UMCES

UNIVERSITY OF MARYLAND CENTER for ENVIRONMENTAL SCIENCE
CHESAPEAKE BIOLOGICAL LABORATORY

MONITORING OF SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN THE POTOMAC RIVER ESTUARY IN SUPPORT OF TMDL DEVELOPMENT

November 2003

Maryland Department of the Environment
Chesapeake Bay and Special Projects
Montgomery Park and Business Center
1800 Washington Boulevard, Suite 540
Baltimore, MD 21230-1718

Technical Report Series No. TS-437-03-CBL Ref. No. [UMCES]CBL 03-396
University of Maryland
Center for Environmental Science

Monitoring of Sediment Oxygen and Nutrient Exchanges in the Potomac River Estuary in Support of TMDL Development

Prepared by:
E.K. Machelor Bailey[1] Sr. Faculty Research Assistant
Paul W. Smail[1] Faculty Research Assistant
F.M. Rohland[1] Associate Research Scientist
Brian Bean[1] Faculty Research Assistant
Maria Ceballos[1] Seasonal Field Assistant
Morgan Kaumeyer[1] Seasonal Field Assistant
W.R. Boynton[1] Principal Investigator

Prepared for:
Maryland Department of the Environment
Chesapeake Bay and Special Projects
Montgomery Park Business Center
1800 Washington Boulevard, Suite 540
Baltimore, MD 21230-1718

November, 2003

[1]University of Maryland Center for Environmental Science
Chesapeake Biological Laboratory
P.O. Box 38, Solomons, MD 20688-0038

TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS

Page No.

LIST OF FIGURES

Page No.

LIST OF TABLES

Page No.

LIST OF TABLES (Continued)

Page No.

LIST OF TABLES (Continued)

Page No.

1. INTRODUCTION

1.1. Background

During the past fifteen years the Ecosystems Processes Component (EPC) of the Chesapeake Bay Water Quality Monitoring Program has learned a great deal about the importance of exchanges of oxygen and nutrients across the sediment-water interface and the dynamics of these interactions. Sediment oxygen consumption can be an important sink for oxygen in estuarine environments and sediment nutrient releases can be a large internal source of both nitrogen and phosphorous to the water column (Boynton *et al.*, 1991). Both of the latter compounds are essential for phytoplankton growth, which can become excessive when nutrient supplies are large. Thus, sediment processes can play an important role in determining water quality conditions by lowering oxygen levels and promoting excessive algal growth.

Estuarine water quality and habitat conditions are directly affected by fluxes of nutrients from the sediments, especially in summer during hypoxic and anoxic events. The magnitudes of these fluxes appear to be directly influenced by nutrient and organic matter loading to the Bay. Both annual and interannual patterns demonstrate that when these external nutrient and organic matter loadings decrease, the cycle of organic matter deposition to the sediments, sediment oxygen demand, and the release of nutrients into the water column also decrease and water quality and habitat conditions improve (Boynton e*t al.*, 1995). Evaluation of these nutrient loadings (via exchanges between sediment and the water column) as well as the loadings of other pollutants, provides the information necessary to diagnose the apparent health of an estuary.

The Clean Water Act Section 303(d)(1)C and federal regulation 40CFR 130.7C(1) directed each State to develop a Total Maximum Daily Load (TMDL) for all impaired waters on the Section 303 (d) list, taking into account seasonal variations and a margin of safety (MOS) to allow for uncertainty. A TMDL reflects the total pollutant loading of the impairing substance a body of water can receive and still meet water quality standards. The draft of the 2002 303(d) list submitted to the Environmental Protection Agency (EPA) by the Maryland Department of the Environment lists numerous Chesapeake Bay rivers and tributaries as being impaired by many critical water quality factors. Specifically, the Potomac River Estuary is listed as being impaired by a number of factors including nutrients, sediments and fecal coliform.

The Maryland Department of the Environment (MDE) is in the process of developing numerous TMDL assessments for Chesapeake Bay rivers and tributaries. This process involves extensive monitoring, as well as the development of watershed and estuarine models. Results from these models will be used to calculate the allocation of loads between point and non-point sources of the TMDLs.

1.2. Description of Project

Measurements of net sediment-water exchanges of nutrients (phosphorus and nitrogen) and oxygen, characterization of the nutrient content of surface sediments, water column respiration and measurement of water quality conditions in near-bottom water were made monthly during June, July and August 2002 within the Potomac River Estuary system. These measurement were made in conjunction of other efforts in the development of TMDLs for these estuaries.

References

Boynton, W.R., J.H. Garber, R. Summers and W.M. Kemp. 1995. Inputs, Transformations, and Transport of Nitrogen and Phosphorus in Chesapeake Bay and Selected Tributaries. Estuaries 18(1B): 285-314.

Boynton, W.R., W.M. Kemp, J.M. Barnes, L.L. Matteson, J.L.Watts, S. Stammerjohn, D.A. Jasinski and F.M. Rohland. 1991. Ecosystem Processes Component Level 1 Interpretive 8. Chesapeake Biological Laboratory (CBL), University of Maryland Center for Environmental Science, Solomons, MD 20688-0038. Ref. No. [UMCES] CBL 91-110a.

2. ACQUISITION AND ANALYSIS OF TMDL SEDIMENT-WATER OXYGEN AND NUTRIENT EXCHANGES DATA

2.1. Location of TMDL Stations

Twenty five stations were located in the tidal fresh portion and the mouth of the Potomac River (Figure 2-1, Table 2-1). At twenty of these stations, measurements of sediment-water and oxygen exchanges were made, while at six of these stations, estimates of water column respiration were made. At five stations measurements of bottom water conditions and sediment chlorophyll-*a* concentrations were made for use in regression model estimates of sediment-water exchanges.

2.2. Sampling Frequency

The sampling frequency was based on the seasonal patterns of sediment water exchanges observed in previous studies conducted in the Chesapeake Bay region (Kemp and Boynton, 1980, 1981; Boynton *et al.*, 1982; and Boynton and Kemp, 1985). In light of these results, the monitoring design adopted for this TMDL study involved three monthly measurements; June, July and August 2002. Sampling dates for these cruises together with alpha-numeric cruise identification codes can be found in Table 2-2.

2.3. Field Methods for TMDL Study

2.3.1. Water Column Profiles

At each TMDL station, vertical water column profiles of temperature, salinity and dissolved oxygen were measured at 2 meter intervals from the surface to the bottom using a Yellow Springs Instrument (YSI) 600R or 6920 DataSonde®. Turbidity of surface waters was measured using a Secchi disc.

2.3.2 Water Column Nutrients

Near-bottom water samples (0.5 – 1.0 meters above the sediment surface) were collected using a high volume submersible pump system. Samples were filtered, where appropriate, using 0.7 µm GF/F filter pads, and immediately frozen. Samples were analyzed by Nutrient Analytical Services Laboratory (NASL) for the following dissolved nutrients: ammonium (NH_4^+), nitrite (NO_2^-), nitrite plus nitrate ($NO_2^- + NO_3^-$) and dissolved inorganic phosphorus corrected for salinity (DIP or PO_4^{-3}).

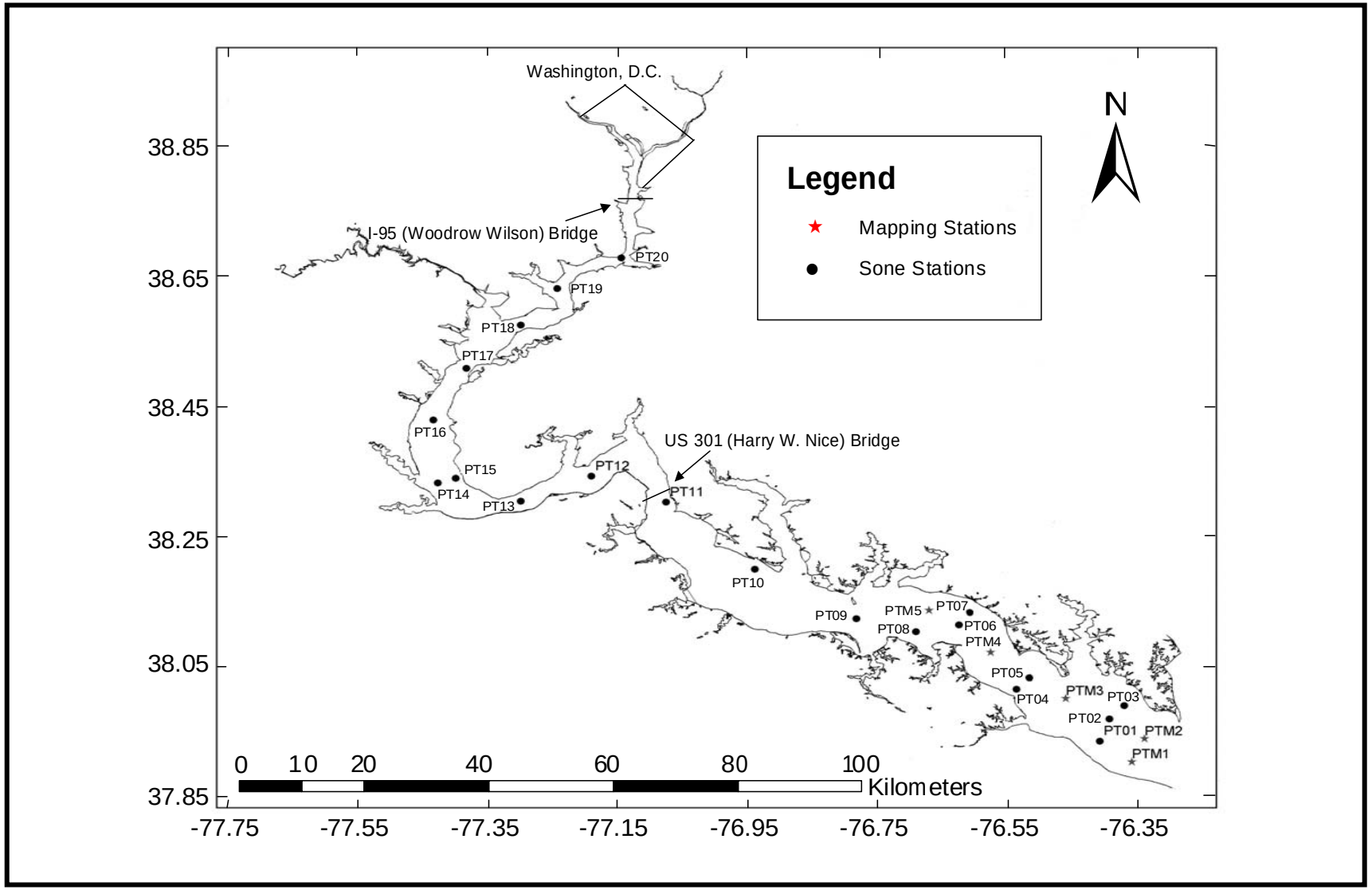

Figure 2-1. Location (decimal degrees) of twenty five TMDL stations sampled in Potomac River.

Precise latitude and longitude values are given in Table 2-1.

Table 2-1. TMDL Station Code, Grid Locations and Mean Depths (meters).

**** Water column respiration stations. DATUM: NAD 83***

(This table is also added at the beginning of the Appendices for reference).

Station	Tributary	Latitude Degrees	Longitude Degrees	Mean Depth (meters)
PT01	Potomac	38˚ 00.5833'N	76˚ 25.5000'W	8.33
PT02*****	Potomac	38˚ 02.5000' N	76˚ 24.7500'W	13.00
PT03	Potomac	38˚ 03.6667' N	76˚ 23.5833'W	15.33
PT04	Potomac	38˚ 05.0833'N	76˚ 32.0000'W	10.33
PT05*****	Potomac	38˚ 06.0833'N	76˚ 31.0000'W	15.00
PT06	Potomac	38˚ 10.6667'N	76˚ 36.5000'W	11.00
PT07	Potomac	38˚ 11.3380'N	76˚ 35.8430'W	8.67
PT08	Potomac	38˚ 10.0833'N	76˚ 39.8333'W	7.00
PT09*****	Potomac	38˚ 11.2000'N	76˚ 44.5000'W	8.67
PT10	Potomac	38˚ 15.5000'N	76˚ 52.4167'W	7.67
PT11*****	Potomac	38˚ 21.3333'N	76˚ 59.3333'W	15.00
PT12	Potomac	38˚ 23.5833'N	77˚ 05.1667'W	10.67
PT13	Potomac	38˚ 21.4167'N	77˚ 10.6667'W	14.33
PT14	Potomac	38˚ 23.0000'N	77˚ 17.1667'W	4.00
PT15	Potomac	38˚ 23.4167'N	77˚ 15.7500'W	6.00
PT16*****	Potomac	38˚ 28.4167'N	77˚ 17.5000'W	5.33
PT17	Potomac	38˚ 32.9167'N	77˚ 14.9167'W	9.00
PT18	Potomac	38˚ 36.6667'N	77˚ 10.6667'W	5.33
PT19*****	Potomac	38˚ 39.8333'N	77˚ 07.8333'W	3.00
PT20	Potomac	38˚ 42.5000'N	77˚ 02.8333'W	2.0
PTM1	Mapping Station	37˚ 58.8333'N	76˚ 23.0000'W	8.67
PTM2	Mapping Station	38˚ 00.8333'N	76˚ 22.0000'W	13.33
PTM3	Mapping Station	38˚ 04.3333'N	76˚ 28.1667'W	16.33
PTM4	Mapping Station	38˚ 08.3333'N	76˚ 34.0000'W	17.67
PTM5	Mapping Station	38˚ 12.0000'N	76˚ 38.8333'W	8.67

Table 2-2. TMDL Potomac River Cruise Identifier

Cruise	Date	Begin Date	End Date	Research Vessel
TMDLPT01	JUN 2002	10 JUN	12 JUN	Orion
TMDLPT02	JUL 2002	22 JUL	24 JUL	Orion
TMDLPT03	AUG 2002	19 AUG	21 AUG	Orion

2.3.3 Sediment Profiles

At each TMDL station an intact sediment core was used to measure the oxidation reduction (redox) potential (Eh) of the sediment porewater. The redox potential of the overlying water was also measured (+1cm measurement). Sediment redox (mV) was measured at the sediment surface, at 1 cm, at 2 cm below the surface. Additionally, surficial sediments were sampled for total and active sediment chlorophyll-*a* to a depth of 1 cm. Particulate carbon (PC), particulate nitrogen (PN), particulate phosphorus (PP) were sampled to a depth of 1 cm.

2.3.4 Sediment Flux Measurements

The protocols used in TMDL flux estimates was a single sediment core with no blank. An intact sediment core constituted a benthic microcosm where changes in oxygen, nutrient and other compound concentrations were determined over a fixed incubation time.

A single intact sediment core was collected at each station using a modified Bouma box corer. These cores were then transferred to a Plexiglass cylinder (15 cm diameter x 30 cm length) and inspected for disturbances from large macrofauna or cracks in the sediment surface. If the sample was satisfactory, the core was fitted with an O-ring sealed top containing various sampling ports, and a gasket sealed bottom (Figure 2-2). The core was then placed in a darkened, temperature controlled holding tank where overlying water in the core was slowly replaced by fresh bottom water ensuring that water quality conditions in the core closely approximated *in situ* conditions.

During the period in which the flux measurements were taken, the cores were placed in a darkened temperature controlled bath to maintain ambient temperature conditions. The overlying water in a core was gently circulated with no induction of sediment resuspension via stirring devices attached to oxygen probes. Oxygen concentrations were recorded and overlying water samples (35 ml) were extracted from each core every 60 minutes during the incubation period. TMDL stations were incubated for 3 hours with a total of 4 measurements taken. As a water sample was extracted from a core, an equal amount of ambient bottom water was added to replace the lost volume. Water samples were filtered and immediately frozen for later analysis for ammonium (NH_4^+), nitrite (NO_2^-), nitrite plus nitrate ($NO_2^- + NO_3^-$) and dissolved inorganic phosphorous (DIP or PO_4^{-3}). Oxygen and nutrient fluxes were estimated by calculating the rate of change in concentration over the incubation period and converting the volumetric rate to a flux using the volume:area ratio of each core.

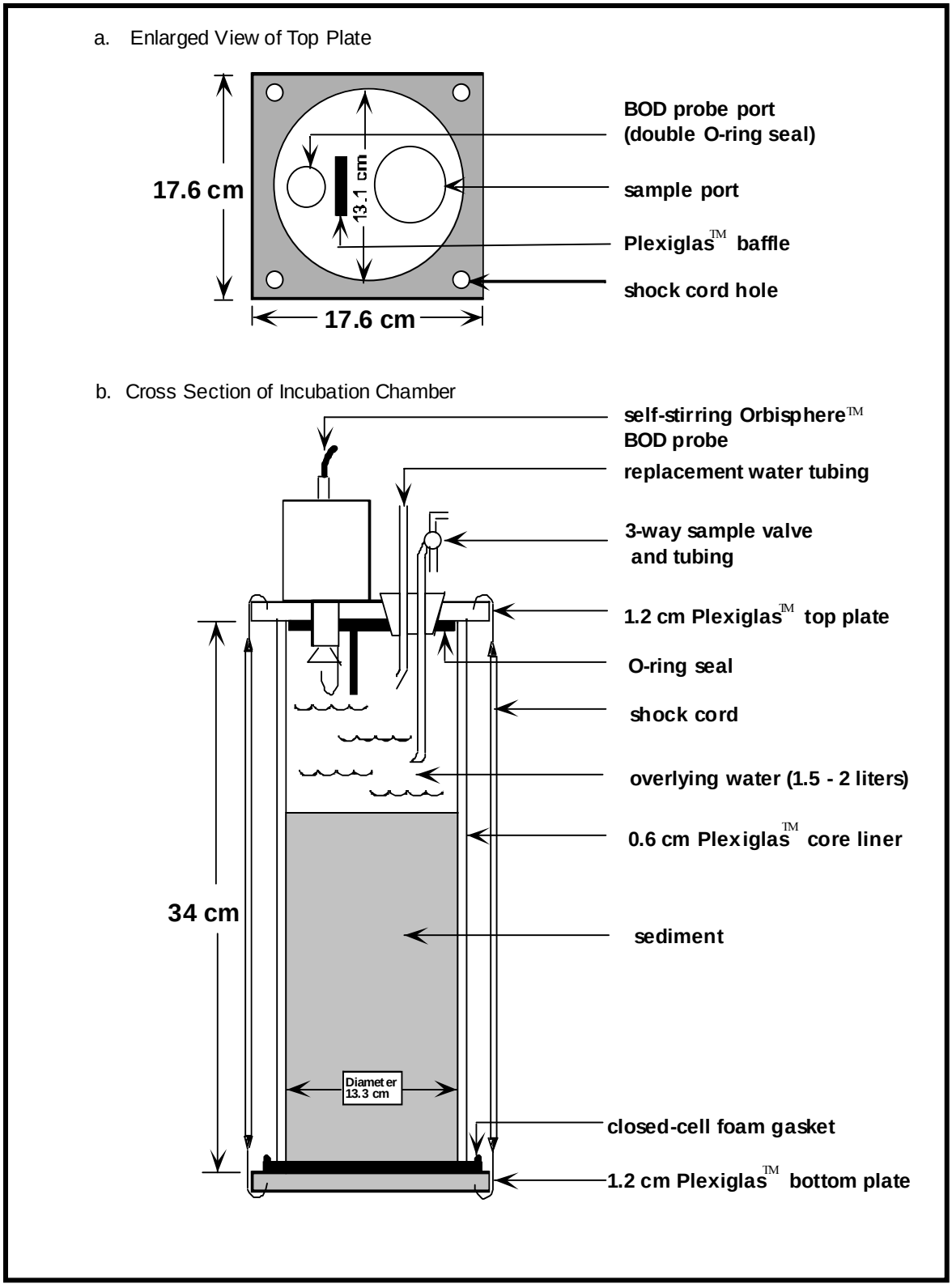

Figure 2-2. Schematic Diagram of the Incubation Chamber
a. Enlarged View of Top Plate

b. Cross Section of Incubation Chamber

2.3.5 Water Column Respiration

Water column respiration measurements were made using a modified biological oxygen demand (BOD) protocol. Whole water samples were taken from the mixed layer at approximately 1 m below the surface using a high volume submersible pump system. Glass BOD bottles (300 ml) were gently filled with sample water and allowed to overfill, exchanging the volume at least two times. Duplicate samples were taken for initial and final measurements. Initial samples were fixed immediately with reagents for determination of dissolved oxygen (APHA, 1989). Final samples (in dark BOD bottles) were capped, incubated in a dark ambient flowing seawater incubator and fixed with reagents at the termination of the incubation period. Fixed samples were stored at room temperature and returned to the lab for final titration analysis. June samples were incubated for 12 hours. During subsequent cruises samples were allowed to incubate for 24 hours to increase the magnitude of the respired oxygen measurement.

2.4. Chemical Analyses used in TMDL Study

Methods for the determination of dissolved and particulate nutrients were: ammonium (NH_4^+), nitrite (NO_2^-), nitrite plus nitrate ($NO_2^- + NO_3^-$), and dissolved inorganic phosphorus (DIP or PO_4^-) were measured using the automated method of EPA (1979); particulate carbon (PC) and particulate nitrogen (PN) samples were analyzed using an Elemental Analyzer; particulate phosphorus (PP) concentration were obtained by acid digestion of muffled-dry samples (Aspila *et al.*, 1976); methods of Strickland and Parsons (1972) and Parsons *et al.* (1984) were followed for chlorophyll-*a* analysis.

2.5. Methods and Data Quality Indicators

Table 2-3. A summary of laboratory methods and performance criteria (from Rohland *et. al*., 2001).

Matrix	Parameter (Units)	Analytical Method	MDL***	Precision (% CV)*	Accuracy (percent spike recovery)
Water	Ammonium (NH_4^+; µM)	Berthelot Reaction	0.0030µM	< 5%	90-110%
Sediment	Active Chlorophyll-*a* (µg l^{-1})	Flourescence after acidification	0.6 µg l^{-1}	-	-
Sediment	Total Chlorophyll-*a* (µg l^{-1})	Flourescence before acidification	0.51 µg l^{-1}	-	-
Water	Dissolved Inorganic Phosphorus (DIP; µM)	Antimony-phospho-molybdate complex	0.0007µM	< 5%	90-110%
Water	Nitrite (NO_2^-, µM)	Diazo compound	0.0003µM	< 5%	90-110%
Water	Nitrite + Nitrate ($NO_2^- + NO_3^-$; µM)	Copper-cadmium reduction	0.0007µM	< 5%	90-110%
Sediment	Sediment Particulate Carbon (%[wt])	Combustion in O_2	0.13%	< 5%**	-
Sediment	Sediment Particulate Nitrogen (%[wt])	Combustion in O_2	0.0084%	< 5%**	-
Sediment	Sediment Particulate Phosphorus (%[wt])	Antimony-phospho-molybdate complex	0.0087%	< 5%**	-

* Concentration dependent
** BCSS-1 Coastal marine sediment: Standard reference material
*** MDL Mean Detection Limit
Note: In the laboratory seven replicates were used. No replicates were used in the field.

References

ALPHA. 1989. Method 4500-0 (azide modification) in Standard methods for the examination of water and wastewater, 17th Edition. American Public Health Association. Washington D.C. p (4) 149-156.

Aspila, I., H. Agemian, and A.S.Y. Chau. 1976. A semi-automated method for the determination of inorganic, organic and total phosphate in sediments. Analyst 101:187-197.

Boynton, W.R. and W.M. Kemp. 1985. Nutrient regeneration and oxygen consumption by sediments along an estuarine salinity gradient. Mar. Ecol. Prog. Ser. 23:45-55.

Boynton, W.R., W.M. Kemp and C.W. Keefe. 1982. A comparative analysis of nutrients and other factors influencing estuarine phytoplankton production, p. 69-90. In: V.S. Kennedy, [Ed.], Estuarine Comparisons, Academic Press, NY.

Environmental Protection Agency (EPA). 1979. Methods for Chemical Analysis of Water and Wastes. USEPA-6000/4-79-020. Environmental Monitoring and Support Laboratory, Cincinnati, OH.

Kemp, W.M. and W.R. Boynton. 1980. Influence of biological and physical factors on dissolved oxygen dynamics in an estuarine system: implications for measurement of community metabolism. Estuar. Coast. Mar. Sci. 11:407-431.

Kemp, W.M. and W.R. Boynton. 1981. External and internal factors regulating metabolic rates of an estuarine benthic community. Oecologia 51:19-27.

Parsons, T.R., Y. Maita and C.M. Lalli. 1984. Determination of chlorophylls and total carotenoids: Spectrophotometric method. pp. 101 - 112 *in* Parsons, T.R., Y. Maita and C.M. Lalli. A manual of chemical and biological methods for seawater analysis. Pergamon Press, Oxford.

Rohland, F.M., W.R. Boynton, R.M. Stankelis, and B.W. Bean. 2001. Work/Quality Assurance Project Plan for Water Quality Monitoring in Chesapeake Bay for FY 2003 (May 31, 2002; Revision 6). Chesapeake Biological Laboratory (CBL), University of Maryland Center for Environmental Science, Solomons, MD 20688-0038. Technical Series No. TS-343-01-CBL.

Strickland, J.D.H. and T.R. Parsons. 1972. A practical handbook of seawater analysis. Fish. Res. Bd. Can. Bull. 167 (second edition).

3. DATA MANAGEMENT PROCEDURES

3.1. QA/QC Field Checks

Cruises were scheduled well ahead of time with Research Fleet Operations (RFO). A schedule for activities for each day of the individual cruises was submitted to the PI and other members of staff. Cruises that were canceled due to weather or mechanical problems with the research vessel were rescheduled.

3.1.1. Preparation of Collection Gear

During the last few days prior to initiating a research cruise all the necessary equipment involved in the collection of water and sediment samples, incubation of sediment cores and collection of physical water quality data were inventoried using specially prepared checklists. All equipment was checked to insure that it was fully operational and had been properly cleaned. The equipment was packed into containers for easy transport and loaded aboard the research vessel. The checklist was then re-examined to verify the presence of all necessary gear.

Standards and reagents involved in the calibration of instrumentation were made according to a schedule of shelf life (*i.e.* daily, weekly or seasonally). All chemicals were handled, prepared and stored in accordance with standard laboratory practices.

3.1.2. Potential Contamination

During the course of a research cruise different steps were taken to insure that the chances for contamination were minimized. These practices involved almost constant washing of equipment over the course of a cruise. All containers used to collect bulk raw water were rinsed with copious amounts of sample (station) water before they were filled and were thoroughly cleaned with fresh water and dried at the end of the cruise. Containers from which samples were taken for chemical analysis were rinsed additionally with deionized water. The apparatus for taking the sediment samples as well as the incubation equipment was thoroughly washed with station water before it was used to collect samples. Upon completion of the cruise the apparatus was rinsed with fresh water. Single use/disposable plastic vials and centrifuge tubes that require no cleaning were used to collect water and sediment samples (after being fully processed) for chemical analysis. All syringes and other laboratory equipment used in processing these samples were washed with deionized water between each use. All glassware associated with the preparation of standards and reagents was cleaned with copious amounts deionized water and acid washed when appropriate.

3.1.3. Calibration Procedures and Frequency

All instruments (YSI 6920/600 and Orbisphere) involved in the collection of physical water quality data (temperature, conductivity, salinity and dissolved oxygen) were calibrated daily. Dissolved oxygen calibration incorporates a standard air calibration based on air temperature and barometric pressure. Conductivity/salinity was calibrated with a 0.10 molar standard of potassium chloride. Temperature is calibrated by the manufacturer only when the instrument is returned for service.

All instruments were maintained in accordance with manufacturers specifications. Standards and reagents involved in the calibration of instrumentation were made according to a schedule of shelf life *(i.e.* daily, weekly or seasonally) or when the supply was exhausted. All chemicals wer handled, prepared and stored in accordance with standard laboratory practices. If any apparent problems arise the instrument was removed from use until the malfunction can be diagnosed and remedied.

3.1.4. Recording of Field Data

All field data were recorded on specially prepared field data sheets and the initials of the person recording the data were recorded on each data sheet. The raw data sheets were reviewed for possible missing data values due to sample collection problems prior to data entry. These sheets were filed in the laboratory. A cruise logbook was also kept.

3.2. General Information Related to Data Sets

3.2.1. Naming Conventions

Data files were given unique names that were a combination of an alpha code reflecting the name of the data set, the type of data set and a numeric descriptor which indicated the number of the cruise.

3.2.2. Incorporation of Error Codes in Data Tables

In order to keep a record of problems experienced while collecting data a one or two letter alpha code (Table 3-3) was entered in the data table, which describes the problems associated with questionable parameter values. Valid entries from the Sediment Data Management Plan (EPA, 1989) were used and where necessary additional codes which were related to the EPC were added.

Table 3-1. Analysis Problem Codes

(This table is also added at the beginning of the Appendices for reference).

ANALYSIS PROBLEM CODE	DESCRIPTION
A	Laboratory accident
B	Interference
C	Mechanical/materials failure
D	Insufficient sample
N	Sample Lost
P	Lost results
R	Sample contaminated
S	Sample container broken during analysis
V	Sample results rejected due to QA/QC criteria
W	Duplicate results for all parameters
X	Sample not preserved properly
AA	Sample thawed when received
BB	Torn filter paper
EE	Foil pouch very wet when received from field, therefore poor replication between pads, mean reported
FF	Poor replication between pads; mean reported
HD	Particulate and chlorophyll-a samples only taken at -1.0 cm of the Eh profile
HH	Sample not taken
JJ	Amount filtered not recorded (Calculation could not be done)
LL	Mislabeled
NI	Data for this variable are considered to be non-interpretable
NN	Particulates found in filtered sample
NR	No replicate analyzed for epiphyte strip chlorophyll-a concentration
PP	Assumed sample volume (pouch volume differs from data sheet volume; pouch volume used)
QQ	Although value exceeds a theoretically equivalent or greater value (*e.g.*, PO4F>TDP), the excess is within precision of analytical techniques and therefore not statistically significant.
SD	All sampling at station discontinued for one or more sampling periods
SS	Sample contaminated in field
TF	Dissolved oxygen probe failure
TL	Instrument failure in research laboratory
TS	Dissolved oxygen probe not stabilized
TT	Instrument failure on board research vessel
UU	Analysis discontinued
WW	Station was not sampled due to bad weather conditions, research vessel mechanical failure, or failure of state highway bridges to open or close
XX	Sampling for this variable was not included in the monitoring program at this time or was not monitored during a specific cruise
YB	No blank measured for MINI-SONE fluxes
YY	Data not recorded

3.3. Potomac River TMDL Data Sets

The data collected at each TMDL station were organized into five data sets, where xx = cruise number:

WATER COLUMN PROFILES (Filename: **TMDLPTPFxx,** Appendix A) reports temperature, salinity and dissolved oxygen data measured at two meter intervals in the water column.

WATER COLUMN NUTRIENTS (Filename: **TMDLPTNTxx**, Appendix B) reports bottom water dissolved nutrient concentrations.

SEDIMENT PROFILES (Filename: **TMDLPTSPxx**, Appendix C) includes redox potential and sediment measurements of total and active chlorophyll-*a*, particulate carbon, particulate nitrogen and particulate phosphorus concentrations.

CORE DATA (Filename: **TMDLPTCDxx**, Appendix D) lists dissolved oxygen and nutrient measurements in MINI-SONE sediment-water flux chambers.

SEDIMENT-WATER FLUX (Filename: **TMDLPTFLxx**, Appendix E) is a summary table providing oxygen and nutrient flux data.

WATER COLUMN RESPIRATION (Filename: **TMDLPTWKxx**, Appendix F) is a summary table providing surface water respiration rate data.

3.3.1. Data Tables QA/QC

Data recorded by instruments in the field were entered directly onto specially prepared data sheets. Data from samples analyzed by Nutrient Analytical Services Laboratory (NASL) were returned in written or electronic format. Data were keyed into the most recent version of Microsoft® Excel 2000. The standard EPC data file format was used. Hard copies of the files were manually checked for errors. Data files were corrected, a second printout was produced which was re-verified by a different staff member. The full data set was plotted and outlier values reevaluated. Values below detection limits are indicated in the data tables.

3.4. Analytical Methods QA/QC Control

The Nutrient Analytical Services Laboratory (NASL) at the Chesapeake Biological Laboratory provides nutrient analyses to University, State and Federal agencies. As part of the laboratory's QA/QC program, NASL participates in cross calibration exercises with other institutions and agencies whenever possible. Refer to D'Elia *et al*. (1997) for specific details but some examples include:

- X Particulate carbon and nitrogen cross calibration with Woods Hole Oceanographic Institution and Horn Point Environmental Laboratory.

- X International Council for the Exploration of the Sea (ICES) inorganic nutrient round-robin communication. The fourth international inter-comparison report was published in 1991 (Kirkwood, Aminot and Perttilä, 1991).

- X Comparisons of dissolved nutrient analyses conducted at Horn Point Environmental Laboratory, Bigelow Laboratory, the University of Delaware and the University of New Hampshire.

- X Quarterly cross calibration exercises with Virginia Institute of Marine Science (VIMS) and Old Dominion University (ODU). The most recent inter-comparison (November 1995) confirmed all parameters routinely analyzed by these laboratories as part of the Chesapeake Bay Monitoring Program. Samples from various salinities and nutrient regimes were analyzed under this exercise.

- X Environmental Protection Agency (EPA) unknown audits for various nutrients have been conducted.

- X EPA audits of known nutrients were analyzed using samples in different salinity water while looking for possible matrix effects.

NASL has analyzed National Institute of Standards and Technology (NIST) and National Research Board of Canada reference materials, primarily estuarine sediment, as a check for their particulate and sediment carbon, nitrogen and phosphorus methods.

As part of the Chesapeake Bay Mainstem Monitoring Program, the laboratory routinely analyzes approximately ten percent of the total sample load for QA/QC checks. These samples include laboratory duplicates and spike analyses.

Specific EPC procedures included inorganic nitrogen (ammonium [NH_4^+], nitrite [NO_2^-], nitrite plus nitrate [$NO_2^- + NO_3^-$] and dissolved inorganic phosphorus [DIP or PO_4^{-3}] for which a standard curve usually comprising five concentrations encompassing the

expected range for that particular sample set, were analyzed at the beginning of each new run. A standard, which was treated as a sample, was analyzed at least every 20 samples. Baseline corrections were determined either manually or automatically, depending on the instrument providing the analysis. Data needed to calculate concentrations was recorded along with the sample concentration in laboratory notebooks, a carbon copy of which was provided to the EPC group. This procedure was also carried out for other parameters performed by the laboratory in support of the EPC effort. Details of precision and limits of detection for the variables are given in D'Elia *et al.* (1997).

3.4.1. Sample Custody

Upon arrival at NASL, samples were counted, observed for potential problems (melting, broken containers, *etc*.) and placed in a freezer until analysis. Sample information and date of arrival were recorded on a log sheet.

3.4.2. Instrument Maintenance

Analytical instruments are maintained on a regular basis and records are kept of hours of operation, scheduled maintenance, pump tube changes, *etc*. A critical spare parts inventory is maintained for each instrument. Instrument down-time is minimized by troubleshooting instrument problems telephonically with manufacturers and service representatives. Spare parts can be received within 24 hours via next-day air service.

3.5. Calculations

The format of the calculations given below follows that used in the Excel files:

3.5.1. Oxygen Saturation

Percent oxygen saturation was calculated using the dissolved oxygen concentration, temperature and salinity data of the sample (Weiss, 1970).

$$DO\ SAT\ (\%) = (100*DO)/(1.428 * @EXP(-173.4292 + (249.6339 * (100/(TEMP + 273))) + (143.3483 * @LN((TEMP + 273)/100)) - (21.8492 * ((TEMP + 273)/100)) + SALIN * (-0.033096 + (0.014259 * ((TEMP + 273)/100)) - 0.0017 * ((TEMP + 273)/100)^2))))$$

3.5.2. Eh

Corrected Eh represents Eh relative to the hydrogen electrode.

Eh CORR (mV) = Eh MEAS + 244

3.5.3. Flux Variables

3.5.3.1. Equations

Core Water Depth represents height of water above the sediment surface in the TMDL chamber.

Core H_2O Depth = (CORE VOL/139)/100

General method for calculating net sediment-water fluxes:

*NET DO FLUX [$gO_2/m^2.d$)] = [(DO SLOPE) * (CORE H20 DEPTH^a) x (1440^b)*

NET NUTRIENT FLUX [$\mu M/(m^2$. hr)] = [(VARIABLE SLOPE^c) x (Core H2O DEPTH^a) x (60^d) x (1000^c)

where

a converts measurements from volumetric to areal basis
b converts time units from per minute to per day
c variables are NH_4^+, NO_2^-, NO_2^- + NO_3^- and DIP
d converts time units from minytes to hours
e converts mass units from mM to μM.

Specific calculations:

a. Dissolved oxygen:

*DO FLUX ($gO_2\ m^2\ d^{-1}$) = [(DO SLOPE) * 1440 * (CORE H20 DEPTH)]*

b. Ammonium:

*NH_4^+ FLUX (μmoles-N $m^2\ h^{-1}$) = (NH_4^+ SLOPE * 60 * CORE H2O DEPTH) * 1000*

c. Nitrite:

*NO_2^- FLUX (μmoles-N $m^2\ h^{-1}$) = (NO_2^- SLOPE * 60 * CORE H2O DEPTH) * 1000*

d. Nitrite plus nitrate

*NO_2^- + NO_3^- FLUX (μmoles-N m^2 h^{-1}) = (NO_2^- + NO_3^- SLOPE * 60 * CORE H2O DEPTH) * 1000*

e. Dissolved Inorganic Phosphorus

*DIP FLUX [μmoles-P m^2 h^{-1}) = (DIP SLOPE * 60 * CORE H2O DEPTH) * 1000*

3.5.3.2. Criteria for accepting, rejecting and modifying variable slopes used in calculating net sediment water fluxes

Nutrient concentrations were plotted against time of sampling and the slope of this curve is used to calculate net sediment-water exchanges. The following steps assume that all data have been previously verified following normal protocols.

1. If the slope of the nutrient concentrations *vs* time plot was statistically significant, the slope was used in calculating fluxes without modification.

2. Occasionally, there are plots which indicated a clear increasing or decreasing trend in concentrations over time but had **one** data point which diverged strongly (either higher or lower concentration) from the trend. We consider these divergent data to represent contaminated samples (either by addition of the compound or addition of water having a much lower concentration of the compound) and they are not used. The slope was recalculated using lower degrees of freedom and a higher "r" value as a criteria for significance. If the slope is statistically significant, it was used in calculating fluxes.

3. If the concentration vs. time plots were erratic (*i.e.* no statistically significant increasing or decreasing trend in concentration over time) and if the difference in concentration among variables was **greater than** twice the detection limit for that variable, the data for that variable were considered to be non-interpretable. The slope was not calculated and the entry for that variable in the MNFLUXxx file was recorded as "NI".

4. If the concentration vs. time plots were erratic (*i.e.* no statistically significant increasing or decreasing trend in concentration over time) and if the difference in concentration among variables was **less than** twice the detection limit for that variable, then the slope was taken to be zero and the net sediment-water flux was reported as zero. Occasionally, statistically significant slopes have been found for some variables (mostly nitrite and dissolved inorganic phosphorus) where concentration differences over the incubation period do not exceed twice the reported detection limit. These slopes were used to calculate net sediment-water exchanges.

References

D'Elia, C.F., E.E. Connor, N.L. Kaumeyer, C.W. Keefe, K. V. Wood and C.F. Zimmerman. 1997. Nutrient Analytical Services Laboratory Standard Operating Procedures. Technical Report Series No. 158-97. Chesapeake Biological Laboratory (CBL), Box 38, Solomons, MD 20688-0038.

Environmental Protection Agency (EPA). 1989. Sediment data management plan. Chesapeake Bay Program. CBP/TRS 29/89.

Kirkwood, D., A. Aminot and M. Perttilä. 1991. International Council for the Exploration of the Sea (ICES) Report on the Results of the 4th Intercomparison Exercise for Nutrients in Sea Water. No 174. ISSN 1017-6195.

Weiss R.F. 1970. The solubility of nitrogen, oxygen and argon in water and seawater. Deep Sea Research 17:721-735.

APPENDICES A - F
Potomac River, 2002

TMDL Data Sets

Table 2-1. TMDL Station Code, Grid Locations and Mean Depths (meters).

Latitude and longitude values are expressed as decimal degrees. DATUM: NAD 83

** Water column respiration stations.*

This table is added here for reference.

Station	Tributary	Latitude Degrees	Longitude Degrees	Mean Depth (meters)
PT01	Potomac	38˚ 00.5833'N	76˚ 25.5000'W	8.33
PT02*****	Potomac	38˚ 02.5000' N	76˚ 24.7500'W	13.00
PT03	Potomac	38˚ 03.6667' N	76˚ 23.5833'W	15.33
PT04	Potomac	38˚ 05.0833'N	76˚ 32.0000'W	10.33
PT05*****	Potomac	38˚ 06.0833'N	76˚ 31.0000'W	15.00
PT06	Potomac	38˚ 10.6667'N	76˚ 36.5000'W	11.00
PT07	Potomac	38˚ 11.3380'N	76˚ 35.8430'W	8.67
PT08	Potomac	38˚ 10.0833'N	76˚ 39.8333'W	7.00
PT09*****	Potomac	38˚ 11.2000'N	76˚ 44.5000'W	8.67
PT10	Potomac	38˚ 15.5000'N	76˚ 52.4167'W	7.67
PT11*****	Potomac	38˚ 21.3333'N	76˚ 59.3333'W	15.00
PT12	Potomac	38˚ 23.5833'N	77˚ 05.1667'W	10.67
PT13	Potomac	38˚ 21.4167'N	77˚ 10.6667'W	14.33
PT14	Potomac	38˚ 23.0000'N	77˚ 17.1667'W	4.00
PT15	Potomac	38˚ 23.4167'N	77˚ 15.7500'W	6.00
PT16*****	Potomac	38˚ 28.4167'N	77˚ 17.5000'W	5.33
PT17	Potomac	38˚ 32.9167'N	77˚ 14.9167'W	9.00
PT18	Potomac	38˚ 36.6667'N	77˚ 10.6667'W	5.33
PT19*****	Potomac	38˚ 39.8333'N	77˚ 07.8333'W	3.00
PT20	Potomac	38˚ 42.5000'N	77˚ 02.8333'W	2.0
PTM1	Mapping Station	37˚ 58.8333'N	76˚ 23.0000'W	8.67
PTM2	Mapping Station	38˚ 00.8333'N	76˚ 22.0000'W	13.33
PTM3	Mapping Station	38˚ 04.3333'N	76˚ 28.1667'W	16.33
PTM4	Mapping Station	38˚ 08.3333'N	76˚ 34.0000'W	17.67
PTM5	Mapping Station	38˚ 12.0000'N	76˚ 38.8333'W	8.67

Table 3-1. Analysis Problem Codes

This table is added here for reference.

ANALYSIS PROBLEM CODE	DESCRIPTION
A	Laboratory accident
B	Interference
C	Mechanical/materials failure
D	Insufficient sample
N	Sample Lost
P	Lost results
R	Sample contaminated
S	Sample container broken during analysis
V	Sample results rejected due to QA/QC criteria
W	Duplicate results for all parameters
X	Sample not preserved properly
AA	Sample thawed when received
BB	Torn filter paper
EE	Foil pouch very wet when received from field, therefore poor replication between pads, mean reported
FF	Poor replication between pads; mean reported
HD	Particulate and chlorophyll-a samples only taken at -1.0 cm of the Eh profile
HH	Sample not taken
JJ	Amount filtered not recorded (Calculation could not be done)
LL	Mislabeled
NI	Data for this variable are considered to be non-interpretable
NN	Particulates found in filtered sample
NR	No replicate analyzed for epiphyte strip chlorophyll-a concentration
PP	Assumed sample volume (pouch volume differs from data sheet volume; pouch volume used)
QQ	Although value exceeds a theoretically equivalent or greater value (*e.g.*, PO4F>TDP), the excess is within precision of analytical techniques and therefore not statistically significant.
SD	All sampling at station discontinued for one or more sampling periods
SS	Sample contaminated in field
TF	Dissolved oxygen probe failure
TL	Instrument failure in research laboratory
TS	Dissolved oxygen probe not stabilized
TT	Instrument failure on board research vessel
UU	Analysis discontinued
WW	Station was not sampled due to bad weather conditions, research vessel mechanical failure, or failure of state highway bridges to open or close
XX	Sampling for this variable was not included in the monitoring program at this time or was not monitored during a specific cruise
YB	No blank measured for MINI-SONE fluxes
YY	Data not recorded

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC RIVER TMDL DATA SET, 2002:

Page No.

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT01	20020612	1537	9.0	1.7	WP13	0.5	24.7	24.0	14.6	9.28	121.4
						2.0	23.8	23.8	14.8	8.20	105.6
						4.0	23.2	23.9	15.1	6.76	86.3
						6.0	22.2	24.9	16.1	3.56	44.9
						8.0	22.1	25.0	16.2	3.29	41.4
PT02	20020612	1446	13.0	1.6	WP13	0.5	26.3	24.6	14.6	9.72	130.8
						1.0	25.9	24.4	14.6	9.82	131.3
						2.0	25.1	24.2	14.7	9.67	127.4
						4.0	23.5	24.7	15.5	7.23	93.1
						6.0	22.7	25.9	16.7	5.39	68.8
						8.0	22.3	27.2	17.7	4.52	57.6
						10.0	21.9	27.8	18.3	3.65	46.4
						12.0	21.8	28.9	19.2	3.31	42.1
PT03	20020612	1404	16.0	1.7	WP13	0.5	26.5	24.9	14.7	8.89	120.1
						3.0	24.9	24.5	15.0	8.44	111.0
						5.0	22.4	26.6	17.3	4.23	53.9
						7.0	22.2	27.4	17.9	3.68	46.8
						9.0	22.0	27.8	18.2	3.46	44.0
						11.0	21.9	28.2	18.6	3.15	40.1
						13.0	21.9	28.3	18.6	3.17	40.4
						15.0	21.9	28.4	18.7	3.36	42.8
PT04	20020612	1232	9.0	1.4	WP13	0.5	24.5	22.4	13.6	8.49	110.0
						2.0	24.0	22.4	13.8	8.15	104.8
						4.0	25.3	22.2	13.9	7.44	97.9
						6.0	22.9	22.3	14.1	6.44	81.3
						8.0	22.1	23.7	15.3	3.94	49.4

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT05	20020612	1145	15.0	1.8	WP13	0.5	25.2	22.9	13.8	8.91	117.1
						1.0	25.1	22.9	13.8	8.92	117.1
						2.0	24.4	22.5	13.8	8.13	105.2
						4.0	24.1	22.9	14.1	7.28	93.9
						6.0	22.5	24.5	15.8	3.49	44.1
						8.0	20.6	25.3	17.0	1.24	15.3
						10.0	20.5	25.5	17.2	1.14	14.0
						12.0	20.5	26.5	17.9	1.16	14.3
						14.0	20.5	27.1	18.4	1.25	15.5
PT06	20020612	958	11.0	1.8	WP13	0.5	24.7	20.6	12.4	6.01	77.6
						2.0	24.4	20.5	12.4	5.79	74.4
						4.0	24.2	20.6	12.5	5.39	69.0
						6.0	23.4	22.0	13.7	4.69	59.7
						8.0	22.6	23.0	14.6	4.18	52.6
						10.0	20.2	25.4	17.3	3.29	40.2
PT07	20020612	923	9.0	1.7	WP13	0.5	25.3	20.7	12.3	8.72	113.8
						2.0	25.1	20.6	12.3	8.62	112.1
						4.0	24.9	20.5	12.3	8.18	106.0
						6.0	21.7	23.6	15.4	2.03	25.2
						8.0	20.4	25.0	16.9	1.67	20.4
PT08	20020612	742	7.0	1.5	WP13	0.5	23.5	19.2	11.8	7.38	92.9
						2.0	23.5	19.2	11.8	7.40	93.1
						4.0	23.4	19.2	11.8	7.43	93.5
						6.0	23.4	19.2	11.8	7.55	95.0
PT09	20020612	637	9.0	1.5	WP13	0.5	23.8	19.4	11.8	7.51	95.1
						1.0	23.8	19.3	11.8	7.50	95.0
						2.0	23.8	19.3	11.8	7.48	94.7
						4.0	23.7	19.4	11.9	7.43	94.0
						6.0	21.9	22.2	14.3	2.70	33.5
						8.0	21.9	22.2	14.3	2.79	34.6

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT10	20020611	1835	8.0	1.3	WP13	0.5	26.9	16.8	9.4	11.59	153.2
						3.0	24.8	16.9	10.0	11.44	146.0
						5.0	24.1	19.0	11.5	8.37	106.4
						7.0	22.7	21.1	13.3	3.20	40.1
PT11	20020611	1053	15.0	0.7	WP13	0.5	25.2	13.3	7.6	9.71	123.3
						1.0	24.6	13.4	7.8	8.75	109.9
						2.0	24.5	13.5	7.9	7.45	93.4
						4.0	24.3	13.8	8.1	6.55	82.0
						6.0	24.0	14.4	8.5	5.85	73.0
						8.0	24.0	14.6	8.7	5.60	70.0
						10.0	24.0	15.6	9.2	5.65	70.8
						12.0	24.0	16.1	9.7	5.77	72.5
						14.0	23.5	17.1	10.4	3.80	47.5
PT12	20020610	1202	10.0	0.8	WP13	0.5	24.9	9.3	5.2	7.10	88.3
						1.0	24.7	9.7	5.5	6.95	86.3
						3.0	24.4	10.7	6.1	6.22	77.2
						5.0	24.3	11.3	6.5	5.58	69.2
						7.0	24.1	11.8	6.8	5.32	65.9
						9.0	24.1	12.2	7.1	5.22	64.7
PT13	20020610	1305	14.0	0.6	WP13	0.5	25.1	5.6	3.0	7.15	88.2
						1.0	25.0	5.7	3.1	7.13	87.8
						3.0	24.5	5.9	3.3	6.86	83.8
						5.0	24.5	6.0	3.3	6.83	83.4
						7.0	24.5	6.0	3.0	6.82	83.1
						9.0	24.4	6.0	3.3	6.80	83.0
						11.0	24.4	6.1	3.4	6.78	82.7
						13.0	24.4	6.2	3.4	6.76	82.5

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT14	20020610	1405	4.0	0.7	WP13	0.5	26.3	1.0	0.5	7.62	94.7
						1.0	25.0	0.9	0.4	7.49	90.8
						3.0	24.9	1.0	0.5	7.58	91.8
PT15	20020610	1445	6.0	1.0	WP13	0.5	25.2	2.1	1.1	7.13	87.2
						1.0	24.9	2.2	1.1	7.03	85.5
						3.0	24.8	2.4	1.2	6.99	84.8
						5.0	24.8	2.4	1.2	7.00	85.0
PT16	20020610	1330	5.0	0.8	WP13	0.5	27.9	0.4	0.2	6.76	86.3
						1.0	25.3	0.4	0.2	6.36	77.4
						2.0	25.1	0.5	0.2	6.15	74.7
						4.0	25.1	0.5	0.2	5.97	72.4
PT17	20020610	1622	9.0	0.9	WP13	0.5	28.1	0.3	0.1	7.35	94.2
						2.0	25.2	0.3	0.1	6.47	78.6
						4.0	25.1	0.3	0.1	6.47	78.5
						6.0	25.1	0.3	0.1	6.56	79.6
						8.0	25.1	0.3	0.1	6.85	83.1
PT18	20020610	1718	4.0	0.8	WP13	0.5	26.9	0.3	0.1	9.20	115.4
						3.0	25.6	0.3	0.1	7.33	89.7
PT19	20020610	1753	3.0	0.5	WP13	0.5	26.4	0.3	0.1	7.85	97.5
						1.0	26.4	0.3	0.1	8.12	101.0
						2.0	26.5	0.3	0.1	8.41	104.8
PT20	20020610	1842	2.0	0.8	WP13	0.5	27.5	0.3	0.1	8.78	111.4
						1.0	27.5	0.3	0.1	8.98	113.9

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM1	20020612	1612	9.0	1.6	WP13	0.5	24.4	24.3	14.9	8.86	115.6
						2.0	24.0	24.4	15.1	7.93	102.8
						4.0	23.0	24.6	15.6	6.27	80.0
						6.0	22.5	25.9	16.7	XX	XX
						8.0	22.5	25.9	16.7	XX	XX
PTM2	20020612	1645	13.0	1.6	WP13	0.5	25.2	24.4	14.7	9.80	129.6
						2.0	23.4	25.0	15.8	7.42	95.4
						4.0	23.3	25.2	15.9	7.20	92.5
						6.0	23.2	25.2	16.0	6.96	89.2
						8.0	22.7	26.2	16.9	5.40	69.0
						10.0	22.5	26.7	17.3	4.72	60.2
						12.0	22.0	28.1	18.5	3.52	44.8
PTM3	20020612	1311	16.0	1.4	WP13	0.5	25.5	23.3	13.9	9.34	123.5
						3.0	24.0	23.8	14.7	7.98	103.1
						5.0	23.1	24.6	15.6	6.74	86.2
						7.0	22.5	25.8	16.7	4.87	62.0
						9.0	21.8	26.2	17.2	3.35	42.2
						11.0	21.2	26.6	17.8	2.02	25.2
						13.0	21.0	27.9	18.7	1.90	23.8
						15.0	21.1	28.3	19.0	2.13	26.7
PTM4	20020612	1037	19.0	1.5	WP13	0.5	25.0	21.9	13.1	8.62	112.5
						2.0	24.2	21.8	13.3	8.25	106.2
						4.0	23.7	22.0	13.6	7.16	91.4
						6.0	23.5	22.1	13.7	6.55	83.4
						8.0	22.0	23.9	15.5	3.51	43.9
						10.0	21.0	24.9	16.6	1.67	20.6
						12.0	20.7	25.0	16.8	1.29	15.9
						14.0	20.5	25.7	17.4	1.21	14.9
						16.0	20.3	26.2	17.8	3.57	43.8
						18.0	20.4	27.5	18.8	4.16	51.5

TABLE A-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTPF01
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM5	20020612	816	9.0	1.6	WP13	0.5	24.6	20.1	12.1	8.26	106.2
						2.0	24.5	20.0	12.1	8.12	104.2
						4.0	24.2	20.0	12.1	7.39	94.5
						6.0	22.0	23.8	15.3	3.01	37.6
						8.0	21.1	24.1	16.0	2.11	26.0

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT01	20020724	1245	8.0	1.7	WP13	0.5	27.7	25.1	14.4	7.29	100.5
						3.0	27.4	25.2	14.6	5.84	80.1
						5.0	27.3	25.5	14.8	5.71	78.3
						7.0	27.2	25.7	15.0	5.63	77.1
PT02	20020724	1149	12.0	1.8	WP13	0.5	27.7	25.1	14.4	6.91	95.2
						1.0	27.6	25.1	14.5	6.89	94.9
						3.0	27.5	25.2	14.5	6.57	90.3
						5.0	26.8	25.8	15.2	2.46	33.5
						7.0	25.5	27.7	16.8	0.00	0.00
						9.0	25.9	32.0	19.5	0.00	0.00
						11.0	26.1	33.3	20.3	0.00	0.00
PT03	20020724	1109	15.0	2.0	WP13	0.5	27.7	25.1	14.4	7.35	101.2
						2.0	27.6	25.1	14.5	7.17	98.7
						4.0	26.6	27.8	16.5	1.16	15.9
						6.0	26.4	31.1	18.7	1.03	14.2
						8.0	26.1	33.0	20.2	0.00	0.00
						10.0	26.1	33.1	20.2	0.00	0.00
						12.0	26.1	33.2	20.2	0.00	0.00
						14.0	26.1	33.8	20.6	0.00	0.00
PT04	20020724	910	12.0	2.1	WP13	0.5	27.7	24.6	14.1	6.99	96.1
						3.0	27.6	24.8	14.3	5.72	78.6
						5.0	27.5	25.0	14.4	4.88	67.0
						7.0	25.6	30.1	18.4	0.00	0.00
						9.0	25.6	31.8	19.5	0.00	0.00
						11.0	25.9	33.0	20.3	0.00	0.00
PT05	20020724	936	15.0	2.0	WP13	0.5	27.8	24.6	14.1	7.21	99.3
						1.0	27.7	24.6	14.1	6.84	94.1
						2.0	27.7	24.6	14.1	6.81	93.6
						4.0	27.1	26.4	15.4	4.03	55.2
						6.0	25.5	28.6	17.4	0.00	0.00
						8.0	25.6	29.7	18.2	0.00	0.00
						10.0	25.8	32.7	20.1	0.00	0.00
						12.0	25.9	33.6	20.6	0.00	0.00
						14.0	25.9	33.6	20.6	0.00	0.00

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT06	20020723	750	11.0	2.4	WP13	0.5	28.0	24.5	13.9	7.56	104.5
						2.0	28.0	24.5	13.9	7.16	98.9
						4.0	27.9	24.5	13.9	7.22	99.7
						6.0	27.7	24.5	14.0	6.31	86.8
						8.0	25.3	31.2	19.3	0.00	0.00
						10.0	25.4	31.6	19.5	0.00	0.00
PT07	20020724	644	8.0	2.1	WP13	0.5	28.1	24.4	13.9	6.75	93.4
						1.0	28.1	24.4	13.9	6.92	95.7
						3.0	28.1	24.5	13.9	6.91	95.7
						5.0	27.6	25.2	14.5	4.83	66.4
						7.0	25.2	30.9	19.1	0.00	0.00
PT08	20020722	754	7.0	2.0	WP13	0.5	27.4	23.4	13.4	6.64	90.5
						2.0	27.4	23.4	13.4	6.41	87.3
						4.0	26.7	27.8	14.6	3.26	44.2
						6.0	26.2	25.8	15.3	1.44	19.4
PT09	20020722	842	9.0	1.8	WP13	0.5	27.5	22.9	13.1	6.44	87.8
						1.0	27.4	22.9	13.1	6.45	87.9
						2.0	27.4	23.0	13.1	6.52	88.8
						4.0	24.5	23.1	13.2	6.59	85.2
						6.0	27.3	23.3	13.4	5.33	72.5
						8.0	27.0	25.0	14.0	3.35	45.5
PT10	20020722	956	7.0	1.7	WP13	0.5	28.0	21.2	11.9	11.91	162.6
						2.0	27.9	21.2	11.9	11.91	162.4
						4.0	27.8	21.1	11.9	11.90	162.0
						6.0	27.8	21.6	12.2	12.18	166.0

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT11	20020722	1059	15.0	1.0	WP13	0.5	28.2	18.2	10.1	5.82	79.0
						1.0	28.2	18.2	10.1	5.67	76.9
						2.0	28.0	18.5	10.2	5.25	71.0
						4.0	28.0	18.8	10.5	5.09	68.9
						6.0	27.9	18.9	10.5	5.05	68.4
						8.0	28.0	19.2	10.7	4.95	67.1
						10.0	27.9	19.5	10.9	4.92	66.8
						12.0	27.9	19.9	11.2	4.80	65.2
						14.0	27.8	20.1	11.3	4.87	66.1
PT12	20020722	1214	11.0	0.6	WP13	0.5	28.8	15.0	8.1	5.31	71.9
						2.0	28.4	15.5	8.4	4.91	66.2
						4.0	28.4	15.8	8.6	4.87	65.7
						6.0	28.4	15.9	8.7	4.85	65.5
						8.0	28.4	16.2	8.8	4.78	64.6
						10.0	23.3	16.3	8.9	4.94	61.0
PT13	20020722	1307	14.0	1.0	WP13	0.5	28.9	11.7	6.2	6.55	88.0
						1.0	28.7	11.8	6.2	6.18	82.8
						3.0	28.6	12.1	6.4	6.00	80.3
						5.0	28.5	12.2	6.4	5.89	78.8
						7.0	28.4	12.3	6.5	5.81	77.6
						9.0	28.4	12.5	6.7	5.57	74.5
						11.0	28.4	12.9	6.9	5.43	72.6
						13.0	28.4	13.0	7.0	5.51	73.7
PT14	20020722	1408	4.0	0.9	WP13	0.5	29.3	6.5	3.3	7.75	103.2
						1.0	29.1	6.7	3.4	7.64	101.4
						3.0	28.4	7.7	3.9	6.82	89.8
PT15	20020722	1438	6.0	0.9	WP13	0.5	29.4	8.6	4.4	4.36	7.1
						1.0	28.8	8.9	4.6	4.57	7.0
						3.0	28.5	9.4	4.9	4.91	7.0
						5.0	28.4	10.3	5.4	5.40	7.0

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT16	20020722	1521	6.0	1.0	WP13	0.5	29.9	5.1	2.5	7.48	100.2
						1.0	29.6	5.0	2.4	7.43	98.9
						3.0	28.7	4.9	2.4	6.25	82.0
						5.0	28.6	4.8	2.4	6.16	80.6
PT17	20020722	1612	9.0	0.9	WP13	0.5	28.9	3.6	1.7	6.42	84.2
						2.0	28.9	3.6	1.7	6.17	80.9
						4.0	28.8	3.6	1.7	5.99	78.5
						6.0	28.8	3.6	1.7	5.87	76.8
						8.0	28.8	3.5	1.7	6.03	78.9
PT18	20020722	1700	6.0	0.8	WP13	0.5	29.3	0.6	0.3	8.90	116.6
						1.0	29.3	0.6	0.3	8.99	117.8
						3.0	29.0	0.6	0.3	7.86	102.5
						5.0	28.8	0.8	0.4	6.69	86.9
PT19	20020722	1743	3.0	0.6	WP13	0.5	29.6	0.4	0.2	9.56	125.9
						1.0	29.6	0.4	0.2	9.55	125.6
						2.0	29.5	0.4	0.2	9.72	127.8
PT20	20020722	1829	2.0	0.5	WP13	0.5	30.0	0.4	0.2	10.00	132.6
						1.0	30.1	0.4	0.2	10.33	137.0

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM1	20020724	1302	8.0	1.9	WP13	0.5	27.8	25.5	14.7	7.70	106.4
						3.0	27.7	25.5	14.7	7.44	102.6
						5.0	27.1	25.7	15.0	6.07	83.1
						7.0	26.7	26.0	15.3	5.96	81.1
PTM2	20020724	1340	13.0	1.7	WP13	0.5	27.8	25.5	14.6	7.68	106.1
						2.0	27.8	25.5	14.6	7.69	106.2
						4.0	27.7	25.5	14.7	7.72	106.5
						6.0	26.5	26.8	15.8	1.70	23.1
						8.0	26.0	29.1	17.6	0.08	1.1
						10.0	26.3	31.3	18.9	0.98	13.5
						12.0	26.1	33.7	20.6	0.75	10.4
PTM3	20020724	1025	16.0	2.0	WP13	0.5	28.0	24.8	14.1	7.57	104.7
						3.0	27.4	25.5	14.7	4.69	64.4
						5.0	25.7	28.2	17.1	0.00	0.00
						7.0	25.8	29.4	17.8	0.00	0.00
						9.0	26.2	33.1	20.2	0.00	0.00
						11.0	26.1	34.1	20.9	0.00	0.00
						13.0	26.1	34.1	20.9	0.00	0.00
						15.0	26.1	34.1	20.9	0.32	4.5
PTM4	20020723	826	16.0	2.2	WP13	0.5	27.9	24.4	13.9	7.18	99.0
						3.0	27.9	24.4	13.9	7.14	98.4
						5.0	27.2	25.4	14.7	3.98	54.5
						7.0	25.2	28.9	17.8	0.00	0.00
						9.0	25.2	30.2	18.6	0.00	0.00
						11.0	25.4	31.2	19.3	0.00	0.00
						13.0	25.3	32.4	20.0	0.00	0.00
						15.0	25.6	32.6	20.0	0.00	0.00

TABLE A-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTPF02
REVISED: 20020806

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM5	20020724	718	8.0	2.3	WP13	0.5	28.1	24.1	13.7	6.70	92.5
						1.0	28.0	24.1	13.7	6.53	90.1
						3.0	28.0	24.1	13.7	6.05	83.5
						5.0	27.1	24.9	14.4	2.71	37.0
						7.0	25.4	28.7	17.5	0.00	0.00

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT01	20020821	1313	8.0	2.1	WP13	0.5	28.7	30.3	17.4	6.87	97.9
						3.0	28.4	30.1	17.4	6.64	94.1
						5.0	28.1	30.0	17.4	5.94	83.8
						7.0	27.4	31.7	18.8	1.50	21.1
PT02	20020821	1229	14.0	1.8	WP13	0.5	28.5	31.2	18.0	6.68	95.2
						1.0	28.5	31.2	18.0	6.73	95.9
						3.0	28.4	31.3	18.1	5.86	83.4
						5.0	28.3	32.0	18.6	5.07	72.3
						7.0	28.2	32.4	18.9	4.43	63.2
						9.0	27.8	32.5	19.1	2.81	39.8
						11.0	27.3	32.5	19.3	1.18	16.6
						13.0	27.0	33.2	19.9	0.76	10.7
PT03	20020821	1150	15.0	2.4	WP13	0.5	28.5	31.7	18.3	6.64	94.8
						2.0	28.4	31.6	18.3	6.59	93.9
						4.0	28.3	31.6	18.3	6.19	88.1
						6.0	28.2	32.1	18.7	4.60	65.4
						8.0	27.8	32.3	19.0	3.79	53.7
						10.0	27.4	32.9	19.5	2.19	30.9
						12.0	27.1	33.5	20.0	0.61	8.6
						14.0	27.0	33.8	20.3	0.22	3.1
PT04	20020821	931	10.0	1.9	WP13	0.5	28.3	28.9	16.7	6.08	85.8
						3.0	28.3	29.1	16.7	5.94	83.8
						5.0	28.0	29.9	17.3	3.40	47.9
						7.0	27.6	30.7	18.0	1.54	21.6
						9.0	27.3	31.1	18.4	1.10	15.4
PT05	20020821	1008	15.0	2.6	WP13	0.5	28.4	29.5	17.0	6.00	84.8
						1.0	28.3	29.4	17.0	5.50	77.7
						2.0	28.2	29.4	17.0	4.56	64.3
						4.0	28.3	29.7	17.1	4.12	58.2
						6.0	28.1	31.5	18.3	2.84	40.3
						8.0	27.6	31.9	18.8	2.05	28.9
						10.0	27.1	33.0	19.7	1.06	14.9
						12.0	27.1	33.0	19.8	0.99	13.9
						14.0	27.0	33.1	19.8	1.61	22.6

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT06	20020821	756	11.0		1.8 WP13	0.5	28.5	28.2	16.1	6.46	91.1
						2.0	28.6	28.3	16.2	6.40	90.4
						4.0	27.5	31.1	18.3	1.86	26.1
						6.0	27.3	31.6	18.7	1.50	21.0
						8.0	27.1	32.3	19.3	0.92	12.9
						10.0	27.0	32.5	19.5	0.49	6.9
PT07	20020821	632	9.0		1.9 WP13	0.5	28.2	28.4	16.3	6.22	87.3
						2.0	28.2	28.5	16.4	5.71	80.3
						4.0	27.5	31.1	18.2	2.08	29.2
						6.0	27.4	31.5	18.6	1.56	21.9
						8.0	27.2	32.0	19.1	1.29	18.1
PT08	20020819	800	7.0		2.1 WP13	0.5	28.4	26.5	15.1	6.93	97.0
						2.0	28.4	26.5	15.1	6.81	95.3
						4.0	28.3	26.6	15.2	6.05	84.5
						6.0	27.6	28.5	16.6	2.15	29.9
PT09	20020819	8.44	8.0		1.9 WP13	0.5	28.2	25.7	14.7	6.71	93.3
						1.0	28.1	25.7	14.7	6.94	96.4
						3.0	28.0	25.6	14.6	6.57	91.1
						5.0	27.6	27.8	16.2	2.44	33.9
						7.0	27.3	29.2	17.1	1.09	15.1
PT10	20020819	1006	8.0		1.7 WP13	0.5	28.9	23.9	13.4	8.01	112.0
						3.0	28.6	24.7	13.9	6.66	92.9
						5.0	27.8	26.2	15.1	3.28	45.4
						7.0	27.7	26.5	15.3	3.06	42.4

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT11	20020819	1114	15.0	1.1	WP13	0.5	29.3	19.5	10.6	5.92	82.1
						1.0	29.0	19.7	10.8	5.36	74.1
						2.0	29.0	20.2	11.1	5.05	69.8
						4.0	29.0	20.8	11.4	4.69	64.9
						6.0	28.9	21.1	11.6	4.52	62.6
						8.0	28.7	22.1	12.3	4.22	58.5
						10.0	28.7	22.3	12.4	4.01	55.6
						12.0	28.7	22.3	12.4	4.01	55.6
						14.0	28.6	22.6	12.6	3.97	55.0
PT12	20020819	1219	11.0	0.8	WP13	0.5	30.2	17.0	9.0	5.85	81.7
						2.0	29.0	17.6	9.5	5.33	73.1
						4.0	29.0	18.0	9.8	5.15	70.7
						6.0	29.0	17.9	9.7	5.16	70.8
						8.0	28.9	18.1	9.9	5.12	70.2
						10.0	28.9	18.3	10.0	5.16	70.8
PT13	20020819	1312	15.0	0.9	WP13	0.5	29.9	13.3	6.9	6.71	92.1
						2.0	29.4	13.3	7.0	6.09	82.8
						4.0	29.3	13.9	7.3	5.84	79.5
						6.0	29.0	14.6	7.8	5.39	73.2
						8.0	28.9	14.9	8.0	5.23	71.0
						10.0	28.9	15.9	8.6	4.99	67.9
						12.0	28.8	16.2	8.7	4.95	67.4
						14.0	28.9	16.2	8.7	5.08	69.2
PT14	20020819	1417	4.0	0.7	WP13	0.5	30.7	9.4	4.7	7.55	103.8
						1.0	29.2	9.4	4.8	6.71	89.9
						3.0	29.0	9.3	4.8	6.67	89.2
PT15	20020819	1444	6.0	0.9	WP13	0.5	29.8	11.3	5.8	6.88	7.1
						3.0	29.1	12.0	6.3	5.76	7.0
						5.0	29.2	12.0	6.3	5.79	7.0

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PT16	20020819	1525	5.0	0.9	WP13	0.5	30.1	6.1	3.0	7.12	96.0
						1.0	29.6	6.1	3.0	6.43	85.9
						2.0	29.3	6.0	3.0	5.76	76.5
						4.0	29.1	6.0	3.0	5.64	74.8
PT17	20020819	1619	9.0	1.1	WP13	0.5	30.6	4.7	2.3	7.03	95.2
						2.0	29.6	5.1	2.5	5.42	72.3
						4.0	29.4	5.2	2.5	5.25	69.7
						6.0	29.3	5.2	2.5	5.18	68.7
						8.0	29.3	5.1	2.5	5.47	72.5
PT18	20020819	1706	6.0	0.7	WP13	0.5	30.4	1.1	0.5	8.36	111.8
						3.0	29.2	2.0	1.0	5.18	68.0
						5.0	29.2	2.1	1.0	5.26	69.0
PT19	20020819	1753	3.0	0.7	WP13	0.5	30.1	0.9	0.4	6.93	92.1
						1.0	30.1	0.9	0.4	6.94	92.2
						2.0	30.1	0.9	0.4	7.36	97.8
PT20	20020820	637	2.0	0.6	WP13	0.5	29.6	0.5	0.2	6.37	83.8
						1.0	29.5	0.5	0.2	6.28	82.6

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM1	20020821	1341	9.0	2.4	WP13	0.5	28.9	30.6	17.5	7.06	100.9
						2.0	28.4	30.2	17.4	7.03	99.7
						4.0	28.3	30.2	17.4	6.25	88.4
						6.0	27.9	32.3	18.9	3.77	53.5
						8.0	27.8	32.3	19.0	3.24	45.9
PTM2	20020821	1420	14.0	2.2	WP13	0.5	28.7	30.8	17.7	7.60	108.5
						3.0	28.2	32.5	18.9	5.95	84.8
						5.0	28.2	32.5	19.0	5.87	83.7
						7.0	28.2	32.6	19.0	5.31	75.7
						9.0	28.0	32.7	19.2	4.35	61.8
						11.0	27.8	32.9	19.4	3.63	51.5
						13.0	27.4	33.1	19.7	1.72	24.3
PTM3	20020821	1051	17.0	2.3	WP13	0.5	28.2	29.8	17.2	6.37	89.9
						2.0	28.1	29.8	17.2	6.33	89.2
						4.0	28.1	30.1	17.5	6.03	85.1
						6.0	28.1	31.8	18.6	4.48	63.6
						8.0	27.6	32.4	19.1	2.63	37.1
						10.0	27.2	32.8	19.5	1.35	19.0
						12.0	27.0	33.3	19.9	0.38	5.3
						14.0	26.9	33.3	20.0	0.18	2.5
						16.0	26.9	33.4	20.1	0.38	5.3
PTM4	20020821	835	18.0	2.1	WP13	0.5	28.7	28.8	16.4	5.65	80.1
						3.0	28.5	29.1	16.7	4.28	60.5
						5.0	28.0	31.1	18.1	3.35	47.3
						7.0	27.6	31.5	18.6	2.10	29.6
						9.0	27.3	31.9	18.9	1.08	15.2
						11.0	27.0	32.3	19.3	0.43	6.0
						13.0	26.8	32.8	19.7	0.22	3.1
						15.0	26.8	32.9	19.8	0.29	4.1
						17.0	26.8	32.9	19.8	0.46	6.4

TABLE A-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN PROFILES: Vertical profiles of temperature, salinity, dissolved oxygen and other characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTPF03
REVISED: 20021007

STATION	DATE	TIME	TOTAL DEPTH (m)	SECCHI DEPTH (m)	GEAR CODE	SAMPLE DEPTH (m)	TEMP (ºC)	COND (mS cm^{-1})	SALIN	DO (mg l^{-1})	DO SAT (%)
PTM5	20020821	709	9.0	1.8	WP13	0.5	28.4	27.9	15.9	6.07	85.4
						2.0	28.4	27.9	15.9	5.82	81.9
						4.0	28.3	28.4	16.3	4.56	64.1
						6.0	27.4	31.0	18.3	1.33	18.6
						8.0	27.2	31.6	18.8	0.84	11.8

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC RIVER TMDL DATA SET, 2002:

Page No.

TABLE B-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN NUTRIENTS: Dissolved and particulate nutrient concentrations in bottom waters

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTNT01
REVISED: 20021120

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

					DISSOLVED NUTRIENTS			
STATION	DATE	TOTAL DEPTH (m)	SAMPLE DEPTH (m)	SAMPLE #	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	CORR DIP (µM)
PT01	20020612	9.0	8.0	146	6.7	0.10	0.31	0.10
PT02	20020612	13.0	12.0	141	3.4	0.18	0.48	0.07
PT03	20020612	16.0	15.0	136	3.0	0.15	0.37	0.09
PT04	20020612	9.0	8.0	130	3.7	0.07	0.23	0.10
PT05	20020612	15.0	14.0	125	10.9	0.15	0.39	0.18
PT06	20020612	11.0	10.0	119	10.9	0.15	0.40	0.12
PT07	20020612	6.0	8.0	114	9.4	0.16	0.36	0.12
PT08	20020612	7.0	6.0	108	8.6	0.19	0.35	0.15
PT09	20020612	9.0	8.0	103	4.4	0.08	0.58	0.18
PT10	20020611	8.0	7.0	98	3.9	0.15	0.33	0.17
PT11	20020611	15.0	14.0	1	12.0	0.55	8.12	0.32
PT12	20020610	10.0	9.0	6	3.8	0.62	27.10	0.65
PT13	20020610	14.0	13.0	11	2.2	0.63	4.61	1.20
PT14	20020610	4.0	3.0	16	5.5	0.82	59.30	1.90
PT15	20020610	6.0	5.0	21	7.2	0.73	51.60	1.95
PT16	20020610	5.0	4.0	26	14.8	1.30	47.10	1.81
PT17	20020610	9.0	8.0	31	10.6	1.33	47.00	0.98
PT18	20020610	4.0	3.0	36	4.1	1.63	60.40	0.46
PT19	20020610	3.0	2.0	41	6.8	2.29	69.20	0.51
PT20	20020610	2.0	1.0	46	5.7	2.29	72.20	0.79

TABLE B-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN NUTRIENTS: Dissolved and particulate nutrient concentrations in bottom waters

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTNT02
REVISED: 20021120

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

					DISSOLVED NUTRIENTS			
STATION	DATE	TOTAL DEPTH (m)	SAMPLE DEPTH (m)	SAMPLE #	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	CORR DIP (µM)
PT01	20020724	8.0	7.0	177	0.6	0.10	0.11	0.26
PT02	20020724	12.0	11.0	172	3.5	0.92	0.69	0.67
PT03	20020724	15.0	14.0	167	3.2	1.03	0.99	0.85
PT04	20020724	12.0	11.0	156	6.6	0.11	0.36	1.57
PT05	20020724	15.0	14.0	161	5.0	0.10	0.22	1.26
PT06	20020723	11.0	10.0	150	9.8	0.08	0.20	2.29
PT07	20020724	8.0	7.0	144	11.7	0.07	0.28	2.54
PT08	20020722	7.0	6.0	29	1.1	0.17	0.26	0.94
PT09	20020722	9.0	8.0	34	0.5	0.08	0.47	0.39
PT10	20020722	7.0	6.0	39	1.3	0.35	0.22	0.14
PT11	20020722	15.0	14.0	44	2.5	0.23	2.15	0.78
PT12	20020722	11.0	10.0	49	6.0	0.71	7.85	1.44
PT13	20020722	14.0	13.0	54	3.9	0.58	13.20	1.47
PT14	20020722	4.0	3.0	59	2.6	0.50	22.80	1.61
PT15	20020722	6.0	5.0	64	3.4	0.52	15.60	1.44
PT16	20020722	6.0	5.0	69	9.2	0.63	21.50	1.71
PT17	20020722	9.0	8.0	74	11.5	0.77	20.80	1.67
PT18	20020722	6.0	5.0	79	4.5	0.93	17.50	0.83
PT19	20020722	3.0	2.0	84	1.0	1.23	26.40	0.24
PT20	20020722	2.0	1.0	89	0.4	1.97	66.70	0.49

TABLE B-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN NUTRIENTS: Dissolved and particulate nutrient concentrations in bottom waters

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLANNT03
REVISED: 20021120

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

					DISSOLVED NUTRIENTS			
STATION	DATE	TOTAL DEPTH (m)	SAMPLE DEPTH (m)	SAMPLE #	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	CORR DIP (µM)
PT01	20020821	8.0	7.0	177	4.4	1.62	1.83	1.63
PT02	20020821	14.0	13.0	172	6.6	0.47	0.15	1.93
PT03	20020821	15.0	14.0	167	2.4	3.49	4.29	1.74
PT04	20020821	10.0	9.0	156	3.4	0.93	1.06	1.67
PT05	20020821	15.0	14.0	161	0.6	6.69	7.66	1.29
PT06	20020821	11.0	10.0	150	0.6	5.38	5.97	1.26
PT07	20020821	9.0	8.0	144	0.7	2.78	3.46	1.08
PT08	20020819	7.0	6.0	29	4.4	1.11	1.22	1.29
PT09	20020819	8.0	7.0	34	1.8	1.86	1.95	0.89
PT10	20020819	8.0	7.0	39	3.1	1.99	1.81	0.73
PT11	20020819	15.0	14.0	44	1.8	5.34	6.41	1.14
PT12	20020819	11.0	10.0	49	0.5	7.85	11.20	1.54
PT13	20020819	15.0	14.0	54	1.4	8.36	14.10	2.00
PT14	20020819	4.0	3.0	59	0.6	7.70	14.40	1.63
PT15	20020819	6.0	5.0	64	2.3	7.28	14.30	1.72
PT16	20020819	5.0	4.0	69	3.7	9.40	22.30	1.96
PT17	20020819	9.0	8.0	74	4.7	8.92	22.20	1.67
PT18	20020819	6.0	5.0	79	11.8	2.30	15.00	1.05
PT19	20020819	3.0	2.0	84	5.3	1.31	16.80	0.66
PT20	20020820	2.0	1.0	89	5.1	2.77	46.70	0.71

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC RIVER TMDL DATA SET, 2002:

Page No.

TABLE C-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTSP01
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT01	20020612	1535	1.0	166	410					
			0.0	42	286					
			-1.0	71	315	3.35	0.460	0.064	97.0	23.5 (1 cm)
			-2.0	-109	135					
PT02	20020612	1450	1.0	142	386					
			0.0	114	358					
			-1.0	-15	229	3.58	0.480	0.067	80.1	17.7 (1 cm)
			-2.0	4	248					
PT03	20020612	1413	1.0	158	402					
			0.0	-93	151					
			-1.0	84	328	3.38	0.470	0.065	84.2	18.1 (1 cm)
			-2.0	-108	136					
PT04	20020612	1231	1.0	169	413					
			0.0	-51	193					
			-1.0	-32	212	3.16	0.440	0.066	90.0	21.6 (1 cm)
			-2.0	110	354					
PT05	20020612	1130	1.0	161	405					
			0.0	121	365					
			-1.0	96	340	0.33	0.050	0.005	68.9	13.9 (1 cm)
			-2.0	115	359					
PT06	20020612	1003	1.0	163	407					
			0.0	116	360					
			-1.0	136	380	3.40	0.470	0.073	95.6	25.7 (1 cm)
			-2.0	P	P					
PT07	20020612	HH	1.0	154	398					
			0.0	106	350					
			-1.0	137	381	3.76	0.500	0.068	94.5	24.8 (1 cm)
			-2.0	109	353					

TABLE C-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTSP01
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT08	20020612	734	1.0	146	390					
			0.0	17	261					
			-1.0	21	265	3.79	0.520	0.094	89.0	23.3 (1 cm)
			-2.0	138	382					
PT09	20020612	649	1.0	153	397					
			0.0	88	332					
			-1.0	79	323	3.60	0.500	0.081	105.2	35.2 (1 cm)
			-2.0	108	352					
PT10	20020611	1824	1.0	149	393					
			0.0	87	331					
			-1.0	97	341	2.78	0.400	0.062	67.4	24.4 (1 cm)
			-2.0	54	298					
PT11	20020610	1029	1.0	108	352					
			0.0	143	387					
			-1.0	77	321	2.41	0.320	0.089	87.0	12.7 (1 cm)
			-2.0	-113	131					
PT12	20020610	1217	1.0	123	367					
			0.0	163	407					
			-1.0	160	404	1.91	0.280	0.089	53.3	5.9 (1 cm)
			-2.0	156	400					
PT13	20020610	1320	1.0	136	380					
			0.0	151	395					
			-1.0	122	366	2.08	0.240	0.100	59.9	9.3 (1 cm)
			-2.0	130	374					
PT14	20020610	1440	1.0	123	367					
			0.0	160	404					
			-1.0	148	392	2.45	0.300	0.112	59.7	8.5 (1 cm)
			-2.0	-59	186					

TABLE C-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTSP01
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT15	20020610	1512	1.0	102	346					
			0.0	138	382					
			-1.0	167	411	2.22	0.300	0.109	55.3	4.8 (1 cm)
			-2.0	161	405					
PT16	20020610	1617	1.0	115	359					
			0.0	128	372					
			-1.0	-123	121	2.85	0.340	0.115	92.7	15.8 (1 cm)
			-2.0	-52	192					
PT17	20020610	1649	1.0	100	344					
			0.0	102	346					
			-1.0	47	291	3.06	0.320	0.124	90.0	16.0 (1 cm)
			-2.0	-99	145					
PT18	20020610	1730	1.0	110	354					
			0.0	-43	201					
			-1.0	-154	90	3.04	0.320	0.106	79.7	28.4 (1 cm)
			-2.0	-193	51					
PT19	20020610	1805	1.0	112	356					
			0.0	-39	205					
			-1.0	-141	103	1.79	0.140	0.080	63.3	22.0 (1 cm)
			-2.0	-115	129					
PT20	20020610	1843	1.0	115	359					
			0.0	-43	201					
			-1.0	-37	207	2.82	0.240	0.080	65.5	20.5 (1 cm)
			-2.0	-161	83					

TABLE C-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTSP01
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PTM1	20020612	1635	1.0	149	393					
			0.0	92	336					
			-1.0	102	346	0.81	0.110	0.020	78.1	16.1 (1 cm)
			-2.0	98	342					
PTM2	20020612	1722	1.0	161	405					
			0.0	62	306					
			-1.0	19	263	3.37	0.460	0.068	76.0	14.8 (1 cm)
			-2.0	62	306					
PTM3	20020612	1336	1.0	169	413					
			0.0	135	379					
			-1.0	120	364	0.39	0.060	0.013	100.0	19.0 (1 cm)
			-2.0	121	365					
PTM4	20020612	1031	1.0	167	411					
			0.0	60	304					
			-1.0	23	267	3.18	0.440	0.067	110.6	31.1 (1 cm)
			-2.0	123	367					
PTM5	20020612	822	1.0	163	407					
			0.0	128	372					
			-1.0	86	330	3.67	0.510	0.074	74.0	21.6 (1 cm)
			-2.0	122	366					

TABLE C-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTSP02
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT01	20020724	1247	1.0	94	338					
			0.0	-355	-111					
			-1.0	-359	-115	3.26	0.46	0.054	88.1	25.0 (1 cm)
			-2.0	-369	-125					
PT02	20020724	1204	1.0	62	306					
			0.0	-91	153					
			-1.0	-325	-81	3.49	0.490	0.056	73.6	18.3 (1 cm)
			-2.0	-344	-100					
PT03	20020724	1124	1.0	128	372					
			0.0	-328	-84					
			-1.0	-366	-122	3.36	0.48	0.055	99.0	35.3 (1 cm)
			-2.0	-367	-123					
PT04	20020724	926	1.0	126	370					
			0.0	-336	-92					
			-1.0	-359	-115	3.43	0.480	0.056	78.7	23.1 (1 cm)
			-2.0	-361	-117					
PT05	20020724	957	1.0	77	321					
			0.0	47	291					
			-1.0	-70	174	0.53	0.07	0.006	50.7	16.0 (1 cm)
			-2.0	-5	239					
PT06	20020724	759	1.0	69	313					
			0.0	-144	100					
			-1.0	-252	-8	3.26	0.460	0.056	76.2	22.3 (1 cm)
			-2.0	-304	-60					
PT07	20020724	651	1.0	146	390					
			0.0	-280	-36					
			-1.0	-331	-87	LL	LL	LL	90.3	27.1 (1 cm)
			-2.0	-317	-73					

TABLE C-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTSP02
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT08	20020722	806	1.0	147	391					
			0.0	107	351					
			-1.0	-147	97	3.78	0.520	0.078	107.9	32.5 (1 cm)
			-2.0	-199	45					
PT09	20020722	850	1.0	148	392					
			0.0	-32	212					
			-1.0	-146	99	3.88	0.55	0.079	92.6	27.6 (1 cm)
			-2.0	-248	-4					
PT10	20020722	1004	1.0	154	398					
			0.0	90	334					
			-1.0	28	272	3.25	0.480	0.069	108.7	29.8 (1 cm)
			-2.0	-98	146					
PT11	20020722	1106	1.0	148	392					
			0.0	140	384					
			-1.0	-151	93	2.49	0.34	0.085	89.8	10.7 (1 cm)
			-2.0	-159	85					
PT12	20020722	1230	1.0	142	386					
			0.0	136	380					
			-1.0	6	250	2.08	0.270	0.091	58.8	11.1 (1 cm)
			-2.0	-58	186					
PT13	20020722	1325	1.0	147	391					
			0.0	144	388					
			-1.0	110	354	2.45	0.31	0.107	66.1	7.0 (1 cm)
			-2.0	140	384					
PT14	20020722	1426	1.0	140	384					
			0.0	138	382					
			-1.0	124	368	2.08	0.280	0.100	55.8	5.1 (1 cm)
			-2.0	63	307					

TABLE C-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTSP02
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT15	20020722	1503	1.0	134	378					
			0.0	118	362					
			-1.0	119	363	2.33	0.30	0.101	53.6	5.4 (1 cm)
			-2.0	131	375					
PT16	20020722	1538	1.0	114	358					
			0.0	119	363					
			-1.0	99	343	2.54	0.330	0.133	116.4	18.9 (1 cm)
			-2.0	-154	90					
PT17	20020722	1627	1.0	129	373					
			0.0	-145	99					
			-1.0	-193	52	2.69	0.30	0.073	80.2	16.8 (1 cm)
			-2.0	-191	53					
PT18	20020722	1714	1.0	116	360					
			0.0	86	330					
			-1.0	-142	102	3.15	0.350	0.108	113.5	37.7 (1 cm)
			-2.0	-144	100					
PT19	20020722	1750	1.0	100	344					
			0.0	58	302					
			-1.0	-46	198	1.38	0.10	0.112	61.7	19.0 (1 cm)
			-2.0	-63	182					
PT20	20020722	1840	1.0	102	346					
			0.0	-55	189					
			-1.0	-92	152	2.84	0.280	0.089	109.2	41.2 (1 cm)
			-2.0	-81	163					

TABLE C-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTSP02
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PTM1	20020724	1320	1.0	85	329					
			0.0	-19	225					
			-1.0	-187	57	1.41	0.20	0.028	80.2	24.3 (1 cm)
			-2.0	-285	-41					
PTM2	20020724	1401	1.0	72	316					
			0.0	-356	-112					
			-1.0	-366	-122	3.68	0.520	0.059	79.7	24.2 (1 cm)
			-2.0	-369	-125					
PTM3	20020724	1037	1.0	130	374					
			0.0	39	283					
			-1.0	54	298	1.08	0.16	0.029	74.5	21.4 (1 cm)
			-2.0	65	309					
PTM4	20020724	844	1.0	114	358					
			0.0	4	248					
			-1.0	64	308	1.51	0.210	0.018	74.1	24.3 (1 cm)
			-2.0	85	329					
PTM5	20020724	731	1.0	98	342					
			0.0	-324	-80					
			-1.0	-333	-89	3.79	0.540	0.064	77.4	23.2 (1 cm)
			-2.0	-344	-100					

TABLE C-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTSP03
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT01	20020821	1321	1.0	138	382					
			0.0	53	297					
			-1.0	67	311	3.81	0.56	0.073	83.0	26.4 (1 cm)
			-2.0	-310	-66					
PT02	20020821	1235	1.0	130	374					
			0.0	-299	-55					
			-1.0	-339	-95	3.45	0.470	0.050	56.5	13.2 (1 cm)
			-2.0	-334	-90					
PT03	20020821	1143	1.0	149	393					
			0.0	-283	-39					
			-1.0	-330	-86	3.32	0.45	0.048	56.1	16.8 (1 cm)
			-2.0	-337	-93					
PT04	20020821	937	1.0	131	375					
			0.0	-293	-49					
			-1.0	-323	-79	3.37	0.470	0.056	70.0	23.3 (1 cm)
			-2.0	-343	-99					
PT05	20020821	1017	1.0	110	354					
			0.0	-37	207					
			-1.0	-63	181	0.23	0.03	0.006	57.4	16.3 (1 cm)
			-2.0	-142	102					
PT06	20020821	802	1.0	92	336					
			0.0	-361	-117					
			-1.0	-371	-127	3.01	0.410	0.048	62.3	16.6 (1 cm)
			-2.0	-368	-124					
PT07	20020821	637	1.0	144	388					
			0.0	-345	-101					
			-1.0	-363	-119	4.14	0.57	0.061	74.2	22.9 (1 cm)
			-2.0	-360	-116					

TABLE C-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTSP03
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT08	20020819	812	1.0	101	345					
			0.0	-168	76					
			-1.0	-107	137	4.03	0.570	0.088	66.6	21.7 (1 cm)
			-2.0	-269	-25					
PT09	20020819	857	1.0	98	342					
			0.0	24	268					
			-1.0	-219	25	3.76	0.54	0.076	90.9	26.6 (1 cm)
			-2.0	-330	-86					
PT10	20020819	1017	1.0	136	380					
			0.0	-144	100					
			-1.0	-266	-22	3.33	0.470	0.063	61.1	16.9 (1 cm)
			-2.0	-288	-44					
PT11	20020819	1125	1.0	140	384					
			0.0	-131	113					
			-1.0	-141	103	2.29	0.31	0.088	73.1	17.3 (1 cm)
			-2.0	-160	84					
PT12	20020819	1234	1.0	138	382					
			0.0	6	250					
			-1.0	-104	140	1.73	0.250	0.078	46.4	10.6 (1 cm)
			-2.0	-185	59					
PT13	20020819	1319	1.0	141	385					
			0.0	110	354					
			-1.0	16	260	2.34	0.29	0.089	50.9	7.1 (1 cm)
			-2.0	-36	208					
PT14	20020819	1435	1.0	134	378					
			0.0	60	304					
			-1.0	7	251	2.30	0.300	0.080	66.9	12.4 (1 cm)
			-2.0	31	275					

TABLE C-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTSP03
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PT15	20020819	1510	1.0	111	355					
			0.0	106	350					
			-1.0	126	370	2.38	0.29	0.090	42.3	6.6 (1 cm)
			-2.0	115	359					
PT16	20020819	1543	1.0	107	351					
			0.0	30	274					
			-1.0	42	286	1.89	0.260	0.131	66.3	12.4 (1 cm)
			-2.0	-166	78					
PT17	20020819	1627	1.0	105	349					
			0.0	-97	147					
			-1.0	-117	127	2.18	0.29	0.120	64.7	14.8 (1 cm)
			-2.0	-95	149					
PT18	20020819	1712	1.0	94	338					
			0.0	-82	162					
			-1.0	-130	114	3.30	0.340	0.096	56.5	19.4 (1 cm)
			-2.0	-145	99					
PT19	20020819	1757	1.0	86	330					
			0.0	-83	161					
			-1.0	-63	181	4.01	0.30	0.264	69.3	28.1 (1 cm)
			-2.0	-166	78					
PT20	20020820	643	1.0	90	334					
			0.0	18	262					
			-1.0	-91	154	2.94	0.290	0.084	124.9	53.0 (1 cm)
			-2.0	-18	226					

TABLE C-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
SEDIMENT PROFILES: Vertical sediment profiles of Eh and surficial sediment characteristics at TMDL stations

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTSP03
REVISED: 20030226

						SURFICIAL SEDIMENT PARTICULATES				
STATION	DATE	TIME	CORE DEPTH (cm)	Eh MEAS (mV)	Eh CORR (mV)	SED PC %(wt)	SED PN %(wt)	SED PP %(wt)	SED CHLa TOTAL (mg m^{-2})	SED CHLa ACTIVE (mg m^{-2})
PTM1	20020821	1353	1.0	131	375					
			0.0	-154	90					
			-1.0	-295	-51	2.62	0.37	0.043	81.0	7.4 (1 cm)
			-2.0	-334	-90					
PTM2	20020821	1425	1.0	89	333					
			0.0	-312	-68					
			-1.0	-336	-92	4.16	0.590	0.061	108.2	35.5 (1 cm)
			-2.0	-339	-95					
PTM3	20020821	1052	1.0	117	361					
			0.0	-215	29					
			-1.0	-186	58	0.20	0.03	0.007	86.5	29.6 (1 cm)
			-2.0	-165	79					
PTM4	20020821	845	1.0	-48	196					
			0.0	-360	-116					
			-1.0	-370	-126	4.96	0.720	0.073	78.4	27.9 (1 cm)
			-2.0	-375	-131					
PTM5	20020821	715	1.0	92	336					
			0.0	-332	-88					
			-1.0	-362	-118	3.68	0.520	0.057	67.7	18.2 (1 cm)
			-2.0	-370	-126					

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC TMDL DATA SET, 2002:

Page No.

TABLE D-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTCD01
REVISED: 20030220

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT01	20020612	1	17	5	0	0	3.04	147	7.40	0.21	0.60	0.14
			18	5	60	60	2.67	148	8.60	0.10	0.46	0.11
			19	5	60	120	2.49	149	9.70	0.11	0.70	0.21
			20	7	62	182	2.32	156	11.40	0.10	0.33	0.11
PT02	20020612	1	16	10	0	0	3.27	142	3.50	0.08	0.49	0.12
			17	10	60	60	2.88	143	4.80	0.10	0.32	0.12
			18	10	60	120	2.67	144	5.70	0.10	0.35	0.13
			19	11	61	181	2.50	145	7.40	0.11	0.37	0.13
PT03	20020612	1	15	30	0	0	2.88	137	3.80	0.10	0.32	0.13
			16	30	60	60	2.50	138	5.90	0.10	0.32	0.15
			17	30	60	120	2.27	139	8.30	0.16	0.32	0.14
			18	30	60	180	2.08	140	10.20	0.12	0.34	0.16
PT04	20020612	1	13	40	0	0	3.04	131	7.50	0.43	0.53	0.11
			14	40	60	60	2.67	132	7.70	0.10	0.51	0.13
			15	41	61	121	2.42	133	9.80	0.12	0.50	0.17
			16	40	59	180	2.21	134	11.80	0.42	0.52	0.19
PT05	20020612	1	13	10	0	0	1.30	126	11.20	0.24	0.59	0.46
			14	10	60	60	1.20	127	11.60	0.33	0.51	0.25
			15	10	60	120	1.14	128	11.50	0.16	0.49	0.24
			16	10	60	180	1.08	129	11.90	0.15	0.49	0.26
PT06	20020612	1	11	25	0	0	0.85	120	11.60	0.12	0.50	0.23
			12	25	60	60	0.70	121	13.40	0.16	0.42	0.23
			13	25	60	120	0.58	122	14.80	0.10	0.38	0.23
			14	25	60	180	0.48	123	18.10	0.64	0.38	0.26
PT07	20020612	1	10	35	0	0	1.03	115	10.80	0.12	0.52	0.23
			11	35	60	60	0.81	116	15.00	0.30	0.44	0.30
			12	35	60	120	0.64	117	18.40	0.12	0.38	0.34
			13	35	60	180	0.50	118	21.60	0.21	0.43	0.40

TABLE D-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTCD01
REVISED: 20030220

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT08	20020611	1	9	10	0	0	1.42	109	12.10	0.11	0.83	0.32
			10	10	60	60	1.11	110	17.00	0.23	0.38	0.40
			11	10	60	120	0.90	111	21.00	0.40	0.33	0.57
			12	10	60	180	0.70	112	23.70	0.28	0.29	0.60
PT09	20020611	1	8	15	0	0	2.65	104	5.90	0.15	0.89	0.21
			9	15	60	60	2.11	105	8.20	0.27	0.72	0.20
			10	16	61	121	1.67	106	9.80	0.11	0.57	0.27
			11	16	60	181	1.36	107	11.70	0.13	0.48	0.33
PT10	20020611	1	19	45	0	0	3.36	99	4.00	0.08	0.39	0.16
			20	43	58	58	2.76	100	5.40	0.08	0.32	0.15
			21	45	62	120	2.31	101	6.70	0.09	0.29	0.17
			22	45	60	180	1.83	102	8.00	0.12	0.32	0.29
PT11	20020610	1	12	40	0	0	3.46	2	12.70	0.54	8.11	0.41
			13	41	61	61	2.66	3	16.40	0.44	7.49	0.40
			14	41	60	121	2.06	4	21.40	0.52	6.98	0.44
			15	40	59	180	1.59	5	28.60	0.97	6.63	0.68
PT12	20020610	1	14	25	0	0	5.49	7	4.50	0.63	25.90	0.60
			15	25	60	60	4.37	8	6.90	0.68	25.50	0.79
			16	25	60	120	3.66	9	7.70	0.63	24.50	0.74
			17	25	60	180	3.00	10	8.50	0.66	24.10	0.80
PT13	20020610	1	14	45	0	0	6.19	12	2.20	0.61	46.00	1.20
			15	50	65	65	5.54	13	2.80	0.65	45.30	1.20
			16	45	55	120	5.16	14	2.80	0.63	45.90	1.40
			17	45	60	180	4.85	15	3.60	0.63	44.10	1.17
PT14	20020610	1	15	45	0	0	6.61	17	9.50	0.91	59.00	1.95
			16	45	60	60	5.71	18	7.50	0.81	58.20	2.01
			17	45	60	120	5.27	19	7.40	0.80	58.30	2.08
			18	45	60	180	4.94	20	7.10	0.74	58.30	2.18

TABLE D-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 1
FILENAME: TMDLPTCD01
REVISED: 20030220

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT15	20020610	1	16	10	0	0	6.55	22	6.80	0.70	51.20	1.47
			17	10	60	60	5.64	23	8.50	0.66	50.80	1.81
			18	10	60	120	5.02	24	9.30	0.68	51.50	1.95
			19	10	60	180	4.62	25	11.10	0.67	50.50	1.98
PT16	20020610	1	17	10	0	0	5.29	27	17.70	1.36	46.70	2.13
			18	10	60	60	3.94	28	21.10	1.38	46.00	2.57
			19	11	61	121	2.90	29	28.10	1.36	45.00	3.11
			20	10	59	180	2.01	30	36.10	1.42	44.50	3.23
PT17	20020610	1	18	25	0	0	6.03	32	8.80	1.34	46.80	1.13
			19	25	60	60	4.55	33	14.40	1.38	46.10	1.57
			20	25	60	120	3.41	34	22.50	1.42	45.40	1.79
			21	25	60	180	2.60	35	25.80	1.56	44.80	2.03
PT18	20020610	1	18	35	0	0	6.88	37	6.40	1.69	59.80	0.58
			19	36	61	61	6.09	38	9.50	1.75	58.70	0.57
			20	36	60	121	5.48	39	11.00	1.82	57.60	0.63
			21	37	61	182	4.98	40	14.20	1.92	57.00	0.69
PT19	20020610	1	19	50	0	0	9.00	42	7.20	2.32	68.70	0.55
			20	50	60	60	7.89	43	8.90	2.32	68.10	0.62
			21	54	64	124	6.90	44	11.50	2.27	67.80	0.79
			22	50	56	180	5.82	45	16.90	2.33	66.80	1.06
PT20	20020610	1	20	5	0	0	8.34	47	9.10	2.29	72.50	0.86
			21	5	60	60	6.65	48	9.20	2.17	71.20	0.93
			22	5	60	120	5.52	49	12.60	2.08	70.10	1.02
			23	5	60	180	4.49	50	14.80	1.99	67.80	1.16

TABLE D-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTCD02
REVISED 20030221

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT01	20020724	1	14	5	0	0	5.20	178	2.80	0.24	0.15	0.73
			15	5	60	60	4.54	179	6.90	0.28	0.40	0.92
			16	6	61	121	4.15	180	7.90	0.12	0.24	0.97
			17	8	62	183	3.79	181	12.20	0.32	0.21	1.04
PT02	20020724	1	13	45	0	0	0.86	173	3.60	0.81	0.86	0.84
			14	45	60	60	0.55	174	5.20	0.76	0.81	0.96
			15	50	65	125	0.30	175	6.50	0.68	0.79	1.06
			16	46	56	181	0.13	176	8.60	0.77	0.55	1.13
PT03	20020724	1	12	25	0	0	0.60	168	3.40	1.03	1.08	0.98
			13	27	62	62	0.35	169	6.20	1.17	0.92	1.29
			14	25	58	120	0.19	170	7.00	0.84	0.83	1.46
			15	25	60	180	0.04	171	9.80	0.84	0.74	1.69
PT04	20020724	1	10	35	0	0	0.11	157	8.40	0.09	0.11	1.71
			11	35	60	60	0.02	158	14.00	0.15	0.13	2.13
			12	36	61	121	0.02	159	21.00	0.12	0.11	2.74
			13	25	49	170	0.02	160	26.60	0.15	0.16	3.14
PT05	20020724	1	11	0	0	0	0.17	162	5.00	0.06	0.16	1.23
			12	0	60	60	0.13	163	6.20	0.28	0.14	1.17
			13	0	60	120	0.11	164	5.00	0.10	0.12	1.10
			14	2	62	182	0.08	165	4.80	0.09	0.16	1.06
PT06	20020724	1	9	10	0	0	0.07	151	10.40	0.07	0.32	2.35
			10	10	60	60	0.02	152	13.00	0.24	0.11	2.78
			11	11	61	121	0.02	153	16.40	0.06	0.11	3.06
			12	10	59	180	0.02	154	18.20	0.10	0.18	3.22
PT07	20020724	1	7	55	0	0	0.07	145	14.00	0.18	0.21	2.70
			8	55	60	60	0.04	146	17.40	0.16	0.11	3.46
			9	55	60	120	0.03	147	19.80	0.09	0.12	4.31
			10	58	63	183	0.03	148	24.10	0.06	0.11	5.05

TABLE D-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTCD02
REVISED: 20030221

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT08	20020722	1	9	25	0	0	1.87	30	3.50	0.31	0.95	1.18
			10	25	60	60	1.47	31	5.50	0.24	0.85	1.28
			11	25	60	120	1.15	32	9.00	0.24	0.76	1.48
			12	25	60	180	0.88	33	10.40	0.18	0.61	1.83
PT09	20020722	1	10	15	0	0	3.52	35	1.80	0.16	0.18	0.39
			11	15	60	60	2.81	36	6.00	0.51	0.20	0.44
			12	15	60	120	2.33	37	5.70	0.09	0.33	0.69
			13	20	65	185	1.87	38	8.60	0.58	0.20	0.54
PT10	20020722	1	11	35	0	0	7.28	40	0.07	0.10	0.15	0.11
			12	37	62	62	6.42	41	2.30	0.28	0.20	0.13
			13	37	60	122	5.95	42	2.50	0.50	0.26	0.13
			14	36	59	181	5.56	43	2.80	0.17	0.30	0.15
PT11	20020722	1	12	35	0	0	4.99	45	3.10	0.23	1.59	0.65
			13	37	62	62	4.31	46	5.10	0.30	1.71	0.68
			14	36	59	121	3.96	47	5.90	0.36	1.68	0.66
			15	36	60	181	3.67	48	9.40	0.53	1.90	0.70
PT12	20020722	1	14	5	0	0	4.78	50	6.30	0.59	8.06	1.45
			15	6	61	61	3.90	51	8.10	0.65	8.06	1.47
			16	5	59	120	3.44	52	8.80	0.63	8.28	1.46
			17	5	60	180	3.09	53	10.45	0.83	8.29	1.45
PT13	20020722	1	14	55	0	0	5.43	55	5.20	0.70	13.20	1.49
			15	55	60	60	4.76	56	6.90	0.64	13.40	1.52
			16	55	60	120	4.32	57	7.80	0.66	13.50	1.55
			17	55	60	180	3.95	58	8.70	0.64	13.50	1.58
PT14	20020722	1	15	10	0	0	6.33	60	3.20	0.52	23.10	1.69
			16	11	61	61	5.17	61	3.60	0.41	22.80	1.83
			17	12	61	122	4.59	62	4.90	0.49	23.00	1.97
			18	9	57	179	4.16	63	5.40	0.63	22.20	1.90

TABLE D-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTCD02
REVISED: 20030221

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT15	20020722	1	16	20	0	0	5.75	65	4.30	0.69	15.90	1.51
			17	20	60	60	4.86	66	5.20	0.56	16.30	1.52
			18	20	60	120	4.36	67	5.50	0.54	17.00	1.57
			19	20	60	180	4.00	68	7.00	0.56	17.50	1.60
PT16	20020722	1	17	10	0	0	5.69	70	10.40	0.80	21.30	1.94
			18	11	61	61	4.30	71	12.20	1.16	21.40	2.41
			19	12	61	122	3.54	72	18.30	0.70	21.00	2.79
			20	10	58	180	3.03	73	21.30	0.69	20.90	2.80
PT17	20020722	1	17	35	0	0	5.11	75	16.70	0.88	19.90	1.79
			18	35	60	60	3.01	76	21.30	0.96	20.10	2.18
			19	36	61	121	1.48	77	36.20	1.03	18.70	2.63
			20	35	59	180	0.54	78	41.90	1.08	17.40	2.76
PT18	20020722	1	18	25	0	0	6.75	80	7.10	1.04	17.50	0.89
			19	25	60	60	5.85	81	10.00	1.32	17.90	0.78
			20	27	62	122	5.40	82	11.20	1.09	17.30	0.85
			21	25	58	180	4.68	83	14.40	1.22	17.20	0.95
PT19	20020722	1	19	15	0	0	9.48	85	1.40	1.15	25.60	0.27
			20	16	61	61	8.32	86	2.50	1.16	25.80	0.45
			21	15	59	120	7.44	87	4.80	1.17	26.10	0.53
			22	15	60	180	6.47	88	6.60	1.14	26.20	0.59
PT20	20020722	1	20	5	0	0	8.97	90	3.20	1.96	65.40	0.80
			21	5	60	60	6.50	91	7.20	1.86	64.70	1.20
			22	5	60	120	4.90	92	9.60	1.79	63.70	1.28
			23	5	60	180	2.98	93	18.10	1.85	31.20	1.82

TABLE D-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLCRCD03
REVISED: 20030224

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr)	(min)	TIME DELTA (min)	TIME SUM (min)	DO ($mg\ l^{-1}$)	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	$NO_2^- + NO_3^-$ (µM)	DIP (µM)
PT01	20020821	1	14	55	0	0	1.69	178	6.00	1.62	1.84	1.83
			15	55	60	60	0.94	179	10.10	1.16	1.61	1.96
			16	55	60	120	0.43	180	13.40	1.99	1.50	2.42
			17	55	60	180	0.20	181	15.90	0.49	2.40	2.69
PT02	20020821	1	14	5	0	0	0.44	173	6.90	0.14	0.20	1.90
			15	8	63	63	0.31	174	6.90	0.31	1.21	1.87
			16	6	58	121	0.26	175	7.20	0.24	0.43	1.83
			17	6	60	181	0.20	176	8.70	0.31	0.85	1.98
PT03	20020821	1	13	5	0	0	0.28	168	3.90	3.58	3.99	1.87
			14	6	61	61	0.06	169	6.90	3.20	3.51	2.31
			15	6	60	121	0.03	170	10.10	2.46	2.91	2.77
			16	4	58	179	0.03	171	12.40	1.46	1.88	3.05
PT04	20020821	1	10	50	0	0	0.89	157	4.30	1.39	1.03	1.67
			11	51	61	61	0.58	158	5.50	0.81	0.87	1.88
			12	50	59	120	0.36	159	7.50	0.76	0.86	2.18
			13	50	60	180	0.18	160	10.00	0.62	0.91	2.45
PT05	20020821	1	11	45	0	0	0.95	162	0.50	6.71	7.64	1.32
			12	45	60	60	0.77	163	0.60	6.43	7.38	1.28
			13	47	62	122	0.67	164	1.00	6.15	7.19	1.25
			14	46	59	181	0.59	165	2.30	5.79	8.25	1.33
PT06	20020821	1	9	15	0	0	0.86	151	1.00	4.83	6.44	1.33
			10	15	60	60	0.65	152	2.40	4.36	4.86	1.42
			11	15	60	120	0.52	153	3.90	3.83	5.11	1.65
			12	15	60	180	0.39	154	5.20	3.26	4.66	1.78
PT07	20020821	1	8	30	0	0	1.66	145	2.50	3.60	4.60	1.38
			9	30	60	60	1.12	146	4.70	3.06	3.57	1.28
			10	30	60	120	0.71	147	7.10	2.04	2.50	1.41
			11	30	60	180	0.43	148	10.60	1.65	2.12	1.64

TABLE D-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTCD03
REVISED: 20030224

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT08	20020819	1	9	30	0	0	2.34	30	6.50	1.92	1.22	1.65
			10	31	61	61	1.40	31	9.70	0.81	1.01	2.25
			11	30	59	120	0.84	32	17.60	0.78	0.92	3.09
			12	30	60	180	0.50	33	22.40	0.76	0.60	4.02
PT09	20020819	1	10	50	0	0	1.50	35	3.50	1.86	1.86	1.04
			11	50	60	60	0.91	36	6.80	1.58	1.67	1.08
			12	50	60	120	0.53	37	10.20	1.22	1.28	1.18
			13	50	60	180	0.29	38	14.00	1.07	1.10	1.32
PT10	20020819	1	12	15	0	0	3.29	40	3.10	1.79	2.21	0.85
			13	15	60	60	2.67	41	7.20	1.92	2.21	0.89
			14	15	60	120	2.27	42	9.30	1.61	1.87	0.93
			15	15	60	180	1.90	43	12.50	1.48	1.77	1.10
PT11	20020819	1	13	45	0	0	4.10	45	2.10	5.82	6.96	1.20
			14	48	63	63	3.44	46	5.00	5.71	7.08	1.25
			15	46	58	121	3.05	47	8.40	5.65	7.12	1.29
			16	46	60	181	2.70	48	10.10	5.52	9.96	1.73
PT12	20020819	1	14	45	0	0	5.15	50	2.00	7.48	11.10	1.66
			15	44	59	59	4.68	51	3.30	7.60	12.00	1.72
			16	47	63	122	4.30	52	3.30	7.13	11.90	1.73
			17	46	59	181	4.00	53	5.90	7.22	11.70	1.74
PT13	20020819	1	15	10	0	0	5.04	55	1.00	7.59	13.20	1.78
			16	11	61	61	4.43	56	1.70	7.14	13.40	1.86
			17	10	59	120	3.99	57	4.10	6.75	13.30	1.88
			18	10	60	180	3.53	58	4.80	6.25	13.90	2.00
PT14	20020819	1	16	30	0	0	7.01	60	1.70	7.34	14.30	1.72
			17	30	60	60	5.88	61	3.50	7.22	13.90	1.73
			18	29	59	119	5.05	62	5.90	6.78	12.80	1.71
			19	30	61	180	4.47	63	7.70	6.40	14.20	1.87

TABLE D-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
CORE DATA: Dissolved nutrient and oxygen concentrations in TMDL sediment-water flux chambers

POTOMAC RIVER CRUISE: 3
FILENAME: TMDLPTCD03
REVISED: 200302024

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

STATION	DATE	CORE NO	TIME OF SAMPLE (hr	min)	TIME DELTA (min)	TIME SUM (min)	DO (mg l^{-1})	AA VIAL NO	NH_4^+ (µM)	NO_2^- (µM)	NO_2^-+NO_3^- (µM)	DIP (µM)
PT15	20020819	1	16	50	0	0	5.59	65	2.00	6.61	8.67	1.40
			17	50	60	60	4.34	66	6.40	5.70	14.50	2.16
			18	50	60	120	3.34	67	11.20	6.01	14.80	2.35
			19	50	60	180	2.79	68	14.80	5.66	14.50	2.52
PT16	20020819	1	17	25	0	0	5.22	70	6.00	8.53	19.10	1.95
			18	26	61	61	3.76	71	9.60	8.60	22.40	2.35
			19	25	59	120	3.11	72	12.90	8.90	21.90	2.54
			20	25	60	180	2.44	73	15.70	8.37	21.80	2.85
PT17	20020819	1	17	45	0	0	4.86	75	7.00	8.87	21.80	1.79
			18	45	60	60	3.19	76	14.30	8.31	21.00	1.98
			19	45	60	120	1.64	77	25.40	7.69	19.50	2.39
			20	46	61	181	0.61	78	37.50	5.98	17.50	2.77
PT18	20020819	1	18	30	0	0	4.86	80	14.80	2.23	15.30	1.01
			19	33	63	63	3.87	81	21.60	2.23	14.50	0.94
			20	30	57	120	3.24	82	26.90	2.21	13.90	0.93
			21	30	60	180	2.68	83	38.30	2.02	13.30	0.92
PT19	20020819	1	19	15	0	0	7.19	85	7.00	1.30	17.00	0.97
			20	15	60	60	5.52	86	10.60	1.34	17.40	0.98
			21	15	60	120	4.36	87	14.40	1.38	17.80	1.17
			22	15	60	180	3.38	88	18.00	1.45	18.40	1.38
PT20	20020820	1	7	55	0	0	5.64	90	8.40	2.72	45.10	0.91
			8	55	60	60	3.87	91	12.90	2.63	43.30	1.29
			9	55	60	120	2.53	92	21.20	2.58	41.40	1.79
			10	56	61	181	1.47	93	28.50	2.52	38.90	2.03

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC RIVER TMDL DATA SET, 2002:

Page No.

TABLE E-1. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 1
FILENAME : TMDLPTFL01
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
			H2O		DO	DO	NH_4^+	NH_4^+
STATION	DATE	NO	VOL (ml)	DEPTH (m)	SLOPE (mg l^{-1} min^{-1})	FLUX (g O_2 m^{-2} d^{-1})	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020612	1	2380	0.171	-0.003857	-0.95	0.021633	222.2
PT02	20020612	1	1930	0.139	-0.004176	-0.83	0.029040	241.9
PT03	20020612	1	1790	0.129	-0.004383	-0.81	0.036000	278.2
PT04	20020612	1	1960	0.141	-0.004560	-0.93	0.023164	196.0
PT05	20020612	1	2960	0.213	-0.001218	-0.37	0.003333	42.6
PT06	20020612	1	2140	0.154	-0.002023	-0.45	0.036548	337.6
PT07	20020612	1	1340	0.096	-0.002963	-0.41	0.059667	345.1
PT08	20020611	1	1800	0.129	-0.003938	-0.73	0.064667	502.4
PT09	20020611	1	1690	0.122	-0.007139	-1.25	0.031451	229.4
PT10	20020611	1	1630	0.117	-0.008365	-1.41	0.022085	155.4
PT11	20020610	1	1530	0.110	-0.010344	-1.64	0.087731	579.4
PT12	20020610	1	2100	0.151	-0.013633	-2.97	0.021333	193.4
PT13	20020610	1	2210	0.159	-0.007420	-1.70	0.007097	67.7
PT14	20020610	1	1970	0.142	-0.009083	-1.85	-0.003333	-28.3
PT15	20020610	1	2000	0.144	-0.010683	-2.21	0.022833	197.1
PT16	20020610	1	2030	0.146	-0.018107	-3.81	0.103448	906.5
PT17	20020610	1	1960	0.141	-0.019050	-3.87	0.098500	833.4
PT18	20020610	1	1780	0.128	-0.010413	-1.92	0.041107	315.8
PT19	20020610	1	2200	0.158	-0.017418	-3.97	0.052186	495.6
PT20	20020610	1	2040	0.147	-0.021133	-4.47	0.034167	300.9

TABLE E-1. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of Dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 1
FILENAME : TMDLPTFL01
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
			H_20		NO_2^-	NO_2^-	NO_2^- + NO_3^-	NO_2^- + NO_3^-
STATION	DATE	NO	VOL (ml)	DEPTH (m)	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020612	1	2380	0.171	0.000000	0.00	0.000000	0.00
PT02	20020612	1	1930	0.139	0.000166	1.38	0.000000	0.00
PT03	20020612	1	1790	0.129	0.000000	0.00	0.000000	0.00
PT04	20020612	1	1960	0.141	0.000000	0.00	0.000000	0.00
PT05	20020612	1	2960	0.213	0.000000	0.00	0.000000	0.00
PT06	20020612	1	2140	0.154	0.000000	0.00	-0.001000	-9.24
PT07	20020612	1	1340	0.096	0.000000	0.00	-0.001167	-6.75
PT08	20020611	1	1800	0.129	0.002417	18.78	-0.000750	-5.83
PT09	20020611	1	1690	0.122	0.000000	0.00	-0.002285	-16.67
PT10	20020611	1	1630	0.117	0.000327	2.30	0.000000	0.00
PT11	20020610	1	1530	0.110	0.000000	0.00	-0.008257	-54.53
PT12	20020610	1	2100	0.151	0.000000	0.00	-0.010667	-96.69
PT13	20020610	1	2210	0.159	0.000000	0.00	-0.010542	-100.57
PT14	20020610	1	1970	0.142	-0.000867	-7.37	0.000000	0.00
PT15	20020610	1	2000	0.144	-0.000167	-1.44	-0.003690	-31.86
PT16	20020610	1	2030	0.146	0.000333	2.92	-0.012655	-110.89
PT17	20020610	1	1960	0.141	0.001262	10.68	-0.011167	-94.48
PT18	20020610	1	1780	0.128	0.001254	9.64	-0.015674	-120.43
PT19	20020610	1	2200	0.158	0.000000	0.00	-0.009873	-93.76
PT20	20020610	1	2040	0.147	-0.001650	-14.53	-0.025333	-223.08

TABLE E-1. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 1
FILENAME : TMDLPTFL01
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE				
STATION	DATE	NO	H_2O VOL (ml)	DEPTH (m)	DIP SLOPE (µmoles-P l^{-1} min^{-1})	DIP FLUX (µmoles-P m^{-2} h^{-1})
PT01	20020612	1	2380	0.171	0.000000	0.00
PT02	20020612	1	1930	0.139	0.000000	0.00
PT03	20020612	1	1790	0.129	0.000000	0.00
PT04	20020612	1	1960	0.141	0.000466	3.94
PT05	20020612	1	2960	0.213	0.000000	0.00
PT06	20020612	1	2140	0.154	0.000000	0.00
PT07	20020612	1	1340	0.096	0.000917	5.30
PT08	20020611	1	1800	0.129	0.001683	13.08
PT09	20020611	1	1690	0.122	0.001075	7.84
PT10	20020611	1	1630	0.117	0.000000	0.00
PT11	20020610	1	1530	0.110	0.000000	0.00
PT12	20020610	1	2100	0.151	0.002348	21.29
PT13	20020610	1	2210	0.159	0.000000	0.00
PT14	20020610	1	1970	0.142	0.001267	10.77
PT15	20020610	1	2000	0.144	0.004000	34.53
PT16	20020610	1	2030	0.146	0.006398	56.06
PT17	20020610	1	1960	0.141	0.004867	41.17
PT18	20020610	1	1780	0.128	0.000992	7.62
PT19	20020610	1	2200	0.158	0.002802	26.61
PT20	20020610	1	2040	0.147	0.001650	14.53

TABLE E-2. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 2
FILENAME : TMDLPTFL02
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
STATION	DATE	NO	H2O VOL (ml)	DEPTH (m)	DO SLOPE (mg l^{-1} min^{-1})	DO FLUX (g O_2 m^{-2} d^{-1})	NH_4^+ SLOPE (µmoles-N l^{-1} min^{-1})	NH_4^+ FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020724	1	1940	0.140	-0.007565	-1.52	0.047872	400.9
PT02	20020724	1	1600	0.115	-0.003986	-0.66	0.026721	184.5
PT03	20020724	1	1560	0.112	-0.003097	-0.50	0.033507	225.6
PT04	20020724	1	1720	0.124	0.000000	0.00	0.107737	799.9
PT05	20020724	1	2980	0.214	-0.000496	-0.15	NI	NI
PT06	20020724	1	1780	0.128	0.000000	0.00	0.044622	342.8
PT07	20020724	1	1620	0.117	0.000000	0.00	0.053747	375.8
PT08	20020722	1	1780	0.128	-0.005477	-1.01	0.040333	309.9
PT09	20020722	1	1660	0.119	-0.008812	-1.52	0.036225	259.6
PT10	20020722	1	1980	0.142	-0.009356	-1.92	NI	NI
PT11	20020722	1	1780	0.128	-0.007172	-1.32	0.032723	251.4
PT12	20020722	1	1820	0.131	-0.009242	-1.74	0.021972	172.6
PT13	20020722	1	1750	0.126	-0.008133	-1.47	0.019000	143.5
PT14	20020722	1	1820	0.131	-0.011889	-2.24	0.013221	103.9
PT15	20020722	1	1600	0.115	-0.009583	-1.59	0.014000	96.7
PT16	20020722	1	2080	0.150	-0.014574	-3.14	0.064561	579.7
PT17	20020722	1	2035	0.146	-0.025380	-5.35	0.150723	1324.0
PT18	20020722	1	1720	0.124	-0.011054	-1.97	0.038297	284.3
PT19	20020722	1	2430	0.175	-0.016549	-4.17	0.029858	313.2
PT20	20020722	1	1980	0.142	-0.032617	-6.69	0.078500	670.9

TABLE E-2. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 2
FILENAME : TMDLPTFL02
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
			H2O		NO_2^-	NO_2^-	NO_2^- + NO_3^-	NO_2^- + NO_3^-
STATION	DATE	NO	VOL (ml)	DEPTH (m)	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020724	1	1940	0.140	0.000421	3.52	0.000000	0.00
PT02	20020724	1	1600	0.115	0.000000	0.00	-0.001776	-12.27
PT03	20020724	1	1560	0.112	0.000000	0.00	-0.001859	-12.52
PT04	20020724	1	1720	0.124	0.000000	0.00	0.000000	0.00
PT05	20020724	1	2980	0.214	0.000000	0.00	0.000000	0.00
PT06	20020724	1	1780	0.128	0.000000	0.00	0.000000	0.00
PT07	20020724	1	1620	0.117	-0.000706	-4.94	0.000000	0.00
PT08	20020722	1	1780	0.128	-0.000650	-4.99	-0.001850	-14.21
PT09	20020722	1	1660	0.119	0.000000	0.00	0.000000	0.00
PT10	20020722	1	1980	0.142	0.000000	0.00	0.000846	7.23
PT11	20020722	1	1780	0.128	0.001593	12.24	0.001697	13.04
PT12	20020722	1	1820	0.131	0.001358	10.67	0.000000	0.00
PT13	20020722	1	1750	0.126	-0.000333	-2.52	0.002500	18.88
PT14	20020722	1	1820	0.131	0.000000	0.00	-0.005036	-39.56
PT15	20020722	1	1600	0.115	0.000000	0.00	0.009167	63.31
PT16	20020722	1	2080	0.150	0.000000	0.00	0.000000	0.00
PT17	20020722	1	2035	0.146	0.001115	9.80	-0.002250	-19.77
PT18	20020722	1	1720	0.124	0.000000	0.00	-0.001662	-12.34
PT19	20020722	1	2430	0.175	0.000167	1.75	0.003505	36.76
PT20	20020722	1	1980	0.142	-0.001417	-12.11	0.000000	0.00

TABLE E-2. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 2
FILENAME : TMDLPTFL02
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE				
STATION	DATE	NO	H2O VOL (ml)	DEPTH (m)	DIP SLOPE (µmoles-P l^{-1} min^{-1})	DIP FLUX (µmoles-P m^{-2} h^{-1})
PT01	20020724	1	1940	0.140	0.001603	13.43
PT02	20020724	1	1600	0.115	0.001597	11.03
PT03	20020724	1	1560	0.112	0.003851	25.93
PT04	20020724	1	1720	0.124	0.008580	63.70
PT05	20020724	1	2980	0.214	-0.000956	-12.30
PT06	20020724	1	1780	0.128	0.004812	36.97
PT07	20020724	1	1620	0.117	0.012968	90.68
PT08	20020722	1	1780	0.128	0.003583	27.53
PT09	20020722	1	1660	0.119	0.000809	5.80
PT10	20020722	1	1980	0.142	0.000199	1.70
PT11	20020722	1	1780	0.128	0.000262	2.01
PT12	20020722	1	1820	0.131	0.000000	0.00
PT13	20020722	1	1750	0.126	0.000500	3.78
PT14	20020722	1	1820	0.131	0.002295	18.03
PT15	20020722	1	1600	0.115	0.000533	3.68
PT16	20020722	1	2080	0.150	0.006967	62.55
PT17	20020722	1	2035	0.146	0.005597	49.17
PT18	20020722	1	1720	0.124	0.000000	0.00
PT19	20020722	1	2430	0.175	0.001739	18.24
PT20	20020722	1	1980	0.142	0.005233	44.73

TABLE E-3. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 3
FILENAME : TMDLPTFL03
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
			H2O		DO	DO	NH_4^+	NH_4^+
STATION	DATE	NO	VOL (ml)	DEPTH (m)	SLOPE (mg l^{-1} min^{-1})	FLUX (g O_2 m^{-2} d^{-1})	SLOPE (µmoles-N l^{-1} min^{-1})	FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020821	1	1640	0.118	-0.008307	-1.41	0.055000	389.4
PT02	20020821	1	1560	0.112	-0.001305	-0.21	NI	NI
PT03	20020821	1	2140	0.154	0.000000	0.00	0.048100	444.3
PT04	20020821	1	1440	0.104	-0.003917	-0.58	0.031865	198.1
PT05	20020821	1	2200	0.158	-0.001971	-0.45	0.013985	132.8
PT06	20020821	1	1500	0.108	-0.002520	-0.39	0.023500	152.2
PT07	20020821	1	1700	0.122	-0.006823	-1.20	0.044500	326.5
PT08	20020819	1	1360	0.098	-0.010171	-1.43	0.092730	544.4
PT09	20020819	1	1580	0.114	-0.006683	-1.09	0.058167	396.7
PT10	20020819	1	1410	0.101	-0.007617	-1.11	0.050500	307.4
PT11	20020819	1	1650	0.119	-0.007653	-1.31	0.045586	324.7
PT12	20020819	1	1720	0.124	-0.006319	-1.13	0.021512	159.7
PT13	20020819	1	1800	0.129	-0.008301	-1.55	0.023009	178.8
PT14	20020819	1	2040	0.147	-0.014099	-2.98	0.034045	299.8
PT15	20020819	1	1580	0.114	-0.015667	-2.56	0.072000	491.1
PT16	20020819	1	1990	0.143	-0.015026	-3.10	0.054098	464.7
PT17	20020819	1	1680	0.121	-0.023698	-4.12	0.170205	1234.3
PT18	20020819	1	1620	0.117	-0.012031	-2.02	0.126922	887.5
PT19	20020819	1	2490	0.179	-0.020983	-5.41	0.061333	659.2
PT20	20020820	1	2350	0.169	-0.022944	-5.59	0.113788	1154.3

TABLE E-3. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 3
FILENAME : TMDLPTFL03
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE						
STATION	DATE	NO	H2O VOL (ml)	DEPTH (m)	NO_2^- SLOPE (µmoles-N l^{-1} min^{-1})	NO_2^- FLUX (µmoles-N m^{-2} h^{-1})	NO_2^- + NO_3^- SLOPE (µmoles-N l^{-1} min^{-1})	NO_2^- + NO_3^- FLUX (µmoles-N m^{-2} h^{-1})
PT01	20020821	1	1640	0.118	-0.006179	-43.74	0.000000	0.00
PT02	20020821	1	1560	0.112	0.000923	6.21	0.000000	0.00
PT03	20020821	1	2140	0.154	-0.011865	-109.60	-0.011583	-107.00
PT04	20020821	1	1440	0.104	-0.004417	-27.46	0.000000	0.00
PT05	20020821	1	2200	0.158	-0.005022	-47.69	0.000000	0.00
PT06	20020821	1	1500	0.108	-0.008733	-56.54	-0.010060	-65.14
PT07	20020821	1	1700	0.122	-0.011450	-84.02	-0.014183	-104.08
PT08	20020819	1	1360	0.098	0.000000	0.00	-0.003257	-19.12
PT09	20020819	1	1580	0.114	-0.004550	-31.03	-0.004450	-30.35
PT10	20020819	1	1410	0.101	-0.001690	-10.29	-0.003667	-22.32
PT11	20020819	1	1650	0.119	-0.001598	-11.38	0.000000	0.00
PT12	20020819	1	1720	0.124	0.000000	0.00	0.000000	0.00
PT13	20020819	1	1800	0.129	-0.007363	-57.21	0.003932	30.55
PT14	20020819	1	2040	0.147	-0.005443	-47.93	0.000000	0.00
PT15	20020819	1	1580	0.114	-0.005238	-35.72	0.000000	0.00
PT16	20020819	1	1990	0.143	0.000000	0.00	0.000000	0.00
PT17	20020819	1	1680	0.121	-0.015425	-111.86	-0.023896	-173.29
PT18	20020819	1	1620	0.117	0.000000	0.00	-0.011065	-77.38
PT19	20020819	1	2490	0.179	0.000817	8.78	0.007667	82.40
PT20	20020820	1	2350	0.169	-0.001078	-10.94	-0.034007	-344.96

TABLE E-3. MARYLAND DEPARTMENT OF THE ENVIRONMENT
SEDIMENT OXYGEN AND NUTRIENT EXCHANGES,
POTOMAC RIVER TMDL STATIONS
SEDIMENT-WATER FLUX: Net sediment-water exchange rates of dissolved oxygen (g O_2 m^{-2} d^{-1}) and nutrients (µmoles-N m^{-2} h^{-1}; and µmoles-P m^{-2} h^{-1})

POTOMAC RIVER CRUISE: 3
FILENAME : TMDLPTFL03
REVISED : 20030223

Note: There are no measurements for PTM1, PTM2, PTM3, PTM4 and PTM5

		CORE				
STATION	DATE	NO	H2O VOL (ml)	DEPTH (m)	DIP SLOPE (µmoles-P l^{-1} min^{-1})	DIP FLUX (µmoles-P m^{-2} h^{-1})
PT01	20020821	1	1640	0.118	0.005067	35.87
PT02	20020821	1	1560	0.112	0.000000	0.00
PT03	20020821	1	2140	0.154	0.006707	61.95
PT04	20020821	1	1440	0.104	0.004405	27.38
PT05	20020821	1	2200	0.158	0.000000	0.00
PT06	20020821	1	1500	0.108	0.002633	17.05
PT07	20020821	1	1700	0.122	0.003000	22.01
PT08	20020819	1	1360	0.098	0.013266	77.88
PT09	20020819	1	1580	0.114	0.001567	10.69
PT10	20020819	1	1410	0.101	0.001441	8.77
PT11	20020819	1	1650	0.119	0.003074	21.90
PT12	20020819	1	1720	0.124	0.000164	1.22
PT13	20020819	1	1800	0.129	0.001136	8.83
PT14	20020819	1	2040	0.147	0.000000	0.00
PT15	20020819	1	1580	0.114	0.005917	40.35
PT16	20020819	1	1990	0.143	0.004829	41.48
PT17	20020819	1	1680	0.121	0.005557	40.30
PT18	20020819	1	1620	0.117	-0.000171	-1.20
PT19	20020819	1	2490	0.179	0.003333	35.83
PT20	20020820	1	2350	0.169	0.006398	64.90

SEDIMENT OXYGEN AND NUTRIENT EXCHANGES IN POTOMAC RIVER TMDL DATA SET, 2002:

Page No.

TABLE F-1. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN RESPIRATION: Dissolved oxygen in surface waters
($g\ O_2\ m^{-3}\ d^{-1}$)

POTOMAC RIVER CRUISE: 1 **T_I : TIME INITIAL**
FILENAME: TMDLPTWK01 **T_F: TIME FINAL**
REVISED: 20031028

			DATE/TIME		DO ($mg\ l^{-1}$)		Respiration Rate
STATION	DATE	SAMPLE	T_I	T_F	T_I	T_F	($g\ O_2\ m^{-3}\ d^{-1}$)
PT02	20020612	A	6/12/02 15:00	6/13/02 3:40	9.00	8.41	1.12
		B	6/12/02 15:00	6/13/02 3:40	9.24	8.90	0.64
PT05	20020612	A	6/12/02 12:01	6/13/02 0:10	8.21	7.87	0.67
		B	6/12/02 12:01	6/13/02 0:10	8.28	8.18	0.20
PT09	20020612	A	6/12/02 6:57	6/13/02 18:52	7.07	6.22	0.57
		B	6/12/02 6:57	6/13/02 18:52	6.81	6.28	0.35
PT11	20020610	A	6/10/02 11:13	6/10/02 23:14	7.68	6.69	1.98
		B	6/10/02 11:13	6/10/02 23:14	7.41	6.63	1.56
PT16	20020610	A	6/10/02 15:52	6/11/02 3:41	6.07	6.78	-1.44
		B	6/10/02 15:52	6/11/02 3:41	6.10	6.71	-1.24
PT19	20020610	A	6/10/02 18:01	6/11/02 6:00	7.28	6.81	0.94
		B	HH	HH	HH	HH	HH

TABLE F-2. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN RESPIRATION: Dissolved oxygen in surface waters
($g\ O_2\ m^{-3}\ d^{-1}$)

POTOMAC RIVER CRUISE: 2
FILENAME: TMDLPTWK02
REVISED: 20031028

T_I : TIME INITIAL
T_F: TIME FINAL

			DATE/TIME		DO ($mg\ l^{-1}$)		Respiration Rate
STATION	DATE	SAMPLE	T_I	T_F	T_I	T_F	($g\ O_2\ m^{-3}\ d^{-1}$)
PT02	20020724	A	7/24/02 12:04	7/25/02 11:55	7.39	5.95	1.45
		B	7/24/02 12:04	7/25/02 11:55	6.81	6.10	0.71
PT05	20020724	A	7/24/02 10:04	7/25/02 10:13	6.78	5.71	1.06
		B	7/24/02 10:04	7/25/02 10:13	6.48	6.39	0.09
PT09	20020722	A	7/22/02 8:55	7/23/02 9:05	6.18	5.41	0.76
		B	7/22/02 8:55	7/23/02 9:05	6.28	5.84	0.44
PT11	20020722	A	7/22/02 11:14	7/23/02 11:20	5.71	5.62	0.09
		B	7/22/02 11:14	7/23/02 11:20	5.69	5.50	0.19
PT16	20020722	A	7/22/02 15:27	7/23/02 15:30	7.17	6.79	0.38
		B	7/22/02 15:27	7/23/02 15:30	7.00	7.57	-0.57
PT19	20020722	A	7/22/02 17:45	7/23/02 17:43	9.22	9.14	0.08
		B	7/22/02 17:45	7/23/02 17:43	9.21	8.93	0.28

TABLE F-3. SEDIMENT OXYGEN AND NUTRIENT EXCHANGES
POTOMAC RIVER: MINI-SONE
WATER COLUMN RESPIRATION: Dissolved oxygen in surface waters
(g O_2 m^{-3} d^{-1})

POTOMAC RIVER CRUISE: 3 — **T_I : TIME INITIAL**
FILENAME: TMDLPTWK03 — **T_F: TIME FINAL**
REVISED: 20031028

			DATE/TIME		DO (mg l^{-1})		Respiration Rate
STATION	DATE	SAMPLE	T_I	T_F	T_I	T_F	(g O_2 m^{-3} d^{-1})
PT02	20020821	A	8/21/02 12:44	8/22/02 12:45	7.27	6.19	1.08
		B	8/21/02 12:44	8/22/02 12:45	7.30	6.28	1.02
PT05	20020821	A	8/21/02 10:27	8/22/02 10:40	7.42	6.70	0.71
		B	8/21/02 10:27	8/22/02 10:40	7.27	6.79	0.48
PT09	20020819	A	8/19/02 8:58	8/20/02 9:01	6.59	5.84	0.75
		B	8/19/02 8:58	8/20/02 9:01	6.52	5.90	0.62
PT11	20020819	A	8/19/02 11:34	8/20/02 11:36	6.50	4.71	1.79
		B	8/19/02 11:34	8/20/02 11:36	6.42	4.92	1.50
PT16	20020819	A	8/19/02 15:35	8/20/02 13:35	6.53	6.59	-0.07
		B	8/19/02 15:35	8/20/02 13:35	6.60	7.16	-0.61
PT19	20020819	A	8/19/02 17:59	8/20/02 18:01	6.73	5.75	0.98
		B	8/19/02 17:59	8/20/02 18:01	6.78	5.84	0.94