North Bergen Municipal Utilities Authority
North Bergen, New Jersey

Cromakill Creek Water Quality Study Modeling Report

January 31, 1995

Metcalf & Eddy

Newark Bay Study Area
NBSA-00075

1995-004

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New Jersey Department of Environmental Protection
Metro Bureau of Regional Enforcement
Division of Water Resources
2 Babcock Place
West Orange, New Jersey 07052

Attention: Mr. Peter Lynch, Chief

Re: North Bergen Municipal Utilities Authority
Administrative Consent Order (ACO), dated June 28, 1991
Water Quality Modeling Study

Dear Mr. Lynch:

On behalf of the North Bergen Municipal Utilities Authority, attached please find two (2) copies of Cromakill Creek Water Quality Study: Modeling Report, submitted in compliance with the referenced ACO.

A separate copy of this report is being sent, along with a copy of this letter, to Dr. Thomas Jenq, of the NJDEP's Bureau of Water Quality Analysis so that he may begin his review.

Should you have any questions on this matter, please call me at (908) 685-6117.

Very truly yours,

Steven Biuso, P.E.
Project Manager
Metcalf & Eddy, Inc.

SB/bnj
7840-001

cc: Chief, Permits Admin. Branch, USEPA, Reg. II
S. Grasso,
J. Napolitano, Esq.,
H. Klitzner, Esq.
A. Meade
B. Johnston

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1.0 INTRODUCTION

On June 28, 1991, the New Jersey Department of Environmental Protection (NJDEP) issued an Administrative Consent Order (ACO) to both the Township of North Bergen (the Township) and to the North Bergen Municipal Utilities Authority (NBMUA). As part of the ACO, the NJDEP stipulated that the Township and the NBMUA submit a Quality Modeling Study Report on the Cromakill Creek, or accept Level 3 treatment at the North Bergen Central Sewage Treatment Plant (Central STP). The object of this study is to determine what level of treatment above secondary, if any, is required at the Central STP to enable the Cromakill Creek to meet water quality standards.

The Central STP is owned by the Township, with operation and maintenance provided by the NBMUA. It is permitted for an effluent flow of 10.0 million gallons per day (MGD), discharging into Cromakill Creek approximately 2 miles upstream of its confluence with the Hackensack River. Currently, this discharge is permitted for and meets the less restrictive secondary wastewater treatment standards.

The water quality of Cromakill Creek is significantly influenced by the water quality and tidal nature of the Lower Hackensack River. This section of the Hackensack River extends from the Oradell Dam for a length of approximately 22 miles to Newark Bay, with it's drainage basin dominated by the Hackensack Meadowlands. This section of the river currently experiences frequent violations of water quality standards due to dry weather combined sewer overflows (DWCSOs), thermal discharges from the PSE&G power plant upstream of Cromakill Creek, landfill leachate runoff, and discharges from other wastewater treatment facilities.

The most notable of the other wastewater treatment facilities is the Bergen County Utilities Authority (BCUA) facility, whose discharge averages approximately 65 MGD (Najarian Associates, 1990). These problems are further exacerbated by a lack of fresh water flow during summer months. The Oradell Dam releases are known to decrease to near negligible amounts for extended periods during the summer.

Water quality in the Cromakill Creek is affected by effluent from the NBMUA Central facility, NBMUA DWCSOs, and tidal inflows from the Hackensack River. The NBMUA is currently working to eliminate the DWCSOs. Due to the dependence of Cromakill Creek water quality upon the Hackensack River inflows, predicting the water quality of Cromakill Creek is complex.

The modeling described in this report attempts to determine the effects of various remedial measures upon the water quality of Cromakill Creek.

An extensive data collection effort was conducted to determine numerous physical and chemical parameters required by the model. This included data on such things as tidal behavior, water quality of DWCSOs, and initial water quality conditions. Since tidal patterns vary from month to month and seasonal temperatures affect water quality, field surveys were performed in both summer and fall months. **Section 3.0** discusses these investigations in more detail.

The modeling was performed using WQONN, a M&E adaptation of the MIT-Dynamic Network Model used by Najarian Associates in performing modeling for the BCUA (Najarian Associates, 1990). This report describes the WQONN model, its calibration and verification, the simulations performed, and their results. Appendices provide additional information regarding the data collection efforts and modeling of Cromakill Creek water quality.

2.0 MODEL SELECTION AND DESCRIPTION

2.1 MODEL SELECTION

WQONN was selected for modeling of the Hackensack River/Cromakill Creek simulations due to its applicability and its use in previous simulations of Hackensack River water quality for the BCUA. WQONN was created for estuarine applications. It is capable of simulating dynamic tidal movements and the significant water quality parameters within that environment. WQONN is an implementation of the MIT-Dynamic Network Model used by the BCUA in their simulations of Hackensack River water quality. Use of WQONN for Cromakill Creek made the modeling process more efficient by simplifying the inclusion of past BCUA modeling results and data collection efforts.

2.2 MODEL DESCRIPTION

WQONN is a one-dimensional, transient flow and water-quality model designed for riverine and estuarine systems (Najarian & Harleman, 1977). The model contains two major components:

A hydrodynamic portion, which simulates the flow regime; and

A water quality component, which simulates the behavior of key water quality parameters.

WQONN simulates these systems as channel reaches These reaches are discrete, relatively short, inter-connected segments of the river and creeks being modeled. Geometric and hydraulic properties are specified at intervals along the channel and interpolated for each of the channel segments.

The model calculates values of the water depth, velocity and constituent concentrations averaged over the stream cross-section. This model has been successfully applied to numerous estuarine water quality studies (Najarian et. al., 1984; Najarian and Harleman, 1977; Metcalf & Eddy, 1990). The implementation of this model to the Hackensack River and Cromakill Creek is described in **Sections 4** through **6** of this report.

3.0 FIELD INVESTIGATIONS

Field investigations were required to characterize the hydraulics and water quality of the Cromakill Creek/Hackensack River system. Measurements included numerous water quality parameter concentrations, temperature, tidal water levels, stream depths and current velocities. Field investigations of water quality were performed on the dates and for the conditions shown in **Table 3-1**.

TABLE 3-1. SUMMARY OF WATER QUALITY MONITORING FIELD EVENTS

Date of Survey Event	Tidal Conditions	Weather Period
July 29-30, 1992	Spring Tide	Warm
August 20-21, 1992	Neap	Warm
October 12, 1992	Spring Tide	--
November 10-11, 1992	Spring Tide	Cool

The July and August field monitoring events were conducted to obtain data during periods when the Cromakill Creek and the Hackensack River would be at their warmest temperatures and lowest flows. As this table indicates, warm weather monitoring data was obtained during both neap and spring tide conditions. The October field monitoring event was used to obtain additional spring tide data. The November field monitoring event observed cool weather conditions.

Since dissolved oxygen (DO), the critical water quality parameter for the majority of the Hackensack River, is lowest during hotter periods, field efforts had to include summer months. At the direction of the NJDEP, conditions used for model simulations were only based on summer month measurements However, the fall field data can possibly be used for future determination of revised winter discharge limits.

Calibration and verification of the water quality model is based on simulating the water quality measured during the field investigations. Factors are selected which approximate the various

influences on the system. The model is then run in an effort to simulate the key water quality parameters as measured in the field. These factors are then adjusted until a close approximation of the observed conditions are produced by the model. This requires careful selection of field monitoring stations and accurate observation and measurement of all field data.

The water quality stations used during the field efforts are indicated in **Figure 3-1**. These locations were chosen so that field surveys included both key locations on both the creek and the river, as well as to enable access by the field survey teams. The water quality stations on the Hackensack River were chosen to allow for verification and use of data previously collected for the study performed for the BCUA (Najarian Associates, 1990). The survey stations immediately below wastewater discharges were chosen to be sufficiently downstream of the discharge to allow distribution of waste loads to stabilize and become mixed across the stream. Point source discharges into Cromakill Creek were also monitored to evaluate inflows to the system; these are summarized in **Table 3-2**.

TABLE 3-2. CROMAKILL CREEK POINT SOURCES DISCHARGES MONITORED

NJPDES Discharge Point No.	Location	Description
001	approximately 75 feet west of West Side Ave., at 43rd Street	N. B. Central Treatment Plant, Treated Effluent
005	approximately 50 feet west of West Side Ave., at 69th Street	CSO, Dry Weather Flow
006	between the Conrail and the NYS&WRR* tracks, approximately at 60th Street	CSO, Dry Weather Flow
008	approximately 50 feet west of West Side Ave., at 43rd Street	CSO, Dry Weather Flow

* The Conrail and the NYS&WRR (New York Susquehanna and Western Railroad) tracks are located between and run parallel to West Side and Tonnelle Avenues.

As required by NJDEP, all sampling, in-situ monitoring, and laboratory analyses for this study was conducted by International Hydronics Corporation, NJDEP Laboratory Certification No. 180806. The in-situ measurements included conductivity, temperature, pH and DO, using a

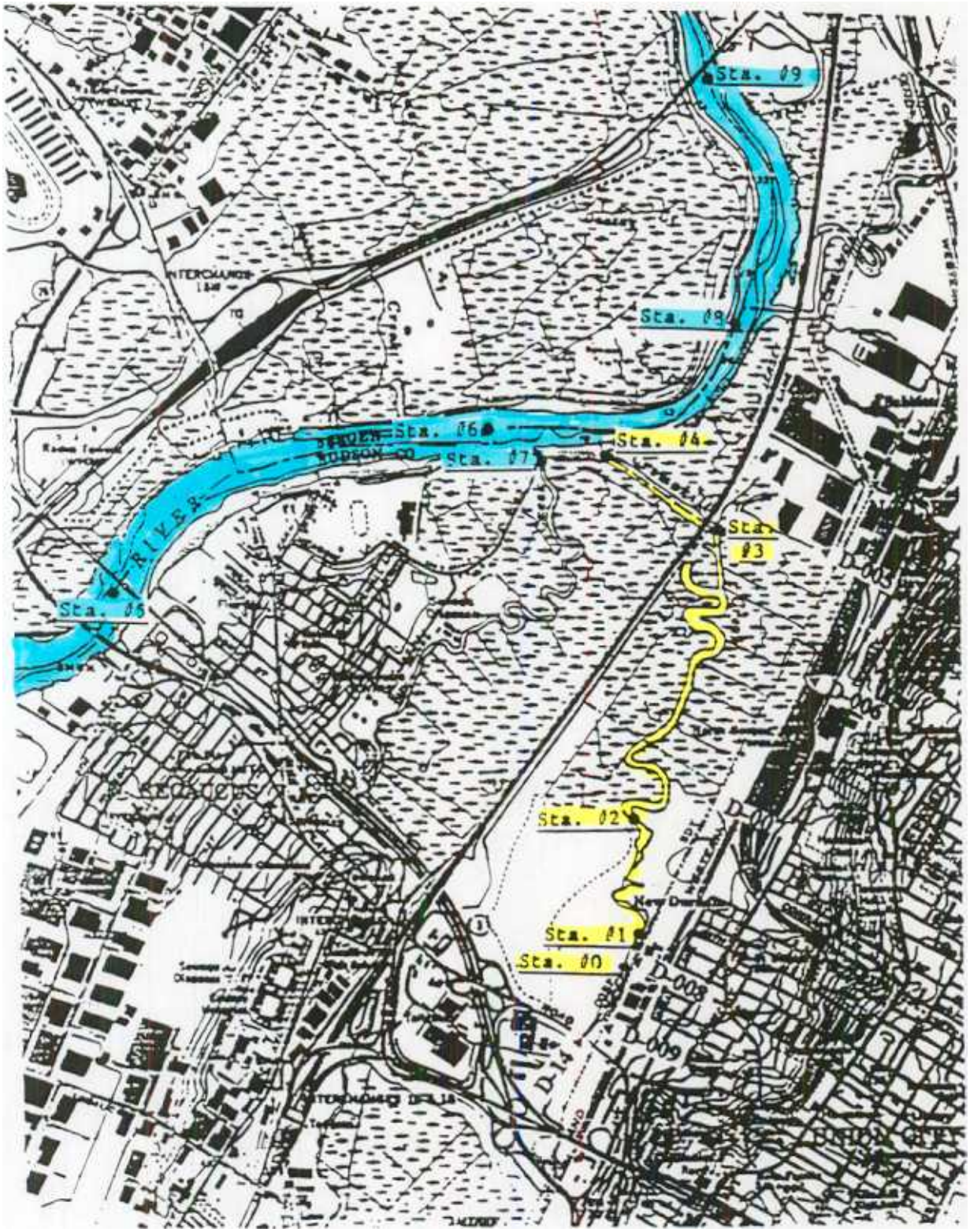


FIGURE 3-1. FIELD INVESTIGATION SAMPLING STATIONS

properly calibrated field test monitor, tide stage using tide boards calibrated to NGVD mean sea level datum, and current speed and direction, using direct-reading electromagnetic current meters. The key analytical parameters from the field sampling includes:

TABLE 3-3. KEY ANALYTICAL PARAMETERS

$CBOD_{30}$	Alkalinity
$CBOD_5$	Chlorophyll-a
Total Dissolved Solids (TDS)	Total Kjeldahl Nitrogen
Total Suspended Solids (SS)	Ammonia Nitrogen
Total Phosphorous	Nitrite plus Nitrate
Organic Phosphorous	

Tables summarizing the results of the field investigation are contained in **Appendices A** and **B**. **Appendix A** contains tables indicating in-situ data (DO, salinity, etc.) while **Appendix B** contains summaries of laboratory results from the sampling periods.

4.0 MODEL CONFIGURATION

4.1 GENERAL MODEL CONFIGURATION

Hydraulic data for the Hackensack River and tributaries other than Cromakill Creek were developed from a study performed for the BCUA (Najarian Associates, 1990). The data received by M&E consisted of data formatted for use in the WQONN/MIT-DNM model. These files were utilized directly in the Cromakill Creek model.

The hydraulic characterization of Cromakill Creek for the WQONN model was based upon surveys of cross-sections along the length of the stream. For consistency, all elevations in the model were referenced to the National Geodetic Vertical Datum (NGVD). Geometric characteristics are entered into the model by specifying attributes of different reaches of the river system. The Hackensack River reaches and geometry were defined using data directly from the BCUA study. This scheme is displayed in **Figure 4-1.** Characteristics for these reaches are displayed in **Table 4-1.**

TABLE 4-1. REACH INFORMATION

Reach #	Length (ft)	Avg. Width (ft)	SOD (g/m^2 - day)	Manning's n
1	30,340	800	2.0	0.035
2	4,850	820	1.5	0.035
3	12,000	725	1.5	0.045
4	29,460	425	1.5	0.045
5	33,015	200	1.0	0.040
6	9,720	275	1.0	0.040
7	16,700	300	1.0	0.040
8	3,700	160	1.0	0.040
9	1,720	80	1.0	0.040
10	3,120	300	1.0	0.035-0.06
11	9,580	150	3.0	0.06-0.20

Reach 1 extends from the Routes 1 and 9 bridge in Jersey City to the confluence of Berry's Creek in Secaucus. Reach 2 extends from Berry's Creek to the confluence of Berry's Creek

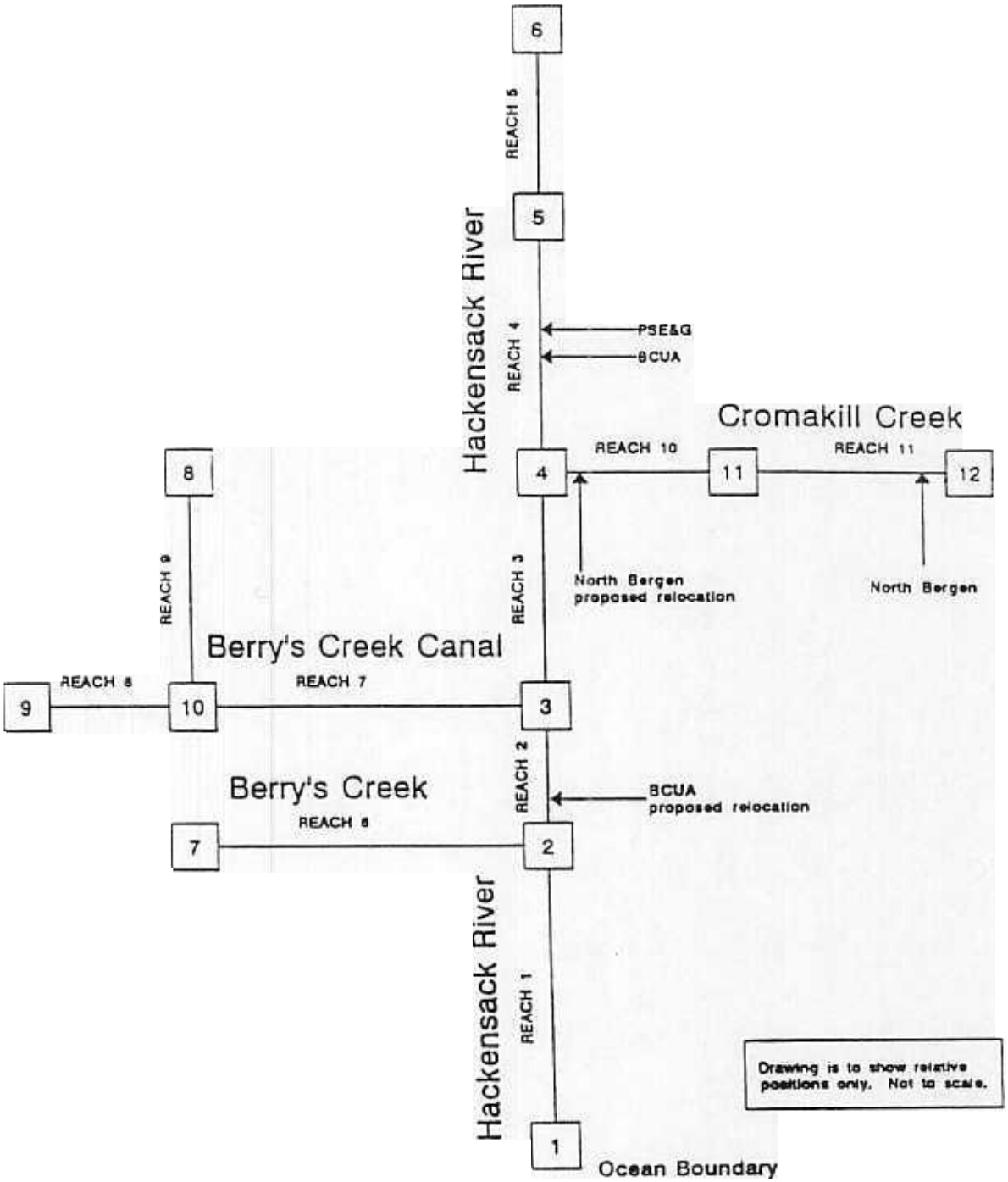


FIGURE 4-1. HACKENSACK RIVER SYSTEM DIAGRAM

Canal. Reach 3 extends from Berry's Creek Canal to Cromakill Creek, while Reach 4 extends to the City of Hackensack. Reach 5 comprises the remainder of the Hackensack River, extending to the Oradell Dam. Reaches 6-9 comprise the Berry's Creek and Berry's Creek Canal system. Reaches 10 and 11 represent Cromakill Creek. Note that stream-bed elevations of the Hackensack River and its tributaries at confluence points are not necessarily equivalent since elevations are specified at the center of each stream/river. **Figures 4-2** and **4-3** show cross-sections of the Hackensack River and Cromakill Creek with points of significance noted.

Accurate configuration of the system is necessary in order for the model to represent the system as closely as possible. The better this representation, the better the model will be able to be calibrated to match existing hydraulic and water quality conditions. Model calibration is required to verify that the model simulates observed water quality conditions and responds to various influences as the system itself would. The actual calibration and verification of this model is discussed in detail in **Section 5.0** of this report.

4.2 BOUNDARY CONDITIONS

Flows induced by tidal effects at the downstream boundary of the Hackensack River dominate the hydraulics of the system. This boundary is the downstream node of Reach 1, approximately 1.3 miles upstream of Elizabeth Bay. Tidal effects were simulated by specifying hydraulic elevations at this point.

Because the field data was collected during dry weather periods, fresh water flows from the Hackensack River tributaries other than Cromakill Creek were negligible and assumed to be zero. A small flow (0.1 cfs) was assumed at the upstream boundary of Cromakill Creek representing fresh water runoff from upland areas and wetlands. Additional flows were added to simulate DWCSOs D-009 and D-014.

For calibration purposes, Oradell Dam flow was 10 MGD, the average of existing flow conditions measured by USGS gauging stations during the field investigations. For future simulations, freshwater flow from Oradell Dam was assumed to be negligible in order to represent the worst-case conditions for the water quality of Cromakill Creek. Freshwater flow is known to decrease to negligible amounts often in summer months. This lack of high quality water reduces the dilution of the Central STP discharge, and thereby creates worst-case water quality conditions in Cromakill Creek.

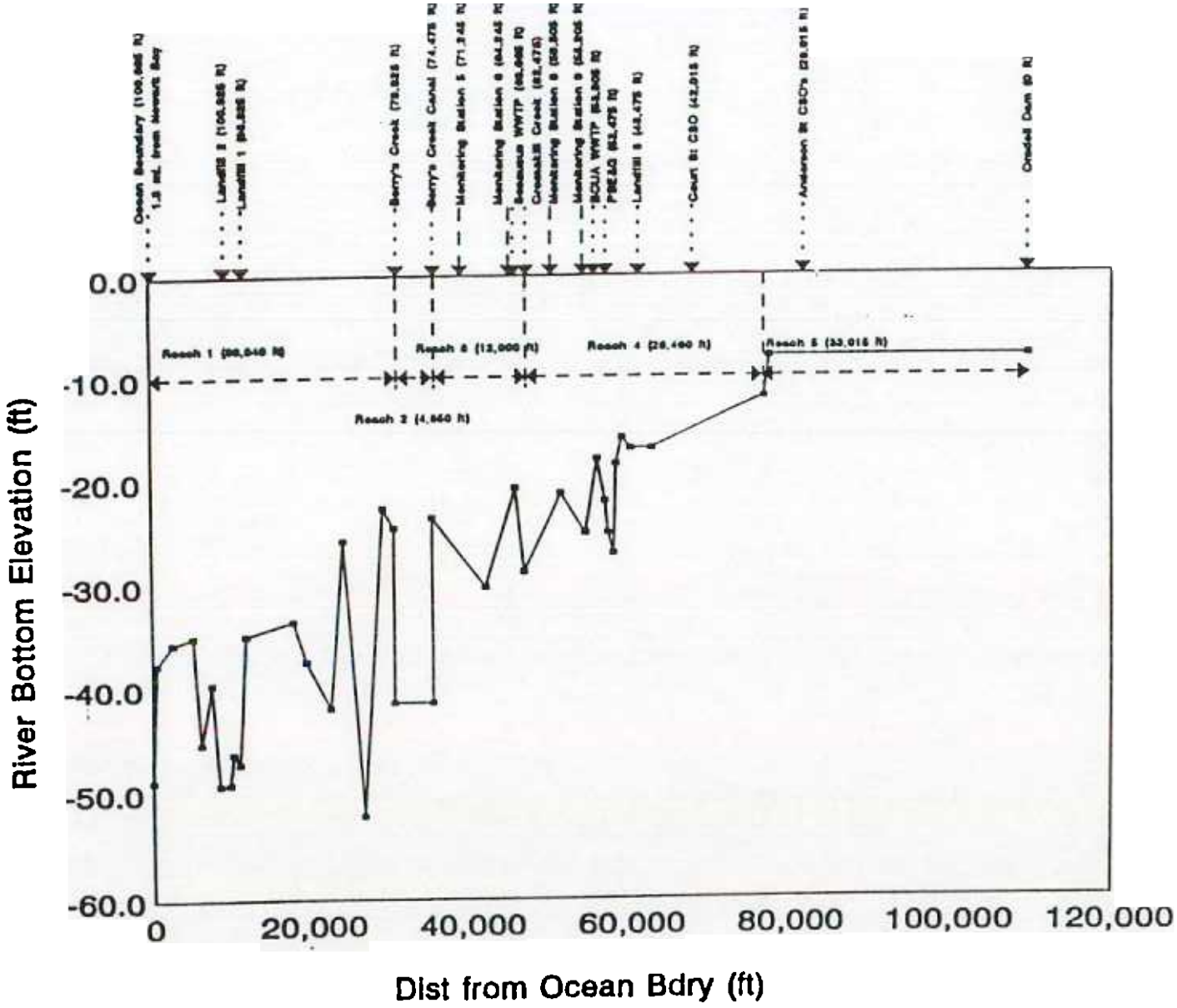


FIGURE 4-2. HACKENSACK RIVER CROSS SECTION

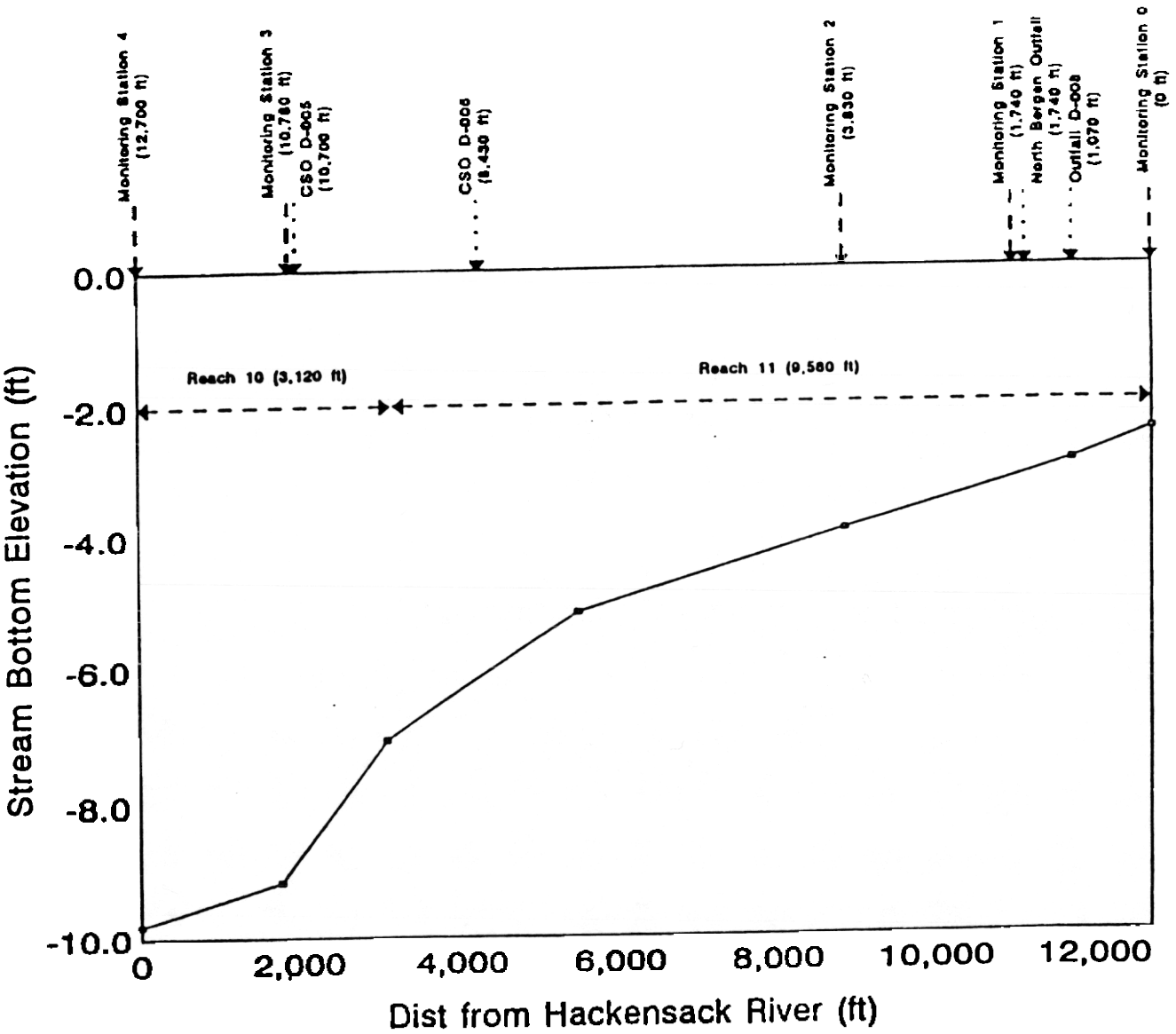


FIGURE 4-3. CROMAKILL CREEK CROSS-SECTION

Water quality boundary conditions were specified at the ocean boundary and at the upstream ends of Cromakill Creek and the Hackensack River. **Table 4-2** lists the values assumed for the water quality parameters at these boundaries. These values were adopted with the guidance of and have been given final confirmation by the NJDEP.

TABLE 4-2. WATER QUALITY BOUNDARY CONDITIONS

Water Quality Parameter	Ocean Boundary (neap tide)	Upstream Hackensack River	Upstream Cromakill Creek
NH_3-N (mg/l)	1.2	0.0	1.0
NO_2-N (mg/l)	0.1	0.0	0.1
NO_3-N (mg/l)	1.0	0.0	1.0
Chlorophyll-a (μg/l)	55.0	0.0	55.0
Zooplankton-N (mg/l)	0.35	0.0	0.35
Particulate Organic N (mg/l)	0.2	0.0	0.2
Dissolved Organic N (mg/l)	0.1	0.0	0.1
CBOD (mg/l)	2.5	0.0	2.0
DO (mg/l)	4.0	8.5	5.0
Salinity (mg/l)	13,000	0.0	70.0

Note that carbonaceous BOD (CBOD) is input as ultimate CBOD and not 5-day CBOD. For conversion purposes a BOD decay rate of 0.2/day was used. The ocean boundary was assumed equivalent in water quality to field survey station 5, the station furthest downstream, at high tide. During model calibration, freshwater flow from the upstream boundary (Oradell Reservoir, node 6 in **Figure 4-1**) was assumed to have insignificant levels of biological oxygen demand (BOD) and ammonia and to be saturated with DO. Conditions used during the BCUA modeling were also taken into account.

Cromakill Creek was modeled from a point upstream of the Central STP near the headwaters of the creek. Water quality measurements at field survey station 0 were used to define the upstream boundary conditions of Cromakill Creek. In this way the boundary conditions inherently account for the effects of CSOs D-001 and D-014 which experience dry weather

overflows upstream of the Central Treatment Plant/station 0. Although field study results indicate that station 0 does experience some tidal influence during high spring tides, the use of constant boundary conditions at station 0 does not significantly affect model accuracy.

4.3 MODELED REACTIONS

Numerous biochemical reactions are simulated in WQONN. DO concentrations are affected by the decay of carbonaceous BOD, nitrification, sediment oxygen demand, reaeration at the air/water interface, photosynthesis, and respiration. The nitrogen nutrient cycle includes simulation of phytoplankton and zooplankton processes as well as nitrification and bacterial hydrolysis. The modeled reactions are indicated graphically in **Figure 4-4**. These processes are all governed by conservation of mass equations in which the change in concentration of water quality parameters is controlled by advection, diffusion, point and non-point sources, and reaction rates.

The rate coefficients used in WQONN include reaeration rates, CBOD decay rates, and nutrient reaction rates. Coefficients used were chosen from the literature and adjusted during model calibration. Default reaction rates were chosen whenever appropriate. Reaction coefficients are shown in Table 4-3. Sediment oxygen demand (SOD) was modeled as a constant oxygen sink. SOD rates for Cromakill Creek were based on measured values. Hackensack SOD values were adapted from the BCUA model; assumed SOD rate values are included in **Table 4-1**.

Measurements of DO in Cromakill Creek and the Hackensack River indicate that algal photosynthesis and respiration significantly alter DO levels in a repetitive daily pattern. This effect is due to the release of oxygen during daylight hours from the photosynthesis of algae and to the uptake of oxygen during the nighttime hours from the respiration of algae. Simulation of this effect was performed by assuming a photosynthesis rate proportional to phytoplankton mass and solar radiation, and a respiration rate proportional to the sum of phytoplankton and zooplankton mass. Temperature also affects DO levels since the concentration at which water is saturated with DO increases as water cools. A portion of the repetitive daily DO pattern is thereby due to daily temperature swings.

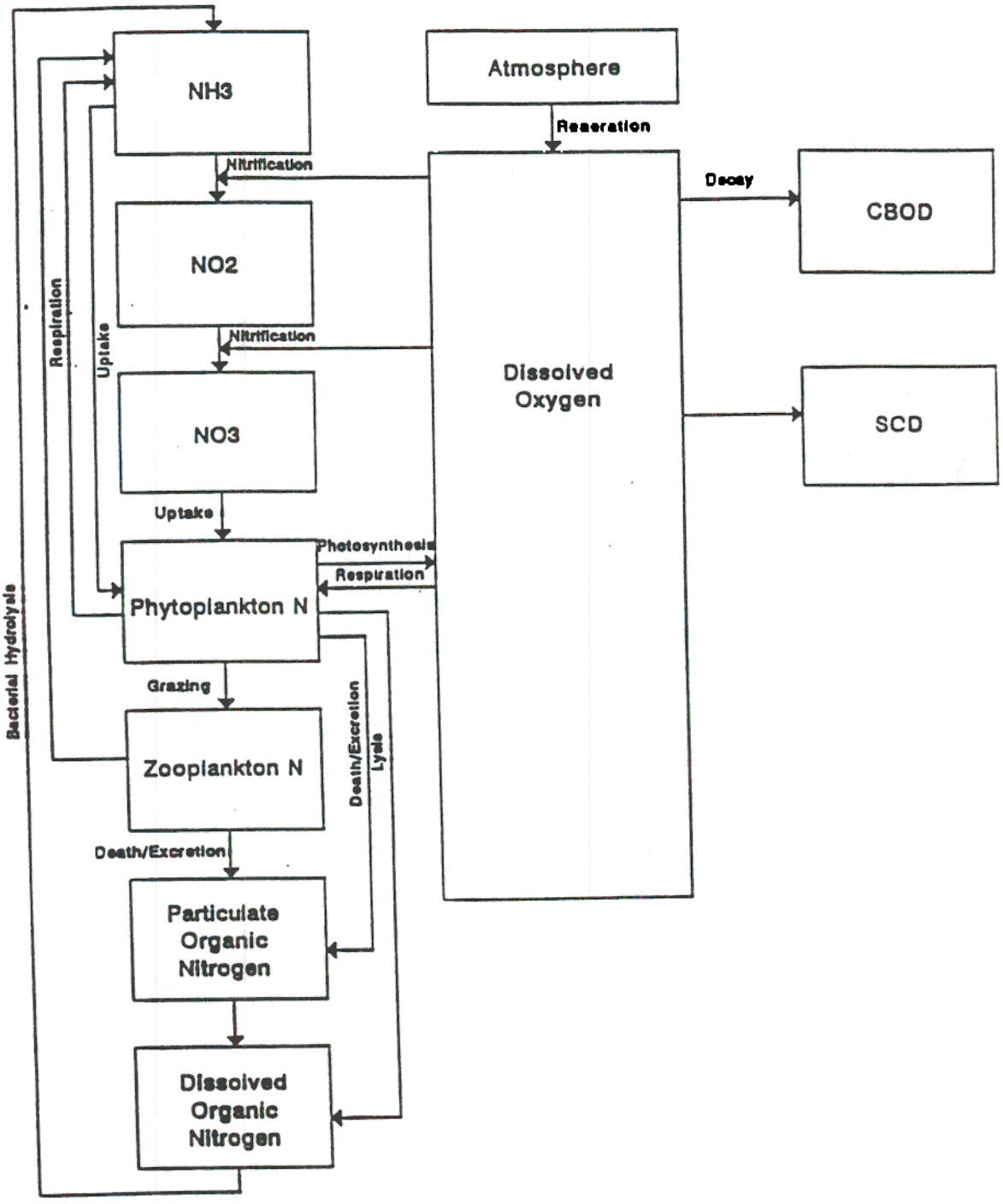


FIGURE 4-4. WQONN REACTIONS

TABLE 4-3. WQONN MODELING COEFFICIENTS

Description	Value	Units
Taylor Diffusion Multiplier	35	
CBOD decay rate	0.20	1/day
Rate of bacterial hydrolysis	0.09	1/day
Temperature coefficient	1.065	
Zooplankton respiration rate	0.008	1/day
Phytoplankton respiration rate	0.008	1/day
Ammonia oxidation rate	0.055	1/day
Optimum solar radiation for photosynthesis	212.36	BTU/sq.ft./day
Optimum temperature for NH_3-N and NO_3-N uptake by phytoplankton	30.0	deg C
Maximum NH_3-N uptake by phytoplankton	0.85 - 1.50	1/day
Half saturation constant for NH_3-N	0.30	mg/l
Nitrite oxidation rate	0.25	1/day
Maximum NO_3 uptake rate by phytoplankton	1.0	1/day
Half saturation constant for NO_3-N	0.7	mg/l
Concentration of NH_3-N above which NO_3 uptake is minimum	0.1	mg/l
Minimum NO_3-N uptake rate of phytoplankton in presence of NH_3-N	0.05	1/day
Phytoplankton lysis	0.03	1/day
Phytoplankton death and excretion	0.03	1/day
Minimum uptake rate of zooplankton during the day	0.075	1/day
Optimum temperature for zooplankton uptake of phytoplankton	25.0	deg C
Maximum zooplankton uptake rate	1.5	1/day
Half saturation constant for PYH-N	1.0	mg/l
Zooplankton lysis rate	0.10	1/day
Conversion of PON to DON	0.30	1/day
Ratio of chlorophyll-a to phytoplankton biomass	15.0	µg/mg

4.4 INFLOWS

Known significant point sources along Cromakill Creek are the Central STP outfall discharge and the NBMUA CSOs D-005, D-006, and D-008. These CSOs continued to experience dry weather overflows during the sampling period. The effluent flow rate from the Central STP was determined from the average of flow measurements during the field investigation. Flow rates for the dry weather overflows were based upon previous studies performed for the NBMUA. Water quality of Cromakill Creek inflows was based upon composite samples taken during the field sampling efforts.

Several major point sources discharge into the Hackensack River. The major source of BOD and NH_3 is the BCUA treatment plant in Little Ferry, approximately two miles upstream of the confluence with Cromakill Creek. In fact, the magnitude of the BCUA treatment plant discharge makes it the major source of flow in the upper Hackensack River, especially during dry summer months. In addition, the Secaucus Koelle Ave wastewater treatment plant flows into Mill Creek, which converges with the Hackensack River downstream of Cromakill Creek. All locations, flow rates, and water quality parameters for Hackensack River point sources were adapted from the BCUA study. A summary of all point source discharges included in the model is shown in **Table 4-4**.

TABLE 4-4. POINT SOURCE DISCHARGES

Point Source	Location		Flow (MGD)	$CBOD_U$ (mg/l)	NH_3
	Reach	Stream/River			
BCUA WWTP	4	Hackensack River	61.0	38	16.
Secaucus WWTP	3	Hackensack River via Mill Creek	2.3	40	4.
North Bergen Central STP	11	Cromakill Creek	6.3	39	12.
CSO D-005	10	Cromakill Creek	0.13	113	18.3
CSO D-006	11	Cromakill Creek	0.10	46	13.1
CSO D-008	11	Cromakill Creek	0.11	127	25.9
Anderson St CSOs	5	Hackensack River	1.9	225	4.
Court St CSOs	4	Hackensack River	1.3	110	6.25
Landfill 1	1	Hackensack River	0.6	570	4.5
Landfill 2	1	Hackensack River	0.03	1,400	4.5
Landfill 3	6	Berry's Creek	0.6	484	4.5
Landfill 4	4	Hackensack River	0.6	175	4.5

In general, the impact of an inflow is greater when the flow of freshwater that it joins and is diluted and flushed by is relatively low. The worst-case conditions simulated take into account the low freshwater flows seen in summer months. As an example, the large fraction of potential freshwater flow that is withdrawn at the Oradell Reservoir has a significant detrimental effect on the water quality of Cromakill Creek.

5.0 MODEL CALIBRATION AND VERIFICATION

Calibration and verification runs were performed to encompass time periods during which field data was taken, attempting to match model output with measured data as closely as possible. The model runs from July 16 to August 23, 1992. Runs are begun well in advance of the time of the field surveys in order to stabilize tidal patterns beforehand. This sequence applies to all model runs.

The model was calibrated and verified for both hydraulics and water quality. While the model is configured to match measured parameters wherever possible, the actual phenomena which are being simulated are quite complex, so some parameters must be inferred from the results of preliminary model runs. Calibration included adjustment of Manning's n (for hydraulic calibration) and various rate coefficients (for water quality calibration) during the spring tide period. Note that the coefficients shown in **Table 4.3** represent final post-calibration values. Verification ensures that the calibration coefficients are valid over a range of conditions. Verification was performed during the neap tide period.

Figures 5-1 through **5-4** show the DO calibration and verification for the Hackensack River and Cromakill Creek. In general the model compares well with the measurements. The hydraulics calibration in the upper reach of Cromakill Creek (i.e. at stations 1 and 2) is less exact than that of the Hackensack River because of model requirements linked to stability. Since station 3 is the most representative of measured conditions, emphasis should be placed on results from this station. The issue of critical stations is discussed in **Section 6.1**. On the Hackensack River, stations 6 and 8 have the most accurate calibrations and are likewise emphasized for interpretation of results. Additional calibration plots show the proximity of modeled results to measured data for other water quality parameters and are contained in **Appendix C**. The NJDEP has reviewed the calibration results and authorized the simulation runs.

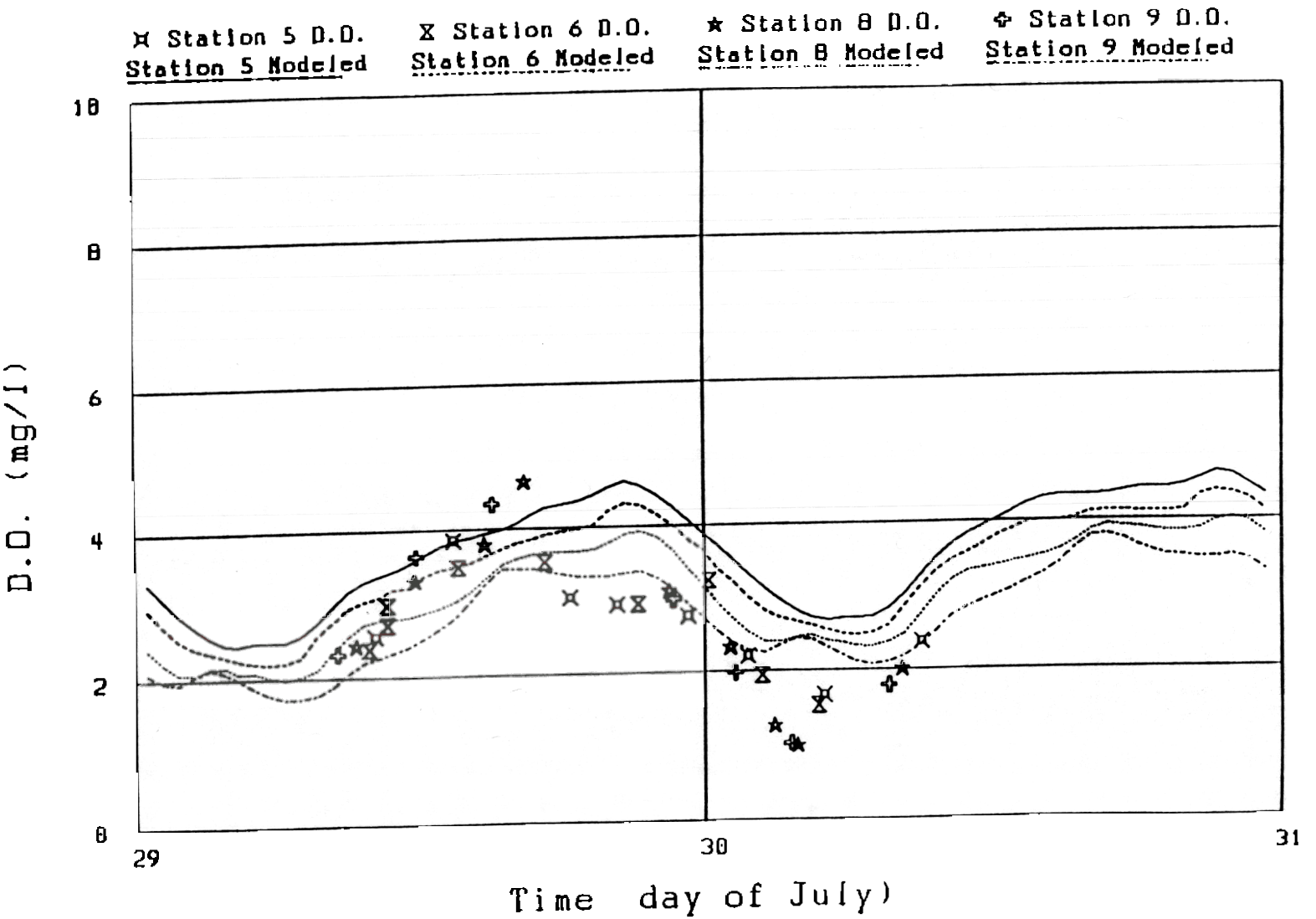


FIGURE 5-1. HACKENSACK RIVER DO CALIBRATION

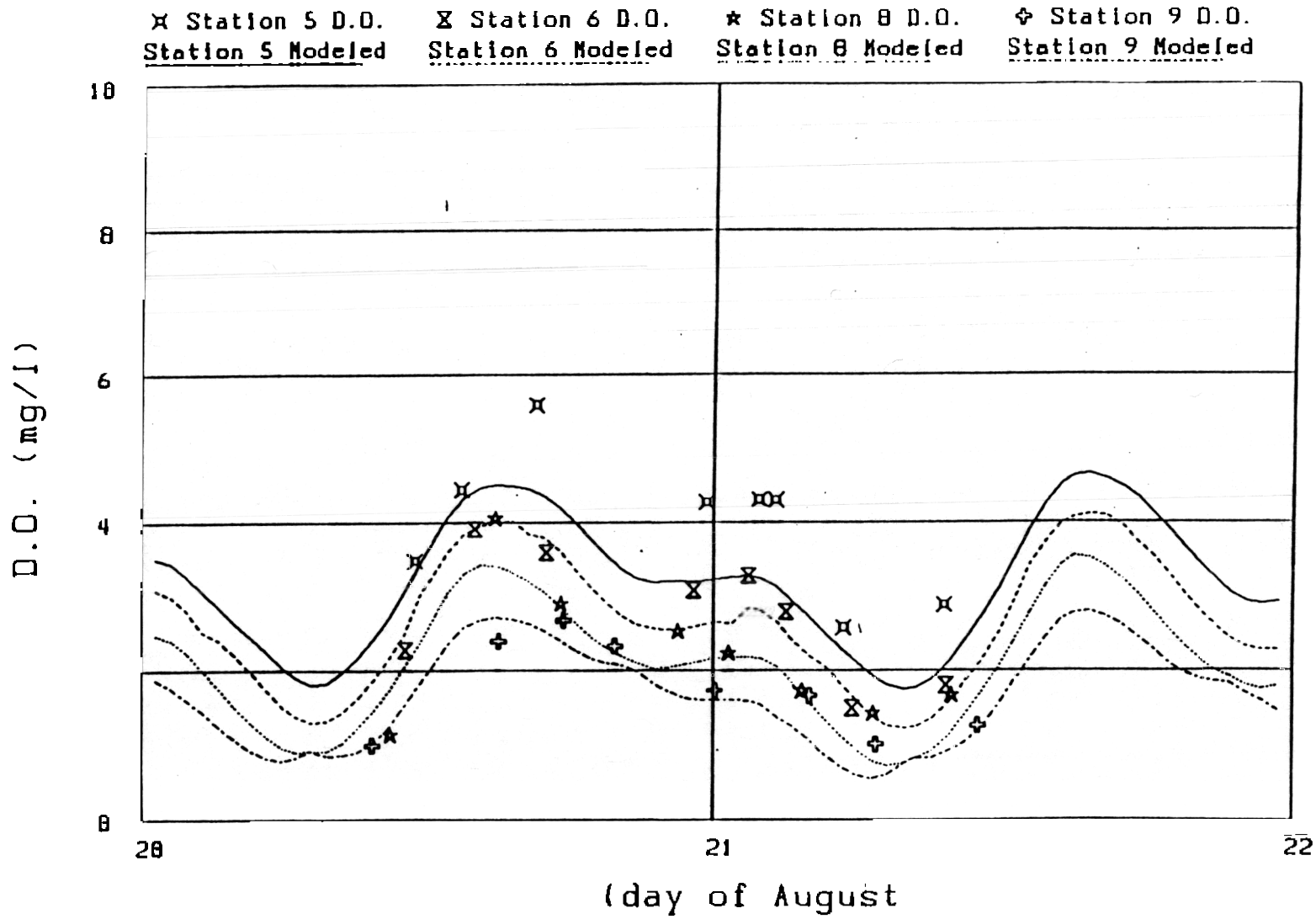


FIGURE 5-2. HACKENSACK RIVER DO VERIFICATION

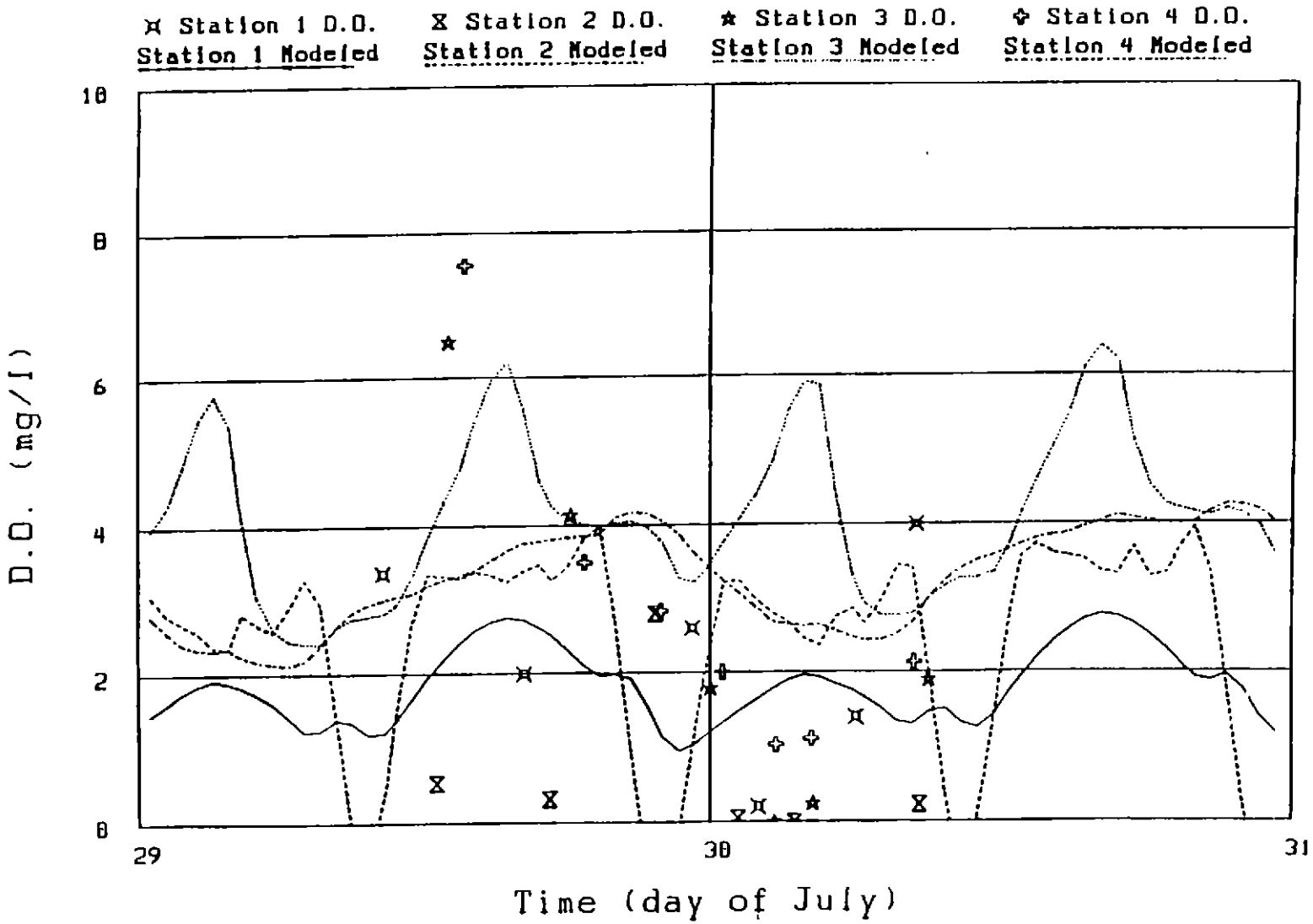


FIGURE 5-3. CROMAKILL CREEK DO CALIBRATION

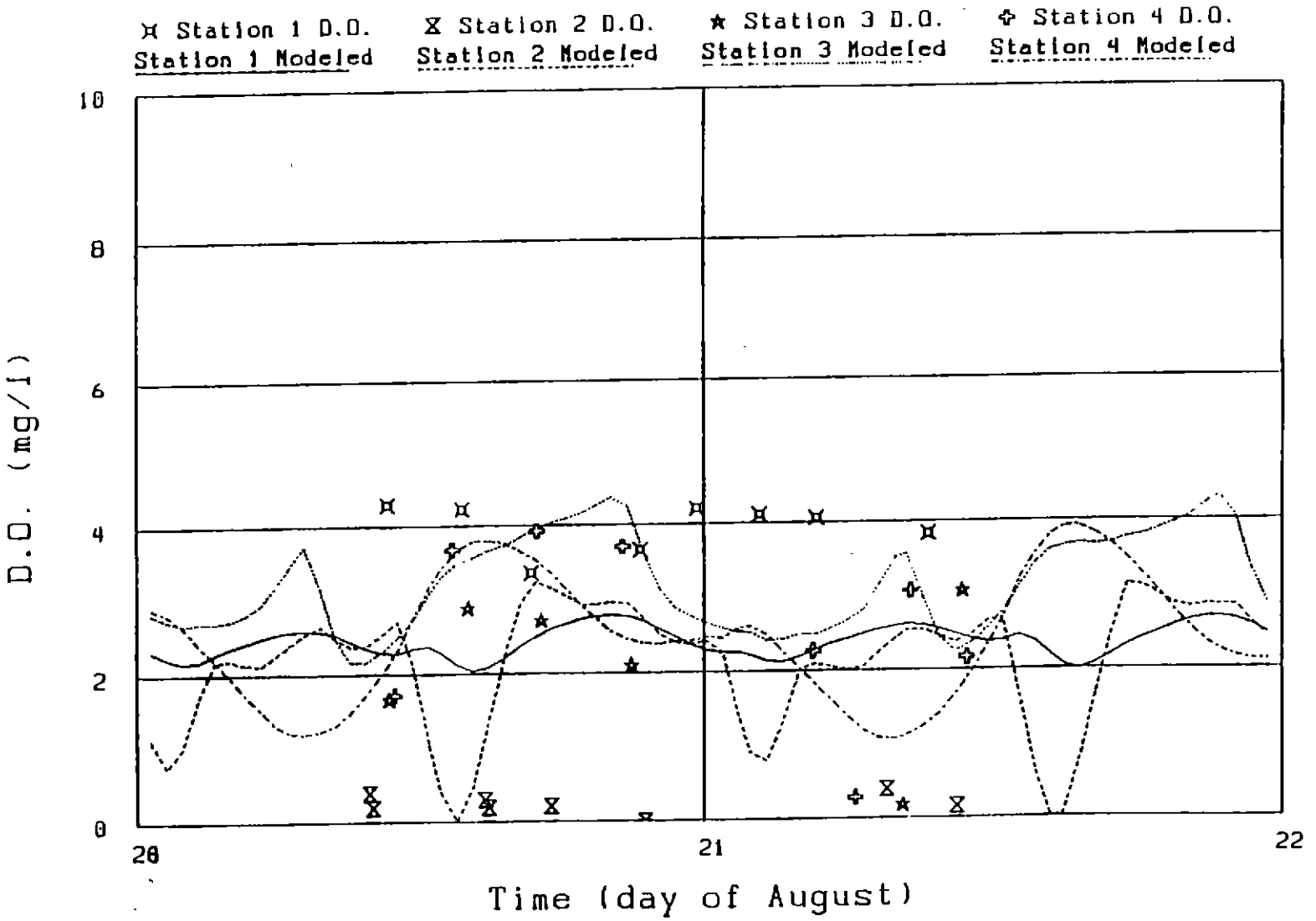


FIGURE 5-4. CROMAKILL CREEK DO VERIFICATION

6.0 SIMULATIONS OF FUTURE CONDITIONS

6.1 MODELING APPROACH

There is a certain degree of control over several factors which affect the water quality of Cromakill Creek and the Hackensack River. These include the water quality and the location of the North Bergen and BCUA wastewater discharges, the thermal loading from the PSE&G discharge, the occurrence of DWCSOs, and the oxygen demand of stream sediments.

To determine the most efficient approach toward meeting surface water quality standards, several future scenarios were modeled. Each model run represents improvements to one or more of the factors over which there is control. Under various combinations, the following factors were considered:

- Elimination of DWCSOs, a requirement of both NJDEP and EPA regulations, removes all dry weather discharges from the system. This would eventually reduce SOD in receiving waters because a significant portion of total SOD results directly from the high BOD levels in DWCSOs. For this reason all runs which include elimination of the DWCSOs also include a decrease in SOD values to 60% of existing levels.

- Upgrade of wastewater treatment levels to Level 2 or Level 3 would decrease BOD and ammonia levels in the WWTP discharges.

- Improvement of the PSE&G thermal discharge has been assumed based on discussions with the NJDEP. At the NJDEP's direction, it is manifested in the model by reducing all water temperatures above 80°F to 80°F.

- Relocation of the Central STP outfall downstream on the Cromakill Creek to a point near its confluence with the Hackensack River. This condition looks at improving the mixing of the plant's effluent with greater stream flow and tidal circulation. However, the creek will still see tidal circulation retarding the flushing of the creek.

- Relocation of the BCUA WWTP outfall to a point downstream of Berry's Creek Canal (Reach 2) attempts to remove the influence that degraded upper-reach Hackensack River water quality has on Cromakill Creek. Relocations in the model involve simple changes to system configuration as shown in **Figure 4-1**.

Table 6-1 shows the conditions of each of the twenty-one model runs, investigated. The key discharge parameter concentrations and flow rates for each of the 3 affected wastewater treatment plants are shown in **Table 6-2** for each of the 21 model runs. **Table 6-3** list the NJDEP treatment level criteria for wastewater treatment plants.

Relocations of the outfalls are not accompanied in the model by reductions in SOD values for the reaches adjacent to the original discharge locations. While some reduction is expected, the extent and rate of change in these SOD values is not known. Even a literature search was unsuccessful in finding a factor for the expected reduction in SOD. This fact is important when interpreting the results of all runs involving relocations, as discussed further in **Section 6.2**.

Finally, as shown in **Table 6-2**, the changes in wastewater treatment levels in the model apply simultaneously to the North Bergen Central STP and BCUA WWTP. The parameters of principal interest are BOD, DO, ammonia and total flow. The Secaucus WWTP discharge is currently at Level 3 and remains at Level 3 at its current location for all runs.

A total of 21 different scenarios were simulated using the model. Run 5 represents existing conditions for each of the factors at hand. This run is used as a basis of comparison for six component analysis runs (Runs 1-4,6,7) which each examine the effects of changes to one factor. Runs 6ext and 8-20 each involve simultaneous changes to several factors as shown in **Table 6-1**. The component analysis runs and the conditions for future simulations were set at the direction of the NJDEP.

TABLE 6-1. DESCRIPTION OF MODELED CONDITIONS, RUNS 1 - 20

Existing Conditions	Eliminate Dry Weather CSOs	Improve Sediment Oxygen Demand	Relocate BCUA Outfall	Improve PSE&G Thermal Discharge	Relocate North Bergen Outfall	Current Treatment Level	Level 2 Treatment	Level 3 Treatment
	✓					Run #1		
		✓				Run #2		
				✓		Run #3		
					✓	Run #4		
✓						Run #5	Run #7	
			✓			Run #6		
			✓		✓	Run #6ext		
	✓	✓				Run #8	Run #9	Run #10
	✓	✓	✓	✓		Run #11	Run #12	Run #13
	✓	✓		✓		Run #14	Run #15	Run #16
	✓	✓		✓	✓	Run #17	Run #18	
	✓	✓	✓	✓	✓	Run #19	Run #20	

TABLE 6-2. WWTP DISCHARGE FLOWS, CONCENTRATIONS

	Flow* (mgd)	CBODult (mg/l)	$CBOD_5$ (mg/l)	DO (mg/l)	NH_3-N (mg/l)
Current Treatment Level Runs (1-6ext,8,11,14,17,19):					
BCUA	75.0	38.0	25.3	6.0	16.0
Secaucus	5.2	24.0	16.0	6.0	4.0
North Bergen	10.0	39.0	26.0	6.0	12.0
Level 2 Treatment Runs (7,9,12,15,18,20):					
BCUA	75.0	24.0	16.0	6.0	10.0
Secaucus	5.2	24.0	16.0	6.0	4.0
North Bergen	10.0	24.0	16.0	6.0	10.0
Level 3 Treatment Runs (10,13,16):					
BCUA	75.0	24.0	16.0	6.0	4.0
Secaucus	5.2	24.0	16.0	6.0	4.0
North Bergen	10.0	24.0	16.0	6.0	4.0

DO concentrations are 6.0 - 6.5 mg.l for all wastewater discharges

* All flows represent permit levels.

TABLE 6-3. NJDEP WWTP TREATMENT LEVEL CRITERIA

WWTP Treatment Level Criteria:	CBODult (mg/l)	$CBOD_5$ (mg/l)	DO (mg/l)	NH_3-N (mg/l)
Secondary	--	30.0	--	--
Level 1	36.0	24.0	4.0	26.0
Level 2	24.0	16.0	6.0	10.0
Level 3	24.0	16.0	6.0	4.0

Table 6-4 shows the NJDEP Surface Water Quality Standards for waters classified as either FW2-NT or SE2. It should be noted that the Hackensack River is classified as SE2. As for the Cromakill Creek:

(1) FW2-NT criteria apply where salinities are less than or equal to 3.5 ppt at mean high tide;

(2) SE2 criteria apply where salinities are greater than 3.5 ppt at mean high tide;

(3) Where salinities vary from 3.5 ppt or less, to greater than 3.5 ppt, at mean high tide, the more stringent of the FW2-NT or SE2 criteria apply.

TABLE 6-4. NJDEP FW2-NT & SE2 SURFACE WATER QUALITY STANDARDS

PARAMETER	FW2-NT	SE2
DO (mg/l)	24 hr. avg. ≥ 6.0	≥ 5.0 at any time
	≥ 5.0 at any time	
pH	6.5 - 8.5	natural pH conditions shall prevail
Phosphorus, total (mg/l)	≤ 0.1	- -
Suspended Solids (mg/l)	≤40.0	none which would render waters unsuitable for the designated uses
Ammonia, unionized 24 hr. average	≤50 μg/l	≤ 0.1 of acute definitive LC50 or EC50

The modeling process involved assembling input files for each run of the calibrated model, running the model over the July 2 - August 23 period, and checking and interpreting output. Field surveys and model results show that DO is the most severely affected water quality parameter for Cromakill Creek and the Hackensack River. The presentation of results, therefore, focuses on the effects of future scenarios on DO concentrations during the spring and

neap tides. These are the tides with the highest and lowest amplitude respectively during a lunar month.

Figures 6-1 and 6-2 show these tide conditions during the period of July 16 to August 23. Spring and neap tides encompass the range of conditions which can occur and, as a result, one of these extremes typically exhibits the worst conditions in terms of water quality. For both spring and neap tides, DO profiles are presented at both high water and low water to also cover the range of conditions during the tide cycle. These plots are presented in Appendix D along with plots of DO concentration time series. The locations of the time series correspond to the locations of monitoring stations from the field surveys.

This lengthy compilation of data is digested in two ways. First, the percent of time during each run that the DO standard (4 mg/l) is violated at representative stations is calculated. This is done only for the spring tide portion of each run (July 16 to August 5) because the tidal extremes that dictate worst-case scenarios occur during the spring tide. Second, the change in time-averaged DO concentration versus existing conditions (Run 5) at each critical station is calculated for each run and tide.

Stations 2 and 3 are the critical stations on Cromakill Creek for the following reasons. Station 1 is largely representative of the constant upstream boundary condition and thereby is not the best representation of the effects of the dynamic mixing processes at work. Station 4 is at the confluence with the Hackensack River and thereby is not representative of water quality along the creek. Note that of Stations 2 and 3, the latter is better calibrated and thereby is assumed to produce results of greater accuracy.

Likewise, of the four Hackensack River stations, station 9 is nearest to the constant upstream boundary condition. Being furthest upriver, it is also the least affected of the four by the water quality of Cromakill Creek and thereby is of less interest for the purposes of this study. Stations 6 and 8 are most representative of the important effects of Cromakill Creek water quality and the BCUA WWTP discharge, respectively, on Hackensack River water quality.

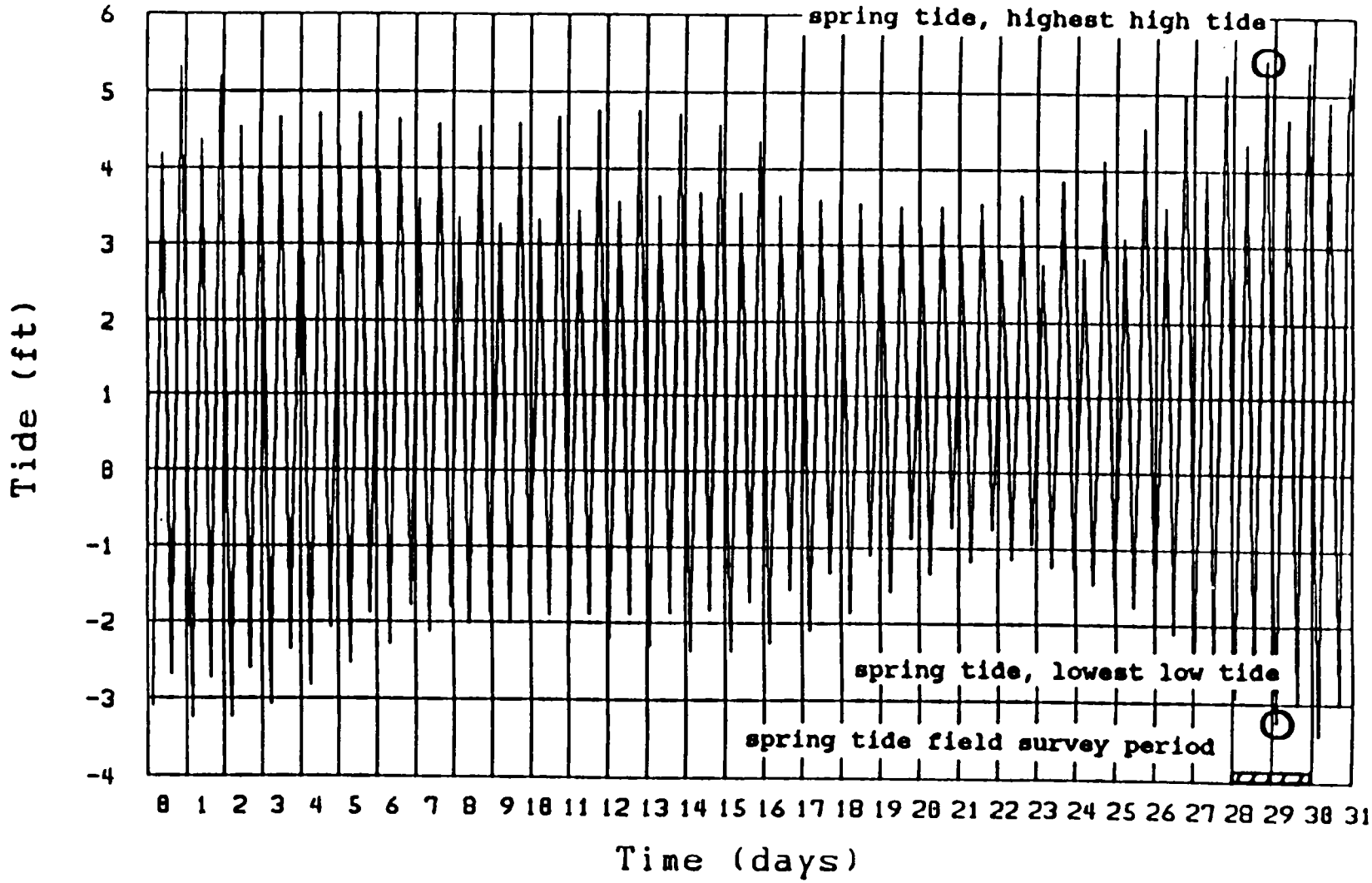


FIGURE 6-1. KEARNY POINT TIDES - JULY 1992

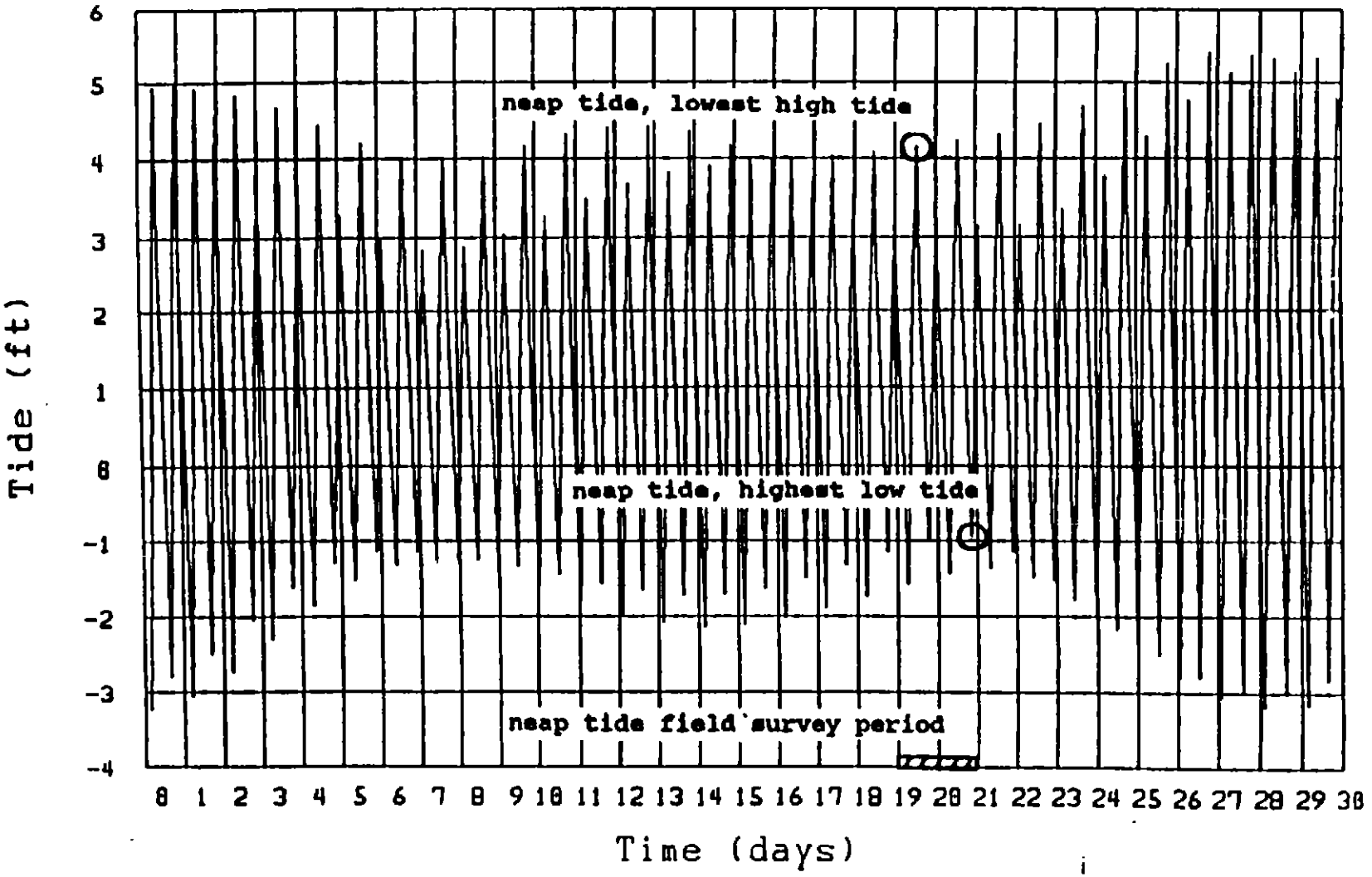


FIGURE 6-2. KEARNY POINT TIDES - AUGUST 1992

6.2 DISCUSSION OF RESULTS

In reference to **Tables 6-5** and **6-6** as well as **Appendix D**, and especially to station 3 on Cromakill Creek, the results of the state-required component analysis simulations show that improving SOD (as a result of eliminating DWCSOs) and relocating the BCUA outfall provide the greatest benefit to DO concentrations in Cromakill Creek and the Hackensack River. **Table 6-5** shows the percent of time during each run that the DO criteria was violated under spring tide conditions at stations 2, 3, 6, and 8. **Table 6-6** shows the change in mean DO concentration relative to existing conditions at the same stations for both spring and neap tides. However, as discussed in **Section 6.1**, Run 4 (relocation of the North Bergen Central STP outfall) does not reflect the long-term reduction in SOD along Reach 11 that would likely result. Some DO levels at station 1 actually appear to worsen following relocation of the North Bergen Central STP. This is due to the continued existence of the original SOD and the drastic reduction in stream flow at that station resulting from that outfall relocation.

Likewise relocation of the BCUA outfall (run 6) would be expected to eventually show greater improvement in DO concentration in the upper Hackensack River reaches than indicated once SOD values adjacent to the original discharges decrease. This effect is likely limited to the reaches adjacent to the original WWTP location since high BOD loads tend to dampen differences in DO concentrations as water flows from reach to reach.

It should also be kept in mind that these simulations reflect worst case scenarios in all important aspects: the effects of extreme spring tide amplitudes, unfavorable DO air/water equilibrium in warm weather, and minimal freshwater flows.

Among the current treatment level runs (1-6ext,8,11,14,17,19), Runs 11 and 19 show the best DO levels, as expected given the extent of improvements in those runs. It is hypothesized that the long term benefits of Run 19 (all improvements and relocations, at current treatment levels) would be even greater once SOD values in Reach 11 drop. Results show that DO continues to be the limiting parameter in terms of Cromakill Creek's water quality. Ammonia levels under future simulations are in accord with water quality standards.

Elimination of DWCSOs, improvement of the thermal discharge, and improvement of SOD are all relatively easily attainable future conditions. Given this, it is of interest to assess the effects of the two WWTP relocations and of the wastewater treatment level upgrades individually by

TABLE 6-5.

MODELED STREAM IMPROVEMENTS VS. % VIOLATIONS OF DO CRITERIA, SPRING TIDE, RUNS 1 - 20.

Model Run Number	Existing Conditions	Eliminate Dry Weather CSOs	Improve Sediment Oxygen Demand	Relocate BCUA Outfall	Improve PSE&G Thermal Discharge	Relocate North Bergen Outfall	Treatment Level	Cromakill Creek		Hackensack River	
								Station 02	Station 03	Station 06	Station 07
1		✓					Current	97	86	98	100
2			✓				Current	97	86	97	100
3					✓		Current	98	89	100	100
4						✓	Current	92	87	100	100
5	✓						Current	98	89	100	100
6				✓			Current	97	72	86	89
6ext				✓		✓	Current	74	60	82	85
7	✓						Level 2	98	79	90	98
8		✓	✓				Current	88	81	94	99
9		✓	✓				Level 2	88	60	77	83
10		✓	✓				Level 3	80	50	69	76
11		✓	✓	✓	✓		Current	73	53	71	72
12		✓	✓	✓	✓		Level 2	79	41	61	63
13		✓	✓	✓	✓		Level 3	69	37	57	60
14		✓	✓		✓		Current	88	81	94	99
15		✓	✓		✓		Level 2	88	60	77	83
16		✓	✓		✓		Level 3	80	50	69	76
17		✓	✓		✓	✓	Current	56	81	94	100
18		✓	✓		✓	✓	Level 2	39	62	79	84
19		✓	✓	✓	✓	✓	Current	32	54	74	74
20		✓	✓	✓	✓	✓	Level 2	26	45	63	65

comparing runs in which all other parameters are held constant. For example, to investigate the benefit of the BCUA relocation, note that Run 11 (all improvements, BCUA relocation, current treatment levels) shows about a 1 mg/l greater average DO concentration at station 3 than does Run 14 (same as run 11, without BCUA outfall relocation).

Quantitatively assessing the long-term effect of the North Bergen relocation (Run 11 vs. Run 19) is problematic given the SOD reduction issue. However it is hypothesized that once SOD values in reach 11 equilibrate to post-relocation levels, the water quality of Cromakill Creek will see its greatest improvement.

To see the effects of upgrades to the BCUA and North Bergen WWTPs, compare the following:

- Runs 11-13 include elimination of DWCSO discharges, improved SOD, relocation of the BCUA outfall and improved thermal discharge from PSE&G, with one run each for current, level 2 and level 3 treatment;

- Runs 14-16 include elimination of DWCSO discharges, improved SOD and improved thermal discharge from PSE&G, with one run each for current, level 2 and level 3 treatment;

- Runs 17-18 include elimination of DWCSO discharges, improved SOD, improved thermal discharge from PSE&G; and relocation of the Central STP outfall, with one run each for current and level 2 treatment;

- Runs 19-20 include elimination of DWCSO discharges, improved SOD, improved thermal discharge from PSE&G, and relocation of both BCUA's and Central STP's outfalls, with one run each for current and level 2 treatment.

As noted, the only change with a group is the wastewater treatment levels. Again station 3 is emphasized since it is mid-creek. Runs 14-16 (all improvements, no relocations) show a benefit at station 3 spring tide from upgrading to Level 2 of approximately 0.7 mg/l average DO concentration. Further upgrading to Level 3 provides an additional benefit of approximately 0.3 mg/l.

Comparing Runs 11 and 12 (all improvements, BCUA WWTP discharge relocated) shows that when the BCUA WWTP discharge is relocated, upgrading to Level 2 only provides an approximate 0.3 mg/l of average DO concentration benefit, while a further upgrade to Level 3 provides less than 0.2 mg/l of benefit.

The difference that a Level 2 upgrade provides from Run 17 to Run 18 (all improvements, N.B. Central STP discharge relocated) is approximately 0.7 mg/l average DO concentration, while the same upgrade from Run 19 to Run 20 (all improvements, both WWTP discharges relocated) is less than 0.3 mg/l average DO concentration.

TABLE 6-6. CHANGE IN MEAN DO CONCENTRATION, RUNS 1-20

	Cromakill Creek				Hackensack River			
	Station 2		Station 3		Station 4		Station 4	
Run/Tide	mean D.O.	change	mean D.O.	change	mean D.O.	change	mean D.O.	change
Run1/Spring	1.85	--	2.39	--	1.67	--	1.10	--
Run1/Neap	1.98	--	2.81	--	2.32	--	1.69	--
Run1/Spring	2.36	0.51	2.61	0.22	1.87	0.19	1.35	0.24
Run1/Neap	2.51	0.53	2.52	-0.29	2.52	0.20	1.94	0.25
Run2/Spring	2.23	0.38	2.74	0.34	2.04	0.37	1.50	0.40
Run2/Neap	2.36	0.38	3.16	0.35	2.69	0.37	2.09	0.41
Run3/Spring	1.85	0.00	2.39	0.00	1.67	0.00	1.10	0.00
Run3/Neap	1.98	0.00	2.81	0.00	2.32	0.00	1.69	0.00
Run4/Spring	1.82	-0.03	2.51	0.11	1.65	-0.02	1.08	-0.02
Run4/Neap	1.93	-0.05	2.96	0.15	2.31	-0.01	1.67	-0.02
Run6/Spring	2.41	0.56	3.33	0.93	2.64	0.97	2.43	1.32
Run 6/Neap	2.58	0.60	3.89	1.08	3.41	1.09	3.22	1.53
Run6a/Spring	2.99	1.14	3.66	1.26	2.85	1.18	2.65	1.55
Run6a/Neap	3.21	1.22	4.30	1.49	3.66	1.34	3.49	1.80
Run7/Spring	2.01	0.16	3.09	0.70	2.41	0.74	1.96	0.86
Run7/Neap	2.14	0.16	3.55	0.74	3.10	0.78	2.59	0.91
Run8/Spring	2.81	0.97	2.98	0.59	2.24	0.57	1.76	0.66
Run8/Neap	2.97	0.98	3.42	0.62	2.91	0.59	2.36	0.68
Run9/Spring	2.99	1.14	3.69	1.29	2.99	1.31	2.63	1.53
Run9/Neap	3.14	1.16	4.16	1.36	3.68	1.36	2.59	-0.68
Run10/Spring	3.28	1.43	3.98	1.58	3.29	1.62	2.99	1.89
Run10/Neap	3.43	1.45	4.47	1.66	4.00	1.68	3.64	1.96
Run11/Spring	3.39	1.54	3.94	1.54	3.23	1.56	3.12	2.02
Run11/Neap	3.58	1.60	4.52	1.72	4.01	1.69	3.93	2.25
Run12/Spring	3.35	1.50	4.24	1.84	3.56	1.89	3.44	2.34
Run12/Neap	3.53	1.57	4.84	2.04	4.36	2.04	4.27	2.58
Run13/Spring	3.55	1.71	4.37	1.98	3.70	2.03	3.58	2.48
Run13/Neap	3.76	1.78	4.98	2.18	4.51	2.19	4.41	2.72
Run14/Spring	2.81	0.97	2.98	0.59	2.24	0.57	1.76	0.66
Run14/Neap	2.97	0.98	3.42	0.62	2.91	0.59	2.36	0.68
Run15/Spring	2.99	1.14	3.69	1.29	2.99	1.31	2.63	1.53
Run15/Neap	3.14	1.16	4.16	1.36	3.68	1.36	3.27	1.58
Run16/Spring	3.28	1.43	3.98	1.58	3.29	1.62	2.99	1.89
Run16/Neap	3.43	1.45	4.47	1.66	4.00	1.68	3.64	1.96
Run17/Spring	3.69	1.84	2.94	0.53	2.18	0.58	1.70	0.59
Run17/Neap	3.99	2.00	3.43	0.63	2.85	0.53	2.31	0.62
Run18/Spring	4.30	2.46	3.62	1.23	2.90	1.23	2.55	1.45
Run18/Neap	4.61	2.63	4.15	1.35	3.61	1.29	3.20	1.51
Run19/Spring	4.63	2.78	3.93	1.53	3.16	1.49	3.03	1.95
Run19/Neap	5.01	3.02	4.57	1.76	3.95	1.63	3.88	2.19
Run20/Spring	4.84	2.99	4.18	1.79	3.47	1.80	3.35	2.25
Run20/Neap	5.22	3.24	4.84	2.04	4.29	1.97	4.19	2.50

Change is calculated relative to mean D.O. concentration at run 5 (existing conditions) at the corresponding station and tide.

7.0 SUMMARY

This study shows that neither the Lower Hackensack River nor the Cromakill Creek can meet the DO stream standard even when the NB Central STP and the BCUA WWTP are both upgraded to Level 3 Treatment.

The study is based on worst case summer conditions. This includes an extended period of warm summer temperatures and very low flows (drought conditions). Allowances were also made in the modeling for other improvements to the lower Hackensack River drainage basin, which encompasses the Cromakill Creek. These allowances include:

- Elimination of dry weather CSO discharges;
- Improvement of Sediment Oxygen Demand (SOD); and
- Improvement of the PSE&G's Bergen Generating Station thermal discharge.

Yet even with these improvements, the DO stream standards could not be met with both the BCUA WWTP and the North Bergen Central STP operating at Level 3 Treatment.

In addition, the relocation of both the BCUA WWTP and the NB Central STP outfalls was also considered under this study. These relocations were modeled both as separate and concurrent events, where:

- the BCUA WWTP outfall was relocated to a point downstream of Berry's Creek Canal on the Hackensack River (per BCUA's own proposal); and
- the NB Central STP outfall was relocated downstream on the Cromakill Creek to a point near the creek's confluence with the Hackensack River.

While the outfall relocation approaches appear to be more cost effective than treatment upgrade, they also do not meet the DO stream standards. This is confirmed by BCUA's modeling study of the lower Hackensack River Basin.

All of the modeled scenarios result in some level of water quality improvement in the lower Hackensack River and the Cromakill Creek. However, none of them meets the DO stream standard during worst case summer conditions. Thus, there is no technical basis upon which the Township and the NBMUA could select any of the studied changes for implementation at the Central STP.

TABLE – – N Bergen Water Quality Study Conventional Pollutant Sampling Results 8/20 – 8/21/92 Survey

Cromakill Creek

PARAMETER (mg/l)	EPA Marine Criteria (1) Acute	Chronic	Lab MDL	STATIONS 0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
CBOD – 30 day			1.00	66 4	72 0	80 1	32.8	66.6	43 6	34.2	14 9	12 3	40.7	21.0	16 2	BDL	BDL	BDL	2 83	BDL	BDL	BDL	BDL
CBOD – 5 day			1 00	17.7	56.6	61 3	24.1	17.1	24.0	16.8	11.1	12 1	19.8	18.7	16.8	2.44	2.94	2.61	8 90	2 77	3 49	2 73	3 93
Total Dissolved Solids			1.00	562	258	438	494	565	530	476	530	1440	862	1760	2290	6130	6590	6500	8780	8220	6420	7090	2770
Chlorophyll – a (mg/m3)			0.500	5 71	21.7	7.33	16.7	10.2	12.0	5.16	5.74	12.6	12.0	14.7	30.0	60.9	36.4	39.6	40.8	71 2	42.8	37.7	63.4
Total Kjeldahl Nitrogen			0 050	19 4	20 9	18 9	18.5	20.9	17 8	14.7	13 5	9 85	17.1	12 9	11.8	4.93	4.51	4.84	7.19	4 99	4 38	4 34	5.16
Total Phosphorus			0 040	2.91	2 98	2.80	2 27	3.14	2.37	2.07	1.87	1.67	2.41	2.18	2.24	0.731	0.899	0.811	1.40	0 678	0.889	0.809	1.11
Total Suspended Solids			1 00	33 0	102	88.0	35.0	35 0	34.0	32.0	28.0	17 0	14.0	20.0	70.0	22.0	33.0	23 0	50 0	162	26.0	25.0	87 0
Alkalinity			1 00	203	226	218	222	201	177	156	137	164	192	172	170	111	120	116	142	113	119	114	123
Ammonia Nitrogen			0.040	16 1	14 0	14 9	14 4	17.4	10.9	11.5	10 5	8 99	12 9	9 84	8 19	2 80	4.06	3.77	6.15	2 91	4 02	3 56	3 59
Nitrite plus Nitrate			0 040	0.287	BDL	BDL	BDL	0.437	0.337	0.466	1.76	BDL	BDL	BDL	BDL	1.26	1 08	1.17	0 297	1.19	1 46	1 24	1 41
Organic Phosphorus			0 040	2.17	1 82	1 80	1 35	2 36	1.58	1.43	1.01	1 24	1 64	1 47	1.37	0.461	0 590	0.578	0 927	0 348	0.595	0.537	0.703

Hackensack River

PARAMETER	EPA Marine Criteria (1) Acute	Chronic	Lab MDL	STATIONS 5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
CBOD – 30 day			1.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
CBOD – 5 day			1.00	3.86	1.42	1.87	3.28	4.14	2.11	1.43	4.01	3.64	4.29	1.20	3.12	4 01	4.34	1.76	1.36	4.71	3.47	3 66	4.73
Total Dissolved Solids			1.00	11700	8870	9450	7320	9010	7130	6030	6220	8370	6550	7420	5770	6800	6110	6630	6030	6590	5370	6480	6730
Chlorophyll – a (mg/m3)			0.500	56 5	46.2	49.7	43.2	56.1	35.1	44.4	39 6	50.6	46.7	43.9	58.8	39.7	37.2	30.6	46.3	40.9	47.0	36.7	47.8
Total Kjeldahl Nitrogen			0 050	3.38	4.04	3.66	3.58	4.06	4.41	4.29	5.04	4.35	5.10	4.87	4 60	5.26	5.09	5.32	4.15	6.72	4.43	5.57	5 83
Total Phosphorus			0 040	0.517	0 622	0.668	0.854	0 705	0 865	0.805	0.848	0.715	0.885	0.851	1.15	0.902	0.885	0.873	0.851	0.907	0.961	0.885	0.876
Total Suspended Solids			1.00	18 0	24.0	27.0	28.0	12.0	11.0	24.0	25.0	15 0	16.0	25.0	31.0	11.0	12.0	19.0	19 0	8.00	11.0	20 0	21.0
Alkalinity			1.00	112	114	114	119	112	118	118	120	111	120	118	125	117	119	118	121	124	120	124	111
Ammonia Nitrogen			0 040	2 13	2 60	2 60	3 47	2 60	3.60	3.12	3 70	3 06	3 73	3 59	3 26	4.00	4 26	3.93	4.07	5 20	4 26	5 07	4.44
Nitrite plus Nitrate			0 040	1.28	1.24	1 20	1.11	1.28	1.19	1.21	1.15	1 21	1.16	1 19	1 81	1.17	1.12	1.15	1.03	1.03	1 10	1 05	1.11
Organic Phosphorus			0.040	0.381	0.485	0.270	0.586	0.497	0.586	0.537	0 585	0.511	0.618	0.580	0.764	0.604	0.611	0.604	0.511	0 851	0.488	0 571	0.594

Appendix C

TABLE – –. N. Bergen Water Quality Study Conventional Pollutant Sampling Results: 7/29 – 7/30/92 Survey

Cromakill Creek

PARAMETER (mg/l)	EPA Marine Criteria (1)		Lab MDL	STATIONS																		
	Acute	Chronic		0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
CBOD – 30 day	NS	NS	1.00	43.3	69.6	72 3	66 0	61 0	88.4	68.6	49.9	42.2	99 6	10.8	48.3	13.0	6 60	3.80	10.6	2 00	BDL	11.6	5.52
CBOD – 5 day	NS	NS	1.00	18.6	43.8	26 3	33.8	17.4	38.6	30.0	30.1	17.6	56.3	12.9	34.8	8.40	6.90	7.30	8.73	3.60	BDL	8.80	4.70
Total Dissolved Solids	NS	NS	1.00	1090	613	1280	995	466	507	1310	667	1530	789	5840	1590	9070	9770	9010	9650	8440	6500	6660	9630
Chlorophyll – a (mg/m3)	NS	NS	0.500	76.0	74.4	91.4	66.6	78.9	91.6	104	119	102	123	66.2	63.1	71.7	81.2	74.7	137	160	63.2	138	69.3
Total Kjeldahl Nitrogen	NS	NS	0 050	11 9	24.3	12.8	19 1	14.2	20.9	13.6	16.7	13 6	20.3	6.79	15.4	8.22	4.24	4.89	8 85	5.66	3 64	3.97	5.24
Total Phosphorus	NS	NS	0.040	1.87	3.29	2.25	3.04	2.12	3.37	2.20	2.67	2.43	3.22	1 24	2 98	1.29	0.940	1.07	1 52	1.07	1.11	1.14	0.914
Total Suspended Solids	NS	NS	1.00	14.0	36.0	27.0	43.0	20.0	30.0	16.0	20.0	20 0	24.0	20 0	168	33.0	61.0	24.0	46 0	36.0	30.0	31 0	20 0
Alkalinity	NS	NS	1.00	127	198	154	169	131	190	144	167	167	192	139	178	134	116	125	144	121	122	131	118
Ammonia Nitrogen	NS	NS	0.040	8.27	16.7	9 42	16.0	10.2	16.2	9.78	13.4	10.2	16 6	4.74	10.7	3 62	2 84	3 33	4 60	3 70	2 42	2 63	3 78
Nitrite plus Nitrate	NS	NS	0 040	1 58	BDL	0.201	BDL	1.68	0.127	0.286	0.316	0.444	BDL	0.956	BDL	0.666	1.33	1.20	0.691	1.20	1 46	1.36	1.26
Organic Phosphorus	NS	NS	0 040	1.33	1 79	1.36	1 66	1.42	2 20	2.20	1.76	1.71	1.87	0.827	1 63	0.674	0.662	0.648	0.906	0.664	0.767	0.800	0.652

Hackensack River

PARAMETER	EPA Marine Criteria (1)		Lab MDL	STATIONS																		
	Acute	Chronic		5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9
CBOD – 30 day	NS	NS	1.00	BDL	2.00	BDL	BDL	BDL	3.64	BDL	BDL	BDL	6 60	3.12	BDL	4.60	4.80	2 00	3 21	4.80	2.40	BDL	3 00
CBOD – 5 day	NS	NS	1.00	3.94	3.90	4.40	BDL	BDL	10.7	7.80	2.10	1.80	8.10	3.80	BDL	3.60	2.40	BDL	BDL	7 60	5.70	BDL	BDL
Total Dissolved Solids	NS	NS	1.00	12100	11600	12800	8280	9190	8880	9320	7030	8360	7800	6650	6650	6910	6850	7060	6970	6970	6280	7130	8170
Chlorophyll – a (mg/m3)	NS	NS	0.500	26.4	112	76.6	65.0	74.8	33.1	91.1	127	106	60.6	65.2	66.0	72 8	61.0	62.2	40 4	67.8	53.4	66.5	102
Total Kjeldahl Nitrogen	NS	NS	0 050	1.74	1.72	2.72	4.37	3.91	3 68	3 71	4 90	3 50	4 77	3.75	4.83	4.74	4.74	4.98	5.23	5.47	5 66	5.29	5 93
Total Phosphorus	NS	NS	0 040	0.832	0.811	0.724	1 03	1.05	0.960	0.866	1.05	1.08	1.20	1.10	1 06	1.05	1.09	1.13	1.16	1.12	1.13	1.13	1.16
Total Suspended Solids	NS	NS	1.00	31.0	46.0	39.0	15.0	35 0	32.0	12 0	17.0	33.0	69 0	61 0	19.0	40 0	27.0	19 0	15 0	25 0	16 0	29 0	28 0
Alkalinity	NS	NS	1.00	116	116	114	116	121	120	119	124	120	123	121	122	124	126	126	124	124	126	122	121
Ammonia Nitrogen	NS	NS	0 040	1 65	1 70	1.71	3 04	2 60	2 87	2 64	3.81	2 26	3 10	2.18	3 43	3 48	3.16	3 66	3 78	3 92	4 24	4 06	4 44
Nitrite plus Nitrate	NS	NS	0.040	1.12	1.17	1.10	1.33	1.34	1.37	1.29	1.44	1 69	1 38	1 64	1.46	1.38	1.44	1.42	1.48	1 46	1 53	1 48	1 58
Organic Phosphorus	NS	NS	0 040	0.663	0.643	0.464	0 897	0.681	0.690	0.676	0.743	0.748	0.676	0.677	0.724	1.390	0 744	0.629	0 768	0.766	0.741	0.799	0.800

BDL = Below Detection Limit
NS = No Standard

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millimhos)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
8	29-Jul-92	09:37	09:36	09:40	3.90	1.35	1.30	1.35	0.75	0.75	0.75	U	U	U	0.20	0.31	0.16	6.80	6.75	6.75	3.80	3.50	3.60	0.25	0.20	0.20	24.6	24.6	24.6			
8	29-Jul-92		13:40		3.30	0.90	0.90	0.90			0.50		D			0.08			6.90			0.25			0.20			25.4			
8	29-Jul-92	22:44		22:45	4.60	2.00		2.00	1.00		1.00	D		D	0.02		0.02	6.70		6.70	0.20		0.20	3.50		3.40	26.4		26.4			
8	30-Jul-92		01:45		4.10		1.45			1.00			D			0.12			6.75			0.00			1.80			25.5			
8	30-Jul-92		05:30		3.50		1.00			0.50			D			0.24			6.70			0.00			0.40			23.0			
8	30-Jul-92	08:00	08:05	08:10	3.40	1.10	1.10	1.10	0.50	0.50	0.50	D	N	N	0.04	0.00	0.00	6.50	6.50	6.50	0.20	0.20	0.20	0.15	0.15	0.15	23.7	23.7	23.7			
8	20-Aug-92	09:50	10:00	10:10	4.50	1.35	1.00	1.00	0.50	0.50	0.50	D	D	D	0.20	0.31	0.20	7.06	7.02	7.10	0.85	0.80	0.70	0.02	0.06	0.03	25.1	24.9	25.5			
8	20-Aug-92	14:04	14:14	14:21	4.85	1.70	1.50	1.30	0.90	0.90	0.70	U	U	U	0.04	0.10	0.12	6.77	6.81	6.83	1.70	2.40	2.25	0.91	0.93	0.93	25.3	25.3	25.3			
8	20-Aug-92	17:15	17:20	17:25	3.70	1.20	1.50	1.50	0.50	1.00	1.00	D	D	D	0.08	0.16	0.20	6.64	6.67	6.65	0.65	0.75	0.70	0.89	0.86	0.84	26.3	26.5	26.5			
8	20-Aug-92	19:50	20:00	20:10	3.30	1.50	1.40	1.20	1.00	1.00	1.00				0.09	0.40	0.30	6.66	6.69	6.64	1.15	1.20	1.40	0.81	0.83	0.82	22.8	22.0	22.0			
8	20-Aug-92	22:00	22:10	22:20	3.30	1.50	1.40	1.00	0.50	0.50	0.50	D	D	D	0.50	0.33	0.35	6.79	6.75	6.66	1.25	1.25	1.25	0.85	0.85	0.82	14.8	14.2	14.9			
8	21-Aug-92	05:00	05:10	05:20	3.20	1.10	1.00	1.00	0.55	0.50	0.50	N	D	D	0.00	0.24	0.24	6.58	6.25	6.12	1.50	1.50	1.50	0.00	0.86	0.86	8.6	8.6	8.9			
8	21-Aug-92	04:50	05:00	05:10	3.00	1.00	1.00	0.90	0.50	0.50	0.50	D	D	D	0.16	0.26	0.24	6.50	6.48	6.44	1.50	1.60	1.40	0.88	0.88	0.89	22.0	22.4	22.6			
8	21-Aug-92	10:11	09:51	09:51	3.40	1.30	1.00	1.00	0.50	0.50	0.50										0.50	0.70	0.70	0.84	0.88	0.89	22.0	22.4	22.6			
8	12-Oct-92	09:43		09:43	3.80	1.00		1.30	0.50		0.66	U		U	0.12		0.22	7.10		7.10	0.90		1.15	0.57		0.57	19.8		19.8			
8	12-Oct-92	13:10		13:10	4.90	1.50		1.40	0.75		0.75	D		D	0.14		0.21	7.00		7.10	1.10		1.30	0.61		0.59	20.4		20.6			
8	12-Oct-92	15:45		15:45	3.60	1.50		1.10	0.00		0.50	D		D	0.16		0.22	7.10		7.10	3.50		3.60	0.51		0.50	20.1		20.4			
8	12-Oct-92	18:25		18:25	3.45	1.30		0.90	0.60		0.60	D		D	0.19		0.13	7.10		7.10	3.60		3.50	0.50		0.51	17.6		17.6			
8	10-Nov-92	11:15			3.84																										
8	10-Nov-92	11:35	11:40	11:45		1.77	1.60	1.66	0.50	0.50	0.50	D	D	D	0.00	0.05	0.13	7.10	7.10	7.10	1.10	0.70	1.30	0.66	0.67	0.67	15.5	15.5	15.5			
8	10-Nov-92	11:35	11:40	11:45		1.77	1.60	1.66	1.00	1.00	0.75	D	D	D	0.01	0.06	0.10	7.10	7.10	7.10	0.10	0.20	1.00	0.66	0.66	0.66	15.2	15.0	15.4			
8	10-Nov-92	13:53	13:50	13:45	3.72	1.60	1.50	1.50	0.50	0.50	0.50	D	D	D	0.10	0.25	0.20	7.10	7.10	7.10	1.50	1.50	0.50	0.65	0.66	0.66	14.0	14.1	14.2			
8	10-Nov-92	13:53	13:50	13:45		1.60	1.50	1.50	1.00	1.00	1.00	D	D	D	0.04	0.01	0.14	7.10	7.10	7.10	1.50	1.70	0.90	0.65	0.66	0.67	14.1	14.2	14.9			
8	10-Nov-92	15:40	15:35	15:30	3.55	1.50	1.05	0.95	0.50	0.50	0.50	D	D	D	0.13	0.29	0.16	7.25	7.25	7.30	3.75	3.85	3.50	0.70	0.71	0.66	13.2	13.5	13.1			
8	10-Nov-92	18:53	18:45	18:35	3.48	1.10	0.90	0.80	0.50	0.50	0.50	D	D	D	1.50	1.10	0.10	7.15	7.25	7.25	3.85	3.95	3.95	0.69	0.70	0.69	11.7	11.9	11.9			
8	10-Nov-92	21:46	21:41	21:36	3.32	1.40	1.40	1.10	0.50	0.50	0.50	U	U	U	0.02	0.05	0.04	7.05	7.05	7.05	0.60	0.72	0.50	0.79	0.83	0.83	17.7	17.7	18.0			
8	11-Nov-92	00:56	00:51	00:46	3.50	1.40	1.10	1.00	0.50	0.50	0.50	D	D	D	0.04	0.33	0.28	6.75	6.56	6.44	0.75	0.80	0.70	0.66	0.66	0.90						
8	11-Nov-92	04:48			3.20																										
8	11-Nov-92	04:48	04:50	04:55		0.97	0.85	0.70	0.50	0.50	0.50	D	D	D	0.17	0.36	0.50	7.00	7.00	7.00	3.70	3.70	3.70	0.61	0.62	0.63	11.8	11.9	11.9			
8	11-Nov-92	08:02			3.33																										
8	11-Nov-92	08:12	08:08	08:05		1.50	1.10	0.82	0.50	0.50	0.50	U	U	U	0.15	0.24	0.17	6.94	6.90	6.76	1.00	1.20	1.10	0.81	0.81	0.81	16.0	16.9	16.8			
8	11-Nov-92	10:30			3.94																										
8	11-Nov-92	10:40	10:37	10:35		1.47	1.48	1.48	0.50	0.50	0.50	U	U	U	0.13	0.25	0.49	6.88	6.92	6.88	4.20	4.30	4.40	0.82	0.82	0.81	17.0	17.0	17.0			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Stn. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millisiemens)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
1	29-Jul-92	10:10	10:10	10:10	3.94	2.60	3.50	2.60	1.50	1.50	1.50	D	D	D	0.70	0.82	0.57	6.70	6.70	6.70	3.20	3.50	3.60	0.20	0.20	0.20	24.5	24.6	24.6			
1	29-Jul-92		10:15		3.62		3.15			1.00			D			0.41			6.85			2.00			0.10			25.5				
1	29-Jul-92		23:15		4.30																											
1	29-Jul-92		23:15				3.80			1.00			D			1.08			6.80			2.40			0.80			26.2				
1	29-Jul-92		23:15				3.60			3.00			D			1.06			6.60			2.60			1.10			26.3				
1	30-Jul-92		03:09		3.20		3.70			1.50			D			1.35			6.40			0.20			0.70			25.1				
1	30-Jul-92	09:09	09:09	09:09	3.12		3.00		1.00	1.00	1.00	D	D	D	0.78	0.76	0.76	6.70	6.70	6.70	1.40	1.40	1.40	0.20	0.20	0.20	24.6	24.6	24.6			
1	30-Jul-92	09:10	09:20	09:30	3.50	3.00	3.00	3.10	1.50	1.50	1.00	D	D	D	0.11	0.18	0.24	6.90	6.90	6.90	4.00	4.00	4.00	0.10	0.10	0.10	25.0	25.0	25.0			
1	20-Aug-92	10:30		10:30	2.70	2.20		2.30	1.00		1.00	D		D	1.05		1.01	6.91		6.91	4.30		4.30	0.84		0.90	24.4		24.0			
1	20-Aug-92	13:20	13:20	13:20	3.77	3.00	3.20	3.40	0.50	1.50	1.50	D	D	D	0.18	0.24	0.30	6.76	6.77	6.78	3.80	4.20	4.70	0.92	0.92	0.91	25.2	25.2	25.1			
1	20-Aug-92	16:25	16:25	16:25	3.05	2.20	2.50	2.70	1.00	1.00	1.50	D	D	D	0.50	1.02	0.66	6.73	6.79	6.68	3.35	3.35	3.35	0.93	0.92	0.92	25.4	25.5	25.2			
1	20-Aug-92	21:20	21:10	21:20	2.70	3.00	3.20	3.30	1.00	1.00	1.00	D	D	D	0.36	1.24	1.16	6.70	6.70	6.68	3.45	3.50	5.00	0.91	0.91	0.91	24.2	24.7	24.7			
1	20-Aug-92	23:20	23:30	23:40	2.90	1.90	2.00	2.10	1.00	1.00	1.00	D	D	D	0.27	0.80	0.63	6.65	6.60	6.66	3.70	4.50	4.45	0.88	0.88	0.89	13.5	13.4	13.3			
1	21-Aug-92	01:00	01:10	01:20	3.00	2.20	2.50	2.70	1.00	1.00	1.50	D	D	D	0.18	0.45	0.18	6.55	6.76	6.28	3.00	4.00	4.55	0.80	0.83	0.83	11.8	12.3	12.8			
1	21-Aug-92	04:30	04:30	04:40	2.50	1.70	2.00	2.00	1.00	1.00	1.00	D	D	D	0.58	1.00	0.83	6.12	6.15	5.78	4.00	5.90	4.30	0.82	0.82	0.87	9.6	9.7	10.0			
1	21-Aug-92	09:00	09:10	09:20	2.60	1.90	2.10	2.20	1.00	1.00	1.00		D			0.73					3.80	3.90	3.90	0.85	0.87	0.88	23.5	23.5	23.4			
1	12-Oct-92	11:00		11:10	4.15	3.70		4.75	1.00		1.00	D		N	0.00		0.00	6.90		6.90	0.50		6.40	0.55		0.57	19.0		18.9			
1	12-Oct-92	11:00		11:10		3.70			2.00		3.00	D		N	0.00		0.00	6.90		6.90	2.10		2.40	0.76		0.89	18.6		18.3			
1	12-Oct-92	12:30		12:40	3.44	3.50		3.00	1.00		1.00	D		D	0.00		0.94	7.10		7.30	0.65		1.20	0.66		0.64	21.3		21.5			
1	12-Oct-92	12:50		12:40		3.50		3.00	1.50		2.00	D		D	0.31		1.48	7.10		7.10	0.30		1.10	0.66		0.67	21.3		21.4			
1	12-Oct-92	16:00		16:00	2.76	1.50		2.50	0.70		1.10	D		D	0.13		1.36	7.00		7.00	0.10		0.10	0.65		0.65	22.1		22.1			
1	12-Oct-92	18:40		18:40	2.62	1.50		2.20	0.70		1.10	D		D	0.13		1.25	7.10		7.10	1.20		0.60	0.84		0.84	21.9		21.9			
1	10-Nov-92	10:35			3.70																											
1	10-Nov-92	10:35	10:50	10:45		2.75	3.20	3.25	0.50	0.50	0.50	D	D	D	0.00	1.14	0.92	7.10	7.10	7.15	3.00	3.50	3.50	0.67	0.67	0.66	16.0	16.1	16.0			
1	10-Nov-92	10:35	10:50	10:45		2.75	3.20	3.25	1.00	1.50	1.50	D	D	D	0.05	0.53	1.05	7.10	7.10	7.15	2.00	3.50	3.50	0.67	0.67	0.66	16.0	16.1	16.0			
1	10-Nov-92	10:35	10:50	10:45		2.75	3.20	3.25	2.00	2.00	2.00	D	D	D	0.09	1.13	1.11	7.10	7.10	7.15	3.00	3.50	3.50	0.67	0.67	0.66	16.0	16.1	16.0			
1	10-Nov-92	12:15			3.85																											
1	10-Nov-92	12:30	12:25	12:20		2.10	2.50	2.40	0.50	0.50	0.50	D	D	D	0.00	0.99	0.71	7.10	7.10	7.10	1.70	2.20	2.00	0.75	0.75	0.74	16.9	17.1	17.1			
1	10-Nov-92	12:30	12:25	12:20		2.10	2.50	2.40	1.00	1.00	1.00	D	D	D	0.07	1.30	1.70	7.10	7.10	7.10	1.40	2.30	2.20	0.75	0.75	0.74	16.9	17.1	17.1			
1	10-Nov-92	12:30	12:25	12:20		2.10	2.50	2.40	1.50	2.00	2.00	D	D	D	0.04	1.38	1.41	7.10	7.10	7.10	1.20	2.20	2.50	0.72	0.73	0.74	16.9	17.1	17.1			
1	10-Nov-92	14:15			2.64																											
1	10-Nov-92	14:20	14:25	14:30		1.50	2.15	2.20	0.50	0.50	0.50	D	U	U	0.06	1.00	0.75	7.20	7.20	7.20	0.60	1.30	1.50	0.77	0.77	0.77	17.5	17.5	17.6			
1	10-Nov-92	14:20	14:25	14:30		1.50	2.15	2.20	1.00	1.50	1.50	N	U	U	0.00	1.00	1.15	7.20	7.20	7.10	0.00	1.20	1.30	0.77	0.77	0.77	17.5	17.5	17.6			
1	10-Nov-92	19:00			2.69																											
1	10-Nov-92	19:40	19:30	19:20		1.20	2.20	2.27	0.50	0.50	0.50	U	U	U	0.05	0.53	0.66	7.15	7.15	7.15	0.85	1.10	1.50	0.80	0.81	0.82	17.5	17.5	17.4			
1	10-Nov-92		19:29	19:20			2.20	2.27		1.50	1.50		U	U		1.09	0.97		7.15	7.20		1.05	1.05		0.81	0.81		17.6	17.5			
1	10-Nov-92	22:31			5.49																											
1	10-Nov-92	22:45	22:40	22:35		1.50	3.00	2.10	0.50	0.50	0.50	D	D	D	0.00	0.49	0.51		0.82			4.50			0.89							
1	10-Nov-92		22:40	22:25			3.00	2.10		2.50	2.50		D	D		1.10	0.94															
1	11-Nov-92	01:22			2.61																											
1	11-Nov-92	01:50	01:45	01:40		1.80	2.10	2.15	0.50	0.50	0.50	D	D	D	0.14	0.65	0.51	6.45	6.60	6.65	3.00	3.70	3.50	0.85	0.82	0.82						
1	11-Nov-92	01:50	01:45	01:40		1.80	2.10	2.15	1.50	1.50	1.50	D	D	D	0.11	1.28	1.15				3.50	3.50	3.20									
1	11-Nov-92	04:05			3.36																											
1	11-Nov-92	04:10	04:10	04:05		1.67	1.90	2.00	0.50	0.50	0.50	N	D	D	0.00	0.67	0.83	7.10	7.10	7.10	0.40	0.40	0.60	0.63	0.63	0.63	15.7	15.7	15.7			
1	11-Nov-92	04:10	04:10	04:05		1.67	1.90	2.00	1.00	1.50	1.50	D	D	D	0.17	1.92	0.13	7.10	7.10	7.10	0.30	0.50	0.20	0.63	0.63	0.62	15.7	15.7	15.6			
1	11-Nov-92	06:55			3.76																											
1	11-Nov-92	07:30	07:05	07:00		1.90	2.10	2.10	0.50	0.50	0.50	N	D	D	0.00	0.35	0.56	7.10	7.10	7.10	1.50	1.50	1.40	0.75	0.65	0.65	16.0	16.0	16.3			
1	11-Nov-92	07:10	07:05	07:00		1.90	2.10	2.10	1.50	1.50	1.50	N	D	D	0.00	0.36	0.35			7.10	1.50	1.50	1.40			0.64			16.3			
1	11-Nov-92	10:20	10:15	10:10	4.17	3.00	3.75	3.70	0.50	0.50	0.50							6.82	6.82	6.84	3.00	3.00	3.10	0.94	0.95	0.95	17.0	17.0	17.0			
1	11-Nov-92	10:20	10:15	10:10		3.60	3.75	3.70	2.00	2.00	2.00	N	N	N	0.00	0.00	0.00				0.00	0.00	0.00									
1	11-Nov-92	10:20	10:15	10:10		3.60	3.75	3.70	2.50	2.50	2.50										0.80	0.80	0.90									

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millisiemens)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
1	29-Jul-92	16:15	17:21	17:53	0.59	3.95	2.60	1.90	2.00	2.00	2.00	D	D	D	0.31	0.25	0.03	6.80	6.80	6.80	0.50	0.60	0.50	2.5	3.1	2.7	24.6	25.0	25.8			
1	29-Jul-92	17:10	17:15		1.00	1.90	4.20		1.00	1.00		U	U		0.08	0.12		7.00	7.00		0.70	0.20		1.1	1.5		28.2	28.4				
1	29-Jul-92		17:15	17:20			4.20	4.70		2.00	2.00		U	U		0.11	0.13		7.00	6.90		0.20	0.30		5.9	0.5		28.4	28.2			
1	29-Jul-92		17:13				4.20			2.00			U			0.13			7.00			0.20			4.2			28.4				
1	29-Jul-92	21:30		21:40	5.05	>6.00		>6.00	2.00		2.00	D		D	0.05		0.30	7.00		7.00	2.70		2.90	12.8		13.6	26.3		26.6			
1	29-Jul-92	21:30		21:40		>6.00		>6.00	4.00		4.00	D		D	0.05		0.04	7.00		7.00	2.70		2.90	14.6		16.6	26.3		26.6			
1	30-Jul-92	01:00		01:10	0.50	3.60		1.90	1.00		1.00	D		D	0.23		0.30	6.00		6.80	0.00		0.10	3.5		3.4	25.6		25.6			
1	30-Jul-92	01:00		01:10		3.80			1.00			D			0.20			6.80			0.00			4.1			25.6					
1	30-Jul-92		01:30				0.70			0.50			D			0.42			6.80			0.00			2.6			23.9				
1	30-Jul-92	08:30		08:40	4.80	>6.00		>6.00	2.00		1.00	U		U	0.16		0.13	7.00		7.10	0.40		0.10	4.0		6.3	24.8		24.6			
1	30-Jul-92	08:30		08:40		>6.00		>6.00	4.00		4.00	U		U	0.26		0.18	7.00		7.10	0.40		0.00	11.0		12.0	25.1		25.1			
1	20-Aug-92	09:35		10:05	1.45	4.50		3.00	1.00		1.00	U		U	0.30		0.30	6.90		6.90	0.40		0.20	0.1		0.1	24.0		23.9			
1	20-Aug-92	09:35		10:05		4.50		3.00	2.00		2.00	U		U	0.30		0.30	6.90		6.90	0.40		0.20	1.1		0.1	23.2		23.9			
1	20-Aug-92	09:35		10:05		4.50		3.00	4.00		2.50	U		U	0.30		0.30	6.90		6.90	0.40		0.20	2.0		0.1	23.1		23.9			
1	20-Aug-92	14:50		15:00	5.45	>6.00		4.00	2.00		1.00	N		N	0.00		0.00	7.20		7.00	0.40		0.20	1.9		1.5	25.2		24.5			
1	20-Aug-92	14:50		15:00		>6.00		4.80	6.00		3.00	N		N	0.00		0.00	6.80		7.00	0.20		0.20	6.5		6.3	23.8		23.5			
1	20-Aug-92	17:25		17:35	0.47	3.50		1.80	2.00		1.00	D		N	0.10		0.00	7.20		7.20	0.25		0.17	4.5		4.6	23.1		23.3			
1	20-Aug-92		21:30		0.25		3.80			1.00			N			0.00			7.30			0.00			1.2			22.5			
1	20-Aug-92		21:40				3.80			2.00			N			0.00			7.20			0.00			3.7			22.5			
1	20-Aug-92		23:01		1.76		4.50			2.25			N			0.00																
1	21-Aug-92	03:24				>6.00			0.50			D			0.30																	
1	21-Aug-92	03:24		03:34	2.63	>6.00		3.70	1.00		1.00	N		N	0.00		0.00															
1	21-Aug-92	04:40		04:43	1.19	4.20		2.00	2.00		1.50	D		D	0.19		0.20															
1	21-Aug-92		07:37				1.10			0.50			N			0.00			7.30			0.48			3.0			20.8				
1	21-Aug-92		10:29		1.35		3.50			2.00			N			0.00			7.14			0.15			2.64			22.7			0.13		
1	12-Oct-92	10:36																														
1	12-Oct-92	10:45	10:50	10:53	4.86	8.00	7.00	6.00	1.00	1.00	1.00	D	D	D	0.16	0.46	0.24	6.99	6.96	6.94	0.31	0.31	0.33	6.11	5.10	4.96	16.9	17.0	17.4	0.33	0.28	0.27
1	12-Oct-92	10:45	10:50	10:53		8.00	7.00	6.00	4.00	4.00	4.00	D	D	D	0.17	0.57	0.22	7.04	7.01	6.98	0.95	1.21	1.01	8.53	8.53	7.49	16.3	16.3	17.0	0.45	0.45	0.34
1	12-Oct-92	10:45	10:50	10:53		8.00	7.00	6.00	6.00	6.00	3.00	D	D	D	0.19	0.06	0.13	7.05	7.05	7.02	1.73	1.66	1.56	8.07	8.08	8.76	16.2	16.3	16.4	0.48	0.48	0.47
1	12-Oct-92	12:46			1.42																											
1	12-Oct-92	13:10	12:48	13:25		0.80	4.50	1.60	0.40	1.00	0.50	N	D		0.00	0.18		6.74	6.70	6.67	2.10	1.80	1.90	2.89	2.68	2.53	19.7	18.9	18.7			
1	12-Oct-92		12:48				4.50			2.00			D			0.02						2.00										
1	12-Oct-92		13:42		0.06																											
1	12-Oct-92		14:13		-1.10		1.80			1.00			D			0.24			6.71			2.10			1.14			21.3				
1	12-Oct-92	18:30	18:30	18:40	1.65	4.00	3.80	3.50	1.00	2.00	1.00	U	U	N	0.16	0.08	0.00	7.11	7.01	7.04	0.84	0.49	0.49	0.85	1.68	1.68	19.4	19.4	19.1	0.04	0.07	0.07
1	12-Oct-92	18:30	18:30	18:40		4.00	3.80	3.50	3.00	3.00	2.50	U	U	U	0.21	0.34	0.22	6.98	6.90	6.96	0.53	0.69	0.45	3.02	3.76	3.78	18.3	18.2	18.3	0.19	0.18	0.19
2	10-Nov-92	11:55		12:05	1.48	4.00		4.00	1.00		1.00	D		D	0.12		0.18	6.53		6.47	2.15		1.65	3.28		3.75	11.5		10.9	0.16		0.19
2	10-Nov-92	11:55		12:05		4.00		4.00	2.00		2.00	D		N	0.04		0.00	6.53		6.49	2.48		2.07	9.63		9.18	8.4		8.3	0.32		0.31
3	10-Nov-92	19:30			-0.00																											
3	10-Nov-92	19:40		19:45		2.25		1.20	1.00		0.50	D		D	0.37		0.34	7.10		7.10	1.60		0.80	2.56		2.08	12.7		12.8			
2	16-Nov-92	17:02			-0.17																											
2	16-Nov-92	17:05		17:15		2.88		2.00	0.50		0.50	D			1.50			7.20		7.20	2.10		1.50	1.33		1.36	19.9		19.7			
2	16-Nov-92	17:05		17:15		2.88		2.00	1.50		1.00			D			0.03															
2	16-Nov-92	17:05		17:15		2.88		2.00	2.50		1.50							7.19		7.20	2.60		1.50	1.66		1.53	12.4		12.2			
3	16-Nov-92	19:41			3.25																											
3	16-Nov-92	20:00		20:05		>6.00		3.90	0.50		0.50	U		U	0.08		0.50	7.13		7.20	2.15		1.55	4.70		4.07	10.3		10.1			
3	16-Nov-92	20:00		20:05		>6.00		3.90	1.50		1.50	U		U	0.16		0.06	7.13		7.15	2.25		2.15	3.57		3.67	9.7		9.3			
3	16-Nov-92	20:00		20:05		>6.00		3.80	3.00		3.00	U		U	0.12		0.04															
3	16-Nov-92	20:00		20:05		>6.00		3.90	3.50		3.50							7.15		7.15	1.75		1.75	6.52		6.60	8.4		8.3			
3	16-Nov-92	22:13		22:30	0.40	7.50		5.00	2.00		1.50	D		D	0.34		0.15	3.75		3.73	1.86		2.00	6.46		2.06	10.0		9.8	0.33		0.37
3	16-Nov-92	22:17		22:30		7.50		5.00	4.00		2.50	N		D	0.00		0.17	3.73		3.74	5.30		5.01	10.30		2.01	9.0		9.1	0.56		0.45
3	16-Nov-92	22:17		22:30		7.50		5.00	6.00		4.00	N		D	0.00		0.05	3.80		3.77	4.06		3.91	11.40		3.91	8.8		8.9	0.63		0.63
3	11-Nov-92	05:34			0.84																											
3	11-Nov-92	08:45		08:53		3.90		3.40	0.50		0.50	N		N	0.00		0.00	7.10		7.10	2.10		2.60	0.94		1.13	13.5		13.1			
3	11-Nov-92	08:45		08:53		3.90		3.40	2.00		2.00	D		D	0.12		0.16	7.10		7.10	2.40		3.00	4.20		4.30	10.5		10.3			
3	11-Nov-92	08:45		08:53		3.90		3.40	3.50		3.00	D		D	0.19		0.16	7.10		7.20	2.70		3.00	4.27		4.44	10.4		10.2			
3	11-Nov-92	08:40			4.15																											
3	11-Nov-92	08:50		09:10		7.10		6.00	1.00		1.00	D		D	0.07		0.00	7.05		7.06	2.20		3.00	6.45		6.55	11.0		11.0			
3	11-Nov-92	08:50		09:10		7.10		6.00	3.00		3.00	D		D	0.16		0.00				2.70		3.20									
3	11-Nov-92	08:50		09:10		7.10		6.00	6.50		3.50	D		D	0.16		0.00				2.90		3.66									
3	11-Nov-92	09:40		09:50	4.50	7.20		3.90	1.00		1.00	D			0.14			7.11		7.12	2.70		2.80	7.56		7.28	11.0		11.0			
3	11-Nov-92	09:40		09:50		7.20		5.00	3.00		2.50	D			0.15						2.60		3.46									
3	11-Nov-92	09:40		09:50		7.20		3.90	6.50		3.50	D			0.15						4.20		3.80				10.0					

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (mg/l)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
1	10-Nov-92	11:47			1.41																										
2	10-Nov-92	11:10	11:30	11:20		12.00	6.50	9.00	2.00	2.00	5.00	D	D	D	1.77	1.30	0.55	6.71	6.74	6.80	6.49	6.10	6.36	14.9	14.2	14.7	8.7	8.6	8.7	0.83	0.79	0.83
3	10-Nov-92		11:30				6.50			3.00									6.73			6.12			14.5			8.6			0.80	
4	10-Nov-92	11:10	11:30	11:20		12.00	6.50	9.00	4.00	4.00	4.00	D	D	D	1.78	1.30	0.56			6.82			6.34			14.9			8.7			0.83
5	10-Nov-92			11:20				9.00			4.50								6.70			6.26			14.5			8.5			0.81	
6	10-Nov-92		11:30				6.50			3.00																						
7	10-Nov-92	11:10	11:30	11:20		12.00	6.50	9.00	6.00	6.00	6.00	D	D	D	1.79	1.10	0.72	6.73		6.83	6.43		6.53	14.9		14.9	8.7		8.7	0.84		0.84
8	10-Nov-92			11:20				9.00			7.00																					
9	10-Nov-92	11:10				12.00			10.00									6.83			6.39			15.1			8.7			0.83	
1	10-Nov-92	13:00			-0.60																										
2	10-Nov-92		13:25	13:05			6.50	5.50		1.00	1.00		D	D		0.00	0.15		6.37	6.33		5.59	5.16		12.6	12.3		8.9	8.9		0.70	0.66
3	10-Nov-92	13:15				8.50			2.00			D			0.92			6.34			5.13			12.6		8.9			0.70		
4	10-Nov-92		13:25	13:05			6.50	5.50		3.00	3.00		D	D		0.87	0.17		6.37	6.33		5.59	5.30		12.7	12.3		8.9	8.9		0.71	0.66
5	10-Nov-92	13:13				8.50		5.50	4.00		4.00	D	D	D	0.66		0.48	6.80		6.34	5.37		5.30	12.9		12.4	9.0		9.0	0.71		0.66
6	10-Nov-92		13:25				6.50			3.00			D			0.59			6.36		5.63			12.8			8.9			0.71	
7	10-Nov-92	13:13				8.50			7.00			D			0.64			6.37			5.60			12.9			9.0			0.71		
1	10-Nov-92	13:35			-3.00																										
2	10-Nov-92	13:40	14:00			5.00	4.00		1.00	1.00		N	U		0.00	0.63		6.04	6.94		5.52	4.82		9.5	10.6		9.3	9.0		0.52	0.58	
3	10-Nov-92			13:50				8.00			2.00			N			0.06			6.46			5.64			9.9			0.51		0.53
4	10-Nov-92	13:40				5.00			2.50			U			0.01			6.04			5.53			9.7			9.5			0.52		
5	10-Nov-92		14:00				4.00			3.00			U			0.55			6.34			4.00			10.7		9.0			0.56		
6	10-Nov-92	13:40		13:50		5.00		8.00	4.00		4.00	N		U	0.00		0.04	6.04		6.45	5.58		5.48	10.0		9.9	9.3		9.3	0.54		0.54
7	10-Nov-92			13:50				8.00			6.00			U			0.00			6.42			5.33			10.0	9.5			0.54		0.54
1	10-Nov-92	16:00			2.00																										
2	10-Nov-92			16:45				6.00			1.00			U			0.34			6.50			6.31			14.9			8.6			0.84
3	10-Nov-92	19:08	18:57			7.00	7.00		2.00	2.00		U	U		0.69	0.86		6.04	6.05		6.37	6.27		14.0	15.3		9.0	8.5		0.91	0.87	
4	10-Nov-92			16:45				6.00			3.00			U			0.61			6.04			6.17			15.0			8.7			0.84
5	10-Nov-92	19:08	18:57			7.00	7.00		4.00	4.00		U	U		0.79	0.92		6.05	6.05		6.25	6.26		14.0	15.3		9.0	8.9		0.91	0.88	
6	10-Nov-92			16:45				6.00			5.00			U			0.66			6.05			6.01			15.1			8.7			0.86
7	10-Nov-92	19:08	18:57			7.00	7.00		6.00	6.00		U	U		0.72	0.95		6.08	6.04		6.30	5.95		16.1	15.7		9.0	9.0		0.91	0.89	
1	10-Nov-92	23:30			1.09																										
2	10-Nov-92	23:14	23:25	23:53		11.50	10.00	11.00	2.00	2.00	2.00	D	D	D	1.41	1.27	0.52	5.82	5.81	5.78	6.04	5.84	5.56	14.8	14.4	14.0	8.7	8.7	8.6	0.85	0.81	0.78
3	10-Nov-92	23:14	23:25	23:53		11.50	10.00	11.00	4.00	4.00	4.00	D	D	D	1.66	1.18	0.53															
4	10-Nov-92		23:25				10.00			3.00									5.81			5.87			14.8			8.7			0.82	
5	10-Nov-92			23:53				11.00			5.50									5.76			5.71			14.0			8.6			0.79
6	10-Nov-92	23:14	23:25	23:53		11.50	10.00	11.00	6.00	6.00	6.00	D	D	D	1.57	1.07	0.64	5.82			6.04			14.9			8.7			0.84		
7	10-Nov-92		23:25				10.00			6.00									5.82			5.86			14.7			8.7			0.83	
8	10-Nov-92			23:53				11.00			9.00									5.79			5.75			14.7			8.6			0.79
9	10-Nov-92	23:14				11.50			10.00									5.83			6.12			15.0			8.6			0.85	
1	11-Nov-92		04:13				6.50			3.50									6.05			6.16			11.8			8.6			0.82	
2	11-Nov-92	00:50	04:19	04:00	-1.50	10.00	6.50	7.50	2.00	2.00	2.00	U	U	U	0.17	0.09	0.10	6.14		6.09	5.87		6.04	11.5		11.6	8.5		8.4	0.83		0.83
3	11-Nov-92		04:13				6.50			3.00									6.08			6.53			12.1			8.6			0.87	
4	11-Nov-92	00:50	04:13	04:00		14.00	6.50	7.50	4.00	4.00	4.00	U	U	U	0.16	0.66	0.70			6.07			6.08			11.8			8.6			0.86
5	11-Nov-92	00:50	04:13			14.00	6.50		3.00	3.00								6.13	6.08		5.81	6.53		11.8	12.3		8.6	8.6		0.84	0.87	
6	11-Nov-92	00:50		04:00		14.00		7.50	6.00		6.00	U		U	0.15		0.17			6.07			6.15			12.3			8.6			0.86
7	11-Nov-92	00:50				14.00			8.00									6.13			4.24			12.2			8.6			0.86	
1	11-Nov-92	08:57			0.96																										
2	11-Nov-92	08:10	08:25	08:30		11.00	9.50	11.00	2.00	2.00	2.00	U	U	U	0.60	0.57	0.59	6.07	6.03	6.16	5.56	5.50	5.53	14.1	14.2	14.3	9.0	9.0	9.1	0.79	0.79	0.80
3	11-Nov-92		08:25	08:30		11.00	9.50	11.00	4.00	4.00	4.00	U	U	U	0.63	0.55	0.60															
4	11-Nov-92	08:10	08:25	08:30		11.00	9.50	11.00	5.00	5.00	5.00							6.06	6.03	6.19	5.43	5.43	5.54	14.4	14.5	14.3	9.1	9.1	9.1	0.81	0.82	0.81
5	11-Nov-92	08:10	08:25	08:30		11.00	9.50	11.00	6.00	6.00	6.00	U	U	U	0.57	0.63	0.58															
6	11-Nov-92		08:25				9.50			6.00									6.06			5.47			14.5			9.1			0.83	
7	11-Nov-92	08:10		08:30		11.00		11.00	7.00		9.00							6.71		6.60	5.44		5.44	14.4		14.5	9.1		9.3	0.81		0.82
1	11-Nov-92	09:41			4.18																										
2	11-Nov-92	09:56	09:50	09:41		12.00	11.00	13.00	2.00	2.00	2.00	D	D	U	0.19	0.06	0.10	5.92	5.96	6.03	5.61	5.68	5.09	14.8	14.9	15.1	9.2	9.3	9.5	0.82	0.84	0.85
3	11-Nov-92	09:56	09:50	09:41		12.00	11.00	13.00	4.00	4.00	4.00	D	U	U	0.06	0.06	0.14															
4	11-Nov-92	09:56	09:50	09:41		12.00	11.00	13.00	6.00	6.00	6.00	N	U	U	0.08	0.06	0.14	5.92	5.96	6.04	5.49	5.50	5.44	15.2	15.1	15.1	9.2	9.2	9.2	0.86	0.85	0.86
5	11-Nov-92	09:56	09:50			12.00	11.00		10.00	10.00								5.96	6.01		5.50	5.50		15.3	15.3		9.2	9.2		0.86	0.86	
6	11-Nov-92	09:56	09:50	09:41		12.00	11.00	13.00			11.00									6.01			5.28			15.2			9.3			0.86

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY
IN-SITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S U)			DO (ppm)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
1	29-Jul-92	13:20	13:13	13:05	-1.10	5.50	5.50	5.50	1.00	1.00	1.00	D	D	D	0.60	0.34	1.06	7.10	7.10	7.10	6.50	6.50	6.50	13.4	13.4	13.4	26.7	26.8	26.8			
2	29-Jul-92	13:20	13:13	13:05		5.50	5.50	5.50	5.00	5.00	5.00	D	D	D	0.58	0.17	0.98	7.10	7.10	7.10	6.50	6.50	6.50	13.4	13.4	13.4	26.7	26.8	26.8			
3	29-Jul-92	13:20	13:13	13:05		5.50	5.50	5.50	9.00	9.00	9.00	D	D	D	0.53	0.18	0.76	7.10	7.10	7.10	6.50	6.50	6.50	13.4	13.4	13.4	26.7	26.8	26.8			
1	29-Jul-92	18:15		18:10	2.80	>6.00		>6.00	2.00		2.00	U		U	1.30		1.40	7.00		7.00	4.10		4.20	17.8		18.0	26.4		26.4			
2	29-Jul-92	18:15		18.10		>6.00		>6.00	6.00		6.00	U		U	1.20		1.40	7.00		7.00	4.10		4.20	17.8		18.0	26.4		26.4			
3	29-Jul-92	18:15		18.10		>6.00		>6.00	9.00		9.00	U		U	1.20		1.40	7.00		7.00	4.10		4.20	17.8		18.0	26.4		26.4			
1	30-Jul-92	00:06		00:01	2.10	>6.00		>6.00	2.00		2.00	D		D	2.20		0.80	6.90		6.90	1.80		1.80	16.5		16.5	25.7		25.7			
2	30-Jul-92	00:06		00:01		>6.00		>6.00	6.00		6.00	D		D	2.02		0.80	6.90		6.90	1.80		1.80	16.5		16.5	25.7		25.7			
3	30-Jul-92	02:45		02:40	-2.40	4.50		>4.00	2.00		2.00	D		D	0.48		0.27	6.60		6.60	0.00		0.00	12.9		12.7	25.6		25.6			
2	30-Jul-92	02:45		02:40		4.50			4.00		6.00	D		D	0.37		0.34	6.60		6.80	0.00		0.00	12.9		12.7	25.6		25.6			
3	30-Jul-92	04:20		04:15	-4.00	>6.00		>6.00	2.00		2.00	N		N	0.00		0.00	6.80		6.60	0.25		0.25	11.8		11.8	25.4		25.4			
2	30-Jul-92	04:20		04:15		>6.00		>6.00	6.00		6.00	N		N	0.00		0.00	6.80		6.80	0.25		0.25	11.8		11.8	25.4		25.4			
3	30-Jul-92	09:05		09:00	4.50	6.00		6.00	2.00		2.00	U		U	0.53		0.60	7.20		7.20	1.90		1.90	21.3		21.3	25.7		25.7			
1	30-Jul-92	09:00		09:00		6.00		6.00	4.00		4.00	U		U	0.64		0.64	7.20			1.90			21.3			25.7					
2	30-Jul-92	09:05		09:00		6.00		6.00			6.00			U			0.77			7.20			1.90			21.3			25.7		
1	20-Aug-92	10:45		10:40		>6.00		>6.00	1.00		1.00	U		U	0.00		1.00	7.00		7.00	1.90		1.90	13.0		12.5	24.5		24.8			
2	20-Aug-92	10:45		10:40		>6.00		>6.00	5.00		5.00			U			1.00	7.00		7.00			1.90			12.5					
3	20-Aug-92	10:45		10:40		>6.00		>6.00	6.00		6.00	U		U	0.60		1.00	7.00		7.00	0.80		1.90	13.9		12.5	24.2		24.6			
1	20-Aug-92	14:05		14:00	8.46	>6.00		>6.00	2.00		2.00	N		N	0.00		0.00	7.20		7.10	3.20		3.10	16.4		16.7	24.5		24.2			
2	20-Aug-92	14:05		14:00		>6.00		>6.00	6.00		6.00	D		D	0.48		0.00	7.20		7.10	2.90		2.90	16.8		16.5	24.4		24.2			
3	20-Aug-92	17:10		17:05	0.60	>6.00		>6.00	2.00		2.00	D		D	0.70		0.60	7.30		7.30	2.60		2.60	8.1		8.2	24.0		23.5			
2	20-Aug-92	17:10		17:05		>6.00		>6.00	6.00		6.00	D		D	0.70		0.60	7.30		7.30	2.60		2.60	8.1		8.2	24.0		24.0			
1	20-Aug-92	20:55		20:50	-0.50	>6.00		>6.00	2.00		2.00	N		U	0.00		0.40	7.30		7.30	1.90		1.80	8.3		8.0	23.2		23.5			
2	20-Aug-92	20:55		20:50		>6.00		>6.00	6.00		6.00	N		U	0.00		0.40	7.30		7.30	2.50		2.40	8.4		7.9	23.2		23.8			
3	20-Aug-92	23:26		23:23	1.96	>6.00		>6.00	3.50		3.50	U		U	0.58		0.50															
1	21-Aug-92	02:40		02:37	2.62	>6.00		>6.00	1.00		1.00	D		D	0.48		0.30															
2	21-Aug-92	02:40		02:37		>6.00		>6.00	5.00		5.00	D		D	0.28		0.26															
3	21-Aug-92	04:37		04:34	1.84	>6.00		>6.00	3.00		3.00	D		D	1.18		0.80															
1	21-Aug-92		08:15		-1.10		7.00			2.00			N			0.00			7.30			0.16			7.3			31.5				
2	21-Aug-92		08:15				7.00			6.00			N			0.00			7.30			0.21			7.6			31.3				
3	21-Aug-92		10:44		1.25		6.00			2.00			U			0.00			7.42			4.07			10.7			33.6			0.61	
2	21-Aug-92		10:44				6.00			5.00			U			0.00			7.33			3.05			11.6			33.7			0.64	
1	12-Oct-92	10:20			4.02																											
2	12-Oct-92	10:03	10:08	10:13		12.00	10.00	12.00	1.00	1.00	1.00	D	D	D	0.26	0.25	0.51	7.16	7.16	7.16	9.86	9.95	9.83	12.9	12.9	13.7	16.5	16.4	16.6	0.75	0.75	0.72
3	12-Oct-92	10:03	10:08	10:13		12.00	10.00	12.00	4.00	4.00	4.00	D	D	D	0.26	0.51	0.23															
1	12-Oct-92		10:08				10.00			5.00									7.14			9.65			12.9			16.6			0.74	
2	12-Oct-92	10:03		10:13		12.00		12.00	6.00		6.00							7.14		7.13	9.75		9.52	13.1		13.1	16.5		16.6	0.75		0.75
3	12-Oct-92	10:03	10:08	10.13		12.00	10.00	12.00	7.00	7.00	7.00	D	D	D	0.27	0.34	0.40															
1	12-Oct-92		10:08				10.00			8.00									7.13			9.46			13.2			16.6			0.75	
2	12-Oct-92	10:03		10:13		12.00		12.00	10.00		10.00							7.12		7.13	9.36		9.33	13.2		13.2	16.5		16.6	0.76		0.76
3	12-Oct-92	13.00			0.33																											
1	13-Oct-92	13:08	13:11	13:16		6.00	12.00	8.00	1.00	1.00	1.00	D	D		1.34	0.98		7.19	7.11	7.11	9.43	9.43	9.43	10.2	10.1	10.1	17.7	17.4	17.7	0.56	0.56	0.55
2	13-Oct-92	13:08	13:11			6.00	12.00		4.00	4.00		D	D		1.38	0.85		7.12			9.39			10.2			17.5			0.57		
1	13-Oct-92		13:11				12.00			3.00									7.11			9.38			10.1			17.4			0.56	
2	13-Oct-92	13:05	13:11			6.00	12.00		6.00	6.00		D	D		1.38	0.55		7.18			9.46			10.2			17.4			0.57		
3	13-Oct-92		13:11				12.00			10.00									7.11			9.40			10.1			17.4			0.56	
1	11-Oct-92	16:28			-1.30																											
2	11-Oct-92	16:20	16:43	16:26		7.50	8.50	10.80	1.00	1.00	1.00	U	U	U	0.64	0.87	0.59	7.07	7.09	7.07	2.60	2.96	2.48	7.89	7.92	7.77	17.4	17.5	17.5	0.41	0.43	0.42
3	12-Oct-92	16:20				7.50			3.50			U			0.57			7.06			2.43			7.77			17.4			0.41		
1	12-Oct-92		16:42	16.26			8.50	10.00		4.00	4.00		U	U		0.62	0.59		7.08			2.85			6.00			17.3			0.43	
2	12-Oct-92			16.26				10.00			5.00									7.06			2.62		7.80			17.5			0.42
3	12-Oct-92	16:20	16:42	16:26		7.50	8.50	10.00	6.00	6.00	6.00	U	U	U	0.61	0.56	0.66															
1	12-Oct-92	16:20	16:43			7.50	8.50		7.00	7.00								7.06	7.08		2.52	2.77		7.87	7.96		17.4	17.4		0.43	0.43	
2	12-Oct-92			16.26				10.00			8.00									7.06			0.45		7.84			17.4			0.42
3	12-Oct-92	19:30	19:20	20:05	2.52	9.50	9.00	9.00	1.00	1.00	1.00	U	U	U	0.95	1.50	0.92	7.15	7.14	7.11	3.75	3.59	3.08	11.5	11.5	11.4	16.7	16.6	16.7	0.65	0.65	0.64
1	12-Oct-92	19:30	19:20	20:05		9.50	9.00	9.00	4.00	4.00	4.00	U	U	U	0.97	1.26	0.92	7.15	7.13	7.11	3.64	3.42	2.86	11.6	11.9	11.4	16.8	16.7	16.7	0.65	0.66	0.64
2	12-Oct-92	19:30	19:20	20:05		9.50	9.00	9.00			6.00			U			0.95															
3	12-Oct-92	19:30	19:20	20:05		9.50	9.00	9.00	6.50	6.50		U	U		0.66	1.26																
2	12-Oct-92	19:30	19:20	20:05		9.50	9.00	9.00	8.00	8.00	8.00							7.14	7.13	7.11	3.69	3.57	3.05	11.6	12.0	11.4	16.8	16.8	16.7	0.65	0.68	0.64

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millisiemens)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
4	12-Oct-92	13:40			-1.93																										
4	12-Oct-92	13:43	13:56	13:53		4.50	7.00	1.00	1.00	1.00	1.00	U	U	U	0.84	0.27	0.24	7.11	7.11	7.13	5.50	5.49	5.56	8.2	9.5	9.8	17.7	17.6	17.8	0.44	0.52	0.53
4	12-Oct-92	13:43				4.50			2.00			U			0.85			7.11			5.25			8.3			17.7			0.45		
4	12-Oct-92		13:56				7.00			5.50			U			0.40			7.11			5.49			9.7			17.6			0.53	
4	12-Oct-92	13:43				4.50			4.00			U			0.86			7.09			2.90			8.5			17.6			0.46		
4	12-Oct-92		13:56				7.00			4.00			U			0.30			7.11			2.50			9.7			17.6			0.34	
4	12-Oct-92	19:35	19:50	19:56	5.14	9.00	12.00	7.00	1.00	1.00	1.00	U	U	U	0.75	0.71	0.46	7.16	7.16	7.16	5.83	5.74	5.79	12.5	12.4	12.5	16.6	16.6	16.7	0.71	0.70	0.71
4	12-Oct-92			19:56				7.00			5.00			U			0.56			7.16			5.75			12.5			16.8			0.71
4	12-Oct-92	19:35	19:50			9.00	12.00		4.00	4.00		U	U		0.79	0.73		7.16			5.82			12.5			16.7			0.71		
4	12-Oct-92		19:50				12.00			5.00									7.14			5.74			12.6			16.8			0.72	
4	12-Oct-92	19:35	19:50	19:56		9.00	12.00	7.00	4.00	6.00	6.00	U	U	U	0.67	0.70	0.56			7.16			5.76			12.7			16.8			0.72
4	12-Oct-92	19:35				9.00			6.00									7.16			5.80			12.5			16.7			0.71		
4	12-Oct-92		19:50				12.00			10.00									7.16			5.81			12.6			16.8			0.72	
4	10-Nov-92	10:05			5.52																										
4	10-Nov-92	10:10	10:30	10:40		10.50	10.50	7.00	2.00	2.00	2.00	D	D	D	0.85	1.06	1.05	6.70	6.86	6.86	6.59	6.46	6.54	14.8	15.0	16.2	0.8	0.9	9.8	0.93	0.91	0.92
4	10-Nov-92	10:10	10:30	10:40		10.50	10.50	7.00	4.00	4.00	4.00	D	D	D	0.55	1.00	1.06			6.97			6.57			16.2			9.8			0.93
4	10-Nov-92		10:30				10.50			5.00									6.67			6.40			16.5			9.9			0.92	
4	10-Nov-92	10:10				10.50			5.50						0.74						6.56			16.6			9.7			0.95		
4	10-Nov-92	10:10	10:30	10:40		10.50	10.50	7.00	6.00	6.00	6.00	D	D	D	0.65	1.00	1.00			6.95			6.60			16.2			9.8			0.93
4	10-Nov-92		10:30				10.50			6.00									6.69			6.66			16.3			9.9			0.93	
4	10-Nov-92	10:10				10.50			8.50						0.75						6.56			17.2			8.6			0.96		
4	10-Nov-92	13:30	13:40	13:50	-0.76	4.50	6.00	1.00	1.00	1.00	1.00	D	D	D	0.49	0.59	0.51	6.31	6.28	6.26	5.67	5.70	5.75	11.0	12.0	12.7	8.9	8.9	8.9	0.72	0.71	0.71
4	10-Nov-92	13:50		13:50		4.50		5.00	2.00		5.00	D		D	0.46		0.35	6.32		6.27	5.82	5.64	5.80	12.1		12.9	8.9		8.6	0.73		0.71
4	10-Nov-92	13:30	13:40			4.50	6.00		5.00	5.00		D	D		0.41	0.50		6.32	6.29		5.80			13.1	13.1		9.0	8.9		0.73	0.73	
4	10-Nov-92		13:40				6.00			4.00			D			0.49			6.30			5.80			13.3			8.9			0.75	
4	10-Nov-92	14:25	14:35	14:50	-1.26	4.00	5.00	2.50	1.00	2.00	1.00	U	U	U	0.72	0.46	0.07	6.32	6.29	6.33	6.17	6.31	6.13	13.3	13.5	13.1	9.3	9.5	9.0	0.74	0.74	0.72
4	10-Nov-92	14:25				4.00			3.00			U			0.57			6.32			6.13			13.3			9.3			0.74		
4	10-Nov-92		14:35				9.00			4.00			U			0.59																
4	10-Nov-92		14:35				8.00			4.50									6.28			6.12			13.3			9.2			0.75	
4	10-Nov-92		14:35				9.00			6.00			U			0.44																
4	10-Nov-92		14:35				9.00			7.00									6.25			6.05			13.4			9.3			0.75	
4	10-Nov-92	19:24	19:35	19:42	2.84	9.00	12.00	5.75	2.00	2.00	2.00	U	U	U	0.66	0.64	0.49	6.02	6.02	6.09	6.31	6.31	6.41	16.7	16.9	17.0	8.8	8.7	8.9	0.95	0.95	0.96
4	10-Nov-92	19:24	19:33	19:42		9.00	12.00	5.75	4.00	4.00	4.00	U	U	U	0.00	0.78	0.47			6.07			6.40			17.2			9.1			0.99
4	10-Nov-92	19:24				8.00			4.50						0.02						6.46			16.9			8.8			0.93		
4	10-Nov-92	19:24	19:33			9.00	12.00		4.00	6.00		U	U		0.85	0.79			6.01			6.24			17.2			9.0			0.99	
4	10-Nov-92	19:24	19:33			9.00	12.00		7.00	10.00								6.02			6.15			17.0			9.1			0.97		
4	10-Nov-92		19:33				12.00			10.00									6.02			6.00			17.2			9.0			0.99	
4	11-Nov-92	00:05			0.83																										
4	11-Nov-92			00:15				4.00			1.00			D			0.66			6.50			5.46			14.0			6.8			0.76
4	11-Nov-92	00:06	00:14			7.00	7.00		2.00	2.00		D	D		0.50	0.78		6.00	6.67		5.23	5.39		14.5	14.5		8.6	8.6		0.83	0.80	
4	11-Nov-92			00:15				4.00			3.00			D			0.60			6.50			5.67			15.9			8.5			0.76
4	11-Nov-92	00:06	00:14			7.00	7.00		4.00	4.00		D	D		0.48	0.65		6.01	6.40		5.86	5.68		14.6	14.5		8.6	8.6		0.83	0.82	
4	11-Nov-92	00:06	00:14			7.00	7.00		6.00	6.00		D	D		0.30	0.48		6.06	6.72		5.35	5.76		14.8	14.9		8.5	8.5		0.84	0.84	
4	11-Nov-92	04:59			-0.36	4.00			1.00						0.06						5.91			18.1			8.8			0.79		
4	11-Nov-92			05:04				5.00			1.50			U			0.34			6.53			5.80			15.5			9.0			0.76
4	11-Nov-92	04:53	05:11			6.00	6.00		2.00	2.00		U	U		0.80	0.51			6.97			5.85			13.9			9.1			0.78	
4	11-Nov-92	04:53				6.00			3.00									6.05			5.71			18.6			9.1			0.76		
4	11-Nov-92		05:12				6.00			4.00			U			0.55			8.01			5.67			14.6			9.1			0.81	
4	11-Nov-92	07:53	08:00	08:09	0.72	10.00	11.00	7.50	2.00	2.00	2.00	U	U	U	0.60	0.65	0.50	6.86	6.80	6.74	5.48	5.49	5.47	14.3	14.3	14.6	9.0	9.1	9.1	0.80	0.80	0.82
4	11-Nov-92	07:53	08:00	08:09		10.00	11.00	7.50	4.00	4.00	4.00	U	U	U	0.00	0.65	0.67			6.75			5.50			14.7			9.1			0.83
4	11-Nov-92	07:53	08:00	08:09		10.00	11.00		5.00	5.00					0.66	0.60					5.46	5.49		14.6	14.8		9.1	9.1		0.81	0.83	
4	11-Nov-92	07:53	08:00	08:09		10.00	11.00	7.50	6.00	6.00	6.00	U	U	U	0.92	0.64	0.57			6.78			5.50			14.8			9.1			0.84
4	11-Nov-92	07:53				10.00			6.00						0.00						5.51			14.6			9.0			0.83		
4	11-Nov-92		08:00				11.00			9.00									6.92			5.53			14.8			9.1			0.84	
4	11-Nov-92	10:07	10:16	10:25	4.24	8.00	13.50	8.00	2.00	2.00	2.00	D	D	D	0.24	0.52	0.41	5.86	5.88	5.75	5.89	5.90	5.89	15.0	15.1	15.1	9.3	9.3	9.3	0.85	0.85	0.85
4	11-Nov-92	10:06	10:16	10:25		9.00	13.50	8.00	4.00	6.00	4.00	D	D	D	0.25	0.29	0.36	5.85		5.74	5.85		5.83	15.6		15.2	9.3		9.3	0.89		0.86
4	11-Nov-92	10:00	10:16	10:25		9.00	13.50	8.00	6.00	8.00	6.00	D	D	D	0.00	0.26	0.29		5.79	5.78		5.58	5.75		15.4	15.4	9.3	9.3			0.87	0.87
4	11-Nov-92	10:06				9.00			6.00									5.90			5.57			15.6			9.2			0.89		
4	11-Nov-92		10:16				13.50			11.00									5.92			5.61			15.7			9.3			0.92	

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/Cross)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millimhos)			Temperature (degrees C)			Salinity (%)		
		F	C	W		F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W
4	29-Jul-92	13:35		13:40	-1.76	3.10		1.80	1.00		0.50	D		D	0.59		0.00	7.20		7.20	7.90		6.50	14.5		14.4	27.1		28.6			
4	29-Jul-92	13:31				3.10			3.00			D			0.34			7.29			7.90			14.4			27.2					
4	29-Jul-92	13:40		13:45	3.64	>6.00			3.00			U			1.25			7.00			3.30			19.6			25.9					
4	29-Jul-92		21:54		4.84		>10.00			1.00									7.33			3.20			14.7			24.2			1.13		
4	29-Jul-92		21:54				>10.00			3.00			D			0.70			7.32			2.70			19.8			24.9			1.10		
4	29-Jul-92		21:54				>10.00			10.00									7.31			2.61			20.2			25.1			1.21		
4	30-Jul-92		00:30		3.34		>9.00			1.00									7.35			2.09			14.7			24.5			0.66		
4	30-Jul-92		00:30				>9.00			4.00			D			1.00			7.34			2.00			14.7			24.8			0.66		
4	30-Jul-92		00:30				>9.00			9.00									7.32			1.94			15.0			24.9			0.67		
4	30-Jul-92		02:43		-2.26		>3.00			1.00			D			0.30			7.19			1.02			12.8			24.9			0.73		
4	30-Jul-92		02:43				>3.00			4.00			D			0.30			7.19			1.03			13.0			24.9			0.73		
4	30-Jul-92		02:43				>3.00			7.00			D			0.30			7.19			1.03			13.0			24.7			0.75		
4	30-Jul-92		04:11				>7.00			1.00									7.16			1.14			12.0			24.5			0.66		
4	30-Jul-92		04:11				>7.00			3.00			U			0.45																
4	30-Jul-92		04:11				>7.00			7.00									7.17			1.04			12.1			24.5			0.69		
4	30-Jul-92		08:24		3.99		>12.00			1.00									7.23			2.26			17.7			24.9			1.07		
4	30-Jul-92		08:24				>12.00			6.00			U			1.33			7.24			2.08			17.5			24.9			1.04		
4	30-Jul-92		08:24				>12.00			12.00									7.24			2.03			17.6			24.9			1.04		
4	20-Aug-92	10:55		11:00	3.34	>6.00		>6.00	2.00		2.00	U		U	0.70		0.60	7.10		7.10	3.00		1.80	13.7		13.5	24.7		24.4			
4	20-Aug-92	10:55		11:00		>6.00		>6.00	6.00		6.00	U		U	0.60		0.50	7.10		7.10	1.50		1.60	15.6		14.4	24.6		23.9			
4	20-Aug-92	11:20		11:25	3.89	>6.00		>6.00	2.00		1.00	U		N	0.30		0.00	7.20		7.20	4.60		4.00	16.7		16.3	24.8		24.7			
4	20-Aug-92	11:20		11:25		>6.00		>6.00	6.00		6.00	U		N	0.15		0.00	7.20		7.20	4.20		1.90	17.5		17.3	24.1		23.9			
4	20-Aug-92	16:50	16:55	16:59	1.44	>6.00	>6.00	>6.00	2.00	2.00	2.00	D	D	D	0.33	0.50	0.40	7.37		7.34	3.90		4.00	9.3		9.3	24.1		24.1			
4	20-Aug-92	16:50	16:55	16:59		>6.00	>6.00	>6.00	6.00	6.00	6.00	D	D	D	0.20	0.40	0.40	7.33		7.37	3.90		3.90	10.0		9.4	24.1		24.1			
4	20-Aug-92	20:30		20:35	-0.68	3.50		2.40	3.00		1.00	N		N	0.00		0.00	7.40		7.40	3.90		3.80	10.5		10.2	23.9		23.2			
4	20-Aug-92	20:30				3.50			3.00			N			0.00			7.40			3.40			11.1			23.9					
4	20-Aug-92	23:39		23:42	2.21	>6.00		>6.00	3.50		3.50	U		U	0.90		0.40															
4	21-Aug-92	02:07			3.04	4.00			3.50			N			0.00																	
4	31-Aug-92	03:30	05:53	05:56	3.44	6.00	6.00	6.00	2.00	2.00	2.00							7.30	7.34	7.34	2.25	2.32	2.23	12.1	12.2	11.9	22.5	22.5	22.4	0.70	0.68	0.67
4	31-Aug-92	03:30		05:56		6.00		6.00	3.00		3.00							7.33		7.34	2.23		2.22	12.1		11.9	22.7		22.4	0.69		0.66
4	21-Aug-92		05:53				6.00			4.00									7.33			2.12			12.6		22.9			0.72		
4	21-Aug-92	03:30		05:56		6.00		6.00	3.00		3.00							7.33		7.34	2.26		2.31	12.2		11.8	22.6		22.3	0.70		0.66
4	21-Aug-92		05:53				6.00			7.00									7.31			2.43			12.5		22.9			0.71		
4	21-Aug-92	04:14		04:14	1.54	>6.00		>6.00	3.50		3.50	D		D	0.60		0.90															
4	21-Aug-92	06:10	06:18	06:14	-0.66	6.00	7.00	3.00	1.00	1.00	1.00	N	N	N	0.00	0.00	0.00	7.31	7.30	7.31	0.48	0.00	0.49	8.80	9.10	8.66	21.6	21.4	21.3			
4	21-Aug-92			06:14				3.00			2.00			N			0.00			7.33			0.55			8.91						
4	21-Aug-92	06:10	06:18			6.00	7.00		3.00	3.00		N	N		0.00	0.00		7.31	7.29		0.48	0.00		8.58	8.40		21.7	21.8	21.6			
4	21-Aug-92		06:18				7.00			6.00			N			0.00			7.30			0.00			8.20			21.8				
4	21-Aug-92		08:35		-0.76		4.50			1.00			N			0.00			7.30			3.50			9.4			22.7				
4	21-Aug-92		08:35				4.50			4.00			N			0.00			7.30			2.60			9.5			22.7				
4	31-Aug-92		10:54		1.55		8.50			2.00			U			0.33			7.40			3.63			11.4			23.2		0.65		
4	31-Aug-92		10:54				8.50			4.00			U			0.33			7.32			1.69			12.7			23.3		0.73		
4	31-Aug-92		10:54				8.50			7.00			U			0.33			7.30			1.17			13.1			23.3		0.72		
4	12-Oct-92	09:15		09:25	4.54	9.00		9.00	1.00		1.00	U		U	0.10		0.34	7.10		7.17	3.80		4.53	13.9		12.7	16.5		16.6	0.76		0.73
4	12-Oct-92	09:20		09:25		9.00		9.00	5.00		5.00	N		U	0.00		0.34															
4	12-Oct-92	09:20		09:25		9.00		9.00	4.50		4.50							7.13		7.19	3.68		3.65	13.9		13.5	16.6		16.4	0.77		0.75
4	13-Oct-92	09:20		09:25		9.00		9.00	6.00		6.00	N		U	0.00		0.34															
4	12-Oct-92	09:20		09:25		9.00		9.00	7.00		7.00							7.13		7.13	3.65		3.59	13.9		13.6	16.6		16.6	0.77		0.80
4	13-Oct-92	10:50	10:45	09:40	4.28	0.00	13.00	8.00	1.00	1.00	1.00	U	U	U	0.04	0.34	0.25	7.17	7.19	7.20	4.15	4.53	4.67	13.1	12.8	12.6	16.3	16.4	16.1	0.75	0.72	0.73
4	13-Oct-92	10:50				8.00			4.00									7.17			4.07			15.2			16.6			0.75		
4	13-Oct-92	10:50	10:45	09:40		8.00	13.00	9.00	4.50	4.50	4.50	D	N	U	0.21	0.00	0.17			7.14			3.71			16.5			0.75		
4	12-Oct-92	10:50	10:45	09:40		8.00	11.00	9.00	6.00	6.00	6.00	D	D	U	0.19	0.18	0.25	7.18			3.95			13.4			16.5			0.76		
4	13-Oct-92		10:45				13.00			6.50									7.14			3.54			13.4			16.5			0.76	
4	12-Oct-92			09:40				9.00			7.00									7.13			3.54			13.7			16.4			0.79
4	12-Oct-92		10:45				13.00			11.00									7.14			3.66			14.1			16.5			0.81	
4	12-Oct-92	12:35	12:41	12:48	1.28	5.00	11.00	5.00	1.00	1.00	1.00	D	D	D	0.62	0.92	1.05	7.14	7.16	7.14	3.80	3.81	3.84	11.0	11.0	11.0	17.1	17.2	17.5	0.62	0.63	0.61
4	12-Oct-92	12:35		12:48		5.00		5.00	2.50		2.50	D		D	0.70		0.95	7.14		7.14	3.24		3.82	11.1		11.0	17.4		17.4	0.62		0.61
4	13-Oct-92		12:41				11.00			3.00			D			0.61															
4	13-Oct-92	12:35		12:48		5.00		1.00	4.00		4.00	D		D	0.69		0.77	7.14		7.14	3.76		3.80	11.1		11.0	17.4		17.4	0.63		0.62
4	12-Oct-92		12:41				11.00			3.00									7.14			3.70			10.9		17.3			0.61	
4	13-Oct-92	12:35	12:41	12:48		5.00	11.00	5.00		4.00			D			0.70															
4	13-Oct-92	12:35	12:41	12:48		5.00	11.00	5.00		9.00									7.16			3.74			11.0		17.3			0.61	

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft. - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity Millimhos			Temperature (degrees C)			Salinity (%)		
		F	C	W		F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W
5	29-Jul-92	10:20	10:15	10:10		30.00	28.00	7.00	1.0	1.0	1.0							7.37	7.30	7.33	2.06	2.48	2.62	20.0	19.6	20.6	24.0	24.4	24.7	1.20	1.16	1.13
6	29-Jul-92	10:30	10:15	10:10		30.00	28.00	7.00	15.0	14.0	6.0	D	D	D	1.34	0.00	0.42	7.36	7.29	7.33	1.83	2.55	3.64	20.1	19.5	20.6	24.5	24.6	24.9	1.21	1.17	1.12
5	29-Jul-92	10:20	10:15	10:12		30.00	28.00	7.00	30.0	28.0	7.0							7.36	7.28	7.35	1.90	2.45	3.47	20.2	19.6	20.6	24.6	24.6	24.9	1.21	1.18	1.12
5	29-Jul-92	13:15	13:20	13:25	-1.87	30.00	32.00	8.00	1.0	1.0	1.0							7.23	7.28	7.31	6.45	9.58	4.27	19.9	14.0	23.6	26.8	26.3	26.4	0.81	0.81	0.79
6	29-Jul-92	13:15	13:20	13:26		30.00	32.00	8.00	16.0	16.0	4.0	D	D	D	0.00	1.26	0.85	7.31	7.24	7.30	6.99	2.05	6.07	19.5	14.4	23.8	26.7	26.3	26.4	0.83	0.84	0.80
5	29-Jul-92	13:11	13:20	13:30		30.00	32.00	8.00	30.0	32.0	8.0							7.29	7.23	7.30	2.98	2.55	6.14	19.9	15.0	23.9	26.6	25.7	26.4	0.87	0.84	0.81
5	29-Jul-92	17:45	17:50	18:22	2.56	25.00	41.00	15.00	1.0	1.0	1.0							7.35	7.32	7.32	5.10	2.31	2.92	18.3	18.6	19.3	25.3	25.2	25.3	1.18	1.12	1.16
6	29-Jul-92	17:45	17:50	18:22		25.00	41.00	15.00	12.5	13.0	7.5	U	U	U	1.20	1.41	0.00	7.38	7.31	7.32	5.11	3.22	2.66	18.0	19.0	20.0	25.3	25.2	25.5	1.11	1.13	1.20
5	29-Jul-92	17:45	17:50	18:22		25.00	41.00	15.00	23.5	28.0	14.5							7.31	7.32	7.32	5.11	5.17	3.01	18.0	19.0	20.2	25.3	25.3	25.3	1.12	1.12	1.21
5	29-Jul-92		20:19		4.93		41.00			1.0									7.32			5.04			21.4			25.4			1.29	
5	29-Jul-92		20:15				41.00			15.0			U			0.00			7.31			2.65			22.5			25.4			1.26	
5	29-Jul-92		20:19				41.00			28.0									7.30			2.90			22.6			25.4			1.26	
5	29-Jul-92		23:16		5.28		>30.00			1.0									7.29			2.64			20.0			24.1			1.22	
5	30-Jul-92		23:16				>30.00			20.0			D			1.00			7.30			2.73			19.8			25.0			1.21	
5	30-Jul-92		23:16				>30.00			30.0									7.30			2.72			19.9			25.0			1.20	
5	30-Jul-92		01:51		-0.98		52.00			1.0									7.16			2.51			15.1			25.0			0.82	
5	30-Jul-92		01:51				52.00			16.0			D			1.15			7.30			2.15			15.6			25.0			0.93	
5	30-Jul-92		01:51				52.00			30.0									7.31			2.19			16.0			25.3			0.94	
5	30-Jul-92		05:00		-0.62		>30.00			1.0									7.23			1.39			14.6			23.7			0.66	
5	30-Jul-92		05:06				>30.00			15.0			U			1.77			7.31			1.87			15.3			25.4			0.69	
5	30-Jul-92		05:00				>30.00			30.0									7.21			1.87			15.4			25.6			0.90	
5	30-Jul-92		09:06		4.45		>30.00			2.0									7.28			2.45			21.4			25.0			1.29	
5	30-Jul-92		09:06				>30.00			15.0			U			0.60			7.29			2.58			21.0			25.1			1.27	
5	30-Jul-92		09:06				>30.00			30.0									7.29			2.93			21.4			25.1			1.29	
5	20-Aug-92	11:30			5.25																											
5	20-Aug-92	11:53	11:25	11:20		30.00	30.00	13.00	1.0	1.0	1.0							7.35	7.35	7.35	5.31	5.68	4.45	15.7	15.6	16.9	23.7	23.6	24.0	0.92	0.95	0.87
5	20-Aug-92	11:53	11:25	11:20		30.00	30.00	13.00	15.0	11.0	6.0	U	U	U	0.91	0.65	0.65	7.34	7.33	7.33	5.36	5.53	5.73	16.0	16.1	15.5	23.6	23.4	23.8	0.96	0.96	0.90
5	20-Aug-92	11:51	11:25	11:20		30.00	30.00	13.00	25.0	25.0	12.0							7.32	7.31	7.31	3.04	3.96	3.10	16.6	16.4	16.0	23.4	23.5	23.6	0.98	0.97	0.94
5	20-Aug-92	15:30	15:25	15:30	5.86	30.00	30.00	13.00	1.0	1.0	1.0							7.34	7.43	7.43	6.41	5.81	6.81	16.0	16.4	16.8	24.7	23.9	24.3	0.94	0.96	0.93
5	20-Aug-92	15:30	15:25	15:30		30.00	30.00	13.00	15.0	14.0	6.6	N	N	N	0.00	0.00	0.00	7.34	7.37	7.40	5.96	4.80	6.47	16.4	17.4	16.9	24.6	23.8	24.1	0.97	1.00	0.99
5	20-Aug-92	15:29	15:25	15:30		30.00	30.00	13.00	25.0	26.0	12.0							7.34	7.36	7.36	3.63	3.60	3.96	16.8	17.1	17.6	24.3	23.8	23.7	0.99	1.01	1.05
5	20-Aug-92	16:30	16:30	16:37	3.68	24.00	24.00	11.00	1.0	1.0	1.0							7.37	7.35	7.43	7.50	7.82	5.99	13.8	13.2	15.3	25.8	25.0	24.3	0.74	0.79	0.78
5	20-Aug-92	16:30	16:30	16:37		24.00	24.00	11.00	12.0	12.0	5.0	D	D	D	1.17	1.85	0.87	7.48	7.52	7.64	6.06	6.42	5.86	13.6	13.6	15.5	25.6	24.0	24.3	0.76	0.78	0.77
5	20-Aug-92	16:29	16:30	16:37		24.00	24.00	11.00	24.0	24.0	10.0							7.40	7.51	7.63	4.35	2.95	5.36	14.5	14.7	15.5	25.1	24.5	24.2	0.82	0.86	0.77
5	20-Aug-92	23:34	23:30	23:41	2.08	13.00	>30.00	10.00	1.6	1.0	1.0							7.38	7.40	7.40	4.15	6.35	4.40	14.6	14.8	14.1	22.6	22.7	22.5	0.83	0.84	0.81
5	20-Aug-92	23:34	23:30	23:41		13.00	>30.00	10.00	6.6	13.0	5.0	U	N	N	0.55	0.00	0.00	7.38	7.36	7.00	4.13	4.54	4.38	15.2	15.5	14.6	25.1	23.1	22.9	0.89	0.91	0.84
5	20-Aug-92	23:34	23:30	23:41		13.00	>30.00	10.00	12.0	26.0	8.0							7.37	7.35	7.39	4.06	4.56	4.15	15.5	15.9	15.1	23.1	23.2	23.1	0.87	0.92	0.89
5	21-Aug-92	02:00			2.94																											
5	21-Aug-92	01:53	01:43	01:36		15.00	32.00	15.00	1.0	1.0	1.0							7.41	7.42	7.40	5.82	4.39	4.37	14.7	15.7	15.3	22.6	22.6	22.4	0.86	0.91	0.91
6	21-Aug-92	01:53	01:43	01:36		15.00	32.00	15.00	15.6	16.0	7.0	D	U	U	0.30	0.10	0.10	7.43	7.41	7.41	6.23	4.36	4.34	16.2	16.0	16.3	22.9	23.0	22.8	0.95	0.96	0.94
5	21-Aug-92	01:51	01:43	01:36		15.00	32.00	15.00	28.0	28.0	14.0							7.40	7.43	7.41	6.76	4.27	4.97	16.7	16.6	16.4	23.2	23.1	23.0	0.96	0.96	0.96
5	21-Aug-92	02:17	02:21	02:25	2.94	24.00	>30.00	14.00	1.0	1.0	1.0							7.39	7.42	7.42	6.10	4.20	4.27	19.1	24.8	24.8	22.0	21.9	21.9	0.88	0.84	0.83
6	21-Aug-92	02:17	02:21	02:25		24.00	>30.00	14.00	14.0	15.0	6.0	D	D	D	0.30	0.26	0.30	7.43	7.42	7.41	6.30	4.41	4.00	17.3	14.3	24.9	22.7	22.7	22.4	1.02	0.95	0.86
5	21-Aug-92	02:17	02:21	02:25		24.00	>30.00	14.00	24.0	24.0	12.0							7.44	7.44	7.40	6.60	4.77	4.07	16.0	17.0	17.9	23.0	23.1	22.7	0.97	1.00	0.97
5	21-Aug-92	05:10	05:10	05:23	1.48	30.00	>30.00	6.00	1.0	1.0	1.0							7.36	7.35	7.34	2.07	2.58	2.16	15.2	15.5	15.1	25.2	22.3	22.8	0.74	0.71	0.69
6	21-Aug-92	05:10	05:10	05:23		30.00	>30.00	6.00	14.0	15.0	5.6	D	D	D	1.20	1.20	1.20	7.34	7.34	7.33	2.74	2.73	2.23	15.4	15.8	15.2	23.5	25.1	22.8	0.77	0.80	0.69
5	21-Aug-92	05:10	05:10	05:23		30.00	>30.00	6.00	28.0	28.0								7.34	7.34		2.68	2.65		15.6	15.4		23.0	23.2		0.75	0.83	
5	21-Aug-92		06:35		-0.71		33.00			15.0			N			0.00																
5	21-Aug-92		09:35		0.35		>30.00			1.0									7.29			5.05			19.0			22.5			0.75	
5	21-Aug-92		09:35				>30.00			15.0									7.30			2.89			19.6			22.9			0.77	
5	21-Aug-92		09:35				>30.00			25.0									7.31			2.71			19.4			22.9			0.82	
5	10-Nov-92	08:35	10:08	10:20	5.54	30.00	>30.00	30.00	1.00	1.00	1.00							7.81	8.01	7.98	5.85	6.00	5.80	14.5	13.7	15.3	8.6	9.3	9.4			
5	10-Nov-92	09:35	10:05	10:20		30.00	>30.00	30.00	14.00	14.00	10.00							7.94	8.01	8.01	5.75	5.74	5.59	15.1	19.8	13.1	9.3	9.4	9.4			
5	10-Nov-92	09:51	10:08	10:20		30.00	>30.00	30.00	28.00	28.00	15.00							7.91	8.00	7.96	5.79	5.70	5.31	15.3	14.5	13.8	9.6	9.4	9.5			
5	10-Nov-92	12:34	12:35	12:41	0.64	30.00	>30.00	7.00	1.00	1.00	1.00	D	D	D	1.31	0.72	2.13	8.14	8.06	8.02	5.30	5.07	5.31	11.9	11.6	11.4	10.3	9.5	9.5			
6	10-Nov-92	12:25	12:35	12:41		30.00	>30.00	7.00	14.00	14.00	5.00							8.10	8.00	8.06	5.08	5.00	5.22	12.0	11.6	11.8	9.4	9.5	9.4			
5	10-Nov-92	12:32	12:35	12:41		30.00	>30.00		28.00	28.00								8.19	8.06		5.00	4.91		12.0	12.2		9.5	9.4				
5	10-Nov-92	17:10	17:18	17:30	-0.93	>24.00	>30.00	15.00	1.00	1.00	1.00	U	U	U	1.32	1.16	0.51	8.02	8.05	8.04	5.37	5.35	5.17	12.3	11.9	11.9	8.7	8.7	9.0			
6	10-Nov-92	17:11	17:18	17:30		>24.00	>30.00	15.00	14.00	14.00	7.00							8.00	8.06	8.06	5.31	5.28	5.33	12.5	11.9	11.6	9.0	9.0	9.1			
5	10-Nov-92	17:11	17:18	17:30		>24.00	>30.00	15.00	28.00	28.00	13.00							8.07	8.07	8.06	5.35	5.35	5.33	11.3	11.9	11.0	8.9	9.0	9.1			
5	10-Nov-92	20:18			5.48																											
5	10-Nov-92	20:14	20:19	20:25		>28.00	>30.00	18.00	1.00	1.00	1.00	U	U	U	0.14	0.02	0.16	6.08	6.13	6.13	6.14	6.06	6.01	14.5	14.1	14.1	6.8	6.9	6.9			
5	10-Nov-92	20:14	20:19	20:25		>28.00	>30.00	18.00	14.00	15.00	10.00							6.14	6.14	6.13	5.99	5.96	5.85	13.9	13.9	13.6	9.4	9.5	9.5			
5	10-Nov-92	20:14	20:19	20:25		>28.00	>30.00	18.00	28.00	28.00	17.00							6.13	6.14	6.13	6.04	6.06	5.90	14.1	14.1	14.1	9.2	9.4	9.5			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Down stream/None)			Current Velocity (ft/sec)			pH (S U)			DO (ppm)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
1	10-Nov-92	21:30			3.67																										
1	10-Nov-92	21:34	21:45	21:41		>30.00	>30.00	19.00	5.00	5.00	5.00	N	N	N	0.00	0.00	0.00	6.09	6.14	6.12	5.86	5.84	5.90	14.1	14.4	14.4	9.0	9.4	9.2			
1	10-Nov-92	21:34	21:45	21:41		>30.00	>30.00	19.00	14.00	15.00	9.00							6.14	6.15	6.14	5.59	5.76	5.77	14.1	14.0	14.0	9.6	9.6	9.6			
1	10-Nov-92	21:34	21:45	21:41		>30.00	>30.00	19.00	16.00	18.00	17.00							6.10	6.11	6.14	5.72	5.86	5.89	14.3	14.2	14.4	10.0	9.7	9.6			
1	11-Nov-92	03:07			-1.72																										
1	11-Nov-92	03:00	03:54	03:50		>30.00	15.00	14.00	1.00	1.00	1.00	D	D	D	0.61	0.36	0.76	6.03	6.04	6.05	4.99	4.96	4.80	10.3	10.3	9.2	9.0	9.0	9.0			
1	11-Nov-92	03:00	03:54	03:50		>30.00	15.00	14.00	12.00	7.00	7.00							6.05	6.06	6.05	4.76	4.81	4.76	10.3	9.8	8.9	9.0	9.0	9.0			
1	11-Nov-92	03:00	03:54	03:50		>30.00	15.00	14.00	16.00	13.00	13.00							6.04	6.05	6.05	4.65	4.77	4.77	10.3	10.3	10.4	9.0	9.0	9.0			
1	11-Nov-92	05:29		05:35	0.65	>30.00		16.00	1.00		1.00	U		U	1.14		1.53	5.98		6.04	5.16		5.37	11.3		11.9	8.9		8.9			
1	11-Nov-92	05:30		05:35		>30.00		16.00	14.00		9.00							6.06		6.08	5.00		5.51	11.3		11.6	9.0		8.9			
1	11-Nov-92	05:30		05:35		>30.00		16.00	28.00		16.00							6.03		6.07	5.04		5.09	11.5		12.3	9.0		9.0			
1	11-Nov-92	06:19			5.94																										
1	11-Nov-92	06:17	06:11	06:06		>30.00	>30.00	17.00	1.00	1.00	1.00	U	U	U	0.35	0.81	0.56	6.11	6.00	5.90	3.70	3.71	3.70	14.6	14.5	14.2	9.6	9.3	9.2			
1	11-Nov-92	06:17	06:11	06:06		>30.00	>30.00	17.00	14.00	14.06	8.00							6.11	6.01	6.06	3.67	3.55	3.64	14.3	14.0	15.0	9.6	9.3	9.4			
1	11-Nov-92	06:17	06:11	06:06		>30.00	>30.00	17.00	24.00	24.00	15.00							6.11	6.01	6.06	3.66	3.60	3.66	14.3	14.2	14.0	9.6	9.5	9.4			
1	11-Nov-92	09:31	09:38	09:41	4.27	14.00	>30.00	28.00	1.00	1.00	1.00	N	N	N	0.00	0.00	0.00	5.97	5.97	6.00	5.48	5.91	5.81	14.1	14.5	14.5	10.5	10.2	10.2			
1	11-Nov-92	09:31	09:38	09:41		16.00	>30.00	28.00	9.00	14.00	10.00							6.12	6.10	6.10	5.10	5.58	5.59	14.3	14.0	14.3	10.5	10.4	10.1			
1	11-Nov-92	09:31	09:38	09:41		16.00	>30.00	28.00	16.00	28.00	16.00							6.10	6.09	6.09	5.45	5.55	5.68	14.2	14.2	14.4	10.4	10.3	10.3			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millisiemens)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
6	29-Jul-92	09:30	09:55	09:55	2.61	6.00	23.00	9.00	1.0	1.0	1.0	D	D	D	0.85	1.22	1.20	7.27	7.29	7.27	3.42	2.93	2.67	17.3	16.5	16.7	25.2	25.0	24.5	1.02	0.97	0.98
6	29-Jul-92	09:50	09:51	09:53		6.00	23.00	9.00	3.0	11.0	3.0							7.26	7.25	7.26	3.37	2.93	2.67	17.3	17.2	16.7	25.0	24.8	24.9	1.02	1.01	0.98
6	29-Jul-92	09:50	09:51	09:53		6.00	23.00	9.00	6.0	23.0	9.0							7.26	7.25	7.25	3.32	2.78	2.62	17.4	17.7	17.1	25.0	24.7	24.6	1.02	1.02	1.02
6	29-Jul-92	10:35	10:45	10:40	2.23	12.00	24.00	9.00	1.0	1.0	1.0							7.29	7.31	7.30	3.17	4.17	3.73	15.0	14.0	15.3	25.3	25.1	25.0	0.92	0.84	0.91
6	29-Jul-92	10:55	10:45	10:40		12.00	24.00	9.00	6.0	12.0	5.0	D	D	D	0.85	1.38	1.25	7.27	7.27	7.27	2.71	3.15	2.67	15.5	15.3	15.7	25.2	25.3	25.3	0.92	0.89	0.93
6	29-Jul-92	10:51	10:45	10:40		12.00	24.00	9.00	12.0	24.0	9.0							7.25	7.27	7.27	3.47	2.77	2.66	15.1	15.0	16.1	25.0	25.1	24.9	0.92	0.92	0.94
6	29-Jul-92	14:10	13:50	13:40	-2.52	14.00	16.00	10.00	1.0	1.0	1.0							7.36	7.28	7.31	5.29	4.29	3.86	11.9	11.9	12.2	27.9	27.3	27.1	0.67	0.66	0.68
6	29-Jul-92	14:10	13:50	13:40		14.00	16.00	16.00	7.0	9.0	5.0	D	D	D	1.20	1.09	0.86	7.36	7.30	7.28	5.18	3.29	3.46	12.4	12.4	12.1	27.1	27.0	27.0	0.70	0.71	0.69
6	29-Jul-92	14:10	13:50	13:40		14.00	16.00	10.00	14.0	15.0	10.0							7.32	7.16	7.28	5.49	5.15	4.13	12.2	12.4	12.4	26.2	26.5	27.1	0.73	0.76	0.72
6	29-Jul-92	16:55	17:05	17:20	0.85	13.00	24.00	10.00	1.0	1.0	1.0							7.31	7.34	7.33	3.57	3.66	3.41	14.2	14.0	14.3	25.6	25.9	25.6	0.83	0.81	0.83
6	29-Jul-92	16:55	17:05	17:20		13.00	24.00	10.00	7.5	13.0	5.0	U	U	U	1.04	1.04	1.00	7.29	7.29	7.29	3.63	3.63	3.57	14.0	13.1	14.0	25.8	25.8	25.7	0.84	0.87	0.86
6	29-Jul-92	16:55	17:05	17:20		13.00	24.00	10.00	14.0	25.0	9.0							7.29	7.29	7.28	3.64	3.60	3.51	14.7	13.1	13.1	25.8	25.7	25.7	0.86	0.89	0.86
6	29-Jul-92	21:30	21:24	21:13	4.45	20.00	24.00	14.00	2.0	1.0	1.0							7.35	7.35	7.35	3.06	3.15	3.13	20.3	20.1	19.8	25.1	25.0	25.0	1.25	1.18	1.16
6	29-Jul-92	21:30	21:24	21:13		20.00	24.00	14.00	10.0	12.0	7.0	U	U	U	0.42	0.45	0.45	7.32	7.31	7.31	2.95	2.84	2.83	20.6	20.9	20.1	25.3	25.4	25.3	1.25	1.26	1.21
6	29-Jul-92	21:30	21:24	21:13		20.00	24.00	14.00	18.0	22.0	11.0							7.33	7.31	7.31	3.05	3.03	2.81	21.0	21.0	20.5	25.4	25.5	25.4	1.26	1.26	1.25
6	29-Jul-93	08:10	23:57	23:45	2.51	13.00	23.00	19.00	1.0	2.0	1.0							7.35	7.30	7.30	3.64	3.30	3.04	13.1	13.3	13.2	25.3	24.8	24.9	0.66	0.90	0.95
6	29-Jul-93	08:10	23:57	23:45		13.00	23.00	18.00	7.0	12.0	9.0	D	D	D	2.10	1.90	2.20	7.25	7.26	7.28	2.57	2.64	2.74	13.1	13.6	13.9	25.3	25.1	25.0	0.60	0.91	0.94
6	29-Jul-93	08:10	23:57	23:45		13.00	23.00	19.00	13.0	23.0	19.0							7.23	7.25	7.27	2.51	2.45	2.72	13.7	14.1	14.1	25.3	25.0	25.1	0.69	0.92	0.93
6	30-Jul-92	02:24	02:20	02:15	-1.64	17.00	24.00	16.00	2.0	2.0	1.0							7.30	7.31	7.32	1.94	2.04	2.05	13.0	13.0	13.0	26.4	26.3	26.2	0.74	0.74	0.74
6	30-Jul-92	02:24	02:20	02:15		17.00	24.00	16.00	8.0	10.0	6.0	D	D	D	0.92	1.60	1.26	7.30	7.21	7.31	1.64	1.91	1.99	13.2	13.5	12.9	26.4	26.4	26.5	0.72	0.77	0.74
6	30-Jul-92	02:24	02:20	02:15		17.00	24.00	16.00	16.0	19.0	11.0							7.30	7.21	7.31	1.79	2.02	1.96	13.2	14.0	13.4	26.1	26.4	26.4	0.76	0.81	0.77
6	30-Jul-92	04:31	04:34	04:45	-2.47	7.00	16.00	14.00	1.0	1.0	1.0							7.19	7.19	7.31	3.36	3.00	3.53	12.5	12.6	12.7	26.1	26.3	25.6	0.73	0.71	0.79
6	30-Jul-92	04:31	04:34	04:45		7.00	16.00	14.00	4.0	9.0	7.0		U	U		1.78	1.50	7.18	7.18	7.19	2.34	1.34	1.36	12.9	12.9	13.0	26.2	26.3	26.1	0.72	0.74	0.76
6	30-Jul-92	04:31	04:34	04:45		7.00	16.00	14.00	7.0	17.0	12.0								7.18	7.18		1.32	1.35		13.1	13.3		26.2	26.1		0.75	0.77
6	29-Jul-93	08:42	08:44	08:51	4.10	18.00	23.00	21.00	1.0	1.0	1.0							7.27	7.29	7.28	2.55	2.72	2.48	17.0	18.4	18.6	24.8	24.6	24.8	1.08	1.10	1.13
6	29-Jul-93	08:42	08:44	08:51		18.00	23.00	21.00	5.0	12.0	10.0	U	U	U	1.65	1.20	1.03	7.26	7.26	7.27	2.23	2.28	2.16	18.6	19.5	18.6	24.9	24.9	24.9	1.13	1.14	1.11
6	29-Jul-93	08:42	08:44	08:51		18.00	23.00	21.00	9.0	21.0	19.0							7.26	7.26	7.26	2.11	2.22	2.12	19.0	18.9	19.0	24.9	24.8	24.9	1.13	1.12	1.12
6	30-Aug-92	10:51	11:08	11:10	2.50	18.00	24.00	14.00	1.0	1.0	1.0							7.37	7.35	7.38	2.94	2.64	2.90	10.8	12.0	12.7	26.5	24.1	23.6	0.60	0.60	0.74
6	30-Aug-92	10:51	11:09	11:10		18.00	24.00	14.00	5.0	10.0	6.0	U	U	U	0.23	1.14	1.11	7.36	7.24	7.25	2.54	1.63	2.16	13.2	12.9	14.0	24.9	23.6	23.8	0.74	0.81	0.88
6	30-Aug-92	10:51	11:09	11:10		18.00	24.00	14.00	9.0	20.0	12.0							7.35	7.23	7.33	2.97	1.91	1.65	13.0	14.5	14.6	24.8	23.4	23.4	0.79	0.84	0.84
6	30-Aug-92	14:00			5.76																										
6	30-Aug-92	13:50	13:53	14:05		13.00	24.00	16.00	1.0	1.0	1.0							7.44	7.47	7.39	6.97	6.53	5.51	13.7	14.3	13.7	24.5	23.9	23.4	0.77	0.83	0.79
6	30-Aug-92	13:50	13:53	14:05		13.00	24.00	16.00	6.0	12.0	8.0	N	N	N	0.00	0.00	0.00	7.26	7.29	7.32	2.63	2.68	3.47	14.6	14.9	15.3	24.5	23.8	23.5	0.84	0.67	0.89
6	30-Aug-92	13:50	13:53	14:05		13.00	24.00	16.00	13.0	22.0	16.0							7.33	7.30	7.29	2.05	2.03	2.04	14.0	15.5	15.6	23.6	23.4	23.3	0.83	0.91	0.92
6	30-Aug-92	17:00			0.99																										
6	30-Aug-92	16:50	16:55	17:03		11.00	22.00	11.00	1.0	1.0	1.0							7.29	7.35	7.32	4.02	4.30	3.76	10.5	10.9	10.4	24.5	24.3	24.3	0.39	0.38	0.39
6	30-Aug-92	16:50	16:55	17:03		11.00	22.00	11.00	5.0	10.0	5.0	D	D	D	0.96	0.85	1.05	7.34	7.36	7.31	4.72	2.93	3.46	10.5	11.3	10.6	24.3	24.7	24.6	0.39	0.43	0.39
6	30-Aug-92	16:50	16:55	17:03		11.00	22.00	11.00	10.0	20.0	10.0							7.33	7.23	7.33	4.02	1.91	2.63	11.0	12.7	10.9	24.5	23.7	24.4	0.42	0.79	0.43
6	30-Aug-92	23:00			0.64																										
6	30-Aug-92	22:59	23:05	23:09		9.00	26.00	10.00	1.0	1.0	1.0							7.35	7.35	7.32	3.33	3.46	2.91	11.5	12.0	12.0	25.1	22.9	23.2	0.66	0.68	0.69
6	30-Aug-92	22:59	23:05	23:09		9.00	26.00	10.00	4.0	12.0	5.0	U	U	U	0.16	1.05	0.10	7.33	7.35	7.32	2.81	3.74	2.81	11.7	12.7	12.7	25.4	25.5	25.4	0.66	0.72	0.72
6	31-Aug-92	22:59	23:05	23:09		9.00	26.00	10.00	6.0	14.0	8.0							7.30	7.33	7.31	2.62	3.32	2.90	11.3	14.7	12.9	25.5	25.3	25.6	0.70	0.63	0.74
6	31-Aug-92	01:15	01:20	01:26	2.64	8.00	25.00	14.00	1.0	1.0	1.0							7.29	7.36	7.37	3.00	3.70	3.35	12.0	12.1	13.7	22.6	22.6	23.0	0.73	0.72	0.79
6	31-Aug-92	01:15	01:20	01:26		8.00	25.00	14.00	4.0	12.0	7.0	N	U	U	0.00	0.20	0.10	7.36	7.36	7.36	3.40	2.43	3.30	14.3	14.5	14.1	23.0	23.2	23.3	0.62	0.84	0.79
6	31-Aug-92	01:11	01:20	01:26		8.00	25.00	14.00	7.0	23.0	13.0							7.35	7.35	7.35	3.22	2.72	3.13	14.6	14.8	14.6	23.3	23.4	23.4	0.61	0.84	0.83
6	31-Aug-92	02:45			2.54																										
6	31-Aug-92	02:47	02:53	02:00		16.00	25.00	16.00	1.0	2.0	1.0							7.36	7.37	7.36	5.16	3.20	3.12	12.7	12.7	12.8	22.0	22.6	22.4	0.72	0.76	0.73
6	31-Aug-92	02:47	02:53	02:00		16.00	25.00	16.00	8.0	12.0	5.0	D	D	D	0.20	0.34	0.51	7.34	7.35	7.36	3.07	3.68	3.16	14.2	14.6	12.7	22.5	22.9	22.8	0.63	0.65	0.73
6	31-Aug-92	02:47	02:53	02:00		16.00	25.00	16.00	13.0	23.0	9.0							7.34	7.36	7.33	3.19	3.10	2.70	12.8	15.4	13.2	23.0	23.0	23.0	0.67	0.69	0.77
6	31-Aug-92	05:34			-0.36																										
6	31-Aug-92	05:39	05:45	05:48		13.00	22.00	8.00	1.0	1.0	1.0							7.32	7.31	7.30	3.72	3.83	3.43	10.4	10.3	10.9	22.1	22.0	23.1	0.59	0.58	0.61
6	31-Aug-92	05:39	05:45	05:48		13.00	22.00	8.00	4.0	10.0	5.0	D	D	D	1.00	1.20	0.80	7.31	7.30	7.30	3.66	3.24	3.43	10.7	11.3	10.9	22.6	22.8	23.1	0.59	0.61	0.62
6	31-Aug-92	05:39	05:45	05:48		13.00	22.00	8.00	12.0	20.0	7.0							7.26	7.26	7.29	3.47	3.47	3.35	10.5	10.6	11.0	22.9	23.1	23.0	0.76	0.79	0.63
6	31-Aug-92		08:09		-1.06								N			0.00															
6	31-Aug-92		09:42		0.29		23.00			1.0									7.33			2.56			18.2			22.9			0.57	
6	31-Aug-92		09:43				23.00			12.0									7.29			2.55			11.8			23.1			0.61	
6	31-Aug-92		09:43				23.00			23.0									7.22			2.25			13.8			23.1			0.75	
6	10-Nov-92	10:35	10:43	10:54	5.00	17.00	25.00	15.00	1.00	1.00	1.00							7.90	6.30	6.00	5.33	5.41	5.23	11.5	11.2	11.4	8.0	9.1	9.3			
6	10-Nov-92	10:35	10:43	10:54		17.00	25.00	15.00	8.00	12.00	7.00							7.97	6.36	6.10	5.02	5.10	5.09	12.0	12.2	11.7	8.1	9.1	9.1			
6	10-Nov-92	10:35	10:43	10:54		17.00	25.00	15.00	13.00	23.00	13.00							7.94	6.31	6.11	5.16	5.23	5.09	12.0	12.1	11.6	8.1	9.2	9.2			
6	10-Nov-92	12:57			-0.07																										
6	10-Nov-92	12:57	12:59	13:06		14.00	20.00	7.00	1.00	1.00	1.00	D	D	D	1.06	1.54	1.74	5.96	6.00	6.00	4.71	4.90	4.64	9.1	9.4	9.6	9.1	9.7	10.0			
6	10-Nov-92	12:53	12:59	13:06		14.00	20.00	7.00	6.00	9.00	3.00							6.06	6.05	6.04	4.63	4.63	4.63	9.2	9.3	10.0	9.6	9.4	9.7			
6	10-Nov-92	12:53	12:59	13:06		14.00	20.00	7.00	12.00	18.00								6.04	6.02		4.66	4.87		10.4	10.2		9.6	9.4				

NEMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY
INSITU MONITORING DATA

Stn. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
6	10-Nov-92	16:41			-0.64																										
6	10-Nov-92	16:43	16:48	16:59		12.00	>25.00	15.00	1.00	1.00	1.00	U	U	U	1.25	1.53	1.00	6.00	6.03	6.06	4.71	5.16	5.31	9.9	9.7	10.1	6.9	9.0	9.1			
6	10-Nov-92	16:43	16:48	16:59		12.00	>25.00	15.00	5.00	12.00	7.00							6.04	6.04	6.06	4.64	4.91	5.02	9.9	9.8	9.6	9.1	9.2	9.2			
6	10-Nov-92	16:43	16:48	16:59		12.00	>25.00	15.00	10.00	25.00	13.00							6.02	6.04	6.05	4.80	4.84	5.06	9.6	10.5	10.3	9.1	9.3	9.3			
6	10-Nov-92	19:36			0.99																										
6	10-Nov-92	19:38	19:45	19:57		19.00	25.00	18.00	1.00	1.00	1.00	U	U	U	0.63	1.14	0.54	6.08	6.09	6.08	5.42	5.37	5.08	11.6	12.1	12.5	8.9	8.8	8.6			
6	10-Nov-92	19:38	19:45	19:57		19.00	25.00	18.00	9.00	12.00	9.00							6.16	6.10	6.10	5.30	5.36	5.35	11.3	12.1	12.3	9.1	9.1	9.1			
6	10-Nov-92	19:38	19:45	19:57		19.00	25.00	18.00	17.00	23.00	16.00							6.09	6.08	6.10	5.36	5.37	5.37	11.3	12.2	12.4	9.1	9.0	9.0			
6	10-Nov-92	23:00			3.59																										
6	10-Nov-92	23:04	23:10	23:07		22.00	>30.00	30.00	1.00	1.00	1.00	N	N	N	0.00	0.00	0.00	6.04	6.10	6.10	5.40	5.33	5.61	12.7	12.6	12.3	8.8	8.7	8.6			
6	10-Nov-92	23:04	23:10	23:07		22.00	>30.00	30.00	10.00	14.00	9.00							6.08	6.11	6.11	5.23	5.35	5.30	12.5	12.6	12.8	9.1	9.3	9.0			
6	10-Nov-92	23:04	23:10	23:07		22.00	>30.00	30.00	20.00	28.00	18.00							6.09	6.11	6.11	5.46	5.33	5.44	12.1	12.9	12.9	9.1	9.1	9.1			
6	11-Nov-92	02:04			-1.76																										
6	11-Nov-92	02:05	02:10	02:16		18.00	22.00	18.00	1.00	1.00	1.00	D	D	D	0.65	0.78	0.79	6.01	6.01	6.03	4.81	4.85	5.01	9.3	10.0	9.7	8.9	9.0	9.1			
6	11-Nov-92	02:05	02:10	02:16		18.00	22.00	18.00	9.00	11.00	9.00							6.03	6.04	6.04	4.40	4.73	4.71	10.1	9.2	10.0	9.0	9.1	9.2			
6	11-Nov-92	02:05	02:10	02:16		18.00	22.00	18.00	16.00	20.00	16.00							6.04	6.04	6.04	4.70	4.74	4.70	10.0	10.0	10.0	9.1	9.2	9.1			
6	11-Nov-92	04:38			-0.36																										
6	11-Nov-92	05:00	05:10	05:05		19.00	21.00	22.00	1.00	1.00	1.00	U	U	U	1.20	1.30	1.35	5.96	5.96	5.96	4.95	5.05	4.93	9.6	9.7	9.3	9.1	8.9	9.1			
6	11-Nov-92	05:00	05:10	05:05		19.00	21.00	22.00	9.00	10.00	11.00							6.05	6.05	6.04	4.68	4.80	4.70	9.5	10.9	9.7	9.2	9.1	9.1			
6	11-Nov-92	05:00	05:10	05:05		19.00	21.00	22.00	17.00	19.00	24.00							6.03	6.04	6.04	4.69	4.67	4.64	10.4	9.4	10.3	9.1	9.1	9.1			
6	11-Nov-92	07:41			0.43																										
6	11-Nov-92	07:42	07:48	07:53		22.00	25.00	15.00	1.00	1.00	1.00	U	U	U	1.00	0.94	0.70	6.06	6.07	6.04	4.67	5.10	5.03	11.8	11.7	11.4	9.0	9.0	9.1			
6	11-Nov-92	07:42	07:48	07:53		22.00	25.00	15.00	11.00	12.00	7.00							6.06	6.09	6.09	5.05	4.98	4.99	12.0	11.9	11.3	9.1	9.1	9.1			
6	11-Nov-92	07:42	07:48	07:53		22.00	25.00	15.00	20.00	23.00	13.00							6.06	6.07	6.09	5.13	5.07	5.07	12.6	12.2	12.2	9.1	9.1	9.1			
6	11-Nov-92	09:51			6.19																										
6	11-Nov-92	09:52	09:56	09:59		18.00	>30.00	21.00	1.00	1.00	1.00	N	N	N	0.00	0.00	0.00	5.87	6.12	6.09	5.06	5.07	5.06	12.9	12.7	12.8	9.7	9.5	9.4			
6	11-Nov-92	09:52	09:56	09:59		18.00	>30.00	21.00	9.00	14.00	10.00							6.11	6.11	6.09	5.26	5.36	5.35	12.6	13.3	13.1	9.5	9.4	9.4			
6	11-Nov-92	09:52	09:56	09:59		18.00	>30.00	21.00	16.00	18.00	13.00							6.11	6.11	6.08	5.33	5.40	5.40	13.3	13.5	13.3	9.5	9.4	9.4			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST) E	Time (EST) C	Time (EST) W	Tide Level (ft - NGVD)	Stream Depth (ft) E	Stream Depth (ft) C	Stream Depth (ft) W	Monitoring Depth (ft) E	Monitoring Depth (ft) C	Monitoring Depth (ft) W	Current Direction (Up/Downstream/None) E	Current Direction (Up/Downstream/None) C	Current Direction (Up/Downstream/None) W	Current Velocity (ft/sec) E	Current Velocity (ft/sec) C	Current Velocity (ft/sec) W	pH (S.U.) E	pH (S.U.) C	pH (S.U.) W	DO (ppm) E	DO (ppm) C	DO (ppm) W	Conductivity Millisiemens E	Conductivity Millisiemens C	Conductivity Millisiemens W	Temperature (degrees C) E	Temperature (degrees C) C	Temperature (degrees C) W	Salinity (%) E	Salinity (%) C	Salinity (%) W
7	29-Jul-92	08:25	09:30	09:40	3.94	9.00	6.00	3.00	1.0	1.0	1.0							7.25	7.27	7.27	2.65	2.25	2.56	17.3	17.3	16.8	24.9	24.6	23.5	1.02	1.02	0.98
7	29-Jul-92	09:25	09:30	09:40		9.00	6.00	3.00	4.0	3.0	2.5	D	D	D	1.22	1.27	1.70	7.27	7.25	7.25	2.68	2.35	2.46	17.1	17.9	17.1	24.8	24.6	23.4	1.00	1.06	1.01
7	29-Jul-92	09:25	09:30	09:40		9.00	6.00	3.00	8.0	6.0	5.0							7.26	7.27	7.26	2.45	2.19	2.32	17.2	17.2	17.3	24.7	24.7	23.2	1.04	1.04	1.02
7	29-Jul-92		11:05	11:20			10.00	6.00		1.0	1.0								7.22	7.26		2.65	2.85		14.5	14.0		25.4	25.7		0.83	0.80
7	29-Jul-92		11:05	11:20			10.00	6.00		3.0	3.0		D	D		1.45	1.25		7.24	7.24		2.51	2.73		14.3	14.1		24.9	25.3		0.64	0.81
7	29-Jul-92		11:05	11:20			10.00	6.00		10.0	6.0								7.24	7.24		2.47	2.56		14.3	14.2		24.9	25.3		0.85	0.82
7	29-Jul-92		14:20		-2.46		4.00			2.0			D			0.62			7.22						11.4			25.0			0.85	
7	29-Jul-92		16:45		0.20		8.00			3.0									7.40			5.10			12.7			26.7			0.73	
7	29-Jul-92		16:45				8.00			4.0			U			1.49			7.40			5.20			12.7			26.7			0.73	
7	29-Jul-92		16:45				8.00			8.0									7.33			6.20			12.4			26.3			0.75	
7	29-Jul-92		21:16		4.70		9.00			3.0									7.32			2.66			19.9			24.8			1.19	
7	29-Jul-92		21:16				9.00			4.5			D			0.70			7.31			2.75			19.9			25.1			1.20	
7	29-Jul-92		21:16				9.00			9.0									7.31			2.62			20.4			25.3			1.23	
7	30-Jul-92		00:21		1.54		11.00			1.0			D			1.68			7.26			2.30			14.8			24.7			0.86	
7	30-Jul-92		02:35							1.0									7.22			1.96			12.7			25.1			0.75	
7	30-Jul-92		04:21				5.00			3.0									7.18			1.36			12.5			26.2			0.70	
7	30-Jul-92		04:21				5.00						U			0.95																
7	30-Jul-92		04:21				5.00			3.0									7.17			1.34			12.1			26.5			0.71	
7	30-Jul-92		08:35		3.94		6.00			1.0									7.26			2.13			17.5			24.8			1.04	
7	30-Jul-92		08:35				6.00			3.0			U			1.08			7.25			2.06			17.8			24.9			1.00	
7	30-Jul-92		08:35				6.00			6.0									7.25			2.05			17.8			24.9			1.00	
7	20-Aug-92	10:30	10:45	10:40	2.29	7.00	6.00	7.00	1.0	1.0	1.0							7.28	7.34	7.32	2.63	1.76	1.46	13.7	13.5	12.5	23.4	23.5	24.3	0.64	0.71	0.71
7	20-Aug-92	10:30	10:45	10:40		7.00	6.00	7.00	2.5	2.0	2.5	U	U	U	0.71	0.70	0.67	7.34	7.32	7.32	1.95	1.40	1.29	13.5	13.8	13.8	23.9	23.6	23.6	0.73	0.80	0.80
7	20-Aug-92	10:30	10:45	10:40		7.00	6.00	7.00	6.0	5.0	6.0							7.23	7.23	7.22	1.63	1.38	1.23	13.9	14.0	13.6	23.3	23.3	23.4	0.81	0.83	0.77
7	20-Aug-92	14:25	14:20	14:15	3.76	7.00	6.00	7.00	1.0	1.0	1.0							7.36	7.39	7.36	4.50	5.01	4.89	13.7	13.4	14.0	23.6	24.0	24.1	0.79	0.76	0.81
7	20-Aug-92	14:25	14:20	14:15		7.00	6.00	7.00	3.0	3.0	3.0	D	D	D	0.56	1.17	1.07	7.34	7.32	7.37	3.83	5.09	4.34	14.0	14.1	14.2	23.9	23.8	24.0	0.80	0.82	0.82
7	20-Aug-92	14:25	14:20	14:15		7.00	6.00	7.00	6.0	6.0	6.0							7.30	7.28	7.35	2.90	2.54	3.58	14.4	14.6	14.6	23.7	23.6	23.9	0.83	0.85	0.83
7	20-Aug-92		17:13	17:19	0.66		5.00	2.00		1.0	0.5								7.35	7.33		4.14	6.12		10.4	10.7		23.8	24.0		0.59	0.61
7	20-Aug-92		17:13	17:18			5.00	2.00		4.0	1.5		D	D		1.01	1.01		7.35	7.33		3.96	3.94		10.5	10.7		23.8	24.0		0.59	0.60
7	20-Aug-92	22:50	22:44	22:41	1.49	5.00	3.00	3.00	1.00	1.00	1.00							7.35	7.33	7.33	3.01	3.09	3.09	11.6	10.8	11.4	22.0	22.9	22.9	0.66	0.61	0.63
7	20-Aug-92	22:50	22:44	22:41		5.00	3.00	3.00				U	U	U																		
7	20-Aug-92	22:50	22:44	22:41		5.00	3.00	3.00	4.0	4.0	4.0				0.40	0.61	0.57	7.33	7.26	7.31	2.01	1.42	2.52	11.7	12.3	12.0	23.5	23.3	23.1	0.67	0.78	0.67
7	21-Aug-92	01:09	01:05	01:02	2.94	6.00	5.00	5.00	1.0	1.0	1.0							7.34	7.35	7.34	2.59	2.66	2.44	12.2	11.8	12.3	22.6	23.1	22.6	0.69	0.79	0.78
7	21-Aug-92	01:09	01:05	01:02		6.00	5.00	5.00	3.0	3.0	4.0	U	U	U	0.20	0.30	0.30	7.33	7.39	7.31	2.38	2.67	2.25	12.8			22.8			0.75		
7	21-Aug-92	01:09	01:05	01:02		6.00	5.00	5.00	5.0									7.32			2.64			13.9	13.1	13.4	23.2	23.3	23.2	0.81	0.75	0.77
7	21-Aug-92	03:15			2.69																											
7	21-Aug-92	03:10	03:13	03:10		7.00	6.00	3.00	1.0	1.0	1.0							7.33	7.34	7.34	2.07	2.30	2.24	12.2	11.9	11.8	22.2	23.4	22.6	0.70	0.68	0.67
7	21-Aug-92	03:10	03:13	03:10		7.00	6.00	3.00	3.0			D	D	D	0.75	0.88	0.80	7.33			2.02			12.1			23.3			0.68		
7	21-Aug-92	03:10	03:13	03:10		7.00	6.00	3.00	6.0	4.0	4.0							7.31	7.33	7.33	1.99	2.12	2.17	12.5	11.7	11.8	23.7	23.7	22.7	0.72	0.65	0.67
7	21-Aug-92	08:59	06:00		-0.56	2.50	3.00			1.0									7.31			2.65			8.3			22.3			0.43	
7	21-Aug-92	08:59	06:00			2.50	3.00		1.5			D	D		0.90	0.90		7.31			2.06			8.5			23.3			0.45		
7	21-Aug-92	08:59	06:00			2.50	3.00			2.0									7.30			2.58			7.9			22.3			0.63	
7	21-Aug-92		06:00		-1.16								N			0.00															
7	31-Aug-92		09:47		0.39		2.00			0.5									7.37			2.92			10.4			23.2			0.59	
7	31-Aug-92		09:47				2.00			1.5									7.33			1.72			10.9			23.2			0.61	
7	10-Nov-92	11:00			3.63																											
7	10-Nov-92		11:05				7.00			1.00									6.04			5.00			10.9			8.9				
7	10-Nov-92		11:03				7.00			3.00									6.06			4.92			10.8			8.8				
7	10-Nov-92		11:00				7.00			5.00									6.08			4.85			10.8			8.8				
7	10-Nov-92	13:11			-0.44																											
7	10-Nov-92		13:13				4.00			1.00			D			1.12			5.88			4.36			11.0			9.4				
7	10-Nov-92		13:13				4.00			3.00									3.97			4.30			10.6			8.8				
7	10-Nov-92	16:52			-0.46																											
7	10-Nov-92	17:00	17:05	16:55		3.50	4.25	6.00	2.00	2.00	2.00	U	U	U	1.05	0.94	0.84	6.21	6.30	6.22	6.07	6.25	6.25	14.0	13.9	13.5	9.1	9.1	9.0			
7	10-Nov-92	17:00	17:05	16:55		3.50	4.25	6.00																								
7	10-Nov-92	17:00	17:05	16:55		3.50	4.25	6.00																								
7	10-Nov-92		19:50		3.54		7.00			2.00			U			0.42			3.99			6.71			16.5			8.9			0.94	
7	10-Nov-92		19:50				7.00			4.00			U			0.47			3.99			6.37			16.5			9.0			0.97	
7	10-Nov-92		19:50				7.00			6.00			U			0.48			3.99			6.33			17.4			9.1			1.00	
7	11-Nov-92		00:45		-0.14		3.00			2.00			D			1.14			4.42			5.75			13.3			8.9			0.76	
7	11-Nov-92		00:50				3.00			4.00			D			0.95			6.44			5.74			13.6			8.8			0.76	
7	11-Nov-92		05:45		3.84		5.00			2.00			U			0.72			6.45			5.87			13.8			8.9			0.78	
7	11-Nov-92		05:50				5.00			4.00			U			0.97			6.41			5.61			13.1			8.8			0.63	
7	11-Nov-92	07:30			3.54																											
7	11-Nov-92	07:41		07:34		7.70		7.50	2.00		2.00	U		U	0.43		0.58	6.91		6.95	5.39		5.38	14.2		13.6	9.0		9.0	0.80		0.76
7	11-Nov-92	07:41		07:34		7.70		7.50	4.00		4.00	U		U	0.48		0.57	6.94		6.95	5.42		5.37	14.3		13.6	8.9		8.9	0.80		0.77
7	11-Nov-92	07:41		07:34		7.70		7.50	6.00		6.00	U		U	0.41		0.37	6.94		6.90	5.44		5.43	14.3		13.9	9.0		8.9	0.81		0.78

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY
INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millimhos)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
7	11-Nov-92	10:31			4.19																										
7	11-Nov-92	10:40		10:52		8.00		8.50	2.00		2.00	D		D	0.57		1.05	5.65		5.71	5.79		5.85	15.3		15.0	9.3		9.3	0.04		0.04
7	11-Nov-92	10:40		10:52		8.00		8.50	4.00		4.00	D		D	0.58		1.03	5.66		5.71	5.72		5.75	15.3		15.0	9.3		9.3	0.07		0.05
7	11-Nov-92	10:40		10:52		8.00		8.50	6.00		6.00	D		D	0.58		0.98	5.68		5.74	5.72		5.72	15.3		15.3	9.3		9.3	0.07		0.07

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millimhos)			Temperature (degrees C)			Salinity (%)		
		F	C	W		F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W
8	19-Jul-92	09:15	09:20	09:25	4.25	6.00	23.00	14.00	1.0	10	19							7.30	7.30	7.25	1.30	1.44	2.64	13.5	15.0	16.1	23.1	24.9	24.8	0.30	0.91	0.94
8	20-Jul-92	09:15	09:20	09:22		6.00	23.00	14.00	5.0	11.0	7.0	N	N	N	0.00	0.00	0.00	7.25	7.22	7.20	2.24	1.96	1.64	16.4	17.0	16.9	24.9	24.6	24.7	0.96	1.01	0.99
8	22-Jul-92	09:15	09:20	09:22		6.00	23.00	14.00	6.0	17.0	16.0							7.29	7.21	7.17	3.33	1.69	1.51	12.9	17.7	17.2	24.9	24.5	24.3	0.97	1.08	1.07
0	29-Jul-92	11:30			1.35																										
8	29-Jul-92	11:31	11:40	11:50		6.00	20.00	3.00	3.0	10	1.0							7.26	7.23	7.31	3.80	2.36	4.01	12.9	12.3	13.1	27.1	27.6	26.4	0.60	0.66	0.73
8	29-Jul-92	11:31	11:40	11:50		6.00	20.00	3.00	3.0	10.0	2.5	D		D	1.40		3.10	7.28	7.19	7.30	3.69	2.81	4.19	12.9	12.9	13.1	26.7	26.9	26.8	0.76	0.75	0.75
8	29-Jul-92	11:32	11:40	11:50		6.00	20.00	3.00	5.0	20.0	2.0							7.29	7.17	7.29	3.62	1.79	4.06	12.1	13.3	13.4	26.6	26.1	26.2	0.75	0.77	0.77
8	29-Jul-92	14:30	14:45	14:50	-2.54	17.00	18.00	17.50	1.0	1.0	2.0							7.38	7.33	7.27	3.02	4.41	4.39	11.10	11.30	9.77	28.5	27.0	27.9	0.65	0.63	0.54
8	29-Jul-92	14:30	14:45	14:50		17.00	18.00	17.50	6.0	9.5	7.5	D	D	N	0.42	0.66	0.00	7.23	7.31	7.34	3.56	2.14	2.96	11.60	11.50	8.93	27.6	27.5	27.3	0.64	0.64	0.55
8	29-Jul-92	14:30	14:45	14:50		17.00	18.00	17.50	17.0	19.0	14.0							7.22	7.48	7.18	4.16	1.92	1.71	11.90	11.90	11.40	27.9	27.9	28.0	0.69	0.66	0.64
8	29-Jul-92	16:15	16:30	16:52	-0.69	12.00	32.00	7.00	1.0	1.0	1.0							7.40	7.34	7.33	3.64	4.70	4.06	11.4	12.0	11.6	27.8	27.5	27.8	0.64	0.68	0.71
8	29-Jul-92	16:15	16:30	16:52		12.00	32.00	7.00	4.0	11.0	9.5	U	U	U	1.53	2.15	1.38	7.39	7.35	7.30	3.43	4.46	4.00	11.5	12.2	12.5	27.7	27.3	26.6	0.67	0.70	0.72
8	29-Jul-92	16:15	16:30	16:52		12.00	32.00	7.00	12.0	22.0	7.0							7.34	7.32	7.25	3.52	4.31	3.85	12.0	12.3	12.7	27.6	27.1	26.7	0.69	0.71	0.73
8	29-Jul-92	22:15	22:23	22:29	4.65	26.00	26.00	11.00	1.0	1.0	1.0							7.51	7.32	7.31	3.34	3.31	3.35	11.1	10.7	11.0	24.9	23.8	23.0	0.90	0.86	0.87
8	30-Jul-92	22:15	22:23	22:29		26.00	26.00	11.00	13.0	15.0	5.0	D	D	D	0.91	1.19	1.31	7.30	7.28	7.29	3.01	3.01	3.18	17.0	16.7	15.3	23.1	23.3	23.1	0.99	0.98	0.89
8	30-Jul-92	22:11	22:23	22:29		26.00	26.00	11.00	24.0	24.0	11.0							7.29	7.29	7.29	2.64	2.90	3.01	16.9	16.1	16.2	23.0	23.1	23.1	1.12	1.00	0.95
8	30-Jul-92	00:30	00:36	01:06	0.83	23.00	23.00	6.00	1.0	1.0	1.0							7.34	7.34	7.34	2.41	2.37	2.41	12.0	12.3	12.4	26.0	26.7	26.4	0.74	0.72	0.71
8	30-Jul-92	00:30	00:36	01:06		23.00	23.00	6.00	12.0	12.0	4.0	D	D	D	1.43	2.00	1.08	7.23	7.23	7.32	2.33	2.29	2.30	12.0	12.0	12.7	27.1	27.1	26.9	0.73	0.72	0.73
8	30-Jul-92	00:30	00:36	01:06		23.00	23.00	6.00	23.0	23.0	8.0							7.33	7.22	7.22	2.41	2.34	2.19	13.3	13.1	13.3	26.6	27.3	26.8	0.78	0.76	0.76
8	30-Jul-92		02:53		-2.37		17.00			1.0									7.20			1.33			11.7			26.4			0.67		
8	30-Jul-92		02:55				17.00			6.00			D			0.60			7.16			1.27			11.8			26.0			0.67		
8	30-Jul-92		02:55				17.00			17.0									7.17			1.24			12.1			26.7			0.69		
8	30-Jul-92		03:33		-2.87		18.00			1.0									7.19			0.96			11.1			25.3			0.63		
8	30-Jul-92		03:53				19.00			6.00			D			0.88			7.16			0.99			11.6			26.5			0.66		
8	30-Jul-92		03:53				19.00			19.0									7.16			1.06			11.9			26.5			0.68		
8	30-Jul-92	08:05	08:10	08:15	3.63	16.00	24.00	15.00	1.0	1.0	1.0							7.22	7.22	7.22	2.06	2.06	1.93	16.3	16.4	15.7	24.9	25.1	25.3	0.96	0.96	0.92
8	30-Jul-92	08:05	08:10	08:15		16.00	24.00	15.00	6.0	12.0	7.0	U	U	U	1.12	1.25	1.00	7.31	7.23	7.22	1.97	2.05	2.11	16.3	16.2	16.2	25.1	25.2	25.4	0.97	0.95	0.94
8	30-Jul-92	08:05	08:10	08:15		16.00	24.00	15.00	16.0	24.0	13.0							7.21	7.22	7.22	1.87	1.93	2.14	16.3	16.3	16.3	25.2	25.3	25.3	0.96	0.96	0.96
8	20-Aug-92	10:15	10:25	10:30	1.83	7.00	28.00	8.00	1.0	1.0	1.0							7.22	7.24	7.23	0.62	2.17	2.51	10.9	10.8	11.0	23.8	23.5	23.5	0.62	0.61	0.62
8	20-Aug-92	10:15	10:25	10:30		7.00	28.00	8.00	3.0	10.0	4.0	U	U	U	1.27	1.12	0.95	7.20	7.18	7.24	0.92	0.81	1.91	11.1	12.4	11.1	23.7	23.6	23.6	0.63	0.70	0.63
8	20-Aug-92	10:15	10:25	10:30		7.00	28.00	8.00	6.0	16.0	7.0							7.16	7.18	7.20	0.58	0.50	0.96	11.9	13.0	12.1	23.5	23.3	23.6	0.67	0.74	0.67
8	20-Aug-92	14:15	14:40	14:55	3.49	14.00	24.00	6.00	1.0	1.0	1.0							7.30	7.40	7.52	3.59	3.39	4.69	10.7	10.7	12.1	24.0	24.5	23.7	0.69	0.61	0.66
8	20-Aug-92	14:55	14:40	14:51		14.00	24.00	6.00	7.0	12.0	3.0	D	D	D	0.99	0.82	0.62	7.36	7.31	7.35	4.61	3.39	4.63	12.1	12.8	12.1	24.0	24.2	24.1	0.66	0.75	0.65
8	20-Aug-92	14:51	14:40	14:55		14.00	24.00	6.00	12.0	22.0	5.0							7.33	7.24	7.33	2.23	1.51	4.45	13.6	14.4	11.6	24.1	23.7	24.2	0.79	0.99	0.65
8	20-Aug-92	17:25	17:55	17:59	0.35	19.00	32.00	12.00	1.0	1.0	1.0							7.34	7.32	7.35	4.44	3.86	4.07	9.9	9.5	9.5	24.8	24.7	24.2	0.54	0.52	0.53
8	20-Aug-92	17:25	17:55	17:59		19.00	32.00	12.00	10.0	10.0	6.0	D	D	D	0.77	1.35	1.05	7.34	7.29	7.29	3.38	2.65	2.87	10.5	9.8	10.0	25.0	25.0	24.7	0.38	0.55	0.55
8	20-Aug-92	17:25	17:55	17:59		19.00	32.00	12.00	18.0	30.0	10.0							7.31	7.28	7.34	0.76	0.76	1.56	12.5	12.9	10.4	23.9	24.0	24.4	0.78	0.75	0.58
8	20-Aug-92	22:15	22:24	22:50	0.63	8.00	19.00	5.00	1.0	1.0	1.0							7.32	7.30	7.30	3.30	2.72	2.66	10.5	10.4	10.5	23.8	23.3	23.5	0.57	0.56	0.50
8	20-Aug-92	22:15	22:24	22:50		8.00	19.00	5.00	4.0	10.0		U	U	U	0.95	1.19	0.60	7.33	7.29		3.33	2.53		10.4	10.1		23.4	23.9		0.58	0.50	
8	20-Aug-92	22:11	22:24	22:50		8.00	19.00	5.00	7.0	18.0	4.0							7.28	7.20	7.29	2.45	0.76	2.12	10.3	12.7	10.3	23.6	23.9	23.9	0.58	0.71	0.57
8	21-Aug-92	08:24	08:30	08:37	2.61	8.00	20.00	5.00	1.0	1.0	1.0							7.32	7.34	7.33	2.63	2.72	2.34	12.0	11.3	10.7	22.9	23.0	23.1	0.65	0.63	0.60
8	21-Aug-92	08:24	08:30	08:37		8.00	20.00	5.00	4.0	18.0	4.0	N	N	N	0.00	0.00	0.00	7.31	7.29	7.29	2.35	2.57	1.63	11.6	13.2	11.9	23.3	23.4	23.4	0.67	0.75	0.67
8	21-Aug-92	08:24	08:30	08:37		8.00	20.00	5.00	7.0	18.0								7.29	7.29		1.65	3.00		13.2	13.6		23.5	23.4		0.76	0.79	
8	21-Aug-92	03:40	03:53	03:45	2.33	15.00	21.00	9.00	1.0	1.0	1.0							7.31	7.33	7.33	2.10	1.66	1.76	10.5	10.4	10.5	22.2	23.0	22.8	0.60	0.57	0.57
8	21-Aug-92	03:40	03:53	03:45		15.00	21.00	9.00	7.0	10.0	4.0	D	D	D	1.00	1.36	0.95	7.30	7.30	7.30	1.87	1.63	1.71	10.6	11.3	10.5	22.6	23.4	23.0	0.61	0.64	0.57
8	21-Aug-92	03:40	03:53	03:45		15.00	21.00	9.00	14.0	20.0	8.0							7.24	7.27	7.31	1.62	1.29	1.65	11.0	12.3	10.5	22.6	23.4	23.1	0.62	0.77	0.59
8	21-Aug-92	06:30	06:35	06:40	-1.19	9.00	18.00	11.00	1.0	1.0	1.0							7.34	7.30	7.33	2.23	1.53	1.80	10.0	9.8	9.8	22.9	23.0	23.1	0.53	0.53	0.54
8	21-Aug-92	06:30	06:35	06:40		9.00	18.00	11.00	4.0	9.0	3.0	D	D	D	0.50	0.80	0.25	7.33	7.26	7.28	2.24	0.87	1.08	10.0	10.4	10.3	22.4	23.3	23.3	0.56	0.56	0.50
8	21-Aug-92	06:30	06:35	06:40		9.00	18.00	11.00	8.0	16.0	10.0							7.32	7.32	7.31	2.22	0.10	0.86	9.7	11.9	10.7	22.4	23.4	23.2	0.54	0.68	0.60
8	21-Aug-92		07:46		-1.37								N			0.00															
8	21-Aug-92		09:53		0.38		21.00			1.0									7.30			3.27			9.5			22.3			0.52		
8	21-Aug-92		09:53				21.00			10.0									7.27			1.00			11.1			22.9			0.63		
8	21-Aug-92		09:53				21.00			20.0									7.25			0.77			12.0			23.3			0.74		
8	10-Nov-92	11:15			3.38																										
8	10-Nov-92	11:17	11:30	11:51		24.00	31.00	3.80	1.00	1.00	1.00							6.01	6.05	6.02	3.04	3.14	4.97	10.4	9.7	10.3	9.3	9.3	9.9			
8	10-Nov-92	11:17	11:30	11:51		24.00	31.00	3.80	12.00	18.00	3.00							6.04	6.06	6.04	3.06	4.66	4.84	10.8	10.4	10.0	9.1	9.3	9.3			
8	10-Nov-92	11:17	11:30	11:51		24.00	31.00	3.80	22.00	19.00								6.07	6.05		4.65	4.71		11.9	11.9		9.1	9.1				
8	10-Nov-92	13:22			-0.55																										
8	10-Nov-92	13:24	13:27	13:33		24.00	31.00	2.00	1.00	1.00	1.00							5.97	5.97	5.98	4.73	4.56	4.87	11.4	11.5	11.4	9.6	9.5	9.7			
8	10-Nov-92	13:24	13:27	13:33		24.00	31.00	2.00	12.00	10.00		D	D	D	1.13	1.17	0.16	6.04	6.05		4.91	4.50		9.1	10.3		9.8	9.4				
8	10-Nov-92	13:24	13:27	13:33		24.00	31.00	2.00	22.00	19.00								6.04	6.03		4.83	4.50		9.2	10.1		9.8	9.5				
8	10-Nov-92	16:08			-1.54																										
8	10-Nov-92	16:10	16:20	16:33		17.00	20.00	3.00	1.00	1.00	1.00							5.98	6.04	6.02	5.10	4.95	5.04	9.8	9.0	9.6	9.3	9.4	9.3			
8	10-Nov-92	16:10	16:20	16:33		17.00	20.00	3.00	7.00	9.00		U	U	U	1.13	1.29	0.70	6.04	6.05		4.79	4.89		9.7	9.8		9.3	9.3				
8	10-Nov-92	16:10	16:20	16:33		17.00	20.00	3.00	13.00	18.00								6.04	6.03		4.79	4.62		9.3	9.1		9.3	9.3				

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY
INSITU MONITORING DATA

Stn. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Down stream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		F	C	W		F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W	F	C	W
5	10-Nov-92	19:05			3.53																										
5	10-Nov-92	19:08	19:14	19:21		16.00	25.00	16.00	1.00	1.00	1.00							6.00	6.05	6.05	5.19	5.23	5.17	11.0	10.7	10.4	8.7	8.5	8.7			
5	10-Nov-92	19:08	19:14	19:21		16.00	25.00	16.00	7.00	12.00	5.00	U	U	U	1.11	0.15	0.11	6.06	6.07	6.06	4.96	5.07	4.94	11.1	10.4	9.42	9.8	9.1	9.0			
5	10-Nov-92	19:08	19:14	19:21		16.00	25.00	16.00	14.00	23.00	6.00							6.09	6.06	6.07	5.01	5.13	4.84	11.1	10.5	9.8	9.8	9.8	9.8			
6	10-Nov-92	22:34			3.18																										
6	10-Nov-92	22:37	22:39	22:33		17.00	26.00	13.00	1.00	1.00	1.00							6.03	6.05	6.01	4.84	4.80	4.58	10.1	9.9	10.8	8.8	8.7	8.8			
6	10-Nov-92	22:37	22:39	22:33		17.86	26.00	13.00	8.00	10.00	7.00	D	D	D	0.96	1.03	1.06	6.07	6.07	6.06	4.94	4.93	4.71	10.4	10.6	10.3	8.9	9.0	9.0			
6	10-Nov-92	22:37	22:39	22:33		17.00	26.00	13.00	15.00	16.00	11.00							6.07	6.06	6.05	5.02	5.15	4.88	11.1	9.4	10.1	8.9	9.0	9.0			
8	11-Nov-92	01:36			-1.13																										
8	11-Nov-92	01:37	01:44	01:50		13.00	15.00	13.00	1.00	1.00	1.00							5.99	6.01	6.00	4.80	4.76	4.82	9.5	9.7	9.7	9.4	9.5	9.2			
8	11-Nov-92	01:37	01:44	01:50		13.00	15.00	13.00	6.00	7.00	6.00	D	D	D	0.10	0.13	0.44	6.05	6.04	6.04	4.80	4.77	4.80	9.2	9.4	9.5	9.5	9.4	9.3			
8	11-Nov-92	01:37	01:44	01:50		13.00	15.00	13.00	11.00	12.00	11.00							6.05	6.03	6.04	4.86	4.75	4.80	9.6	10.1	9.8	9.5	9.5	9.3			
8	11-Nov-92	04:29			-0.93																										
8	11-Nov-92	04:30	04:42	04:36		12.00	19.00	15.00	1.00	1.00	1.00							5.97	4.03	5.99	4.84	4.95	5.05	10.7	10.8	10.8	9.2	9.3	9.1			
8	11-Nov-92	04:30	04:43	04:36		12.00	19.00	15.00	6.00	9.00	7.00	U	U	U	0.90	0.91	0.89	6.05	6.04	6.04	4.80	4.80	4.66	10.5	10.0	10.5	9.5	9.5	9.3			
8	11-Nov-92	04:30	04:43	04:36		12.00	19.00	15.00	10.00	17.00	12.00							6.02	6.03	6.02	4.75	4.73	4.66	10.6	9.5	10.9	9.3	9.3	9.3			
6	11-Nov-92	07:17			3.11																										
6	11-Nov-92	07:18	07:22	07:31		10.00	25.00	8.00	1.00	1.00	1.00							6.01	6.02	5.92	4.95	5.00	4.87	11.1	11.1	10.9	9.0	9.0	8.9			
6	11-Nov-92	07:18	07:22	07:31		10.00	25.00	8.00	3.00	12.00	4.00	U		U	1.16		1.07	6.06	6.07	6.05	4.95	4.82	4.60	11.0	10.9	10.6	9.0	9.0	9.0			
6	11-Nov-92	07:18	07:22	07:31		10.00	25.00	8.00	8.00	21.00	6.00							6.05	6.07	6.05	4.95	4.89	4.81	11.0	11.3	10.6	9.0	9.0	9.0			
8	11-Nov-92	10:05			4.28																										
8	11-Nov-92	10:06	10:06	10:10		17.00	26.00	15.00	1.00	1.00	1.00							6.02	6.06	6.07	5.36	5.54	5.54	11.6	11.5	11.7	8.3	9.4	9.1			
8	11-Nov-92	10:06	10:06	10:10		17.00	26.00	15.00	8.00	13.00	7.00	N	N	N	0.00	0.00	0.00	6.06	6.06	6.09	5.05	5.10	5.05	11.7	12.0	11.8	8.3	9.5	9.2			
8	11-Nov-92	10:06	10:06	10:10		17.00	26.00	15.00	15.00	24.00	13.00							6.06	6.06	6.09	5.11	5.18	5.06	12.0	12.4	12.4	9.4	9.3	9.3			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity (Millimhos)			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
9	29-Jul-92	08:30	08:46	08:33		6.00	25.00	5.75	1.0	1.0	1.0							7.27	7.25	7.20	3.53	2.85	2.50	14.2	14.6	14.7	24.7	24.3	24.1	0.82	0.84	0.85
9	29-Jul-92	08:50	08:46	08:33		6.00	25.00	5.75	3.0	12.0	3.0	N	N	N	0.00	0.00	0.00	7.36	7.17	7.20	2.80	1.52	2.50	14.2	15.6	15.0	24.9	24.4	24.3	0.83	0.92	0.87
9	29-Jul-92	08:50	08:46	08:33		6.00	25.00	5.75	6.0	23.0	5.0							7.19	7.17	7.19	1.59	1.50	2.13	14.7	16.0	15.3	24.9	24.4	24.2	0.86	0.94	0.89
9	29-Jul-92	12:05	12:00	11:55	0.72	5.00	18.00	5.00	1.0	1.0	1.0							7.51	7.31	7.26	4.58	4.05	3.40	11.3	11.5	11.9	27.2	27.3	26.9	0.65	0.65	0.67
9	29-Jul-92	12:05	12:00	11:55		5.00	18.00	5.00	2.5	9.0	2.5	D	D	D	1.22	1.72	0.60	7.28	7.25	7.25	4.21	3.00	3.51	11.5	11.8	11.9	27.6	27.1	27.1	0.65	0.68	0.68
9	29-Jul-92	12:05	12:00	11:55		5.00	18.00	5.00	5.0	18.0	5.0							7.28	7.22	7.24	4.22	2.80	3.27	11.5	12.1	11.9	27.5	27.0	27.1	0.66	0.69	0.68
9	29-Jul-92	15:50	15:15	15:10	-2.33	5.00	14.00	15.00	1.0	1.0	1.0							7.42	7.35	7.30	9.20	5.18	4.45	9.46	9.25	10.5	28.9	28.7	28.5	0.52	0.51	0.56
9	29-Jul-92	15:50	15:15	15:10		5.00	14.00	15.00	2.5	8.0	7.0	U	N	U	1.26	0.00	0.30	7.34	7.25	7.20	6.10	2.53	2.40	9.45	9.57	10.5	28.9	27.8	27.6	0.52	0.52	0.59
9	29-Jul-92	15:50	15:15	15:10		5.00	14.00	15.00	5.0	14.0	13.0							7.31	7.19	7.17	5.90	1.82	1.54	9.45	9.62	10.9	28.9	27.3	27.1	0.52	0.53	0.62
9	29-Jul-92	22:56	22:49	22:40	4.27	18.00	18.00	8.00	1.0	1.0	1.0							7.25	7.25	7.26	3.01	2.99	3.50	13.2	12.6	12.2	27.6	27.4	26.7	0.75	0.73	0.69
9	29-Jul-92	22:56	22:49	22:40		18.00	18.00	8.00	9.0	6.0	4.0	D	D	D	1.71	1.05	1.09	7.24	7.25	7.25	2.79	2.91	3.10	13.4	13.2	12.7	27.3	27.7	27.0	0.78	0.77	0.72
9	29-Jul-92	22:56	22:49	22:40		18.00	18.00	8.00	18.0	13.0	8.0							7.26	7.26	7.26	2.83	2.98	3.01	16.8	15.0	14.6	25.7	26.6	26.4	0.99	0.87	0.84
9	30-Jul-92	01:34	01:23	01:17	0.17	20.00	14.00	5.00	1.0	1.0	1.0							7.31	7.18	7.22	1.90	2.05	2.23	12.0	11.8	12.0	26.5	26.4	26.6	0.68	0.67	0.65
9	30-Jul-92	01:34	01:23	01:17		20.00	14.00	5.00	10.0	7.0	2.5	D	D	D	1.85	1.95	1.25	7.30	7.19	7.21	1.75	1.87	2.50	12.1	12.2	12.0	26.9	26.9	26.8	0.69	0.70	0.69
9	30-Jul-92	01:34	01:23	01:17		20.00	14.00	5.00	20.0	14.0								7.19	7.19		1.70	1.86		12.4	12.2		27.0	26.9		0.70	0.70	
9	30-Jul-92		03:08		-2.83		17.00			1.0									7.17			1.20			18.7			24.6			0.61	
9	30-Jul-92		03:08				17.00			8.0			D			1.10			7.16			0.99			11.0			27.1			0.62	
9	30-Jul-92		03:08				17.00			17.0									7.16			0.99			11.1			27.2			0.63	
9	30-Jul-92		03:37				17.00			1.0									7.18			1.20			10.6			24.5			0.59	
9	30-Jul-92		03:37				17.00			8.0			D			0.84			7.16			1.05			10.7			27.8			0.60	
9	30-Jul-92		03:37				17.00			17.0									7.15			0.85			10.9			27.1			0.62	
9	30-Jul-92	07:54	07:49	07:42	3.42	19.00	24.00	10.00	1.0	1.0	1.0							7.21	7.21	7.13	2.00	2.01	1.69	14.7	14.8	14.4	25.4	25.2	25.2	0.85	0.86	0.84
9	30-Jul-92	07:54	07:49	07:42		19.00	24.00	10.00	9.0	12.0	5.0	U	U	U	1.25	1.10	0.08	7.30	7.18	7.17	1.91	1.74	1.69	15.1	15.2	14.6	25.5	25.5	25.4	0.86	0.88	0.85
9	30-Jul-92	07:54	07:49	07:42		19.00	24.00	10.00	19.0	24.0	10.0							7.19	7.18	7.13	1.81	1.61	1.52	15.3	15.4	15.0	25.6	25.5	25.4	0.90	0.90	0.87
9	20-Aug-92	10:05	10:00	09:45	1.43	7.00	21.00	10.60	1.0	1.0	1.0							7.22	7.20	7.21	1.53	1.78	1.60	10.3	10.1	10.0	23.5	23.6	23.5	0.56	0.56	0.55
9	20-Aug-92	10:05	10:00	09:45		7.00	21.00	10.60	5.0	18.0	5.0	U	U	U	0.00	1.31	0.62	7.23	7.16	7.21	1.38	0.21	1.35	10.0	11.9	10.0	23.6	23.6	23.4	0.56	0.67	0.56
9	20-Aug-92	10:05	10:00	09:45		7.00	21.00	10.60	6.0	20.0	9.0							7.19	7.16	7.13	0.78	0.19	0.21	10.4	12.6	11.9	23.6	23.4	23.4	0.56	0.72	0.67
9	20-Aug-92	15:15			3.32																											
9	20-Aug-92	15:25	15:10	15:05		7.00	23.00	14.00	1.0	1.0	1.0							7.24	7.33	7.27	3.39	3.99	3.72	10.4	9.7	9.7	25.2	24.4	24.2	0.61	0.56	0.53
9	20-Aug-92	15:25	15:10	15:05		7.00	23.00	14.00	5.0	12.0	6.0	D	D	D	0.87	0.65	0.87	7.27	7.23	7.22	2.94	1.47	1.61	10.9	13.2	12.0	24.9	24.7	24.5	0.61	0.75	0.67
9	20-Aug-92	15:25	15:10	15:05		7.00	23.00	14.00	6.0	22.0	12.0							7.25	7.25	7.22	1.86	1.25	1.31	12.2	14.0	12.2	24.8	25.5	25.7	0.69	0.81	0.70
9	20-Aug-92	17:55	17:50	17:45	0.17	7.00	20.00	8.00	1.0	1.0	1.0							7.32	7.31	7.30	3.42	3.65	3.52	8.46	9.6	9.5	24.8	24.3	24.4	0.46	0.54	0.53
9	20-Aug-92	17:55	17:50	17:45		7.00	20.00	8.00	5.0	18.0	4.0	D	D	D	0.83	0.89	0.84	7.31	7.25	7.30	3.16	1.50	3.90	8.60	10.6	9.6	24.9	24.5	24.8	0.47	0.59	0.53
9	20-Aug-92	17:55	17:50	17:45		7.00	20.00	8.00	6.0	18.0	6.0							7.26	7.20	7.12	1.69	0.31	3.11	9.14	11.6	9.7	24.9	24.9	24.8	0.49	0.66	0.53
9	30-Aug-92	20:00			-0.83																											
9	30-Aug-92	20:10	20:02	19:55		3.00	20.00	12.00	1.0	1.0	1.0							7.31	7.29	7.29	3.46	3.04	3.04	9.2	9.4	9.4	24.0	24.4	24.1	0.51	0.53	0.52
9	30-Aug-92	20:10	20:02	19:55		3.00	20.00	12.00	2.0	10.0	6.0	N	N	N	0.00	0.00	0.00	7.36	7.25	7.28	3.20	2.04	2.27	9.2	9.7	9.7	24.1	24.4	24.4	0.51	0.56	0.47
9	30-Aug-92	20:10	20:02	19:55		3.00	20.00	12.00		18.0	10.0								7.19	7.26		0.17	1.41		12.1	9.2		23.8	24.4		0.69	0.53
9	31-Aug-92	00:15	00:09	00:03	2.67	3.00	24.00	9.00	1.0	1.0	1.0							7.32	7.31	7.27	2.11	2.42	2.35	10.3	11.3	10.3	22.6	22.8	22.9	0.58	0.62	0.58
9	31-Aug-92	00:15	00:09	00:03		3.00	24.00	9.00		12.0	4.0	N	N	N	0.00	0.00	0.00		7.26	7.29		1.58	2.22		11.9	10.4		23.6	23.3		0.66	0.59
9	31-Aug-92	00:15	00:09	00:03		3.00	24.00	9.00	4.0	22.0	8.0							7.30	7.22	7.25	1.85	0.42	1.00	10.4	13.0	12.4	23.5	23.3	23.4	0.59	0.74	0.71
9	31-Aug-92	04:18	04:09	04:03	1.92	3.00	23.00	9.00	1.0	1.0	1.0							7.31	7.31	7.31	1.75	2.52	2.52	10.2	8.9	9.6	23.6	23.8	23.5	0.57	0.51	0.52
9	31-Aug-92	04:18	04:09	04:03		3.00	23.00	9.00		12.0	4.0	D	D	D	0.70	1.40	1.20		7.24	7.28		0.50	2.06		12.6	9.5		23.8	23.7		0.72	0.53
9	31-Aug-92	04:18	04:09	04:03		3.00	23.00	9.00	4.0	21.0	8.0							7.30	7.25	7.27	1.72	0.91	1.06	10.3	13.3	10.5	23.7	23.5	23.6	0.58	0.77	0.57
9	31-Aug-92	06:53	06:51	06:47	-1.08	3.00	18.00	10.00	1.0	1.0	1.0							7.30	7.28	7.29	1.44	0.94	1.45	9.7	10.1	9.8	23.3	23.5	23.2	0.54	0.56	0.54
9	31-Aug-92	06:53	06:51	06:47		3.00	18.00	10.00		8.0	5.0	D	D	D	0.10	0.50	0.40		7.28	7.28		0.69	1.02		10.4	10.0		23.6	23.3		0.58	0.56
9	31-Aug-92	06:53	06:51	06:47		3.00	18.00	10.00	4.0	16.0	9.0							7.29	7.24	7.25	1.35	0.59	0.78	9.3	10.7	10.3	23.4	23.7	23.5	0.51	0.60	0.57
9	31-Aug-92	07:18	07:23	07:40	-1.92							N	D	D	0.00	0.50	0.22															
9	31-Aug-92		09:39		0.83		21.00			1.0									7.35			2.98			10.2			25.4			0.57	
9	31-Aug-92		09:39				21.00			10.0									7.27			0.55			10.9			23.7			0.61	
9	31-Aug-92		09:39				21.00			20.0									7.24			0.29			11.9			23.6			0.67	
9	10-Nov-92	11:37			1.87																											
9	10-Nov-92	11:51	11:42	11:39		6.00	21.00	14.00	1.00	1.00	1.00							6.02	6.05	6.02	5.06	5.26	5.20	10.8	10.7	9.2	10.2	9.9	10.4			
9	10-Nov-92	11:51	11:42	11:39		6.00	21.00	14.00	4.00	16.00	6.00							6.05	6.05	6.05	5.15	4.67	4.68	9.4	9.8	9.2	9.8	9.3	9.5			
9	10-Nov-92	11:51	11:42	11:39		6.00	21.00	14.00		19.00	12.00								6.04	6.04		4.66	4.72									
9	10-Nov-92	13:43			-1.13																											
9	10-Nov-92	13:53	13:48	13:45		2.00	13.00	13.00	1.00	1.00	1.00							6.01	5.98	5.95	5.00	4.91	5.08	10.6	10.6	10.5	9.6	9.5	9.7			
9	10-Nov-92	13:53	13:48	13:45			13.00	13.00		3.00	3.00	D	D	D	0.66	1.14	1.19		6.05	6.04		4.75	4.75		10.6	10.3		9.6	9.6			
9	10-Nov-92	13:53	13:48	13:45			13.00	13.00		11.00	11.00								6.03	6.04		4.83	4.93		10.6	10.3		9.6	9.6			
9	10-Nov-92	15:37			-2.33																											
9	10-Nov-92	16:00	15:49	15:39		3.00	13.00	16.00	1.00	1.00	1.00							6.04	6.02	5.87	5.52	5.50	5.35	9.86	9.31	9.23	9.9	10.0	10.3			
9	10-Nov-92	16:00	15:49	15:39		3.00	13.00	16.00		6.00	7.00	U	U		0.94	0.50			6.06	6.04		5.08	4.90		9.32	9.47		9.9	9.9			
9	10-Nov-92	16:00	15:49	15:39		3.00	13.00	16.00		13.00	14.00								6.05	6.00		4.97	4.87		9.64	9.51		9.9	10.0			
9	10-Nov-92	18:35			2.17																											
9	10-Nov-92	18:52	18:43	18:36		12.00	23.00	19.00	1.00	1.00	1.00							6.04	6.05	5.99	4.96	4.96	4.71	10.1	9.6	10.1	8.9	8.9	9.8			
9	10-Nov-92	18:52	18:43	18:36		12.00	23.00	19.00	6.00	12.00	10.00	U	U	U	1.07	1.15	1.03	6.06	6.06	6.03	4.84	4.84	4.69	10.0	9.7	9.8	9.1	9.2	9.2			
9	10-Nov-92	18:52	18:43	18:36		12.00	23.00	19.00	10.00	23.00	17.00							6.07	6.05	6.02	4.86	4.83	4.75	10.1	9.6	10.2	9.1	9.2	9.1			

NBMUA CROMAKILL CREEK/HACKENSACK RIVER WATER QUALITY STUDY

INSITU MONITORING DATA

Sta. No.	Date	Time (EST)			Tide Level (ft - NGVD)	Stream Depth (ft)			Monitoring Depth (ft)			Current Direction (Up/Downstream/None)			Current Velocity (ft/sec)			pH (S.U.)			DO (ppm)			Conductivity Millisiemens			Temperature (degrees C)			Salinity (%)		
		E	C	W		E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W	E	C	W
9	10-Nov-92	22:55			2.47																										
9	10-Nov-92	23:01	23:06	22:56		26.00	25.00	22.00	1.00	1.00	1.00							6.02	6.02	6.00	4.85	4.96	4.95	9.3	10.0	9.7	10.0	9.9	9.9			
9	10-Nov-92	23:01	23:06	22:56		26.00	25.00	22.00	10.00	12.00	11.00	D	D	D	1.15	1.44	1.15	6.05	6.05	6.05	4.72	4.76	4.90	10.0	10.3	10.2	9.5	9.3	9.1			
9	10-Nov-92	23:01	23:06	22:56		26.00	25.00	22.00	18.00	22.00	20.00							6.06	6.06	6.06	4.90	4.97	4.90	10.6	10.9	10.7	9.3	9.3	9.0			
9	10-Nov-92	00:56			-0.36																										
9	11-Nov-92	01:10	01:04	00:57		19.00	22.00	17.00	1.00	1.00	1.00							5.99	6.05	5.94	4.87	4.75	4.84	9.7	9.6	9.5	9.4	9.4	10.1			
9	11-Nov-92	01:10	01:04	00:57		19.00	22.00	17.00	6.00	11.00	8.00	D	D	D	1.19	1.34	1.25	6.05	6.05	6.03	4.82	4.71	4.56	9.5	9.3	9.2	9.5	9.5	9.7			
9	11-Nov-92	01:10	01:04	00:57		19.00	22.00	17.00	11.00	20.00	13.00							6.04	6.04	6.00	4.81	4.56	4.69	9.4	9.7	9.8	9.9	9.5	9.7			
9	10-Nov-92	04:02			-1.41																										
9	11-Nov-92	04:11	04:15	04:03		15.00	15.00	14.00	1.00	1.00	1.00							5.99	6.03	6.00	5.25	5.02	5.00	10.0	10.0	10.1	9.3	9.4	9.1			
9	11-Nov-92	04:11	04:15	04:03		15.00	15.00	14.00	6.00	7.00	7.00	N	N	N	0.00	0.00	0.00	6.04	6.04	6.05	5.13	4.84	4.74	9.5	9.8	10.1	9.4	9.5	9.4			
9	11-Nov-92	04:11	04:15	04:03		15.00	15.00	14.00	11.00	13.00	12.00							6.04	6.04	6.04	4.89	4.84	4.87	9.8	10.0	10.4	9.4	9.5	9.5			
9	10-Nov-92	06:55			2.92																										
9	11-Nov-92	07:07	07:02	06:56		18.00	26.00	22.00	1.00	1.00	1.00							6.00	5.94	5.84	4.97	4.90	4.66	9.9	9.8	9.8	9.0	9.1	9.3			
9	11-Nov-92	07:07	07:02	06:56		18.00	26.00	22.00	5.00	13.00	11.00	U	U	U	0.90	1.27	1.44	6.04	6.01	6.04	4.72	4.59	4.48	9.5	9.1	9.54	9.1	9.1	9.2			
9	11-Nov-92	07:07	07:02	06:56		18.00	26.00	22.00	8.00	24.00	20.00							6.02	6.00	6.03	4.76	4.45	4.40	9.5	9.1	9.6	9.1	9.2	9.2			
9	10-Nov-92	10:17			4.52																										
9	11-Nov-92	10:22	10:20	10:16		11.00	24.00	30.00	1.00	1.00	1.00							6.09	6.07	5.95	5.35	5.38	4.96	10.3	10.6	10.5	9.2	9.3	9.3			
9	11-Nov-92	10:22	10:20	10:16		11.00	24.00	30.00	3.00	12.00	14.00	N	N	N	0.00	0.00	0.00	6.06	6.06	6.05	5.16	4.95	4.83	10.1	11.3	11.4	9.2	9.1	9.1			
9	11-Nov-92	10:22	10:20	10:16		11.00	24.00	30.00	9.00	22.00	28.00							6.06	6.06	6.02	4.93	4.98	4.66	11.2	11.4	11.5	9.1	9.1	9.2			