6	6	5	5	4	16.9
Vel.	1.24	2.05	2.07	2.01	1.95	1.87	1.73	1.51	1.44	1.39	0.81	
W.P.	17.47	16.94	16.94	16.94	16.94	16.94	16.95	16.95	16.94	16.95	17.08	
Depth	2.29	4.77	4.82	4.62	4.42	4.16	3.70	2.99	2.77	2.65	1.17	
Area	38.8	80.7	81.7	78.2	74.9	70.9	62.6	50.6	46.9	44.9	19.9	
KM 201	1019.8 cms			7.66 l/sec remaining								
Conc.	7	7	7	7	7	7	6	6	5	5	5	16.9
Vel.	1.18	1.94	1.96	1.90	1.85	1.78	1.64	1.43	1.36	1.32	0.77	
W.P.	17.47	16.94	16.94	16.94	16.94	16.94	16.95	16.95	16.94	16.95	17.08	
Depth	2.42	5.04	5.10	4.88	4.67	4.40	3.91	3.16	2.93	2.80	1.24	
Area	41.1	85.4	86.4	82.7	79.2	74.5	66.2	53.5	4'3.6	47.5	21.1	
KM 202	1022.6 cms			7.66 l/sec remaining								
Conc.	7	7	7	7	7	7	6	6	5	5	S	16.9
Vel.	1.18	1.95	1.96	1.91	1.85	1.78	1.65	1.43	1.36	1.32	0.77	
W.P.	17.47	16.94	16.94	16.94	16.94	16.94	16.95	16.95	16.94	16.95	17.08	
Depth	2.43	5.04	5.11	4.89	4.68	4.40	3.91	3.16	2.94	2.81	1.25	
Area	41.1	85.4	86.5	82.8	79.3	74.6	66.3	53.6	49.7	47.6	21.1	
KM 203	1025.4 cms			7.66 l/sec remaining								
Conc.	7	7	7	7	7	7	6	6	5	5	5	16.9
Vel.	1.18	1.95	1.96	1.91	1.85	1.78	1.65	1.43	1.37	1.33	0.77	
W.P.	17.48	16.94	16.94	16.94	16.94	16.94	16.95	16.96	16.94	16.95	17.08	
Depth	2.43	5.05	5.11	4.89	4.68	4.41	3.92	3.17	2.94	2.81	1.25	
Area	41.1	85.5	86.6	82.9	79.3	74.7	66.4	53.6	49.8	47.6	21.1	
KM 204	1028.2 cms			7.66 l/sec remaining								
Conc.	7	7	7	7	7	7	6	6	5	5	5	16.9
Vel.	1.18	1.95	1.97	1.91	1.86	1.78	1.65	1.44	1.37	1.33	0.78	
W.P.	17.48	16.94	16.94	16.94	16.94	16.94	16.95	16.96	16.94	16.95	17.08	
Depth	2.43	5.05	5.11	4.90	4.69	4.41	3.92	3.17	2.94	2.82	1.25	
Area	41.2	85.6	86.6	82.9	79.4	74.8	66.5	53.7	49.'3	47.7	21.2	
KM 205	1030.9 cms			7.66 l/sec remaining								
Cunc.	7	7	7	7	7	7	6	6	5	5	5	16.9
Vel.	1.18	1.95	1.97	1.91	1.86	1.79	1.65	1.44	1.37	1.33	0.78	

W.F.	17.48	16.94	16.94	16.94	16.94	16.94	16.95	16.96	16.94	16.95	17.09	
Depth	2.43	5.06	S.12	4.90	4.64	4.42	3.93	3.18	2.95	2.82	1.25	
Area	41.2	85.6	86.7	83.0	79.5	74.8	66.5	53.8	50.0	47.8	21.2	
KM 206	1033.7 cms				7.66 l/sec remaining							
Conc.	7	7	7	7	7	7	6	6	5	5	5	16.9
Vel.	1.18	1.96	1.97	1.92	1.86	1.79	1.66	1.44	1.37	1.33	0.78	
W.P.	17.48	16.94	16.94	16.94	16.94	16.94	16.95	16.96	16.94	16.35	17.09	
Depth	2.43	5.06	5.12	4.91	4.70	4.42	3.93	3.18	2.95	2.83	1.25	
Area	41.2	85.7	86.8	83.1	79.6	74.9	66.6	53.9	50.0	47.3	21.3	
KM 207	1036.S cms				7.66 l/sec remaining							
Conc.	6	7	7	7	7	7	6	6	S	5	5	16.9
Vel.	1.19	1.96	1.97	1.92	1.87	1.79	1.66	1.44	1.38	1.34	0.78	
W.F.	17.48	16.95	16.94	16.94	16.94	16.94	16.95	16.96	16.95	16.95	17.09	
Depth	2.44	5.06	5.13	4.91	4.70	4.43	3.94	3.19	2.96	2.83	1.26	
Area	41.3	85.8	86.9	83.2	79.7	75.0	66.7	54.0	50.1	48.0	21.3	
KM 208	1039.3 cms				7.66 l/sec remaining							
Conc.	6	7	7	7	7	7	6	6	5	S	5	16.9
Vel.	1.19	1.96	1.98	1.92	1.87	1.80	1.66	1.45	1.38	1.34	0.78	
W.F.	17.48	16.95	16.94	16.94	16.94	16.95	16.95	16.96	16.95	16.95	17.0'3	
Depth	2.44	5.07	5.13	4.92	4.71	4.43	3.94	3.19	2.96	2.84	1.26	
Area	41.3	85.9	87.0	83.3	79.7	75.1	66.8	54.0	50.2	48.0	21.3	
KM 209	1042.1 cms				7.66 l/sec remaining							
Conc.	6	6	6	7	7	8	7	6	5	S	4	16.9
Vel.	1.19	1.93	2.00	2.08	2.12	2.14	2.17	2.20	1.99	1.51	0.78	
W.P.	17.27	16.94	16.94	16.94	16.94	16.94	16.94	16.94	16.99	16.99	17.03	
Depth	1.66	3.39	3.57	3.79	3.91	3.97	4.06	4.15	3.57	2.34	0.86	
Area	28.2	57.4	60.6	64.2	66.3	67.3	68.8	70.2	60.S	39.6	14.5	
KM 210	1044.9 cms				7.66 l/sec remaining							
Conc.	6	6	7	7	7	7	6	6	5	5	5	16.1
Vel.	1.24	2.03	2.14	2.09	2.04	1.95	1.78	1.54	1.51	1.49	0.86	
W.F.	16.65	16.07	16.06	16.06	16.06	16.07	16.08	16.08	16.07	16.08	16.25	
Depth	2.28	4.86	5.04	4.85	4.66	4.37	3.81	3.06	2.97	2.91	1.28	
Area	36.7	78.1	81.0	77.9	74.9	70.1	61.2	49.2	47.7	46.7	20.5	
KM 211	1047.7 cms				7.66 l/sec remaining							
Conc.	6	7	7	7	7	7	6	6	5	5	4	20.6
Vel.	1.34	2.11	2.05	1.97	1.86	1.80	1.77	1.68	1.51	1.32	0.78	
W.F.	21.04	20.60	20.60	20.60	20.60	20.60	20.60	20.60	20.60	20.60	20.68	
Depth	2.14	4.15	3.99	3.77	3.44	3.27	3.19	2.94	2.50	2.09	0.92	
Area	44.0	85.5	82.2	77.6	70.9	67.3	65.7	60.6	51.4	42.2	19.0	
KM 212	1050.5 cms				7.66 l/sec remaining							
Conc.	S	6	6	7	7	7	7	6	5	5	4	13.7
Vel.	1.16	2.15	2.56	2.73	2.74	2.61	2.39	2.20	2.06	1.75	0.95	
W.F.	13.97	13.75	13.69	13.67	13.67	13.68	13.68	13.67	13.67	13.71	13.83	
Depth	1.36	3.42	4.44	4.89	4.94	4.58	4.01	3.53	3.19	2.51	0.99	
Area	18.6	46.7	60.6	66.9	67.5	62.6	54.9	48.3	43.6	34.2	13.6	
KM 213	1053.2 cms				7.66 l/sec remaining							
Csnc.	5	6	6	7	7	7	7	6	5	5	4	13.7
Vel.	1.10	2.03	2.42	2.58	2.60	2.47	2.27	2.08	1.95	1.66	0.90	
W.F.	13.97	13.75	13.69	13.67	13.67	13.68	13.69	13.68	13.67	13.71	13.83	
Depth	1.44	3.62	4.70	5.18	5.22	4.85	4.25	3.74	3.38	2.66	1.05	
Area	19.7	49.5	64.2	70.8	71.4	66.3	58.1	51.1	46.2	36.3	14.4	
KM 214	1056.0 cms				7.66 l/sec remaining							
Conc.	5	6	6	7	7	7	7	6	5	5	4	13.7
Vel.	1.10	2.03	2.42	2.58	2.60	2.47	2.27	2.09	1.95	1.66	0.90	
W.P.	13.97	13.75	13.69	13.67	13.67	13.68	13.6'3	13.68	13.68	13.71	13.83	
Depth	1.44	3.63	4.70	5.18	5.23	4.86	4.26	3.75	3.39	2.66	1.06	
Area	1'3.7	49.6	64.3	70.9	71.5	66.4	58.2	51.2	46.3	36.4	14.5	
KM 215	1058.8 cms				7.66 l/sec remaining							
Conc.	6	6	7	7	7	7	6	6	S	5	4	16.9
Vel.	1.32	2.18	2.20	2.14	2.08	2.00	1.8'3	1.62	1.54	1.50	0.87	
W.P.	17.50	16.95	16.95	16.95	16.95	16.95	16.96	16.96	16.95	16.96	17.10	
Depth	2.22	4.62	4.69	4.49	4.30	4.05	3.60	2.92	2.72	2.60	1.16	
Area	37.7	78.4	79.4	76.1	72.9	68.6	61.1	49.5	46.0	44.1	19.6	
KM 216	1062.1 cms				7.66 l/sec remaining							
Conc.	6	6	7	7	7	7	6	6	S	5	4	16.9
Vel.	1.36	2.24	2.26	2.20	2.14	2.05	1.90	1.66	1.58	1.54	0.90	

W.P.	17.50	16.95	16.95	16.95	16.95	16.95	16.96		16.95	16.96	17.10	
Depth	2.17	4.52	4.58	4.33	4.20	3.36	3.52	16.97	2.66	2.543	1.13	
Area	36.8	76.6	77.6	74.3	71.2	67.1	5'3.7	48.4	45.0	43.1	19.2	
KM 217	1065.4	cms		7.66 l/sec remaining								
Conc.	6	6	7	7	7	7	6	6	5	4	4	17.0
Vel.	1.36	2.24	2.26	2.20	2.14	2.06	1.91	1.66	1.58	1.54	0.90	
W.P.	17.50	16.95	16.95	16.95	16.35	16.95	16.36	16.37	16.95	16.96	17.10	
Depth	2.17	4.52	4.58	4.39	4.21	3.96	3.53	2.86	2.66	2.55?	1.13	
Area	36.8	76.7	77.7	74.4	71.3	67.2	5'3.8	48.5	45.1	43.2	13.2	
KM 218	1068.7	cms		7.66 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	5	4	4	17.0
Vel.	1.36	2.25	2.27	2.21	2.14	2.06	1.91	1.66	1.59	1.54	0.90	
W.P.	17.50	16.96	16.95	16.95	16.95	16.95	16.96	16.97	16.96	16.96	17.10	
Depth	2.18	4.53	4.99	4.40	4.21	3.97	3.53	2.87	2.67	2L.55	1.14	
Area	36.9	76.7	77.8	74.5	71.4	67.3	59.3	48.6	45.2	43.3	19.3	
KM 219	1072.1	cms		7.66 l/sec remaining								
Conc.	6	6	7	7	7	7	6	5	5	4	4	17.0
Vel.	1.36	2.25	2.27	2.21	2.15	2.07	1.91	1.67	1.59	1.55	0.90	
W.P.	17.50	16.36	16.95	16.95	16.35	16.96	16.36	16.37	16.96	16.96	17.10	
Depth	2.18	4.53	4.59	4.40	4.22	3.37	3.5	4	2.87	2.67	2.56	1.14
Area	36.9	76.8	77.9	74.6	71.5	67.3	60.0	48.7	45.3	43.4	13.3	
KM 220	1075.4	cms		7.66 l/sec remaining								
Conc.	6	6	7	7	7	6	5	4	4	3	3	27.4
Vel.	0.57	0.38	1.06	1.04	0.96	0.84	0.72	0.69	0.63	0.46	0.21	
W.P.	27.78	27.40	27.38	27.39	27.39	27.41	27.39-	27.38	27.33	27.41	27.40	
Depth	3.24	7.17	8.07	7.85	7.00	5.71	4.53	4.19	3.69	2.31	0.69	
Area	88.7	196.2	221.1	214.9	191.8	156.4	124.0	114.3	101.0	63.2	18.9	
KM 221	1078.7	cms		7.66 1 /sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.80	1.36	1.47	1.45	1.34	1.17	1.01	0.96	0.88	0.65	0.30	
W.P.	27.78	27.40	27.39	27.39	27.39	27.42	27.33	27.39	27.39	27.42	27.40	
Depth	2.33	5.16	5.81	5.65	5.04	4.11	3.26	3.02	2.66	1.66	0.50	
Area	63.9	141.3	159.2	154.7	138.1	112.6	89.4	82.8	72.8	45.6	13.7	
KM 222	1082.0	cms		7.66 l/sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.80	1.36	1.48	1.45	1.34	1.18	1.01	0.96	0.88	0.65	0.30	
W.P.	27.78	27.41	27.39	27.40	27.39	27.42	27.33	27.39	27.40	27.42	27.41	
Depth	2.33	5.17	5.82	5.66	5.05	4.12	3.27	3.03	2.66	1.67	0.50	
Area	63.9	141.5	159.4	154.9	138.3	112.8	89.5	83.0	73.0	49.7	13.7	
KM 223	1085.4	cms		7.66 l/sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.80	1.37	1.48	1.45	1.35	1.18	1.01	0.96	0.89	0.65	0.30	
W.P.	27.79	27.41	27.39	27.40	27.40	27.42	27.40	27.39	27.40	27.42	27.41	
Depth	2.34	5.17	5.83	15.66	5.05	4.12	3.27	3.03	2.67	1.67	0.50	
Area	64.0	141.7	159.6	155.1	138.4	113.0	89.7	83.1	73.2	45.3	13.8	
KM 224	1088.7	cms		7.66 l/sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.81	1.37	1.48	1.45	1.35	1.18	1.01	0.97	0.83	0.65	0.30	
W.P.	27.79	27.41	27.40	27.40	27.40	27.43	27.40	27.40	27.40	27.43	27.41	
Depth	2.34	5.18	5.83	5.67	5.06	4.13	3.28	3.04	2.68	1.68	0.51	
Area	64.1	141.9	159.7	155.3	138.6	113.1	89.3	83.3	73.3	46.0	13.3	
KM 225	1092.0	cms		7.66 l/sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.81	1.37	1.48	1.45	1.35	1.18	1.02	0.97	0.89	0.65	0.30	
W.P.	27.80	27.42	27.40	27.41	27.40	27.43	27.40	27.40	27.41	27.43	27.42	
Depth	2.34	5.18	5.84	5.67	9.07	4.14	3.29	3.05	2.68	1.68	0.51	
Area	64.2	142.0	153.3	155.4	138.8	113.3	90.0	83.5	73.5	46.1	13.9	
KM 226	1095.3	cms		7.66 l/sec remaining								
Conc.	5	6	7	7	7	6	5	4	3	3	3	27.4
Vel.	0.81	1.37	1.48	1.46	1.35	1.18	1.02	0.97	0.89	6.66	0.30	
W.P.	27.80	27.42	27.40	27.41	27.41	27.43	27.41	27.4~:)	27.41	27.43	27.42	
Depth	2.35	5.19	5.84	5.68	5.07	4.14	3.29	3.05	2.6'3	1.63	0.51	
Area	64.3	142.2	160.1	155.6	133.0	113.5	'30.2	83.7	73.6	46.3	14.0	
KM 227	1038.6	cms		7.66 l/sec remaining								
Cont.	5	6	7	7		6	5	4	3	3	3	27.4
Vel.	0.81	1.37	1.49	1.46	1.35	1.18	1	.02	0.97	0.83	0.66	0.30

W.P. 27.81 27.42 27.41 27.41 27.41 27.44 27.41 27.41 27.41 L7.44 27.42
Depth 2.35 5.20 5.85 5.68 S. 08 4. 15 3.X) 3.06 2.63 1.63 0.51
Area 64.4 142.4 160.3 155.8 13'3.2 113.7 90.4 83.8 73.8 46.4 14. 1

KM 228 1102.0 cms 7.66 l/sec remaining
Conc. 5 6 7 7 7 6 5 4 3 3 30 27.4
Vel. 0.81 1.38 1.49 1.46 1.36 1. 1'3 1 .02 0.97 0. 89 0. 66 0.
W.P. 27.81 27.43 27.41 27.42 27.41 27.44 27.41 27.41 27.42 27.44 27.43
Depth 2.35 5.20 5.86 5.69 5.08 4.15 3.30 3.07 2.70 1.70 0.52
Area 64.5 142.6 160. 5 156.0 139.3 113.8 90.5 84 .0 74 . 0 46.6 14. 1

KM 223 1105.3 cms 7.66 l/sec remaining
Conc. 5 6 7 7 7 6 5 4 3 3 3 27.4
Vel. 0.81 1.38 1 .49 1.46 1.36 1.19 1 .02 0.97 0.90 0. 66 0.30
W.P. 27.81 27.43 27.41 27.42 27.42 27.44 27.41 27.41 27.42 27.44 27.43
Depth 2.36 5.21 S.86 5.69 5.09 4.16 3.3 1 3.07 2.70 1 . 70 0.52
Area 64.6 142.7 160.6 156.1 139.5 113.9 90. 7 84. 1 74.1 46.7 14.2

KM 230 1108.6 cms 7.66 l/sec remaining
Conc. 3 3 4 4 S 6 7 6 6 5 5 20.1
Vel. 0.51 0.83 0.95 1.15 1.39 1.64 1.80 1.87 1.94 1.71 0.90
W.P. 20.15 20.08 20.09 20.10 20.11 20.11 20.08 20.08 20.08 20.25 20.49
Depth 0.85 1.78 2.18 2.93 3.92 5.02 5.78 6.14 6.49 9.41 2.05
Area 17.0 35.6 43.8 58.8 78.7 100.8 116.1 123.3 130.2 108.6 41.2

KM 231 1111.3 cms 7.66 l/sec remaining
Conc. 3 3 4 4 5 6 6 6 6 5 5 '20.1
Vel. 0.51 0.83 0.35 1.15 1.40 1.64 1.80 1.88 1.95 1.72 0.90
W.P. 20.15 20.08 20.09 20.10 20.11 20.11 20.09 20.08 20.08 20.25 20.50
Depth 0.85 1.78 2.18 2.93 3.92 5.02 5.79 6.14 6.49 5.41 2.06
Area 17.1 35.7 43.9 58.9 78.8 100.9 116.2 123.4 130.3 108.7 41.3

KM 232 1115.2 cms 7.66 l/sec remaining
Conc. 3 3 4 4 S 6 6 6 6 S s 20.1
Vel. 0.51 0.83 0.95 1.16 1.40 1.65 1.81 1.88 1.95 1.72 0.90
W.P. 20.15 20.08 20.09 20.10 20.11 20.11 20.09 20.08 20.09 20.25 20.50
Depth 0.85 1.79 2.19 2.94 3.93 5.03 5.79 6.15 6.50 5.42 2. 06
Area 17.1 35.8 44.0 59.0 78.9 101.0 116.3 123.5 130.4 108.7 41.3

KM 233 1118.6 cms 7.66 l/sec remaining
Conc. 3 3 4 4 S 6 6 6 6 S 5 '20.1
Vel. 0.51 0.84 0.96 1.16 1.40 1.65 1.81 1.88 1.95 1.72 0.90
W.P. 20.15 20.08 20.09 20.10 20.11 20.11 20.09 20.08 20.09 20.25 20.50
Depth 0.86 1.79 2.19 2.94 3.93 s. 03 5.80 6.15 6.50 5.42 2.06
Area 17.2 35.3 44.1 59.1 79.0 101.1 116.4 123.6 130.5 108.8 41.3

KM 234 1121.9 cms 7.66 l/sec remaining
Conc. 3 3 4 4 S 6 6 6 6 S 5 20.1
Vel. 0.52 0.84 0.96 1.16 1.40 1.65 1.81 1.89 1.9s 1.73 0.91
W.P. 20.16 20.08 20.09 20.10 20.12 20.11 20.09 20.08 20.09 20.25 20.50
Depth 0.86 1.79 2.20 2.95 3.94 5.04 5.80 6.16 6.51 5.42 2.06
Area 17.2 36.0 44.2 59.2 79.1 101.2 116.5 123.7 130.7 108.9 41.4

KM 235 1125.2 cms 7.66 l/sec remaining
Conc. 3 3 3 4 S 6 6 6 6 S s 20.1
Vel. 0.52 0.84 0.96 1.16 1.41 1.65 1.82 1.89 1.96 1.73 0.91
W.P. 20.16 20.08 20.09 20.10 20.12 20.11 20.09 20.09 20.09 20.25 20.50
Depth 0.86 1.80 2.20 2.95 3.94 9.04 5.81 6.16 6.51 5.43 2.06
Area 17.3 36.1 44.3 59.3 79.2 101.3 116.6 123.8 130.8 109.0 41.4

KM 236 1128.5 cms 7.66 l/sec remaining
Conc. 3 3 3 4 5 6 6 6 6 S S 20. 1
Vel. 0.52 0.84 0.96 1.17 1.41 1.66 1.82 1.89 1.96 1.73 0.31
W.P. 20. 16 20.09 20. 10 20. 10 20. 12 20. 11 20.09 20.09 20.09 20.25 20.50
Depth 0.86 1.80 2.2 1 2.96 3.9s 5.05 5.81 6.17 6.52 5.43 2.06
Area 17.3 36.2 44.4 59.4 79.3 101.4 116.7 130.91 109. 1 41.4

KM 237 1131.8 cms 7.66 l/sec remaining
Conc. 3 3 3 4 S 6 6 6 6 S 5 20.1
Vel. 0.52 0.85 0.97 1.17 1.41 1.66 1.82 1.89 1.96 1.73 0.91
W.P. 20. 16 20.09 20. 10 20. 10 20. 12 20. 11 20.09 20.09 20.09 20. 26 20.51
Depth 0.87 1.81 2.21 2.96 3. 95 5.05 5.82 6.17 6.52 5.44 2.06
Area 17.4 36.3 44.5 101.5 116.8 53.5 134.0 131.0 109.2 41.5

KM 238 1135. 2 cms 7.66 l/sec remaining
Conc. 3 3 3 4 5 6 6 6 6 5 5 20. 1
Vel. 0.52 0.85 0. 97 1.17 1.41 1.66 1.82 1.90 1.97 1.74 0.91

W.P.	20.16	20.09	20.10	20.11	20.12	20.12	20.09	20.09	20.09	20.26	20.51	
Depth	0.87	1.81	[illegible]	2.97	3.46	5.06	5.82	6.18	6.53	5.44	2.07	
Area	17.4	36.4	44.6	59.6	7'3.5	101.6	116.9	124.1	131.1	109.3	41.5	
KM 239	1138.5 cms			7.66 l/sec remaining								
Conc.	3	3	3	4	5	6	6	6	6	5	5	20.1
Vel.	0.52	0.85	0.97	1.17	1.42	1.67	1.83	1.90	1.97	1.74	0.91	
W.P.	20.16	20.09	20.10	20.11	20.12	20.12	20.09	20.09	20.09	20.26	20.51	
Depth	0.87	1.82	[illegible]	2.97	3.96	5.06	5.83	6.18	6.53	5.44	2.07	
Area	17.5	36.5	44.7	59.7	79.6	101.7	117.0	124.2	131.2	10'3.3	41.5	
KM 240	1141.8 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	1.02	2.03	2.52	2.57	2.54	2.51	2.47	2.44	2.35	1.98	1.05	
W.P.	11.69	11.55	11.21	11.20	11.20	11.20	11.20	11.20	11.22	11.37	11.74	
Depth	1.48	4.20	5.65	5.82	5.72	5.60	5.48	5.37	5.08	3.97	1.56	
Area	16.6	47.0	63.3	65.2	64.1	62.7	61.4	60.2	56.9	44.5	17.4	
KM 241	1148.0 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.90	1.80	2.24	2.28	2.26	2.23	2.19	2.17	2.09	1.76	0.93	
W.P.	11.70	11.55	11.22	11.21	11.21	11.21	11.21	11.21	11.22	11.37	11.75	
Depth	1.67	4.74	6.39	6.59	6.47	6.33	6.20	6.08	9.74	4.49	1.76	
Area	18.7	53.2	71.7	73.8	72.5	71.0	69.4	68.1	64.4	50.3	19.7	
KM 242	1154.1 cms			7.66 1 /sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.91	1.81	2.25	2.29	2.27	2.23	2.20	2.17	2.09	1.76	0.93	
W.P.	11.70	11.56	11.22	11.21	11.21	11.21	11.21	11.21	il.23	11.38	11.76	
Depth	1.67	4.75	6.40	6.60	6.48	6.34	6.21	6.09	5.79	4.50	1.76	
Area	18.7	53.2	71.8	74.0	72.6	71.1	69.6	68.3	64.5	50.4	19.8	
KM 243	1160.3 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.91	1.82	2.25	2.30	2.27	2.24	2.21	2.18	2.10	1.77	0.94	
W.P.	11.71	11.57	11.23	11.22	11.22	11.22	11.22	11.22	11.23	11.39	11.76	
Depth	1.67	4.75	6.41	6.61	6.49	6.35	6.21	6.10	5.76	4.50	1.77	
Area	18.7	53.3	71.9	74.1	72.8	71.3	69.7	68.4	64.6	50.5	13.8	
KM 244	1166.4 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.91	1.82	2.26	2.31	2.28	2.25	2.22	2.19	2.11	1.78	0.94	
W.P.	11.71	11.58	11.24	11.22	11.22	11.23	11.22	11.22	11.24	11.39	11.77	
Depth	1.67	4.76	6.42	6.61	6.50	6.36	6.22	6.11	5.77	4.51	1.77	
Area	18.8	53.4	72.1	74.2	72.3	71.4	63.9	68.6	64.8	50.6	19.8	
KM 245	1172.6 cms			7.66 l/sac remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.91	1.83	2.27	2.32	2.29	2.26	2.23	2.20	2.12	1.78	0.94	
W.P.	11.72	11.58	11.24	11.23	11.23	11.23	11.23	11.23	11.24	11.40	11.77	
Depth	1.67	4.76	6.43	6.62	6.51	6.37	6.23	6.12	5.78	4.51	1.77	
Area	18.8	53.5	72.2	74.4	73.1	71.5	70.0	68.7	64.9	50.7	19.9	
KM 246	1178.7 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	6	5	5	11.2
Vel.	0.91	1.83	2.28	2.32	2.30	2.27	2.23	2.21	2.12	1.79	0.95	
W.P.	11.72	11.59	11.25	11.24	11.24	11.24	11.24	11.24	11.25	11.40	11.78	
Depth	1.67	4.76	6.44	6.63	6.52	6.38	6.24	6.13	5.73	4.52	1.77	
Area	18.8	53.5	72.3	74.5	73.2	71.7	70.1	68.8	65.0	50.8	19.9	
KM 247	1184.9 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	5	5	5	11.2
Vel.	0.92	1.84	2.29	2.33	2.30	2.27	2.24	2.21	2.13	1.80	0.95	
W.P.	11.73	11.60	11.25	11.24	11.24	11.24	11.24	11.24	11.25	11.41	11.79	
Depth	1.67	4.77	6.45	6.64	6.52	6.39	6.25	6.14	5.80	4.53	1.77	
Area	18.8	53.6	72.5	74.7	73.3	71.8	70.3	69.0	65.1	50.9	13.3	
KM 248	1191.0 cms			7.66 l/sec remaining								
Conc.	5	5	6	6	6	6	6	6	5	5	5	11.2
Vel.	0.92	1.84	2.29	2.34	2.31	2.28	2.25	2.22	2.14	1.80	0.95	
W.P.	11.73	11.60	11.26	11.25	11.25	11.25	11.25	11.25	11.26	11.41	11.73	
Depth	1.67	4.77	6.46	6.65	6.53	6.40	6.26	6.15	5.80	4.53	1.78	
Area	18.8	53.7	72.6	74.8	73.5	27.0	70.4	69.1	65.3	51.0	20.0	
KM 249	1197.2 cms			7.66 l/sec remaining								
Conc.	5	5	5	6	6	6	6	6	5	5	5	11.3
Vel.	0.92	1.85	2.30	2.35	2.32	2.29	2.26	2.23	2.15	1.81	0.96	

w.P.	11.74	11.61	11.26	11.25	11.25	11.25	11.25	11.25	11.27	11.42	11.80	
Depth	1.67	4.78	6.46	6.66	6.54	6.41	6.27	6.15	5.81	4.54	1.78	
Area	18.8	53.7	72.7	75.0	73.6	72.1	70.6	69.2	65.4	51.1	20.0	
KM 250	1203.3 cms				7.66 l/sec remaining							
Conc.	4	5	5	5	6	6	6	6	5	5	5	12.4
Vel.	1.42	0.35	2.49	2.69	2.89	3.03	3.10	3.17	3.02	2.51	1.35	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.97	
Depth	1.52	3.13	3.41	3.84	4.30	4.59	4.76	4.93	4.60	3.50	1.41	
Area	18.9	38.9	42.4	47.7	53.3	57.0	59.1	61.2	57.1	43.4	17.5	
KM 251	1204.2 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.98	1.64	1.73	1.87	2.01	2.10	2.15	2.20	2.10	1.75	0.94	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.97	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.08	6.60	5.02	2.02	
Area	27.1	55.8	60.8	68.4	76.5	81.8	84.9	87.3	81.9	62.3	25.1	
KM 252	1205.0 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.98	1.64	1.73	1.87	2.01	2.10	2.16	2.21	2.10	1.75	0.94	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.08	6.60	5.02	2.03	
Area	27.1	55.8	60.8	68.5	76.5	81.8	84.9	87.9	81.9	62.3	25.1	
KM 253	1205.9 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.98	1.64	1.73	1.87	2.01	2.10	2.16	2.21	2.10	1.75	0.94	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.08	6.60	5.02	2.03	
Area	27.1	5S.8	60.8	68.5	76.5	81.8	84.9	87.9	81.9	62.4	25.1	
KM 254	1206.7 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.98	1.64	1.73	1.87	2.01	2.11	2.16	2.21	2.10	1.75	0.94	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.09	6.60	5.02	2.03	
Area	27.1	55.8	60.8	68.5	76.5	81.8	84.9	87.9	81.9	62.4	25.1	
KM 255	1207.5 cms				7.66 l/sec remaining							
Conc.	5	S	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.99	1.64	1.73	1.87	2.02	2.11	2.16	2.21	2.10	1.75	0.94	
W.P.	13.06	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.09	6.60	5.03	2.03	
Area	27.1	55.9	60.8	68.5	76.6	81.8	84.9	87.9	82.0	62.4	25.2	
KM 256	1208.4 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.99	1.64	1.73	1.87	2.02	2.11	2.16	2.21	2.10	1.75	(3.94	
W.P.	13.07	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.59	6.84	7.09	6.60	5.03	2.03	
Area	27.1	55.9	60.9	68.5	76.6	81.8	84.9	88.0	82.0	62.4	25.2	
KM 257	1209.2 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.99	1.64	1.74	1.87	2.02	2.11	2.16	2.21	2.11	1.75	0.94	
W.P.	13.07	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.90	4.90	5.52	6.17	6.59	6.84	7.09	6.61	5.03	2.03	
Area	27.1	55.9	60.9	68.5	76.6	81.9	84.9	88.0	82.0	62.4	25.2	
KM 258	1210.1 cms				7.66 l/sec remaining							
Conc.	5	S	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.99	1.64	1.74	1.88	2.02	2.11	2.16	2.21	2.11	1.75	0.94	
W.P.	13.07	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.90	5.52	6.17	6.60	6.84	7.09	6.61	5.03	2.03	
Area	27.1	55.9	60.9	68.5	76.6	81.9	84.9	88.0	82.0	62.4	25.2	
KM 259	1210.9 cms				7.66 l/sec remaining							
Conc.	5	5	5	6	6	6	6	6	6	5	5	12.4
Vel.	0.99	1.64	1.74	1.88	2.02	2.11	2.16	2.21	2.11	1.75	0.95	
W.P.	13.07	12.41	12.42	12.43	12.42	12.41	12.41	12.41	12.46	12.54	12.98	
Depth	2.18	4.50	4.91	5.52	6.17	6.60	6.84	7.09	3.61	5.03	2.03	
Area	27.1	55.9	60.9	68.5	76.6	81.9	85.0	88.0	82.0	62.4	25.2	
KM 260	1211.8 cms				7.66 l/sec remaining							
Conc.	5	5	6	6	6	6	6	6	5	5	5	12.3
Vel.	1.06	1.85	1.36	1.99	2.03	2.06	2.07	2.00	1.84	1.37	0.86	

W.P.	13.05	1 2.29	12.26	12.26	12.26	12.26	12.26	12.28	12.28	12.33	12.66	
Depth	2.61	5.69	6.22	6.37	6.54	6.68	6.75	6.39	5.64	4.45	1.83	
Area	32 . 0	69.7	76.3	78.1	80. 1	81.9	82.7	78.4	69. 1	54.5	22.5	

KM 261 1212.7 cm5 7.66 1/sec remaining

Conc.	5	5	6	6	6	6	6	6	5	5	5	12.3
Vel .	1.24	2.16	2.29	2 . 33	2.3 “7	2.40	2.42	2.33	2.14	1.83	1.01	
W.P.	13.05	12.29	12.26	12.26	12.26	12.26	12.26	12.28	12.28	12.33	12.66	
Depth	2.24	4.88	5.34	5.46	5.61	5.73	5.79	5.49	4.84	3.82	1.57	
Area	27.4	59.8	65.4	67.0	68.8	70.3	71.0,	67.3	59.3	46.8	19.3	

KM 262 1213.5 cms 7.66 1/sec remaining

Conc.	S	5	6	6	6	6	6	6	5	5	5	12.3
Vel .	1.24	2.16	2.29	2.33	2.37	2.40	2.42	2.33	2.15	1.83	1.01	
W.P.	13.05	12.29	12.26	12.26	12.26	12.26	12.26	12.28	12.28	12.33	12.66	
Depth	2.24	4.88	5.34	5.46	5.61	5.73	5.79	5.49	4.84	3. 82	1.57	
Area	27.4	59.9	65.5	67.0	68.8	70.3	71.0	67.3	59.3	46.8	19.3	

KM 263 1214.4 cms 7.66 1 /sec remaining

Conc.	5	S	6	6	6	6	6	6	5	S	5	12.3
Vel .	1.24	2.16	2.29	2.33	2.37	2.40	2.42	2.33	2.15	1.83	1.01	
W.P.	13.05	12.29	12.26	12.26	12.26	12.26	12.26	12.28	12.28	12.33	12.66	
Depth	2.24	4.88	5.34	5.47	5.61	5.74	5.79	s.49	4.84	3.82	1.57	
Area	27.4	59.9	65.5	67.0	68.8	70.3	71.0	67.3	59.3	46.8	19.3	

KM 264 121s. 2 cms 7.66 1/sec remaining

cone.	5	5	6	6	6	6	6	6	5	5	5	12.3
Vel .	1.24	2.16	2.29	2.33	2.37	2.40	2.42	2.33	2.15	1.83	1.01	
W.P.	13.05	12.23	12.26	12.26	12.26	12.26	12.26	12.28	12.28	12.34	12.66	
Depth	2.24	4.88	5.34	5.47	5.61	5.74	5.79	5.49	4.84	3.82	1.57	
Area	27.4	53.9	65.5	67.0	68.8	70.3	71.0	67.3	59.3	46.8	19.3	

KM 265 1216.1 cms 7.66 1/sec remaining

Conc.	3	4	4	S	6	6	6	6	6	S	S	21.3
Vel .	0.44	0.83	1.01	1.11	1.19	1.24	1.28	1.35	1.35	1.27	0.78	
W.P.	21.42	21.36	21.33	21.33	21.33	21.33	21.33	21.33	21.34	21.33	21.90	
Depth	1.29	3.27	4.42	5.11	5.65	6.02	6.36	6.91	6.86	6.31	3.07	
Area	26.7	69.8	94.2	109.0	120.6	128.4	135.6	147.3	146.3	134.5	65.5	

KM 266 1217.5 cms 7.66 1/sec remaining

Conc.	3	4	4	S	5	6	6	6	6	5	5	21.3
Vel .	0.54	1.02	1.24	1.37	1.46	1.53	1.58	1.67	1.66	1.57	0.96	
W.P.	21.42	21.36	21.33	21.33	21.33	21.33	21.33	21.33	21.34	21.33	21.90	
Depth	1.02	2.66	3.59	4.15	4.59	4.89	5.17	5.61	5.57	5.12	2.50	
Area	21.7	56.7	76.6	88.6	98.0	104.3	110.2	119.7	118.8	109.2	53.2	

KM 267 1218.8 cms 7.66 1/sec remaining

Conc.	3	4	4	5	5	6	6	6	6	S	S	21.3
Vel .	0.54	1.02	1.25	1.37	1.47	1.53	1.58	1.67	1.66	1.57	0.96	
W.P.	21.42	21.36	21.34	21.33	21.33	21.33	21.33	21.33	21.34	21.33	21.90	
Depth	1.02	2.66	3.59	4.15	4.60	4.89	5.17	5.61	5.57	5.12	2.50	
Area	21.7	56.7	76.6	88.6	98.0	104.4	110.2	119.7	118.9	109.3	53.2	

KM 268 1220.2 cm5 7.66 1/sec remaining

Conc.	3	4	4	5	5	6	6	6	6	5	S	21.3
Vel .	0.54	1.02	1.25	1.37	1.47	1.53	1.58	1.67	1.66	1.58	0.97	
W.P.	21.42	21.36	21.34	21.33	21.33	21.33	21.33	21.33	21.34	21.33	21.90	
Depth	1.02	2.66	3.59	4.15	4.60	4.90	5.17	3.61	5.58	5.12	2.50	
Area	21.7	56.8	76.6	88.6	98.0	104.4	110.3	119.7	118.9	103.3	53.2	

KM 269 1221.6 cms 7.66 1/sec remaining

Conc.	3	4	4	S	S	6	6	6	6	5	5	21.3
Vel.	0.55	1.02	1.25	1.37	1.47	1 .53	1.59	1.67	1.67	1.58	0.97	
W.P.	21.42	21.36	21.34	21.33	21.33	21.33	21.33	21.33	21.34	21.33	21.90	
Depth	1.02	2.66	3.59	4.16	4.60	4.90	5.17	5.62	5.58	5.13	2.X)	
Area	21.7	56.8	76.6	88.6	98.1	104.4	110.3	119.8	118.9	109.3	53.3	

KM 270 1223.0 cms 7.66 1/sec remaining

Conc.	5	5	6	6	6	5	5	5	4	4	. 4	
Vel .	0.96	1.53	1.53	1.45	1.29	1.13	1 .01	0.92	0.85	0.83	0.52	32.
W.P.	32.78	32.44	32.44	32.45	32.45	32.45	32.43	32.44	32.44	32.44	32.49	
Depth	2.63	5.29	5.27	4.85	4.06	3.35	2.83	2.43	2.17	2.06	1.03	
Area	85.4	171.7	171.1	157.4	131.8	108.7	‘31.8	78.8	70.4	67.0	33.3	

KM 271 1224.4 cms 7.66 1/sec remaining

Conc.	5	5	6	6	6	5	5	5	4	4	3	32.4
Vel.	1.03	1.73	1.73	1.64	1.46	1.28	1.15	1.04	0. 97	0.93	0.3	

W.P.	32.78	32.45	32.45	32.45	32.	45	32.45	32.45	32.45	32.45	32.45	32.50
Depth	2.33	4.69	4.67	4.30	3.60	2.97	2.51	3.15	1.92	1.83	0.91	
Area	75.7	152.1	151.5	133.4	116.7	36.3	81.3	69.9	62.4	59.3	29.5	

KM 272 1225.7 cms 7.66 l/sec remaining

Conc.	5	6	6	6	6	5	5	4	4	3	3	32.4
Vel.	1.09	1.73	1.73	1.64	1.46	1.28	1.15	1.04	0.97	0.43	0.53	
W.P.	32.78	32.45	32.45	32.45	32.46	32.45	32.45	32.45	32.45	32.45	32.50	
Depth	2.33	4.69	4.67	4.30	3.60	2.97	2.51	2.15	1.92	1.83	0.31	
Area	75.7	152.2	151.6	139.5	116.7	96.3	81.3	69.9	62.4	59.4	29.5	

KM 273 1227.1 cms 7.66 l/sec remaining

Conc.	5	6	6	6	6	5	5	4	4	3	3	32.4
Vel.	1.09	1.73	1.73	1.64	1.46	1.28	1.15	1.04	0.37	0.94	0.59	
W.P.	32.78	32.45	32.45	32.46	32.46	32.45	32.45	32.45	32.45	32.45	32.50	
Depth	2.33	4.69	4.67	4.30	3.60	2.97	2.51	2.16	1.93	1.83	0.91	
Area	75.7	152.2	151.6	139.5	116.8	96.4	81.4	69.9	62.5	59.4	29.5	

KM 274 1228.5 cms 7.66 l/sec remaining

Conc.	5	6	6	6	6	5	5	4	4	3	3	32.5
Vel.	1.04	1.74	1.73	1.64	1.46	1.29	1.15	1.04	0.97	0.94	0.59	
W.P.	32.78	32.45	32.45	32.46	32.46	32.46	32.45	32.45	32.45	32.45	32.50	
Depth	2.33	4.69	4.67	4.30	3.60	2.97	2.51	2.16	1.93	1.83	0.91	
Area	75.7	152.3	151.7	139.6	116.8	96.4	81.4	70.0	62.5	59.5	29.5	

KM 275 1229.9 cms 7.66 l/sec remaining

Conc.	5	6	6	6	5	5	5	4	4	3	3	32.5
Vel.	1.09	1.74	1.73	1.64	1.46	1.29	1.15	1.04	0.97	0.94	0.59	
W.P.	32.79	32.45	32.45	32.46	32.46	32.46	32.46	32.45	32.45	32.49	32.50	
Depth	2.33	4.69	4.68	4.30	3.60	2.97	2.51	2.16	1.93	1.83	0.91	
Area	75.8	152.3	151.7	139.6	116.9	96.5	81.5	70.0	62.6	59.5	29.6	

KM 276 1231.2 cms 7.66 1 /sec remaining

Conc.	5	6	6	6	5	5	5	4	4	3	3	32.5
Vel.	1.09	1.74	1.73	1.64	1.46	1.29	1.15	1.04	0.97	0.94	0.59	
W.P.	32.79	32.45	32.45	32.46	32.46	32.46	32.46	32.46	32.46	32.45	32.51	
Depth	2.33	4.69	4.68	4.30	3.60	2.97	2.51	2.16	1.93	1.84	0.91	
Area	75.8	152.4	151.8	139.7	116.9	96.5	81.5	70.1	62.6	5'3.6	29.6	

KM 277 1232.6 cms 7.66 l/sec remaining

Conc.	5	6	6	6	S	5	5	4	4	3	3	32.5
Vel.	1.09	1.74	1.73	1.64	1.46	1.29	1.15	1.04	0.97	0.94	0.59	
W.P.	32.79	32.46	32.46	32.46	32.46	32.46	32.46	32.46	32.46	32.46	32.51	
Depth	2.34	4.70	4.68	4.30	3.60	2.97	2.51	2.16	1.93	1.84	0.91	
Area	75.8	152.4	151.8	139.7	117.0	96.6	81.5	70.1	62.7	59.6	29.6	

KM 278 1234.0 cms 7.66 l/sec remaining

Conc.	5	6	6	6	S	5	5	4	4	3	3	32.5
Vel.	1.09	1.74	1.74	1.64	1.46	1.29	1.15	1.05	0.97	0.94	0.59	
W.P.	32.79	32.46	32.46	32.47	32.47	32.46	32.46	32.46	32.46	32.46	32.51	
Depth	2.34	4.70	4.68	4.31	3.60	2.98	2.51	2.16	1.93	1.84	0.91	
Area	75.8	152.5	lSl.9	139.8	117.0	96.6	81.6	70.2	62.7	99.7	29.6	

KM 279 1235.4 cms 7.66 l/sec remaining

Conc.	5	6	6	6	S	5	5	4	4	3	3	32.5
Vel.	1.09	1.74	1.74	1.64	1.46	1.29	1.15	1.09	0.97	0.94	0.59	
W.P.	32.79	32.46	32.46	32.47	32.47	32.46	32.46	32.46	32.46	32.46	32.51	
Depth	2.34	4.70	4.68	4.31	3.61	2.98	2.51	2.16	1.93	1.84	0.91	
Area	75.9	152.5	151.9	139.8	117.1	96.6	81.6	70.2	62.7	5'3.7	29.7	

KM 280 1236.7 cms 7.66 l/sec remaining

Conc.	5	5	5	5		4	3	3	2	?	1	16.8
Vel.	4.15	6.60	5.44	4.29	3.7:	3.37	3.14	3.13	2.61	1.4;	0.60	
W.P.	18.28	16.82	16.95	16.81	16.80	16.79	16.79	16.79	16.83	16.81	16.7'3	
Depth	2.48	4.63	3.48	2.40	1.95	1.66	1.49	1.48	1.13	0.48	0.12	
Area	41.7	77.7	58.4	40.3	32.8	27.3	25.0	24.9	18.9	8.0	2.0	

KM 281 1238.1 cms 7.66 l/sec remaining

Conc.	5	5	5	5	4	3	3	3	?	2	1	16.8
Vel.	2.84	4.51	3.72	2.93	2.56	2.31	2.15	2.15	1.7;	1.02	0.41	
W.P.	18.29	16.82	16.96	16.81	16.80	16.80	16.80	16.80	16.84	16.81	16.80	
Depth	3.62	6.74	5.07	3.50	2.84	2.42	2.17	2.16	1.64	0.70	0.17	
Area	60.7	113.2	85.1	58.7	47.8	40.7	36.4	36.2	27.6	11.7	2.9	

KM 282 1233.5 cms 7.66 1 /sec remaining

Conc.	5	5	5	5	4	3	3	?	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.43	2.56	2.31	2.15	2.14	1.79	1.02	0.41	

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W.F.	18.29	16.83	16.96	16.82	16.81	16.80	16.80	16.80	16.84	16.81	16.80	
Depth	3.62	6.74	5.07	3.50	2.85	2.42	2.17	2.16	1.64	0.70	0.17	
Area	60.8	113.2	85.2	58.7	47.8	40.7	36.5	36.3	27.6	11.7	2.9	
KM 283	1240.9 cms				7.66 1/sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.31	2.15	2.14	1.79	1.02	0.41	
W.F.	18.30	16.83	16.97	16.82	16.81	16.81	16.80	16.80	16.8-I	16.82	16.81	
Depth	3.62	6.74	5.07	3.50	2.85	2.42	2.17	2.16	1.64	0.70	0.17	
Area	60.8	113.3	85.2	58.8	47.8	40.7	36.5	36.3	27.6	11.8	2.9	
KM 284	1242.2 cms				7.66 1/sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.31	2.15	2.14	1.79	1.02	0.41	
W.P.	18.30	16.84	16.97	16.83	16.82	16.81	16.81	16.81	16.85	16.82	16.81	
Depth	3.62	6.74	5.07	3.50	2.85	2.43	2.17	2.16	1.64	0.70	0.17	
Area	60.8	113.3	85.3	58.8	47.9	40.8	36.5	36.4	27.6	11.8	2.9	
KM 285	1243.6 cms				7.66 1/sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.'34	2.57	2.31	2.15	2.15	1.79	1.02	0.41	
W.P.	18.31	16.84	16.97	16.83	16.82	16.82	16.81	16.81	16.85	16.83	16.82	
Depth	3.62	6.74	5.07	3.50	2.85	2.43	2.18	2.17	1.65	0.70	0.17	
Area	60.9	113.4	85.3	58.'3	47.9	40.8	36.6	36.4	27.7	11.8	2.9	
KM 286	1245.0 cms				7.66 1/sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.31	2.15	2.15	1.79	1.03	0.41	
W.P.	18.31	16.89	16.38	16.84	16.82	16.82	16.82	16.82	16.86	16.83	16.82	
Depth	3.62	6.75	5.08	3.50	2.85	2.43	2.18	2.17	1.65	0.70	0.18	
Area	60.9	113.4	85.3	58.9	47.9	40.8	36.6	36.5	27.7	11.8	2.9	
KM 287	1246.4 cms				7.66 1 /sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.31	2.15	2.15	1.79	1.03	0.42	
W.P.	18.31	16.85	16.98	16.84	16.83	16.82	16.82	16.82	16.86	16.83	16.82	
Depth	3.62	6.75	5.08	3.50	2.85	2.43	2.18	2.17	1.65	0.70	0.18	
Area	60.9	113.5	85.4	58.3	48.0	40.9	36.7	36.5	27.7	11.8	3.0	
KM 288	1247.7 cms				7.66 1/sec remaining							
Conc.	5	S	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.31	2.16	2.15	1.79	1.03	0.42	
W.P.	18.32	16.85	16.99	16.84	16.83	16.83	16.83	16.82	16.87	16.84	16.83	
Depth	3.62	6.75	5.08	3.51	2.85	2.43	2.18	2.17	1.65	0.70	0.18	
Area	61.0	113.5	85.4	59.0	48.0	40.9	36.7	36.6	27.8	11.8	3.0	
KM 289	1249.1 cms				7.66 1/sec remaining							
Conc.	5	5	5	5	4	3	3	2	2	2	1	16.8
Vel.	2.84	4.52	3.73	2.94	2.57	2.32	2.16	2.15	1.79	1.03	0.42	
W.P.	18.32	16.86	16.99	16.85	16.84	16.83	16.83	16.83	16.87	16.84	16.83	
Depth	3.62	6.75	5.08	3.51	2.86	2.43	2.18	2.18	1.65	0.71	0.18	
Area	61.0	113.6	85.9	59.0	48.0	40.9	36.7	36.6	27.8	11.9	3.0	
KM 290	1250.5 cms				7.66 1/sec remaining							
Conc.	6	6	6	5	5	5	5	5	5	5	5	10.7
Vel.	0.65	1.26	1.45	1.54	1.48	1.35	1.21	1.07	0.91	0.68	0.33	
W.P.	12.86	10.95	10.82	10.71	10.77	10.80	10.80	10.7'3	10.79	10.93	10.92	
Depth	5.18	12.05	14.88	16.02	15.18	13.31	11.24	9.25	7.33	4.75	1.57	
Area	55.5	129.0	159.3	171.5	162.6	142.5	120.3	99.1	78.5	50.3	16.8	
KM 291	1251.9 cms				7.66 1/sec remaining							
Conc.	6	6	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.83	2.12	2.25	2.16	1.98	1.77	1.56	1.34	1.00	0.48	
W.P.	12.86	10.95	10.82	10.71	10.77	10.80	10.80	10.79	10.79	10.93	10.92	
Depth	3.56	8.28	10.22	11.00	10.43	9.14	7.72	6.36	5.04	3.27	1.08	
Area	38.1	88.6	10'3.5	117.8	111.7	97.9	82.6	68.1	53.9	35.0	11.5	
KM 292	1253.2 cms				7.66 1/sec remaining							
Conc.	6	5	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.84	2.13	2.25	2.16	1.98	1.77	1.56	1.34	1.00	0.48	
W.P.	12.86	10.95	10.82	10.71	10.77	10.80	10.80	10.79	10.73	10.93	10.92	
Depth	3.56	8.28	10.23	11.00	10.43	9.15	7.72	6.36	5.04	3.27	1.08	
Area	38.1	88.7	109.5	117.8	111.7	'37.3	82.7	68.1	54.0	35.0	11.6	
KM 293	1254.6 cms				7.66 1/sec remaining							
Conc.	6	5	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.84	2.13	2.25	2.16	1.98	1.77	1.56	1.34	1.00	0.48	

W.P.	12.86	10.95	10.82	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.92	
Depth	3.56	8.28	10.23	11.01	10.43	9.15	7.72	6.36	5.04	3.27	1.08	
Area	38.1	88.7	109.5	117.9	111.7	97.9	82.7	68.1	54.0	35.0	11.6	
KM 294	1256.0	cms		7.66	l/sec	remaining						
Conc.	6	5	5	5	[illegible]	[illegible]	5	[illegible]	4	4	4	10.7
Vel.	0.95	1.84	2.13	2.25	2.17	1.98	1.77	1.56	1.34	1.00	0.48	
W.P.	12.86	10.95	10.82	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.92	
Depth	3.56	8.28	10.23	11.01	10.44	9.15	7.72	6.36	5.04	3.27	1.08	
Area	38.2	88.7	103.5	117.9	111.8	98.0	82.7	68.2	54.0	35.1	11.6	
KM 295	1257.4	cms		7.66	l/sec	remaining						
Conc.	6	5	5	5	5	[illegible]	5	[illegible]	4	4	4	10.7
Vel.	0.95	1.84	2.13	[illegible]	[illegible]	2.17	1.98	1.77	1.56	1.34	1.00	0.48
W.P.	12.86	10.96	10.82	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.93	
Depth	3.56	8.29	10.23	11.01	10.44	9.15	7.73	6.37	5.05	3.28	1.08	
Area	38.2	88.7	109.6	117.9	111.8	98.0	82.7	68.2	54.0	35.1	11.6	
KM 296	1258.7	cms		7.66	l/sec	remaining						
Conc.	6	[illegible]	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.84	2.13	[illegible]	[illegible]	17	1.98	1.78	1.56	1.34	1.00	0.49
W.P.	12.87	10.96	10.82	10.71	10.77	10.81	10.80	10.73	10.73	10.94	10.93	
Depth	3.57	8.29	10.23	11.01	10.44	9.15	7.73	6.37	5.05	3.28	1.08	
Area	38.2	88.8	103.6	117.9	111.8	38.0	82.8	68.2	54.1	35.1	11.6	
KM 297	1260.1	cms		7.66	l/sec	remaining						
Conc.	6	5	5	5	[illegible]	5	5	5	4	4	4	10.7
Vel.	0.95	1.84	2.13	2.26	2.17	1.3	1.78	1.57	1.34	1.00	0.49	
W.P.	12.87	10.96	10.82	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.93	
Depth	3.57	8.29	10.24	11.02	10.44	9.16	7.73	6.37	5.05	3.28	1.09	
Area	38.2	88.8	109.6	118.0	111.8	98.1	82.8	68.2	54.1	35.1	11.6	
KM 298	1261.5	cms		7.66	l/sec	remaining						
Conc.	6	5	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.84	2.14	2.26	2.17	1.99	1.78	1.57	1.35	1.00	0.49	
W.P.	12.87	10.36	10.82	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.93	
Depth	3.57	8.29	10.24	11.02	10.45	3.16	7.73	6.37	5.05	3.28	1.09	
Area	38.2	88.8	109.6	118.0	111.3	98.1	82.8	68.3	34.1	35.2	11.6	
KM 299	1262.9	cms		7.66	l/sec	remaining						
Conc.	6	5	5	5	5	5	5	5	4	4	4	10.7
Vel.	0.95	1.85	2.14	2.26	2.17	1.99	1.78	1.57	1.35	1.01	0.43	
W.P.	12.87	10.96	10.83	10.71	10.77	10.81	10.80	10.79	10.79	10.94	10.93	
Depth	3.57	8.29	10.24	11.02	10.45	9.16	7.74	6.38	5.06	3.29	1.09	
Area	38.2	88.8	109.7	118.0	111.9	98.1	82.9	68.3	54.1	35.2	11.6	
KM 300	1264.2	cms		7.66	l/sec	remaining						
Conc.	4	5	5	6	6	6	6	6	6	5	4	34.5
Vel.	0.60	0.94	0.94	0.91	0.94	0.99	1.10	1.18	1.16	1.06	0.61	
W.P.	34.66	34.47	34.47	34.48	34.48	34.47	34.43	34.47	34.47	34.49	34.67	
Depth	1.81	3.62	3.59	3.44	3.58	3.91	4.54	5.06	4.97	4.32	1.86	
Area	62.4	124.7	123.8	118.7	123.4	134.7	156.5	174.6	171.4	148.9	64.1	
KM 301	1265.6	cms		7.66	l/sec	remaining						
Conc.	4	4	5	5	5	6	6	6	6	[illegible]	4	34.5
Vel.	0.60	0.95	0.94	0.92	0.94	0.99	1.10	1.18	1.16	1.06	0.61	
W.P.	34.66	34.47	34.47	34.48	34.48	34.48	34.49	34.47	34.47	34.50	34.68	
Depth	1.81	3.62	3.59	3.45	3.58	3.31	4.54	5.07	4.97	4.32	1.86	
Area	62.4	124.8	123.8	118.8	123.4	134.8	156.6	174.7	171.5	149.0	64.2	
KM 302	1267.0	cms		7.66	l/sec	remaining						
Conc.	4	4	[illegible]	5	5	6	6	6	6	5	4	34.5
Vel.	0.60	0.95	0.94	0.92	0.94	1.00	1.10	1.113	1.17	1.06	0.61	
W.P.	34.66	34.48	34.48	34.48	34.48	34.48	34.49	34.48	34.48	34.50	34.68	
Depth	1.81	3.62	3.59	3.45	3.58	3.31	4.54	5.07	4.98	4.32	1.86	
Area	62.4	124.8	123.9	118.8	123.5	134.8	156.7	174.7	171.6	143.0	64.2	
KM 303	1268.4	cms		7.66	l/sec	remaining						
Conc.	4	4	5	5	5	6	6	6	6	5	4	34.5
Vel.				0.92	0.00	11.1	0	1.18	1.17	1.06	0.61	
W.P.	0.60	30.95	[illegible]0.94	34.48	34.40	34.48	34.43	34.48	34.48	34.50	34.68	
Depth	31.81	3.62	3.59	3.●	$S 3.S 8	3.31	4.55	5.07	4.38	4.32	1.86	
Area	62.4	124.9	123.9	118.9	123.5	134.9	156.7	174.8	171.6	143.1	64.2	
KM 304	1269.7	cms		7.66	l/sec	remaining						
Conc.	4	4	[illegible]	5	5	6	6	6	6	5	4	34.5
Vel.	0.60	0.95	0.94	0.92	0.94	1.00	1.10	1.18	1.17	1.06	0.61	

W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.49	34.48	34.48	34.50	34.68	
Depth	1.81	3.62	3.60	3.45	3.53	3.32	4.55	5.07	4.98	4.33	1.86	
Area	62.5	124.9	124.0	118.9	123.6	134.9	156.8	174.8	171.7	149.1	64.3	
KM 305	1271.1 cms			7.66 l/sec remaining								
Conc.	4	4	[illegible]	[illegible]	[illegible]	5	6	6	6	6	5	4 34.5
Vel.	0.60	0.35	0.34	0.92	0.94	1.00	1.10	1.18	1.17	1.06	0.61	
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.81	3.63	3.60	3.45	3.53	3.32	4.55	5.07	4.98	4.33	1.86	
Area	62.5	125.0	124.0	119.0	123.7	135.0	156.8	174.9	171.7	149.2	64.3	
KM 306	1272.5 cms			7.66 l/sec remaining								
Conc.	4	4	[illegible]	0.92	5	6	6	6	6	5	4 34.5	
Vel.	0.60	0.95	0.34	0.94	1.00	1.10	1.18	1.17	1.07	0.61		
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.81	3.63	3.60	3.45	3.53	3.92	4.55	5.07	4.98	4.33	1.87	
Area	62.5	125.0	124.1	119.0	123.7	135.0	156.9	175.0	171.8	149.2	64.3	
KM 307	1273.9 cms			7.66 l/sec remaining								
Conc.	4	4	5	5	5	6	6	6	6	5	4 34.5	
Vel.	0.60	0.95	0.34	0.92	0.94	1.00	1.10	1.18	1.17	1.07	0.61	
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.81	3.63	3.60	3.45	3.54	3.92	4.55	5.08	4.38	4.33	1.87	
Area	62.5	125.1	124.2	113.1	123.8	135.1	157.0	175.0	171.8	149.3	64.3	
KM 308	1275.2 cms			7.66 l/sec remaining								
Conc.	4	4	5	5	5	6	6	6	6	5	4 34.5	
Vel.	0.60	0.95	0.95	0.92	0.34	1.00	1.10	1.18	1.17	1.07	0.61	
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.81	3.63	3.60	3.46	3.53	3.32	4.55	5.08	4.99	4.33	1.87	
Area	62.6	125.1	124.2	113.2	123.8	135.2	157.0	175.1	171.3	149.4	64.4	
KM 309	1276.6 cms			7.66 l/sec remaining								
Conc.	4	4	5	[illegible]	[illegible]	[illegible]	6	6	6	6	5	4 34.5
Vel.	0.60	0.95	0.95	0.92	0.94	1.00	1.10	1.13	1.17	1.67	0.61	
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.82	3.63	3.60	3.46	3.59	3.32	4.56	5.08	4.99	4.33	1.87	
Area	62.6	125.2	124.3	119.2	123.9	135.2	157.1	175.1	171.9	143.4	64.4	
KM 310	1278.0 cms			7.66 l/sec remaining								
Conc.	4	4	5	5	5	6	6	6	6	5	4 34.5	
Vel.	0.60	0.95	0.95	0.92	0.94	1.00	1.10	1.13	1.17	1.07	0.61	
W.P.	34.67	34.48	34.48	34.48	34.48	34.48	34.50	34.48	34.48	34.50	34.68	
Depth	1.82	3.63	3.61	3.46	3.53	3.92	4.56	5.08	4.99	4.34	1.87	
Area	62.6	129.3	124.3	113.3	123.3	135.3	157.1	175.2	172.0	149.5	64.4	