# Environmental Engineering

**Databases**

**Wastewater, Chemical, Pharmaceutical, Electronics, Battery, and Oil Industries**

**Case Studies and Solution to Wastewater Case Study**

**Professor Zikri Ahmed**

**Gateway Project**

**July, 1997**

GATEWAY EEC PROJECT No. CID - U - 05 - CU
FINAL REPORT

August 15, 1997

Project Title; " Shared Resources " Classroom Case Studies and Database Applications In Environmental Engineering Education

Cooper Union Personnel; Dr. Zikri Ahmed , Faculty
Department of Chemical Engineering

Project Description;

Scope;

Environment, as a specific curriculum ,must be an integral part of the engineering education process. Environmentally safe products require the application of environmentally sound design and the use of less hazard alternatives.

EPA provides guidelines for waste reduction. It does not provide pollution prevention technology. The environmental awareness and designer skills are the cornerstone for pollution prevention technology. Engineering students should learn the skills inorder to become environmentally conscious and to avoid costly training after graduation.

The lack of reliable, quantifiable information on environmental fate and health data is an impedment to effective class analysis and strategic design policy. Compilation of such information assists in locating potential trouble spots and provide ideas on how to reduce environmental risks and develop safe design.

One of the areas that is of most concern to our daily life and represents an interesting module is municipal wastewater. A prototype database system has been constructed from the information contained in the annual survey of municipal wastewater in The New York - New Jersey area. The database module developed spans hundreds of pollutants and can project wastewater emmissions in urban and suburban regions. It is therefore a useful guide to safe design.Database modules together with case studies that cover other areas such as;chemical, pharmaceutical,electronic , electrochemical and oil industries have also been developed.

Objectives;

The objectives of this project is to establish an information sharing database system that can be used by students and teachers to estimate comprehensive profiles of domestic and industrial pollution for regions and urban areas and to provide them with a reliable picture and better understanding of the concept of environmental engineering in more details. It can also provide them with the basic training required to enhance their abilities to implement alternative technology. It is also expected that these developed modules will serve as educational tools for integrating environmental factors into other courses.

Methodology and Goals ;

The database in the attached disk has been collected from different municipalities inorder to have complete coverage which allows sectoral comparison.It covers several areas of interest such as, municipal wastewater, battery and electronic industries, chemical and pharmaceutical industries and oil refineries.These database modules can answer

such questions as;
what types of waste are produced and processed by such industries?
what types of chemicals are used by these industries?
what are the typical influent and effluent stream concentrations?
what are the effluent standard concentrations established by EPA?
what are the threshold concentration limits that an average worker endures for these chemicals?
what are the toxic effects and safety considerations?

The broad databases developed here have been used to construct mini-type classroom projects which represent true case studies and have been used by different engineering majors.Some of these projects have been incorporated into ChE 340 ( a junior-senior chemical engineering course that deals with industrial waste control and can be taken by all majors) and CE 441 ( a civil engineering course that deals with pollution and water management open to civil and chemical engineering senior and graduate students). *

The databases developed together with these case studies are available on the Internet .This creates an electronic environmental mini-library available to all institutions.This mini-library can be used for class applications and research. For example, in the case of municipal wastewater module, students and teachers can summon the data to check the variation of the effluent streams due to seasonal and abnormal changes, compare the different municipalities involved or use the data directly to design a treatment facility.

A detailed solution of one of these case studies (design of a new water treatment plant for a growing community) is presented and discussed .The detailed solution can be used as a guiding model to enhance student ability and approach to solution of engineering problems.This case can be used as a term project .Parts of this case study can also be assigned as mini projects or homework problems.

## Assessment and Evaluations

These databases have been used and betatested at Cooper Union and The University of South Carolina. All points raised by evaluators in their assessment have been adressed.A copy of the assessment is attached .

## Conclusion

Environmental regulations are currently implementd at great cost to society and industry.This is because the infrastructure needed for implementing these regulations has not been sufficiently developed.Industry can no longer react to these challenges with"end-of-pipe" solutions.The need to design for environment is a must.Integrating environmental considerations into existing design practices reflects a forward thinking approach to achieve a safe and sucessful design.Academia can play an important role in developing future generations of engineers who are trained in methodology of design for environment. Developing of such information and modules and making it available for engineering students is a step on the road to achieving this goal.

* http://www.cooper.edu/~ahmed/intro.html
or
http://www.cooper.edu/engineering/chemechem/Welcome.html (faculty research projects)

UNIVERSITY OF
SOUTH CAROLINA

June 30, 1996

Civil and Environmental Engineering

Professor Zikri Ahmed
The Cooper Union
Albert Nerken School of Engineering
Cooper Square
New York, New York 10003-7183

Re: *Submission of the Gateway Beta Test*

Zikri
Dear Dr. ~~Ahmed~~:

Enclosed is the Beta Test evaluation of the wastewater treatment module (D21) developed at the Cooper Union as part of the Gateway Environmental Engineering Project. A summary of the beta test results is provided on page 5 of the report.

If you require any future information, please call me at (803) 777-7403 or send me e-mail at mcanally@engr.engr.sc.edu. Thank you.

Sincerely,

A. Steve McAnally, Ph.D., P.E.
Associate Professor

Enclosures

University of South Carolina • Columbia, South Carolina 29208 • 803/777-3614 • 803/777-0670

**GATEWAY PROJECT**
**Beta Test of Polytechnic University Modules D17 -D19**
**and The Cooper Union Module D21**

## Introduction

In January 1997 the co-PI received the course modules from Polytechnic University and the Cooper Union. Polytechnic University's modules included D17: Small Municipal Wastewater Treatment Plant Design, D18: Municipal + Industrial Wastewater Treatment, and D19: Large Wastewater Treatment Plant Design each of which is based on the use of *SuperPro Designer® v. 1.0.* The Cooper Union module included D21: Data Base Information for Municipal Wastewater, Chemical and Pharmaceutical Industries Wastewater, and Electronic Industries Wastewater. These case studies were introduced to the students of a junior/senior level water and wastewater treatment course (ECIV 551- *Elements of Water and Wastewater Treatment*) as a final project for the Spring 1997 semester. Evaluations were performed by the instructor (Co-PI) and the students of ECIV 551. Additionally, some feedback on The Cooper Union module was obtained from a couple of graduate students in ECIV 752 (Water and Wastewater Treatment II). This is a graduate level course dealing with the principles of biological process design.

## Implementation

The overall evaluation process of the case study modules developed at Polytechnic University and The Cooper Union required a four-step procedure. The first step involved the introduction of the students to the use of the *SuperPro Designer® v. 2.0* software by implementing several of the USC developed instructional modules. The USC modules provided preliminary training for the ECIV 551 students in utilizing the software to analyze various unit operations and treatment trains. This introductory step prepared the students for working the more comprehensive case study modules developed by Polytechnic University and The Cooper Union. ECIV 551 has both science and design components. The objectives of the course include the development of the students' understanding of the engineering principles governing the design of physical, chemical, and biological water/wastewater treatment unit operations, and the integration of the students understanding into municipal treatment systems design. An outline of this course is as follows:

1. Introduction
2. Water and wastewater treatment systems
   - Water quality standards
   - Regulations
3. Chemical principles and reactor kinetics
4. Physical treatment unit operations applied to water and wastewater treatment plant design
5. Chemical treatment processes applied to water treatment plant design

6. Introduction to wastewater treatment and wastewater characteristics
7. Secondary wastewater treatment processes
   - Suspended growth systems
   - Attached growth systems
   - Ponds and lagoons
8. Advanced wastewater treatment processes
9. Sludge treatment and disposal

By mid-semester (March 15, 1997) the students had been introduced to two of the USC instructional modules, D24: Clarifier/Thickener Instructional Module and D26: Aerobic Treatment Instructional Module. The third USC instructional module D27: Sludge Treatment Instructional Module was introduced later in the semester after the Polytechnic University and The Cooper Union case study modules were presented to the students. The USC modules are provided in Appendix 1.

The second step involved the development of a problem statement for the presentation of the Polytechnic University and The Cooper Union case study modules to the students. Because the ECIV 551 class had only six students, it was divided into three teams of two students each. Therefore, only three modules could be utilized as design problems, two from Polytechnic University and one from The Cooper Union. (Another module from The Cooper Union was introduced as a final project for a graduate student in the ECIV 752 course).

Each of the modules required preparation time by the instructor before they could be integrated into the course. Although the Polytechnic University case study modules provided example simulation reports that included the input and output data, the instructor needed to develop a more detailed scenario so the ECIV 551 students would be able to complete the final projects within the second half of the semester. The problem statements developed and presented by the USC instructor for Polytechnic University's Modules D18: Municipal + Industrial Wastewater Treatment and D19: Large Wastewater Treatment Plant Design are presented as Design Project #1 and Design Project #2, respectively, in Appendix 2. The Cooper Union provided data bases for typical influent and effluent parameter values representing several municipal and industrial facilities found in the New York/New Jersey area. The USC instructor developed a problem scenario for one of the data bases to be introduced to a student team. This problem statement is also provided in Appendix 2 as Design Project #3.

The third step involved the implementation of the Polytechnic University and The Cooper Union case study modules into the course. As an introduction to the various aspects of a design project, the instructor modified and presented an overview of the Polytechnic University module D17: Small Municipal Wastewater Treatment Plant Design. The modification required updating the module to *SuperPro Designer®* *v. 2.0*. The summary of the overview is presented in Appendix 3. The overview included the development of a problem scenario, and some specific information for the more difficult aspects of the simulations. Additionally, technical information on engineering economics (Peters and Timmerhaus, 1968) was provided to help explain the engineering economics report of the module. The overview was formally provided over 1.5 class periods (approximately 2 hours of class time). Also, informal tutoring was available with a graduate teaching assistant throughout the semester.

The fourth step involved the formal evaluation of the Polytechnic and The Cooper Union case study modules.

**Module Evaluation**

The development of evaluation procedures for the case study modules was performed by the co-PI in conjunction with a local Gateway evaluator. The evaluation has two basic components: an instructor review and student evaluation. The instructor review involved a technical review of module documentation as well as an evaluation of the effectiveness and practicality of implementing the module. The students evaluated the quality and usefulness of the case study module application and the instructor's approach in implementing the modules.

**Instructor Evaluation.** The instructor evaluated the practicality and effectiveness of the case study modules by answering the following questions as he implemented each into the classroom instruction. A summary of the responses is provided following each question.

*(1) What is the degree of compatibility of the instructional module with the course objectives?* The theme of each module (Polytechnic University D17 to D19, and The Cooper Union D21) was very compatible with the objectives of the ECIV 551 course of instruction.

*(2) What degree of effort was required to evaluate the module during the initial "screening" review?* The degree of effort required for the initial screening review has been summarized by the amount of time required to read the instructions and perform the example problem simulations. The instructor (who is familiar with the computer software) screened the first module within a 4 - 6 hour period. This included reviewing the module background information and running the simulations with *SuperPro Designer®* *v. 2.0.* (Additional time was required to transfer the modules to from *v. 1.0* to *v. 2.0*). However, instructors not familiar with the computer software will require a significantly greater period of time to perform the initial screening review.

*The Cooper Union* module (D21) was a slightly different situation. This module presented a data base and didn't provide a formal case study problem to be implemented. Because of this approach, the instructor spent additional time developing an appropriate case study problem for the class. The effort is described in more detail in Question #4.

(3) *How does the case study module format compare to the SuperPro Designer® User's Guide format for utility in this course?* The summary format of the Polytechnic University modules D17 to D19 provided a more clear and concise approach for using the computer program to produce wastewater treatment plant designs.

This question does not apply to *The Cooper Union* module (D21).

(4) *What degree of effort was required to implement each case study module in the classroom instruction?* The *Polytechnic University* modules D17 to D19 are very useful in providing specific input/output data required for a particular problem scenario. However, the instructor must still generate the problem scenario to apply to the specific input/output data. It would be more useful to have an example problem scenario included with at least one of the modules so the instructor can quickly assess the module utility and easily implement it in the course.

*The Cooper Union* module (D21) contains thorough useful data sets for application to the ECIV 551 course. A couple of data sets (Pharmaceutical and Oil Refinery) would be more readily adaptable for design problems with a typical and range of example flowrates, or a typical and range of mass loading rates. Even so, the instructor must still generate the problem scenario to apply to the specific input/output data. It would be more useful to have an example problem scenario included with the module so the instructor can quickly assess the module utility and easily implement it in the course.

**Student Evaluation.** The ECIV 551 students completed two surveys at the end of the 1997 Spring Semester. A 9 item survey asked the students to evaluate the case study modules for use in classroom instruction. The second survey included 20 questions requesting the students to evaluate the instructor and the course. A summary of the student evaluations is provided in Appendix 4. (Note: the local Gateway evaluator is reviewing and summarizing the student evaluations of the instructor and course. These are not available at the time of this writing).

There were six students in the ECIV 551 class, all of which were civil engineering majors. Self-reports on the survey indicated that the students GPAs ranged from # to # with an average of 3.1 for the class. All of the students were familiar with AutoCad v. 12 and 13 software and with KYPipes software. Fifty percent of the students were familiar with WaterCad.

Students responded to seven evaluative questions about the case study modules. A summary of the responses to each of these questions is provided in Appendix 4. Overall, the students were very positive concerning the usefulness of the case study modules for this particular course of instruction. The students felt that the strongest advantage of the modules was that they were helpful in aiding the student visualize the practical design aspects of the course. Most of the students (67%) felt that the case study modules added to the quality of the course instruction and should be used as part of the course in the future.

The students did not strongly feel that the instructional modules were helpful in learning the fundamental concepts of the course. However, the majority (approximately 67%) of the students did indicate that the modules reinforced their learning of the fundamental concepts to a varying degree.

**Summary of the Beta Test Results**

The overall conclusions from the evaluations by the instructor and the students are that the case study modules (Polytechnic University D17 to D19 and The Cooper Union D21) definitely enhanced the presentation of the course material, and the modules should be used in future courses. The modules can be strengenthed for a science/design type course, such as ECIV 551, by providing a more detailed example problem scenario for the instructor. Such an inclusion will allow a potential user (the instructor) to readily assess the utility of the module for his/her course, and easily implement the module with minimal preparation time.

**Design Project#3** **Municipal Wastewater with metals and nutrients**
**(Copper Union Module D21)**

An influent from several industrial plants and towns located in the New York city are treated at a single waste treatment plant. The yearly average flow into the waste treatment plant is 270 mgd. The municipal waste contains sewage, metals, and nutrients with the following average influent characteristics:

SS (suspended solids) = 83 mg/l
Glucose = 83 mg/l (Biodegradable organics can be represented as glucose to simplify the problem)
Silver = 0.003 mg/l
Zinc = 0.056 mg/l
Copper = 0.044 mg/l
Mercury = 0.0002 mg/l
Nickel = 0.0043 mg/l
Lead = 0.0087 mg/l
Ammonia = 9.5 mg/l

Design a waste treatment plant to handle the influent flow that meets the NPDES standards set by the regulatory authorities for the discharge of the effluent into the Savannah River located in Augusta, Ga. Also, evaluate the design under average, peak, and low loading conditions.

The finish product should consist of a summary report (5 to 7 pages) to communicate the results of the study. The summary report should have the general format:

INTRODUCTION
BACKGROUND
DESIGN ANALYSIS
CONCLUSIONS
RECOMMENDATIONS
REFERENCES

Each design problem statement should included the following format:

1. List of assumptions and justifications
2. Sizes and number of unit operations and specifications of the oxygen delivery facilities
3. Print out of flow diagram of design
4. A stream report, economic report, and environmental report under average conditions included in an appendix
5 Other information you deem important and necessary.

NOTE : Any questions should be directed to Brian Bush(Bush@engr.sc.edu)

- Office Hours MWF 11:00 a.m.-12:15 a.m.
  TH 3:00 p.m.-5:00 p.m.

**STUDENT EVALUATION**
**of**
**Case Study Module**

1. Instructor: Date: Major: GPA:

2. List the number of the case study evaluated?

3. How did the case study help or hinder the learning process? (What were the advantages and disadvantages of using the case study)?

4. To what extent did the case study module help you learn the fundamental concepts in the course?

5. To what extent did the case study module help you visualize the practical design aspects of the course?

6. If you could get the software developer to change any aspect of the program, what would you suggest and why?

7. Did you consult with the user's manual at any time during the course? If yes, how helpful was the manual? If no, why not?

8. Would you recommend the usage of the case study module as part of future course instruction? Why?

9. If you could make any changes to the case study module, what would you suggest and why?

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
STUDENTS EVALUATION OF INSTRUCTION

ourse ________ ____________________ Instructor ______________ Term Spring Year 1997

The instructor clearly stated the instructional objectives of the course.
(1) inadequately (2) poorly (3) adequately (4) well (5) very well

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The instructor clearly stated the method by which your final grade would be determined.
(1) inadequately (2) poorly (3) adequately (4) well (5) very well

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The instructor clearly explained any special requirements of attendance which differ from the attendance policy of the University.
(1) no special requirements stated (2) no (3) yes

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The instructor graded and returned the student's written work (e.g., examinations and papers) in a timely manner.
(1) inadequately (2) poorly (3) adequately (4) well (5) very well

---

The instructor met the class regularly and at the scheduled times.
(1) inadequately (2) poorly (3) adequately (4) well (5) very well

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The instructor scheduled a reasonable number of office hours per week.
(1) no hours scheduled (2) no (3) yes

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Please indicate your satisfaction with the availability of the instructor outside the classroom by choosing one response from : scale below. (In selecting your rating, consider the instructor's availability via established office hours, appointments, and ıer opportunities for face-to-face interaction as well as via telephone, e-mail, fax, and other means)
(1) very dissatisfied (2) dissatisfied (3) satisfied (4) very satisfied

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During the semester, how often did you seek assistance or attempt to seek assistance from the instructor outside of class?
(1) never (2) less than once a month (3) about once a month (4) several times a month (5) weekly

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What is your classification?
(1) freshman (2) sophomore (3) junior (4) senior (5) graduate

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What is your cumulative G.P.A. ?
(1) first semester (2) 2.00-2.49 (3) 2.50-2.99 (4) 3.00-3.49 (5) 3.50-4.00

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What grade do you anticipate in the course ?
(1) F (2) D or D+ (3) C or C+ (4) B or B+ (5) A

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Why are you taking this course ?
(1) elective in my major (2) elective outside my major (3) degree requirement

---

How beneficial were the textbook and other aids utilized in the course?
(1) inadequate (2) barely adequate (3) fair (4) good (5) excellent

---

To what extent does the instructor exhibit command of the subject matter?
(1) inadequate (2) barely adequate (3) fair (4) good (5) excellent

---

How beneficial were the instructor's responses to student questions?
(1) inadequate (2) barely adequate (3) fair (4) good (5) excellent

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Based on the instructor's presentation; he/she was prepared for the class:
(1) not applicable (2) rarely (3) sometimes (4) usually (5) almost always

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7. To what extent did the examinations reflect the course objectives and the material emphasized in class?
(1) very poorly (2) poorly (3) fair (4) good (5) excellent

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In your opinion is the instructor concerned about the students as individuals?
(1) no opinion (2) unconcerned (3) concerned

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The overall effectiveness of the Instructor in this course is:
(1) terrible (2) poor (3) fair (4) good (5) excellent

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The overall quality of the course is:
(1) terrible (2) poor (3) fair (4) good (5) excellent

---

the space below write your comments which will help the instructor improve his/her effectiveness as a teacher. Include any rengths or weaknesses which are not adequately revealed by the questionnaire. In addition, your reasons for any particularly gh or low ratings will be useful.

**Case Study**
**Student Evaluation from 551**

**Question #1:** List the number of students involved in each case study?

Number of students: 6 undergraduates students Ave. GPA: 3.1

**Question #2:** List the number of the case study evaluated?

- Case study #1 was given as an example
- Case study # 2 and 3 were given as problems
- Copper Union database

**Question #3:** How did the case study help or hinder the learning process? (What were the advantages and of using the case study)?

**Advantages:**

- Helped with application of class material
- It explained a lot of little details of a waste treatment plant design and operation.

**Question #4:** To what extent did the case study module help you learn the fundamental concepts in the course.

- Above average
- Good
- Not very good

**Question #5:** To what extent did the case study module help you visualize the practical design aspects of course.

- Excellent
- Pretty good

**Question #6:** If you could get the software developer to change any aspect of the program, what would you suggest and why?

- Provide more real examples of their software
- Increase the number of unit operation allow in one simulation
- Make the software more user friendly
- The problem is to sensitive because it kicks you out for entering the wrong numbers.
- Increase the number of unit operations that can be combined in one simulation.
- Add more options for operations that can be combined in one simulation
- Check divide by zero error because it terminates the program if the user neglects to input a flow.
- Check influent component percentage because if you change your flowrates or even enter the stream and don't change anything, the programs says the mass percentages don't add up to 100 percent. However, the mass percentages add up to 100 percent.
- Make the [OK] button the default selection on the simulation data sheet for unit operation and not the

reaction button.

- Have a dialog box pop up when doing the iterations which allows the user to pause calculation and check the status of lines or cancel calculation.

**Question #7:** Did you consult with the user's manual at anytime during the course? If yes, how helpful was the manual? If no, why not?

**Yes Responses:**

- It was moderately helpful
- It was pretty good

**No Responses:**

- Because of it's simplicity

**Question #8:** Would you recommend the usage of the case study modules as part of the future course instruction? Why?

**Yes Responses:**

- It helps the student practice and apply concepts.
- Yes, but need to expand the complexity

**No Responses:**

- Need to expand it's completeness.
- Superpro Version 2 has too many bugs

**Question #9:** If you could make any changes to the case study module, what would you suggest and why?

- Expand the scope of the case study

**Graduate Student Evaluation**
**Brian M. Bush**

**Question #3:** How did the case study help or hinder the learning process? (What were the advantages and of using the case study)?

**Advantages:**

- It tied the course material with real application work.
- Gave examples of results of unit operation under different conditions.
- It demonstrated different types of design for waste treatment plants.
  Case #2 - showed an illustration of industrial treatment.
  Case #3 - Showed a full scale plant design of waste treatment plant.
- Showed how engineering knowledge is applied using computer software.
- Displayed the big picture of a waste treatment plant.
- Show impacts on environmental properties under different loading conditions.

**Disadvantages:**

- Superpro Ver. 2.0 software is not easy to use and master
- Students depended to much on the software to answer the case study problem
- Not detailed enough to be presented in the 551 class because the class is not a design class
  A) Lacked background information to explain the difference in the case study modules

**Question #4:** To what extent did the instructional module help you learn the fundamental concepts in this course?

- Tie the individual unit operation into a big picture
- Extended the learning process because of the quickness of the program

**Question #5:** To what extent did the case study module help you visualize the practical design aspects of the course?

- It provided a technical view on how different unit operations are tied together.

**Question #6:** If you could get the software developer to change any aspect of the program, what would you suggest and why?

A) Make the program less sensitive to input data such that the inputs do not cause the program to terminate it's operation.
- For example, if no input flows are not entered, it would terminate the program

B) Put a undo button in the program

C) Add a liquid exiting stream from the anaerobic digester
- Such a designer could recycle the stream

D) Increase the number of unit operations on the simulation

- Could not add nitrification and denitification such that I could perform different load values such that one could use one simulation.

E) Address in the manual that some of the database components are incomplete which will effect the environmental properties in the simulation.

- In the database provided by in the program, the ammonia environmental properties have all zero values

F) Make the air flotation unit calculate the area of the length, width, and amount of air used in the unit operation.

G) Add a simulation run window so that you could cancel the simulation run or show any important errors

H) Add an error check routine to display any missing information on the flowsheet

I) Make the program recognize that streams beside the influent is a input stream because this makes the mass balance off by the amount entered in the streams that are entering the simulation. For example, the amount of water entered in the belt press for washing is not counted as a input and the mass balance is off by a number plus the input stream of the belt filter press.

**Question #7:** Did you consult with the user's manual at anytime during the course? If yes, how helpful was the manual? If no, why not?

- No, because the manual does not show or define how to effectively run a simulation.

**Question #8:** Would you recommend the usage of the case study module as part of future course instruction? Why?

- Yes because the module was beneficial to class understanding of the class material

**Question #9:** If you could make any changes to the case study module, what would you suggest and why?

**Polytech**

A) Need more input as why the input was provided

- Why the Case Study #2 lacked a sludge handling process
- Why case study 2 used the influent as income in the economics section
- What the overall goals of each case study
- Why the polymer was removed out of case study 2 and 3.

B) Address reactions provided with the case studies

- Why all the case studies coupled the synthesis and oxidation equation

C) Give more detail on a background of the case study

- What region are the case study modules basis

D) Give more information on how to present the case study

E) Give more information on why certain values were entered in the economic section
- Why each stream was used as income

F) Give a focus on the case study such a sample NPDES permit.
- What was case study number 2 overall goal for treating the industrial waste
- What was the requirements for case study 3 since it used polymers to increase the efficiency of the secondary clarifier.

## Cooper Union

A) Provide more operating data so a good representation of average, peak, and minimum flows can be determined

B) Provide some limits from the NPDES permit.
- Since the flows were so large, the NPDES requirements would give a regional treatment requirements

C) Give more detail on a background of the case study

D) Provide a sample design of one of the databases

# Municipal Wastewater Treatment Facilities

## Case 1.

The population increase in the state of Easy Living has brought about growing demands for the establishment of new cities in the state. The cities would be constructed on land owned by the state. The state would sell the land to the developers. However, it is the responsibility of the state to supply these new communities with water, energy, schools, and recreation areas. The state is also responsible for building municipal wastewater treatment facilities for these new cities. A typical city would have the potential for approximately 100,000 to 200,000 residents over the next 30 years. These new cities will also attract industries such as food processing, metal and light chemicals. Typical wastewater influent streams would resemble those of an urban city. Design a suitable wastewater treatment facility for one of these cities.

This project requires a teamwork solution.

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## Case 2.

Design a wastewater treatment facility that can handle 20 MGD. Sources of wastewater are commercial, household and pretreated industrial waste. The following table gives stream influent characteristics:

| Component | Concentration (mg/l) |
|---|---|
| BOD | 18 |
| Suspended Solids | 180 |
| Biomass | 26 |
| Debris | 70 |
| Copper | 0.3 |
| Lead | 0.1 |
| Organic Compounds | 3.0 |
| Oil and Grease | 1.0 |
| Water | 999,600 |

The treatment process should involve among others; screening, sedimentation, clarification, thickening, digestions, and filtration. You can use your own unit operations and unit processes scheme or any wastewater treatment software such as SuperPro Designer. The effluent stream is discharged into a nearby river.

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# Case 3.

The population increase in the state of Easy Living has brought about growing demands for a new supply of potable water, especially in the area of Freedom City (a residential community). It is anticipated that the city will have a population potential for approximately 50,000 new residents over the next 50 years. 1,000 visitors per day are also epected when the new shopping mall is completed within the next two years. The existing treatment facilites are limited and allow no future expansion. The purpose of any treatment plant is to provide water that is chemically and bacteriologically safe for human consumption and domestic use. A surface water reservior is located 8 miles north of Freedom City and is assumed to contain enough water supply at all times. Preliminary studies by the Pussy Cat water company indicate that the average use of water per capita is 300 gallons per day. This includes residential interior, business, schools, recreation and fire fighting use. It also indicates a peaking factor equal to 2. The company also studied the quality of the reservior water. Analysis of a typical sample of the surface reservior water gave the following information:

1. amount of dissolved oxygen = 5 mg/L
2. turbidity = 8 NTU
3. suspended solids = 30 mg/L
4. BOD5 = 8 mg/L
5. dissolved inroganic salts (mostly calcium) = 300 mg/L
6. 2000 fecal coliform per 100 mL
7. some debris and fish
8. no radioactive contaminants

The city has designated a space located 4 miles south of the reservior as a site for the construction of a new water treatment plant. It has an elevation 400 ft lower than the reservior. This elevation is also 200 ft higher than the ground surface of the city.

Design a suitable water treatment plant that solves the water shortage problem and meets the EPA standards. The following design criteria apply:

1. Minimum detention time in a sedimentation tank is 4 hours
2. Maximum overflow rate in a sedimentation tank is 30 $m^3/m^2$ a day.
3. Efficiency for sedimentation tank no less than 85%
4. Filtrate rate in a treatment filter is 3 $L/m^2$ per second
5. Pumping station efficiency is no less than 80%
6. Flocculation average detention time no less than 30 minutes

Justify and design parameters used and give references for any assumed values.

# Pharmaceutical Wastewater Treatment Systems

## Case 1.

Curepharma is engaged in the production of soft gelatin capsules (vitamins and dietary supplements). These products consist of gelatin shells and medicine or vitamin fill materials. In order to produce softgels, the gelatin and medicines or vitamins muse be processed.

The gelatin is melted down to a liquid, then cast into a sticky ribbin like form of specific dimensions. This ribbon is then lubricated with oil so it can be drawn through the mechanical components of the encapsulations machine without sticking to the machine parts. The fill material must be liquid and must have an edible oil base since a water base liquid would destroy the gelatin ribbon. Rotary dies cut capsule shapes fromthe ribbons while a pump simultaneously fills the capsule shell as it is being formed. This process consumes 20,000 pounds of processed gelatin per day and 3,000 gallons of food grade oil per day.

Because the products are manufactured for human consumption, the cleanlienss of equipment is very important. To remoive the oils and vitamin and medicine powders from tanks, trays, pumps, and other manufacturing equipment, manual and automatic washing processes utilize strong detergents which emulsify the oils and powders.

The wastewater resulting from the procesures discussed above is rich in oils and high in pH and heavy with sediments in the form of mineral and vitamin powders. While all the oils and soaps used are non-toxic and FDA approced, the company's wastewater permit requires and effluent which meets the EPA levels of oil and grease and acceptable pH values. Design a treatment system which can handle a 10,000 gallon per day of wastewater produced by Curepharma.

## Case 2.

A wastewater system of a vitamin gel capsule manufacturing company collects waterwater from the following areas:

1 - Formulation

The pot wash sink

2 - Wash Room
  a- Capsule Tray washing machine
  b- Formulation Tank washing pit
  c- Formulation Tank Wash Room sink
3 - Maintenance Shop
  a- Parts washing sink
  b- Pump washing pit
4 - Porter station
  a- Mop Washing pit

The company uses food oils and non-toxic petroleum products to facilitate the encapsulation process. The wastewater resulting from the manufacturing process is high in oils and grease (5,000 - 15,000 ppm) and heavy sediments (mineral and vitamin powders). Its pH ranges from 9 to 12 and its BOD is between 2,000 and 5,000 mg/lit.

Design a treatment facility capable of producing an effluent that meets EPA standards and regulations. The company generates approximately 20,000 gallons wastewater per day.

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# Case 3.

The growth of the pharmaceutical industry has been steady over the past years. Their products are classified according to the SIC system as a) medicinal, chemical, and botanical products, b) pharmaceutical preparations, c) in vitro and invivo diagnostic substances, and d) biological products, except diagnostic substances (US EPA). The pharmaceutical industry utilizes batch type reactions to manufacture its products. Cleanliness is an important factor since the products are eventually consumed by humans. Typical pharmaceutical products include vitamin supplements, aspirin, saline solution, and shampoos.

Depending upon the specific product, the raw materials, processes employed, generated wastes for the industry vary. The industry can be divided into the followinf sections:

1. research and development
2. chemical synthesis
3. natural product extraction
4. fermentation
5. formulation

The fifth segment will be analyzed, specifically a soft gel capsule production.

Soft Gel Capsule Production

The formulation process involves the production of gels, capsules, creams and ointments. In the production of soft gels, the capsules are prepared by melting gelatin into rotary die plates. To avoid sticking to the rotary plates and other mechanical components, oil is used to lubricate the equipment. A capsule is formed when the rotary plates are brought together combining the two halves of the capsule shell. Afterwards, the fill material, a non-aqueous solution, is injected into the empty shell capsules, thus producing a soft gelatin capsule. The finished product can be a vitamin supplement or an over the counter medicine.

Process Waste Description

The wastes generated by the soft gel capsules production results from the cleaning and sterilization of equipment, chemical spills, rejected products, and lubricants. The equipments must be thoroughly cleaned since the capsules are for human consumption. The oil and medicine powder residues from the machines are mechanically and heand cleaned. Strong detergents are utilized to emulsify the oils and powders. A typical waste stream composition includes oil, grease, and hydrocarbons. Therefore, the industrial pretreatment facility for soft gel capsule production must handle oils and sediments. In addition, the water is basic with a pH range os 9-12.

For a plant with the following Influent Stream Characteristics;

| Component | Flow Rate, kg/hr | Concentration, gm/lit |
|---|---|---|
| Oil and Grease | 150 | 93.8 |
| Petroleum Hydrocarbons | 340 | 212.5 |
| TSS | 10 | 6.3 |
| Water | 1100 | 687.5 |

Design a treatment facility that will produce and effluent within the range of POTW's regulations. The treated effluent is ultimately discharged into sewers.

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# Electronics and Electrochemical Industrial Waste Treatment Facilities

## Case 1.c

The Printed Circuit Board: Electroplating

Since its development, printed circuit board has virtually replaced hand wiring as a means of connecting electronic circuitry in military and commercial applications. A printed circuit board consists of a circuit pattern placed on a nonconductive base. These patterns are made with conductive metals such as nickel, copper and aluminum. Depending on its use, the design and complexity of the printed circuit board varies.

The wastes generated in the production of printed circuit (PC) boards range from solid wastes such as failed PC boards to hazardous wastes such as nitric acids. The principal sources of wastes are; cleaning and surface preparation operations, catalst application and electrolyze plating operations, pattern printing and masking operations, electroplating and etching operations

The materials used for each operation dictate the characteristics of the wastewater resulting from such operation. It includes spent solvents, airborne particles, acids and metals.

In a typical electroplating process, the influent waste stream consists of the following:

| Component | Flow Rate (kg/hr) |
|---|---|
| copper | 14.5 |
| nickel | 12.2 |
| lead | 10.4 |
| cyanide | 6.2 |
| water | 500 |

Design a treatment facility capable of treating 4000 gallons per day of liquid waste. The effluent stream is to be discharged into a public sewer system. Common unit operations used in such treatment facilties might include among others; ion exchange, granular media filtration and neutralization.

---

# Case 2.

Pollution Prevention or Reduction at the Source; Computer Impact Printers:

Printbands are parts of many compnenet parts used in the manufacturing of impact printers, Orintbands are stainless steel belts chemically machined via a photolithographic process in which stainless steel panels are treated with etching solution of ferric chloride and hydrochloric acid (IBM).

$$Fe + 2\ FeCl_3 = 3\ FeCl_2$$

The dissolved streel spent etchant (ferrous chloride) solution contains also chromium and traces of molybdenum. The treatment of the waste etch solution involves neutralization of the hydrochloric asid and precipitation of metals. The presence of chromium deposits in the sludge makes it hazardous and results in an expensive disposal cost.

Expansion of the computer industry in the last 15 years requires large investment in on-site sludge handling and off-site disposal treatment. To handle the voluminous waste etch solution alternative technologies which 1) ensure continuous supply of ferric chloride, 2) encourage conservation practices, and 3) reducewaste and minimuze treatment costs are needed.

Suggest, discuss and design at least two alternative strategies that will address this problem.

---

# Case 3.

Treatment Plant from and Electrochemical Industry

Wastewater treatment system design requires two phases, (1) the identification of the chemical compounds in the waste, the sources of these compounds in the industrial process, the toxic effects of these chemicals, the concentration lvels of these chemicals and the technologies capable of reducing the concentrationss of these contaminants to an acceptable non-toxic levels, (2) the selecting, combining and arranging of the unit treatment operations and processes that will achieve the treatment objectives.

The design or simulation of a chemical plant or a wastewater treatment facility becomes more realistic with the use of actual site data. Whether it involves utilizing the quantitative aspects of the influent or effluent stream concentrations or basically just obtaining a listing of the chemicals used, the student has a better chance of practically solving or simulating the facility. In turn, the sizes of the unit operations and costs of the plant will not be ridiculously meaningless.

The wastes generated by an electrochemical industry have to be treated first before discharging it into the sewers. The main source of pollution comes from two general chemical categories: 1) heavy metals and 2) organics. The typical influent wastes' characteristics include chromium, copper, benzene, and toluene. The concentration values for these and other chemicals can be obtained from the electrochemical folder in the enviro.wb2 database. The effluent stream from this database readily meets the stringent EPA guidelines. Design a feasible, cost-effective treatment facility that can reduce the influent stream characteristics to the desired effluent stream values. Note that the flow rates are not given. Look for the typical flow rates used in this industry and state any assumptions made.

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# Battery Industries

## Case 1.

The waste generated by battery industries contains chemicals that are not only toxic but also resistant to degradation. Thus, they represent serious health, safety and environmental problems. Manufacturing processes involve casting, chemical reactions, pasting and curing, container and tank formation of batteries, quality control work,... Waste that could result from such processes include among others; acids, alkalies, heavy metals,oil and greases, metallic dust, and spent and washing water.

reducing pollution at the source through new technologies or minimizing toxic waste is an objective of these industries. Companies are looking for ways to replace some of the raw materials used. They are also investigating more efficient methods that can recycle some of the compounds foudn in the waste.

Until new technologies are found, industry isrequired to treat its waste before discharging into sewers or downstream reserviors. For such an existing battery manufacturing company, design a treatment plant capable of treating 1000 gallons of liquid waste per day.

---

## Case 2.

Pollution reduction and prevention in industry became an important objective and a priority for both the Environmental Protection Agency and the manufacturing companies.

Materials used in battery industries (lead, chromium, sinc, mercury, arsenic, camium) are high sources of toxicity. Battery-related pollution is found in raw materials, manufacturing processes, use and disposal.

The "Forever Working" Battery Company is under construction. The company is a small to medium organization. Preliminary and pilot plant studies indicate that the generated influent waste stream will be around 500 gallons per day and includes the following;

**Parameters (mg/lit)**

| | |
|---|---|
| Chemical Oxygen Demand (COD) | 1200 - 1300 |
| Total Suspended Solids | 60 - 70 |

–

**Heavy Metals (mg/lit)**

| | |
|---|---|
| Copper | 1 - 1.5 |
| Lead | 30 - 36 |
| Nickel | 0.5 - 0.7 |
| Silver | 0.01 |
| Zinc | 3 - 5 |
| Chromium | 1 - 1.2 |
| Cadmuim | 0.1 |
| Arsenic | 0.2 - 0.4 |

–

**Other Substances (mg/lit)**

| | |
|---|---|
| Oil and Greases | 8 - 10 |
| Cyanide | 0.04 - 0.06 |

You have been asked to lead a team responsible for assuring that the "Forever Working" Company meets and sustains the regulations of all federal and state environmental agencies. Develop a treatment plan that will accomplish this task.

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# SOLUTION TO CASE STUDY #3: Municipal Watewater Treatment Facilities

## Problem Statement for Case 3.

The population increase in the state of Easy Living has brought about growing demands for a new supply of potable water, especially in the area of Freedom City (a residential community). It is anticipated that the city will have a population potential for approximately 50,000 new residents over the next 50 years. 1,000 visitors per day are also epected when the new shopping mall is completed within the next two years. The existing treatment facilites are limited and allow no future expansion. The purpose of any treatment plant is to provide water that is chemically and bacteriologically safe for human consumption and domestic use. A surface water reservior is located 8 miles north of Freedom City and is assumed to contain enough water supply at all times. Preliminary studies by the Pussy Cat water company indicate that the average use of water per capita is 300 gallons per day. This includes residential interior, business, schools, recreation and fire fighting use. It also indicates a peaking factor equal to 2. The company also studied the quality of the reservior water. Analysis of a typical sample of the surface reservior water gave the following information:

1. amount of dissolved oxygen = 5 mg/L
2. turbidity = 8 NTU
3. suspended solids = 30 mg/L
4. BOD5 = 8 mg/L
5. dissolved inroganic salts (mostly calcium) = 300 mg/L
6. 2000 fecal coliform per 100 mL
7. some debris and fish
8. no radioactive contaminants

The city has designated a space located 4 miles south of the reservior as a site for the construction of a new water treatment plant. It has an elevation 400 ft lower than the reservior. This elevation is also 200 ft higher than the ground surface of the city.

Design a suitable water treatment plant that solves the water shortage problem a nd meets the EPA standards. The following design criteria apply:

1. Minimum detention time in a sedimentation tank is 4 hours
2. Maximum overflow rate in a sedimentation tank is 30 $m^3/m^2$ a day.
3. Efficiency for sedimentation tank no less than 85%
4. Filtrate rate in a treatment filter is 3 $L/m^2$ per second
5. Pumping station efficiency is no less than 80%
6. Flocculation average detention time no less than 30 minutes

Justify and design parameters used and give references for any assumed values.

# Introduction

Water treatment plants are designed to achieve two basic goals: "speed up the natural purification process that occur in streams, rivers and lakes and reduce toxic contaiminants that might otherwise interfere with the natural process."

In the design of a water treatment facility for the city of Freedom, environmental percussionsmust be adressed. The areas of most concern are the air, water and local ecology surrounding the plant. The following should be considered:

(1) Air
- any gases or vapors resulting from the treatment be non-toxic,
- any chemicals used in the treatment are properly stored and processed,
- emergency backup system for contamination is installed.

(2) Water
- water returning to the environment is non-toxic,
- waste products are treated before discharging,
- efficient distribution system,
- prevention design for flood or overflow.

(3) Ecology
- safety of fish and marine life,
- preservation of non-aquatic animal wildlife,
- maintenance of existing wildlife habitat,
- reforestation of local vegetation,
- environmental landscaping.

The building facilities will include besides the treatment sections, an administration section, a laboratory and workshop section, water storage facility and several parking lots. The site area should allow further expansion. The design should be flexible to permit any control adjustments required to compensate for any changes in the composition and behavior of the influent and its contents. Finally a proper on-site safety program that includes regular training in safety and emergency procedures should be established.

The major stages of the treatment process are:

1. Intake and Screening
2. Coagulation and Flocculation
3. Sedimintation
4. Filtration

5. Disinfection

---

# The Design Process

### Intake and Screening

Because of the geography of the reservoir location, the treatment site and city elevation, the screening operation will take place along-side the water reservoir. The design will rely on the natural water pressure of the reservoir to force the water through the screening section. Placing the screening operation in close proximity to the reservoir allows quick and safe return of the retained fish and other aquatic life to their natural habitat. Effective screening should remove approximately 10% of the suspended solids and all the debris.

| | | |
|---|---|---|
| Daily amount of water used by residents | = 50,000 x 300 | = 15,000,000 gallons |
| Daily amount of water used by visitors | = 1000 x 300 x 2/24 | = 25,000 gallons |
| Maintenance, spillage and evaporation | | = 5,000 gallons/day |
| Average daily consumption | | = 15,030,000 gallon |
| Peak flow | = 2 x 15,030,000 | = 30,060,000 gallons/day (347.92 gallons/sec) |

To avoid potential intake of surface debris and bottom sludge, the intake pipe entrance is located at 30 ft. below the surface. The pipe opening is covered with a grating composed of metal bars spaced 2 inches apart to prevent the influx of extremely large debris.
Inlet velocity should not exceed 3 ft/sec to prevent debris from being forced through the screens.

v = 3 ft/sec

Q = 347.92 x 8.33 / 62.4 = 46.5 $ft^3$/sec

A = Q / v = 15.5 $ft^2$ = 3.14 D2 / 4

D = diameter of pipe = 3.44 ft

take D = 4.5 ft. Use concrete as material of the pipe due to its durability and low cost.

As recommended, head loss due to each screen should not exceed 0.3 ft.

Now, the equation of Bernoulli will be used to calculate the location of the screening facility. Taking the inlet velocity as zero (very large reservoir) and assuming atmospheric pressure and using Darcy-Weisbach expression for head loss, the equation reduces to:

$$30 = v^2 / 2g + H_b + 0.0006 L * v^2$$

where

Hb = height of screen above intake level
L = the length of the pipe.

Solving the above equation iteratively gives a slight drop in elevation from reservoir surface. Taking into account the natural grade in the vicinity of the reservoir, location of screening would be 30.5 ft from water edge.

Two wedgewire rotary screens will be used, one with 1/2 inch mesh to remove large debris and aquatic life, the second with 1/8 inch mesh to remove suspended particulate matter. Based on recommended value of screen capacity of 10 to 30 gal / $ft^2$-min, screen dimensions are 5 ft diameter and 10 ft long each.

Waste accumulates on the screening surface is scraped using a rubber flange and sprayer system. Debris is collected in a waste tank of dimensions 9 x 6 x 6 ft. Aquatic life will be returned to the reservoir. Periodic cleaning of tank is required. The filtered water enters a catch basin tank, from which it proceeds to the second screen. The basin tank has dimensions of 8 x 15 x 12 ft assuming 30 sec lag.

A backup screening system should be available and should be easily mounted in case of any rotary screening failure. Screening is housed on floor of dimensions 50 x 30 ft.

After screening, water is transported in concrete piping system of 4.5 ft diameter to the treatment facility using decreasing gradual elevation mechanism.

## Coagulation and Flocculation

This operation is carried out to form larger particles to facilitate their settling and reduce turbidity. Chemicals such as metalic salts (coagulants) are added to water at the inlet section of the flocculator to help agglomerate the particles. Mixing takes place in this section to bring more collision between particles ,so flocs can be formed. The flocs then move to the detention section where wooden paddles regulate the motion of these particles. Chemical dosages can be determined experimentally or by searching existing data. In our case a mixture of Alum, cationic polymer and caustic soda is used. The dosage is as follows:

| | |
|---|---|
| Alum | 2.4 to 3.0 mg/L |
| Cationic polymer | 0.5 to 2.0 mg/L |
| Caustic soda | 2.0 to 4.0 mg/L |

These data were obtained from a typical treatment facility.

Storage and piping for chemicals are made of polyethylene to resist corrosion. Hydraulic jump is chosen for mixing because it requires minimum maintenance. Coagulant should be added at the point of maximum turbulence.

Mixing Time = 3 minutes

Detection Time t = V/Q

Assuming t = 50 min,

$$V = 50 * 60 * 46.5 = 139{,}528 \text{ ft}^3$$

Use four flocculation tanks each of volume 139,528/4 = 34,882 $ft^3$

Water leaves screening system and enters the mixing section with a velocity = 3 ft/sec. Assuming head loss of 2 ft through the hydraulic jump mixing section, water enters the settling section with velocity = 1 ft/sec.

Velocity of paddle = 2 ft/sec = $v_p$

$$P = \text{Power} = C\, A_p\, (\text{Density})\, v_p^3 / 2$$

$$= 1.8\ (0.2)\ (\text{Cross-sectional area of tank})\ (62.4)\ (2^3) / 2$$

$$= 37.908\ L^2 * \text{Watt}$$

Let

$$G * t = 105 = (50 * 60)\, G$$

$$G = 33.33\ \text{sec}^{-1}$$

$$G^2 = P / (V * \text{viscosity}) = 37.908\ L^2 / (34882 * 0.00066)$$

Therefore,

L = 25.97 ft

V = L2W = 34,882 ft3 = tank volume

W = 51.72 ft

The tank dimensions are 25.97 * 25.97 * 51.72

$$\text{Total } A_p = 0.2 * L^2$$

$$= 134.88 \text{ ft2}$$

Using 20 paddles with one ft. spacing,

$$\text{Area of paddle} = 134.88/20 = 6.74\ ft^2$$

with dimensions 3.54 * 1.9 for the paddle.

Assume velocity of inflow to settling section = 1 ft/sec

Using steel pipes to inlet and exit from tank:

$$Q = 46.5$$

Using 4 pipes,

$$Q = 46.5 / 4 = 11.625\ ft^3$$

$$3.14 * r^2 * v = 11.625 = 3.14 * r^2 * 1$$

$$r = 1.92 \text{ and } d = 3.84\ ft.$$

Tanks are made of concrete and lined with polyethylene because of its chemical resistance.

## Sedimentation

Suspended solids originally large and those formed by flocculation are given enough time to settle by gravity. Sedimentation is responsible for the removal of the majority of the suspended solids (over 80%). The technique used here is that of a horizontal flow sedimentation. Quiescent conditions should be established in the sedimentation tank through slow and smooth flow of water. A large detention time is required, i.e. a long and narrow tank is used. Sedimentation tanks have four zones: (1) inlet zone where very little settling is observed and the flow should be evenly distributed throughout the tank, (2) settling zone where particles start to settle as a result of quiescent conditions, (3) sludge storage zone where most of the settling takes place. The sludge at the bottom should be removed preriodically to allow for more settling and prevent particles from moving back upward and disturb the flow, and (4) outlet zone where partially clear water exits the tank and moves to the filtration step.

To facilitate the design, four particle sizes ranging from 0.004 inch to 0.2 inch, all with the same density of 66 lb/ft3 and each size contributes the same amount to the total suspended solid concentration. An automated sludge removal will be constructed as part of the tank. This is a conveyor type chai n pulling transverse blades which sweep the sludge toward a sump.

Total suspended solids concentration = 30 mg/L

= 46.5 * 28.316 * 0.03 = 39.50 g/sec

= 0.087 lb/sec

Assuming the smallest particles as 0.004 inch or 0.1 mm, particles with diameter s larger than 0.1 mm will be removed completely.

Using Stokes Equation for the smallest particles,

$$v_{small} = (density_s - density) * g * d^2 / (18 * viscosity)$$
$$= (66 - 62.4)(32.17)(0.00033)^2 / 18 * 0.0007)$$
$$= 0.00102 \text{ ft/sec.}$$

Assuming 50% of these particles is removed,

$$v_{average} = 0.00102 / 0.5 = 0.00204 \text{ ft/sec}$$
$$d_{average} = [(18 * viscosity * v_{average}) / (g * (density_s - density))]^{0.5}$$
$$= 0.00047 \text{ ft}$$
$$Re = (0.00047 * 0.00204 * 62.4) / 0.0007 = 0.085 < 0.3$$
$$q_o = 30 \text{ m}^3 / (\text{m}^2 * \text{day}) = 0.0011574 \text{ ft}^3 / (\text{ft}^2 * \text{sec})$$

Using 4 hours sedimentation time,

$$V = \text{volume} = Q*t = 46.5 * 4 * 3600 = 669{,}600 \text{ ft}^3$$
$$Hmax = \text{height} = v*t = 0.00204 * 4 * 3600 = 29.38 \text{ ft}$$
$$A = 46.5 / qo = 46.5 / 0.0011574 = 40{,}184 \text{ ft}^2$$
$$H = 669{,}600 / 40{,}184 = 16.66 \text{ ft} < 29.38 \text{ ft}$$

Two tanks will be used , each of volume = 669,600 / 2 = 335,000 $ft^3$ approximately.

$$A = 335{,}000 / 16.66 = 20{,}100 \text{ ft2}$$
$$q_o = 46.5 / (2 * 20{,}100) = 0.0011567 \text{ ft3/ft2}$$

Assuming 300 ft length,

$$w = 20{,}100 / 300 = 67 \text{ ft}$$

Stream exit velocity = 300 / (4 * 3600) = 0.0208 ft/sec

Water exits the sedimentation tank and continues on to filtration.

## Filtration

The remaining suspended solids (10 to 15 %) are removed by filteration. The resulting effluent is clear and colorless.
Filteration rate is constant at 3 lit / sq.m-sec and the head loss should not exceed 9.8 ft. Eight filter, each with filteration capacity of 4. million gallons per day are used. Because of the high filteration rate, the rapid sand filteration process is used. A layer of anthracite occupies the upper part of filter, sand and anthracite are chosen because of their particle size, porosity and specific gravity. The particles that escapes the lage and light anthracite layer will be trapped in the find sand layer. An 8 inches gravel layer is placed between the sand layer and the underdrain system to prevent sand from slipping into the underdrain system.The design is based on the peak conditions to ensure smooth operation at any time. The underdrain system consists of central manifold with laterals, 7 inches diameter steel pipes on each side containing a number of orifices (radius = 0.25 inches). A back washing system is to be used to remove any clogging and prevent any dramatic increase in the headloss or shearing stress on the cake. A recommended rate of washing is 15 to 20. gpm / sq.ft. The backwash valve has to be opened slowly to avoid upsetting the filter layers. The differences between the specific gravities of the layers materials allow the filter media to expand and fall without intermixing. The low specific gravity suspended particles are disposed through a system of troughs. A control system is used to control the constant flow rate operation.

number of units= 30.06 / 4 = 7.5 units
use 8 units each of capacity = 4 millon gallons per day
3 lit / sq.m -sec = 4.43 gallons / sq. ft-sec
filteration area per unit = 4 million / 24 * 60 * 4.43 = 630. sq.ft
with dimensions of 42 x 15 ft

total headloss = sum of headlosses over the three layers
delta P = { L / g ( fluid density * $v^2$ (1-porosity) / d * $porosity^3$ * 150 * (1-porosity) / Re + 1.75)
Assuming L = 2 ft for anthracite and 1 ft. for sand
delta $P_{sand}$ = 1.8
delta $P_{anthracitc}$ = 4.72
delta $P_{gravel}$ = 1.22
total pressure head loss = 7.73 ft
where

| | |
|---|---|
| sp gravity sand = 2.65, | d = 0.002 ft. |
| sp gravity anthracite = 1.45, | d = 0.005 ft. |
| sp gravity gravel = 4.5, | d = 0.003 ft. |
| superficial velocity | v = 0.5 ft/sec. |

Area of orifice / area of filter bed = 0.0001 - 0.2
N (3.14) $(0.02 \text{ ft})^2$ / 630 = 0.0216
N = number of orifices = 10,000
Area of laterals / area of orifices = 2:4:1
take ratio = 3.14:1 = n (3.14) $(3.5/12)^2$ / 10,000 (3.14) (.022)
Number of laterals n =160
Area of manifold / area of laterals = 1.5 - 3:1
a / 160 (3.14) $(3.5/12)^2$ = 3
a = 128 $\text{ft}^2$ with dimensions 40 * 3.2 ft
use space between orifices same as space between laterals. Each lateral has about 63 orifices. Tanks above the troughs are used for supplying the backwashing water. The filtrate now goes to the disinfection unit.

## Disinfection

Disinfection is done using chlorine. Chlorine is effective in killing harmful organisms. It also controls odor.
Chlorine is stored in cylinders, each of one ton capacity in a climate control room with sufficient ventilation and away from the sun.
Chlorination facility is housed in a separate building. Safety procedures must be used in storage transporting and processing chlorine. Piping should be PVC schedule 80 to resist corrosion. It is released as a solution into the water through diffusers constructed on the pipes carrying the gas solution along the bottom third of the basin.
Chlorine monitors and feed control system are installed to ensure 1.0 mg residual chlorine. A plug flow is preferred to help retain the water in the basin for the required detention time. Contact time between the gas and the water depends on the residual concentration of the chlorine, temperature, and pH of the water.

Recommneded dosage for 1.0 mg/L chlorine residual is 6 mg/L
Rate of Chlorine supply / day

= 6 (30.06) $(10)^6$ (3.76) / (454 * 1000)
= 1500 lbs/day

using a 2 inch diameter injection pipe

A = 3.14 (1) / 144 = 0.0218 $\text{ft}^2$

at a rate 75 gpm or 0.167 $\text{ft}^3$/sec

velocity of chlorine solution = 0.167/0.0218 = 7.66 ft/sec

Assuming a pH = 7 and average temperature of 35 F for winter,
to achieve 2 coliform / 100 mL

$$N_t/N_o = 2 / 1000 = (1 + 0.23\ t)^{-3}$$

$$t = 39.13$$

For a residual of 1. mg/L

$$\text{Contact time} = 39.13 / 1 = 39.13 \text{ minutes}$$

Use detention time of 60 minutes.

For summer with average temperature of water=60F, use detention time 30 minutes.

Volume of detention basin:

$$V = 46.5\ (60)\ (60) = 167{,}400\ ft^3$$

Use two 100,000 $ft^3$ basins with L/W > 20
Dimensions of basin are

h = 16 ft
W = 15 ft
L = 416 ft

velocity of water traveling the basin

$$v = 46.5 / (16 * 15) = 0.193\ ft/sec$$

Baffles are used to regulate the flow along the basin. Four baffles, 16 x 15 x 1/3 ft for each basin.

The disinfected water now goes to the distribution system.

| BERGEN COUNTY UTILITIES AUTHORITY (NJ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | MONTHLY AVERAGE VALUES | | | | | | | | | | | | |
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| | | | | | | | | | | | | | |
| BCUA FLOW (MGD) | 95.817 | 83.453 | 75.682 | 73.655 | 73.455 | 63.92 | 62.094 | 64.496 | 72.356 | 74.274 | 69.073 | 70.816 | 73.258 |
| BOD 5-DAY (INFLUENT) | 170 | 181 | 203 | 171 | 165 | 179 | 195 | 152 | 155 | 178 | 189 | 178 | 176 |
| BOD 5-DAY (EFFLUENT) | 26 | 17 | 26 | 17 | 18 | 20 | 18 | 17 | 17 | 19 | 16 | 19 | 19 |
| TSS (INFLUENT) | 194 | 234 | 262 | 228 | 208 | 226 | 275 | 227 | 211 | 222 | 237 | 219 | 229 |
| TSS (EFFLUENT) | 25 | 17 | 16 | 14 | 14 | 18 | 15 | 21 | 19 | 18 | 16 | 17 | 18 |
| AMMONIA-NITROGEN (influent), mg/L | 18.8 | 21.1 | 21.8 | 22.5 | 19.6 | 24.7 | 24.3 | 24.8 | 25.4 | 24.3 | 26.1 | 25.1 | 23.2 |
| AMMONIA-NITROGEN (effluent), mg/L | 16.1 | 18.1 | 19.2 | 15.7 | 16.3 | 18.6 | 18.3 | 20.5 | 20.3 | 19.4 | 20.9 | 20.6 | 18.7 |
| CYANIDE (effluent), mg/L | 0.06 | 0.04 | 0.11 | 0.06 | 0.05 | 0.05 | 0.06 | 0.04 | 0.04 | 0.07 | 0.07 | 0.04 | 0.06 |
| PHOSPHATE (effluent), mg/L | 2.69 | 3.46 | 4.29 | 2.72 | 3.85 | 4.81 | 5.07 | 5.4 | 5.86 | 3.71 | 3.28 | 3.18 | 4.03 |
| | | | | | | | | | | | | | |
| SQAR DATA (mg/kg) | | | | | | | | | | | | | |
| METALS | | | | | | | | | | | | | |
| arsenic | 6.8 | 0.33 | 0.34 | 0.22 | 1.25 | 1.1 | 0.55 | 0.94 | 0.35 | 0.4 | 4.65 | 7.3 | |
| beryllium | 0.36 U | 0.28 | 0.2 | 1.43 | 1.8 | 1.6 | 0.8 | 1.45 | 1.15 | 0.6 | 0.01 U | 0.01 U | |
| cadmium | 22.1 | 12.7 | 15.3 | 7.37 | 7 | 6.6 | 4.3 | 6 | 1.25 | 2.2 | 4.05 | 3.35 | |
| chromium | 223 | 292.6 | 330.5 | 261.9 | 518 | 490.8 | 354.2 | 454.5 | 66.7 | 223.2 | 33.9 | 141.7 | |
| copper | 513 | 651 | 694.8 | 793.9 | 742.8 | 562 | 495.3 | 529.5 | 126.5 | 526.2 | 449.4 | 203.6 | |
| iron | 33250 | 31498 | 38123 | 43028 | 40859 | 39987 | 44467 | 43232 | 135 | 25870 | 1842 | 6660 | |
| lead | 109.5 | 143.3 | 138.1 | 136.1 | 145.5 | 128.3 | 92.6 | 107.8 | 3.5 | 88.5 | 22 | 48.6 | |
| mercury | 0.98 | 0.35 | 0.32 | 0.93 | 0.56 | 0.41 | 0.93 | 0.19 | 0.18 | 0.45 | 0.01 U | 0.17 | |
| molybdenum | 7.2 U | 3.55 | 3.24 | 3.02 | 4 | 4.3 | 3.02 | 2.95 | 0.01 U | 1.4 | 0.5 | 0.01 U | |
| nickel | 118 | 206.1 | 271.5 | 258 | 319.6 | 314.3 | 243.3 | 405.2 | 24 | 208.8 | 95 | 77.8 | |
| selenium | 4.35 | 0.41 | 0.5 | 0.78 | 0.71 | 0.58 | 0.69 | 0.25 | 0.01 U | 0.15 | 21.45 | 3.8 | |
| silver | 74.6 | 71.5 | 72.1 | 38.8 | 19.6 | 20 | 2.9 | 4.8 | 5.2 | 37.5 | 8.5 | 17.3 | |
| zinc | 662 | 69.8 | 111.8 | 1023.1 | 767.6 | 725.8 | 1047.5 | 853.9 | 91.1 | 700.8 | 459.4 | 232 | |
| | | | | | | | | | | | | | |
| SELECTED CHEMICALS | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| total nitrogen | 6725 | 49909 | 66319 | 49425 | 45953 | 42131 | 35660 | 38900 | 13079 | 48580 | 59021 | 15605 | |
| NH3 nitrogen | 6000 | 13921 | 20215 | 11161 | 2181 | 1987 | 1338 | 1386 | 5255 | 22387 | 19683 | 4373 | |
| nitrate nitrogen | 28.4 | 56 | 52.4 | 50.9 | 46.9 | 45.5 | 51.3 | 64.6 | 13.7 | 45.4 | 20.1 | 14.9 | |
| oil & grease | 2690 | 41149 | 33669 | 26313 | 6901 | 17601 | 20728 | 20375 | 8536 | 58470 | 33213 | 3112 | |
| phenols | 89.7 | 21.2 | 40.8 | 22 | 57.9 | 57.3 | 47.9 | 43.5 | 287.9 | 370.9 | 618.9 | 1.7 | |
| phosphorus | 4700 | 15100 | 12694 | 14204 | 11694 | 15055 | 10257 | 15165 | 8754 | 11872 | 10480 | 7271 | |
| calcium | 22850 | 10518 | 13339 | 11019 | 11275 | 10925 | 11905 | 14130 | 2795 | 11658 | 22516 | 389684 | |
| magnesium | 3095 | 2721 | 2679 | 2933 | 2831 | 2461 | 3710 | 2815 | 1008 | 5330 | 4917 | 7783 | |
| potassium | 1570 | 1118 | 994 | 1266 | 923 | 813 | 684 | 844 | 337 | 1627 | 549 | 976 | |
| cyanide | 0.9 U | 9 | 11.85 | 3.61 | 22.6 | 20.3 | 15.05 | 10.35 | 0.5 | 14.75 | 41 | 7.35 | |
| fluoride | 7.1 | 97.2 | 89.8 | 75.1 | 107.8 | 109.9 | 138.5 | 92.6 | 7.8 | 26.9 | 44.7 | 24.4 | |
| chloride | 8070 | 6441 | 5279 | 5807 | 7214 | 7207 | 9362 | 7050 | 5538 | 4310 | 2128 | 1917 | |
| petroleum hydrocarbons | 1390 | 10652 | 8129 | 8609 | 8860 | 8484 | 9352 | 9480 | 4593 | 14262 | 15227 | 2857 | |

| BERGEN COUNTY UTILITIES AUTHORITY (NJ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MONTHLY AVERAGE VALUES | | | | | | | | | | | | |
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| METAL CONCENTRATION (mg/L) | | | | | | | | | | | | | |
| INFLUENT | | | | | | | | | | | | | |
| arsenic | 0.00103 | 0.00164 | 0.00198 | 0.00267 | 0.0015 | 0.00165 | 0.00183 | 0.001 | 0.001 | 0.00153 | 0.001 | 0.0014 | 0.0015 |
| cadmium | 0.0045 | 0.0044 | 0.0043 | 0.0053 | 0.0042 | 0.004 | 0.004 | 0.006 | 0.004 | 0.004 | 0.004 | 0.0042 | 0.0044 |
| chromium (total) | 0.059 | 0.018 | 0.021 | 0.049 | 0.034 | 0.03 | 0.03 | 0.082 | 0.088 | 0.011 | 0.031 | 0.049 | 0.0418 |
| copper | 0.078 | 0.141 | 0.068 | 0.114 | 0.14 | 0.16 | 0.105 | 0.09 | 0.073 | 0.07 | 0.086 | 0.076 | 0.1001 |
| lead | 0.042 | 0.042 | 0.042 | 0.057 | 0.042 | 0.044 | 0.062 | 0.046 | 0.044 | 0.049 | 0.042 | 0.042 | 0.0462 |
| mercury | 0.00048 | 0.00044 | 0.0005 | 0.0002 | 0.00043 | 0.0002 | 0.00063 | 0.00036 | 0.00033 | 0.00035 | 0.0003 | 0.00022 | 0.0004 |
| nickel | 0.052 | 0.043 | 0.015 | 0.029 | 0.018 | 0.03 | 0.03 | 0.025 | 0.038 | 0.033 | 0.023 | 0.018 | 0.0295 |
| silver | 0.012 | 0.017 | 0.017 | 0.073 | 0.018 | 0.017 | 0.019 | 0.017 | 0.018 | 0.012 | 0.015 | 0.013 | 0.0207 |
| zinc | 0.085 | 0.117 | 0.113 | 0.115 | 0.9 | 0.144 | 0.141 | 0.125 | 0.143 | 0.103 | 0.128 | 0.125 | 0.1866 |
| | | | | | | | | | | | | | |
| EFFLUENT (mg/L) | | | | | | | | | | | | | |
| arsenic | 7E-05 | 0.00125 | 0.00068 | 0.001 | 0.00073 | 0.00093 | 0.00108 | 0.001 | 0.001 | 0.00085 | 0.001 | 0.001 | 0.0009 |
| cadmium | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 | 0.0035 | 0.0268 | 0.004 | 0.004 | 0.004 | 0.004 | 0.0059 |
| chromium (total) | 0.005 | 0.014 | 0.005 | 0.016 | 0.006 | 0.014 | 0.013 | 0.027 | 0.025 | 0.006 | 0.006 | 0.022 | 0.0133 |
| copper | 0.032 | 0.068 | 0.038 | 0.022 | 0.02 | 0.041 | 0.017 | 0.028 | 0.02 | 0.013 | 0.009 | 0.013 | 0.0268 |
| lead | 0.051 | 0.042 | 0.037 | 0.042 | 0.042 | 0.042 | 0.028 | 0.042 | 0.042 | 0.042 | 0.042 | 0.042 | 0.0412 |
| mercury | 0.00023 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.00023 | 0.0002 | 0.00029 | 0.00016 | 0.00015 | 0.0002 | 0.0002 |
| nickel | 0.013 | 0.03 | 0.011 | 0.015 | 0.012 | 0.019 | 0.023 | 0.008 | 0.014 | 0.026 | 0.015 | 0.01 | 0.0163 |
| silver | 0.01 | 0.009 | 0.007 | 0.019 | 0.007 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.0102 |
| zinc | 0.05 | 0.061 | 0.054 | 0.054 | 0.035 | 0.073 | 0.053 | 0.05 | 0.048 | 0.048 | 0.051 | 0.064 | 0.0534 |
| | | | | | | | | | | | | | |
| VOLATILE ORGANICS | | | | | | | | | | | | | |
| INFLUENT (mg/L) | | | | | | | | | | | | | |
| 1,2-dichloroethene, trans | 0.00397 | 0.0016 | 0.00363 | 0.00269 | 0.00266 | 0.00183 | 0.00254 | 0.0016 | 0.0033 | 0.0033 | 0.00253 | 0.00376 | 0.0028 |
| chloroform | 0.00562 | 0.00598 | 0.00573 | 0.00827 | 0.00651 | 0.00709 | 0.0312 | 0.00333 | 0.00507 | 0.00392 | 0.00487 | 0.00287 | 0.0075 |
| 1,1,1-trichloroethane | 0.00242 | 0.00975 | 0.00129 | 0.00078 | 0.0023 | 0.00149 | 0.00389 | 0.00096 | 0.00139 | 0.00238 | 0.00101 | 0.00679 | 0.0029 |
| bromodichloromethane | 0.00086 | 0.00086 | 0.00101 | 0.00045 | 0.00086 | 0.00043 | 0.0007 | 0.00086 | 0.00043 | 0.00052 | 0.00021 | 0.00191 | 0.0008 |
| tetrachloroethene | 0.0124 | 0.00607 | 0.0168 | 0.00428 | 0.004 | 0.00459 | 0.0121 | 0.00424 | 0.00438 | 0.00728 | 0.00487 | 0.0144 | 0.0080 |
| toluene | 0.033 | 0.0163 | 0.00623 | 0.00855 | 0.00842 | 0.00771 | 0.0156 | 0.00659 | 0.0109 | 0.0128 | 0.0151 | 0.0148 | 0.0130 |
| m-xylene | 0.0152 | 0.00279 | 0.00663 | 0.00497 | 0.00318 | 0.00605 | 0.0122 | 0.00352 | 0.00026 | 0.0047 | 0.0022 | 0.00315 | 0.0054 |
| o,p-xylenes | 0.015 | 0.00262 | 0.00883 | 0.00644 | 0.00776 | 0.00659 | 0.0164 | 0.00936 | 0.00136 | 0.00427 | 0.00076 | 0.00432 | 0.0070 |
| | | | | | | | | | | | | | |
| EFFLUENT (mg/L) | | | | | | | | | | | | | |
| 1,2-dichloroethene, trans | 0.0023 | 0.0008 | 0.00143 | 0.00042 | 0.00076 | 0.0008 | 0.0008 | 0.0008 | 0.00177 | 0.00142 | 0.0008 | 0.00064 | 0.0011 |
| chloroform | 0.00807 | 0.00526 | 0.00615 | 0.00735 | 0.00405 | 0.0083 | 0.00365 | 0.00282 | 0.00528 | 0.00665 | 0.00547 | 0.00316 | 0.0055 |
| 1,1,1-trichloroethane | 0.00113 | 0.00471 | 0.00113 | 0.00113 | 0.00031 | 0.00034 | 0.00113 | 0.00113 | 0.00045 | 0.00098 | 0.00113 | 0.00033 | 0.0012 |
| bromodichloromethane | 0.00263 | 0.00115 | 0.00102 | 0.00261 | 0.00083 | 0.0016 | 0.00123 | 0.00096 | 0.00156 | 0.00113 | 0.00052 | 0.001 | 0.0014 |
| tetrachloroethene | 0.00199 | 0.00097 | 0.00326 | 0.00099 | 0.00059 | 0.00065 | 0.00097 | 0.00095 | 0.00097 | 0.00405 | 0.00097 | 0.00465 | 0.0018 |
| toluene | 0.00144 | 0.00063 | 0.0021 | 0.00262 | 0.00079 | 0.00087 | 0.00063 | 0.00063 | 0.00197 | 0.00379 | 0.00063 | 0.00111 | 0.0014 |

| BERGEN COUNTY UTILITIES AUTHORITY (NJ) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MONTHLY AVERAGE VALUES | | | | | | | | | | | | |
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| ADDITIONAL COMPOUNDS | | | | | | | | | | | | | |
| INFLUENT (ug/l) | | | | | | | | | | | | | |
| acetone | 4690 | 1039 | 1543 | 269 | 3735 | 2447 | 636 | 1288 | 418 | 16225 | 3672 | 4572 | 3378 |
| 2-chlorotoluene | 206 | 17.5 | 137 | 19.5 | 109 | 225 | 49.7 | 14.4 | 113 | 53.9 | 22.1 | 39.3 | 83.87 |
| 4-chlorotoluene | 12.2 | 1.7 | 14.5 | 1.81 | 21.9 | 31.8 | 6.83 | 1.7 U | 14.6 | 7.21 | 1.95 | 5.33 | 9.99 |
| BASE NEUTRALS | | | | | | | | | | | | | |
| INFLUENT (ug/l) | | | | | | | | | | | | | |
| bis-2-ethyl hexyl phthalate | 17.42 | 26.58 | 21.8 | 13.88 | 125.2 | 8.35 | 21.22 | 23.56 | 7.42 | 33.79 | 21.88 | 33.09 | 29.516 |
| butyl benzyl phthalate | 2.35 | 0.74 | 4.5 | 3.84 | 3.46 | 4.66 | 2.42 | 1.24 | 0.54 | 2.67 | 0.98 | 15.54 | 3.578 |
| dibutyl phthalate | 5.43 | 4.12 | 10.26 | 5.02 | 3.86 | 6.6 | 3.1 | 1.71 | 2.85 | 12.28 | 3.86 | 6.11 | 5.433 |
| diethyl phthalate | 3.9 | 0.83 | 5.86 | 5.3 | 0.82 | 3.96 | 5.56 | 1.94 | 1.35 | 2.34 | 1.88 | 5.78 | 3.293 |
| di-n-octyl-phthalate | 2.84 | 1.8 | 2.12 | 0.52 | 6.71 | 2.27 | 0.55 | 1.68 | 0.25 | 5.08 | 6.65 | 3.81 | 2.857 |
| naphthalene | 3.56 | 1.09 | 0.49 | 0.44 | 0.26 | 1.39 | 0.4 | 0.64 | 31.91 | 1.01 | 0.75 | 1 | 3.578 |
| EFFLUENT (ug/l) | | | | | | | | | | | | | |
| bis-2-ethyl hexyl phthalate | 108.12 | 10.8 | 17.18 | 7.38 | 11.6 | 21.26 | 11.45 | 2.41 | 6 | 3.35 | 4.27 | 3.23 | 17.254 |
| butyl benzyl phthalate | 0.7 | 0.19 | 1.27 | 1.15 | 1.28 | 1.15 | 1.15 | 0.68 | 0.1 | 1.15 | 0.12 | 0.3 | 0.770 |
| dibutyl phthalate | 6.5 | 2.46 | 2.83 | 1.18 | 2.95 | 2.2 | 0.9 | 1.45 | 0.73 | 1.45 | 0.35 | 0.82 | 1.985 |
| diethyl phthalate | 1.99 | 0.58 | 0.83 | 0.43 | 0.99 | 0.85 | 1.28 | 0.3 | 0.77 | 1.48 | 1.02 | 0.59 | 0.926 |
| di-n-octyl-phthalate | 4.96 | 1.15 | 0.86 | 0.44 | 0.67 | 1.16 | 1.8 | 1.14 | 4.3 | 1.16 | 1.2 | 0.25 | 1.591 |
| naphthalene | 1.72 | 0.19 | 0.42 | 0.41 | 0.42 | 0.59 | 0.12 | 0.4 | 1.25 | 0.49 | 0.17 | 0.32 | 0.542 |
| ACID FRACTION (ug/l) | | | | | | | | | | | | | |
| phenol (influent) | 6.57 | 8.09 | 8.1 | 4.82 | 10.02 | 8.7 | 13.98 | 6.15 | 4.83 | 6.05 | 2.75 | 8.24 | 7.358 |
| phenol (effluent) | 1.19 | 1.61 | 3.98 | 3.88 | 0.78 | 4.27 | 1.83 | 0.41 | 0.87 | 0.3 | 0.85 | 1.03 | 1.750 |
| NOTE | | | | | | | | | | | | | |
| "U" INDICATES COMPOUND ANALYZED BUT NOT DETECTED | | | | | | | | | | | | | |
| "B" INDICATES COMPOUND FOUND IN ASSOCIATED BLANK | | | | | | | | | | | | | |
| "J" INDICATES COMPOUND CONCENTRATION FOUND BELOW MDL | | | | | | | | | | | | | |
| "E" INDICATES COMPOUND CONCENTRATION EXCEDDS CALIBRATION LIMIT | | | | | | | | | | | | | |
| 'ND" INDICATES NO DATA AVAILABLE FOR THIS PARAMETER | | | | | | | | | | | | | |

| WARDS ISLAND WATER POLLUTION CONTROL PLANT (NY) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| FLOW (MGD) | 264 | 263 | 268 | 283 | 273 | 261 | 252 | 261 | 245 | 241 | 241 | 229 | 256.75 |
| SUSPENDED SOLIDS, RAW SEWAGE (mg/L) | 94 | 98 | 104 | 84 | 83 | 92 | 91 | 95 | 91 | 101 | n/a | n/a | 93.3 |
| SUSPENDED SOLIDS, PLANT EFFLUENT (mg/L) | 12 | 15 | 16 | 9 | 6 | 7 | 12 | 11 | 7 | 8 | n/a | n/a | 10.3 |
| BOD, TOTAL RAW SEWAGE (mg/L) | 97 | 90 | 81 | 69 | 77 | 80 | 94 | 96 | 86 | 97 | n/a | n/a | 86.7 |
| BOD, TOTAL PLANT EFFLUENT (mg/L) | 14 | 13 | 12 | 9 | 7 | 8 | 9 | 9 | 9 | 10 | n/a | n/a | 10 |
| | | | | | | | | | | | | | |
| HEAVY METALS (influent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.047 | 0.051 | 0.054 | 0.039 | 0.044 | 0.044 | 0.038 | 0.035 | 0.038 | 0.055 | 0.035 | 0.045 | 0.044 |
| Cr, chromium | 0.0078 | 0.0023 | 0.0029 | 0.0071 | 0.012 | 0.0063 | 0.0025 | 0.0041 | 0.0018 | 0.0047 | 0.0041 | 0.0024 | 0.0048 |
| Ni, nickel | 0.0032 | 0.0034 | 0.0015 | 0.004 | 0.0043 | 0.0068 | 0.0036 | 0.001 | 0.0025 | 0.0057 | 0.0022 | 0.012 | 0.0042 |
| Zn, zinc | 0.056 | 0.059 | 0.041 | 0.065 | 0.051 | 0.054 | 0.046 | 0.044 | 0.047 | 0.082 | 0.05 | 0.1 | 0.058 |
| Pb, lead | 0.0068 | 0.0072 | 0.014 | 0.0088 | 0.0087 | 0.0069 | 0.01 | 0.0071 | 0.0056 | 0.019 | 0.0055 | 0.029 | 0.0107 |
| Cd, cadmium | 0.00024 | 0.00013 | 0.0001 | 0.00019 | 0.00019 | 0.00029 | 0.0005 | 3E-05 | 0.00011 | 0.00057 | 0.00018 | 0.0058 | 0.00069 |
| Hg, mercury | 0.00015 | 0.00015 | 0.00021 | 7E-05 | 0.00018 | 0.00019 | 0.00016 | 9E-05 | 6E-05 | 0.0003 | 0.00013 | 6E-05 | 0.00015 |
| As, arsenic | 0.00034 | 0.00054 | 0.00052 | 0.00073 | 0.00039 | 0.00058 | 0.00064 | 0.00057 | 0.00072 | 0.00036 | 0.00061 | 0.00084 | 0.00057 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 5E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 5E-05 | 4.58E-05 |
| Ag, silver | 0.002 | 0.0024 | 0.0029 | 0.0012 | 0.003 | 0.0052 | 0.0046 | 0.00097 | 0.0023 | 0.0026 | 0.0019 | 0.0035 | 0.0027 |
| | | | | | | | | | | | | | |
| HEAVY METALS, (effluent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.0097 | 0.0093 | 0.035 | 0.018 | 0.01 | 0.0056 | 0.01 | 0.0091 | 0.0062 | 0.008 | 0.0062 | 0.012 | 0.0116 |
| Cr, chromium | 0.0019 | 0.0012 | 0.0015 | 0.0027 | 0.0018 | 0.0013 | 0.0009 | 0.0004 | 0.0007 | 0.0005 | 0.0018 | 0.0027 | 0.0015 |
| Ni, nickel | 0.0015 | 0.0073 | 0.0019 | 0.0026 | 0.0031 | 0.003 | 0.0007 | 0.001 | 0.001 | 0.0034 | 0.0026 | 0.0093 | 0.0031 |
| Zn, zinc | 0.023 | 0.02 | 0.016 | 0.045 | 0.018 | 0.017 | 0.028 | 0.025 | 0.023 | 0.017 | 0.05 | 0.059 | 0.028 |
| Pb, lead | 0.0012 | 0.0011 | 0.0026 | 0.0022 | 0.0014 | 0.0016 | 0.0026 | 0.0018 | 0.0014 | 0.0013 | 0.0023 | 0.012 | 0.0026 |
| Cd, cadmium | 5E-05 | 5E-05 | 3E-05 | 5E-05 | 6E-05 | 3E-05 | 0.00042 | 3E-05 | 4E-05 | 6E-05 | 5E-05 | 3E-05 | 7.5E-05 |
| Hg, mercury | 8E-05 | 6E-05 | 6E-05 | 7E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6.25E-05 |
| As, arsenic | 0.00027 | 0.00052 | 0.00043 | 0.00061 | 0.00038 | 0.00043 | 0.00041 | 0.00048 | 0.00051 | 0.00026 | 0.00054 | 0.00072 | 0.00046 |
| Be, beryllium | 8E-05 | 3E-05 | 6E-05 | 8E-05 | 8E-05 | 4E-05 | 5E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 4.75E-05 |
| Ag, silver | 0.00045 | 0.0008 | 0.001 | 0.00022 | 0.00025 | 0.00034 | 0.0011 | 0.00055 | 0.00045 | 0.0007 | 0.00055 | 0.0018 | 0.00068 |
| | | | | | | | | | | | | | |
| NUTRIENTS (influent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 8.54 | 11.94 | 11.28 | 7.36 | 7.51 | 6.25 | 12.15 | 6.73 | 8.58 | 8.58 | 7.65 | 8.5 | 8.76 |
| organics | 11.48 | 5.58 | 8.43 | 9.18 | 6.25 | 10.28 | 9.75 | 15.97 | 8.95 | 12.05 | 9.5 | 9 | 9.70 |
| TKN (total kjeldahl nitrogen) | 20 | 17.5 | 19.7 | 16.5 | 13.8 | 16.5 | 21.9 | 22.7 | 17.5 | 20.6 | 17.1 | 17.5 | 18.44 |
| NO3 | 0.2278 | 0.2893 | 0.106 | 0.2155 | 0.385 | 0.1343 | 0.112 | 0.2567 | 0.1085 | 0.287 | 0.205 | 0.113 | 0.203 |
| NO2 | 0.054 | 0.12 | 0.053 | 0.057 | 0.063 | 0.033 | 0.046 | 0.039 | 0.021 | 0.043 | 0.03 | 0.022 | 0.048 |
| phosphates-total | 2.125 | 2.571 | 1.841 | 1.925 | 1.756 | 1.765 | 1.962 | 1.817 | 2.105 | 1.994 | 2.711 | 2.195 | 2.064 |
| phosphates-ortho | 1.04 | 1.352 | 1.138 | 1.088 | 1.335 | 0.969 | 1.592 | 1.213 | 1.125 | 1.4 | 1.072 | 1.105 | 1.202 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | | | | | | | | | | | | | |
| NUTRIENTS (effluent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 10.69 | 14.05 | 11.19 | 11.91 | 11.84 | 9.38 | 14.05 | 13.65 | 11.2 | 11.72 | 11.7 | 10.6 | 11.83 |
| organics | 4.83 | 5.05 | 8.8 | 2.93 | 6.4 | 8.38 | 6.43 | 9.54 | 7.2 | 10.62 | 8.86 | 8.27 | 7.28 |
| TKN (total kjeldahl nitrogen) | 15.5 | 19.1 | 20 | 16.4 | 18.2 | 17.8 | 20.5 | 23.2 | 18.4 | 22.3 | 20.5 | 18.9 | 19.23 |
| NO3 | 0.073 | 0.1695 | 0.155 | 0.1618 | 0.27 | 0.073 | 0.2412 | 0.191 | 0.1286 | 0.2744 | 0.1289 | 0.0975 | 0.1637 |
| NO2 | 0.068 | 0.148 | 0.143 | 0.108 | 0.095 | 0.067 | 0.079 | 0.068 | 0.084 | 0.073 | 0.055 | 0.047 | 0.086 |
| phosphates-total | 1.127 | 1.744 | 1.469 | 1.439 | 1.877 | 1.458 | 2.124 | 1.165 | 1.298 | 3.432 | 1.39 | 1.968 | 1.708 |
| phosphates-ortho | 0.926 | 0.934 | 1.062 | 1.163 | 1.485 | 1.074 | 0.972 | 1.319 | 1.085 | 1.185 | 1.09 | 1.078 | 1.114 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

| HUNTS POINT WATER POLLUTION CONTROL PLANT (NY) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| FLOW (MGD) | 146 | 147 | 143 | 148 | 143 | 138 | 136 | 137 | 133 | 132 | 133 | 125 | 138.42 |
| SUSPENDED SOLIDS, RAW SEWAGE (mg/L) | 99 | 101 | 104 | 99 | 101 | 104 | 101 | 102 | 93 | 82 | n/a | n/a | 98.6 |
| SUSPENDED SOLIDS, PLANT EFFLUENT (mg/L) | 9 | 11 | 7 | 7 | 6 | 6 | 10 | 10 | 8 | 6 | n/a | n/a | 8 |
| BOD, TOTAL RAW SEWAGE (mg/L) | 101 | 104 | 95 | 84 | 89 | 96 | 105 | 97 | 98 | 106 | n/a | n/a | 97.5 |
| BOD, TOTAL PLANT EFFLUENT (mg/L) | 8 | 9 | 7 | 6 | 5 | 5 | 7 | 8 | 10 | 9 | n/a | n/a | 7.4 |
| | | | | | | | | | | | | | |
| HEAVY METALS (influent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.085 | 0.054 | 0.09 | 0.042 | 0.073 | 0.074 | 0.12 | 0.059 | 0.096 | 0.088 | 0.094 | 0.038 | 0.076 |
| Cr, chromium | 0.019 | 0.021 | 0.021 | 0.012 | 0.01 | 0.0014 | 0.022 | 0.077 | 0.023 | 0.015 | 0.015 | 0.0073 | 0.0203 |
| Ni, nickel | 0.0064 | 0.012 | 0.01 | 0.0031 | 0.0095 | 0.0077 | 0.012 | 0.012 | 0.0071 | 0.0084 | 0.011 | 0.0099 | 0.0089 |
| Zn, zinc | 0.11 | 0.072 | 0.11 | 0.1 | 0.15 | 0.1 | 0.18 | 0.078 | 0.13 | 0.11 | 0.13 | 0.051 | 0.110 |
| Pb, lead | 0.017 | 0.013 | 0.025 | 0.0094 | 0.027 | 0.018 | 0.031 | 0.013 | 0.013 | 0.019 | 0.012 | 0.0072 | 0.0171 |
| Cd, cadmium | 0.00098 | 0.00059 | 0.00091 | 0.0027 | 0.0014 | 0.00094 | 0.0021 | 0.002 | 0.0017 | 0.0016 | 0.0014 | 0.00034 | 0.0014 |
| Hg, mercury | 0.00026 | 0.00058 | 0.00015 | 0.00021 | 0.00022 | 0.00035 | 0.00026 | 0.00023 | 0.00019 | 6E-05 | 0.00012 | 6E-05 | 0.00022 |
| As, arsenic | 0.00069 | 0.00083 | 0.0009 | 0.00086 | 0.00098 | 0.00073 | 0.00088 | 0.00086 | 0.00084 | 0.0005 | 0.00076 | 0.00043 | 0.00077 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 6E-05 | 3E-05 | 3E-05 | 4E-05 | 4E-05 | 3E-05 | 4.67E-05 |
| Ag, silver | 0.0053 | 0.0033 | 0.0051 | 0.0019 | 0.0041 | 0.0068 | 0.006 | 0.0038 | 0.006 | 0.0074 | 0.0063 | 0.0033 | 0.0049 |
| | | | | | | | | | | | | | |
| HEAVY METALS, (effluent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.0077 | 0.012 | 0.0045 | 0.0047 | 0.0068 | 0.0053 | 0.021 | 0.0085 | 0.012 | 0.0042 | 0.0074 | 0.0084 | 0.0085 |
| Cr, chromium | 0.0015 | 0.0016 | 0.0011 | 0.0016 | 0.0013 | 0.0014 | 0.0019 | 0.0037 | 0.0018 | 0.0034 | 0.0018 | 0.0009 | 0.0018 |
| Ni, nickel | 0.0082 | 0.0077 | 0.0053 | 0.004 | 0.0047 | 0.0028 | 0.011 | 0.0073 | 0.0041 | 0.0062 | 0.014 | 0.0077 | 0.0069 |
| Zn, zinc | 0.025 | 0.035 | 0.036 | 0.029 | 0.021 | 0.019 | 0.05 | 0.034 | 0.023 | 0.043 | 0.036 | 0.037 | 0.032 |
| Pb, lead | 0.0012 | 0.0014 | 0.0008 | 0.0004 | 0.0006 | 0.0017 | 0.0034 | 0.0016 | 0.0019 | 0.0029 | 0.0023 | 0.001 | 0.002 |
| Cd, cadmium | 0.00022 | 0.00018 | 0.00014 | 0.00038 | 0.00021 | 0.00034 | 0.00017 | 0.0011 | 0.00019 | 0.00069 | 0.00044 | 8E-05 | 3.45E-04 |
| Hg, mercury | 9E-05 | 6E-05 | 8E-05 | 7E-05 | 7E-05 | 0.00016 | 6E-05 | 0.0053 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 5.11E-04 |
| As, arsenic | 0.00045 | 0.00061 | 0.00068 | 0.00057 | 0.00049 | 0.00046 | 0.00063 | 0.00067 | 0.00016 | 0.00043 | 0.00049 | 0.00029 | 0.00049 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 5E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 4.42E-05 |
| Ag, silver | 0.00018 | 0.001 | 0.00036 | 0.00022 | 0.00032 | 0.0002 | 0.00074 | 0.00062 | 0.0006 | 0.0015 | 0.00057 | 0.0002 | 0.0005 |
| | | | | | | | | | | | | | |
| NUTRIENTS (influent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 13.54 | 12.31 | 14.8 | 10.4 | 10.86 | 8.41 | 12.32 | 10.6 | 10.05 | 12.87 | 11.85 | 9.93 | 11.50 |
| organics | 8.85 | 11.75 | 10.3 | 11.16 | 12.53 | 10.6 | 15.7 | 17.9 | 10.95 | 6.65 | 13.8 | 9.75 | 11.7 |
| TKN (total kjeldahl nitrogen) | 22.4 | 24.1 | 25.1 | 21.6 | 23.4 | 19 | 28 | 28.5 | 21 | 19.5 | 25.7 | 19.7 | 23.2 |
| NO3 | 0.3338 | 0.3083 | 0.1668 | 0.206 | 0.4113 | 0.1598 | 0.135 | 0.2525 | 0.087 | 0.336 | 0.267 | 0.1225 | 0.232 |
| NO2 | 0.052 | 0.072 | 0.088 | 0.056 | 0.077 | 0.03 | 0.011 | 0.043 | 0.028 | 0.097 | 0.053 | 0.043 | 0.054 |
| phosphates-total | 2.101 | 2.043 | 3.103 | 1.899 | 2.311 | 2.358 | 1.854 | 2.162 | 1.929 | 2.767 | 2.58 | 2.157 | 2.272 |
| phosphates-ortho | 1.118 | 0.969 | 1.194 | 1.168 | 1.387 | 1.333 | 1.218 | 1.135 | 1.201 | 1.455 | 1.51 | 0.981 | 1.222 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | | | | | | | | | | | | | |
| NUTRIENTS (effluent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 15.31 | 10.74 | 11.25 | 9.58 | 13.84 | 13.7 | 13.11 | 15.35 | 12.61 | 11.94 | 10.39 | 10.84 | 12.39 |
| organics | 3.95 | 6.93 | 9.5 | 8.12 | 14.15 | 5.68 | 7.41 | 9.04 | 8.52 | 9.74 | 8.89 | 7.92 | 8.32 |
| TKN (total kjeldahl nitrogen) | 19.3 | 17.7 | 20.8 | 17.7 | 28 | 19.4 | 20.5 | 24.4 | 21.1 | 21.7 | 19.3 | 18.7 | 20.7 |
| NO3 | 1.182 | 2.1693 | 0.6845 | 1.13 | 0.6313 | 0.4993 | 3.3347 | 3.8892 | 4.68 | 3.6233 | 3.3018 | 5.6922 | 2.5681 |
| NO2 | 0.716 | 0.434 | 0.239 | 0.401 | 0.256 | 0.264 | 0.769 | 0.987 | 0.391 | 0.345 | 0.279 | 0.512 | 0.466 |
| phosphates-total | 1.791 | 1.953 | 1.394 | 1.187 | 1.817 | 2.021 | 0.978 | 1.934 | 1.789 | 1.794 | 2.31 | 2.119 | 1.757 |
| phosphates-ortho | 1.774 | 1.123 | 1.313 | 1.037 | 1.5 | 1.688 | 0.897 | 1.724 | 1.597 | 1.37 | 1.91 | 1.821 | 1.480 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

| 26th WARD WATER POLLUTION CONTROL PLANT (NY) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| FLOW (MGD) | 70 | 69 | 68 | 76 | 76 | 78 | 76 | 70 | 80 | 74 | 74 | 72 | 73.58 |
| SUSPENDED SOLIDS, RAW SEWAGE (mg/L) | 83 | 94 | 99 | 91 | 88 | 90 | 90 | 90 | 80 | 79 | n/a | n/a | 88.4 |
| SUSPENDED SOLIDS, PLANT EFFLUENT (mg/L) | 24 | 22 | 11 | 7 | 8 | 9 | 8 | 22 | 13 | 12 | n/a | n/a | 13.6 |
| BOD, TOTAL RAW SEWAGE (mg/L) | 115 | 115 | 118 | 102 | 115 | 98 | 120 | 118 | 106 | 117 | n/a | n/a | 112.4 |
| BOD, TOTAL PLANT EFFLUENT (mg/L) | 14 | 17 | 9 | 8 | 10 | 9 | 11 | 18 | 16 | 15 | n/a | n/a | 12.7 |
| | | | | | | | | | | | | | |
| HEAVY METALS (influent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.054 | 0.059 | 0.053 | 0.066 | 0.21 | 0.05 | 0.11 | 0.067 | 0.042 | 0.032 | 0.052 | 0.029 | 0.069 |
| Cr, chromium | 0.0051 | 0.003 | 0.0022 | 0.0046 | 0.0048 | 0.0039 | 0.027 | 0.0038 | 0.0036 | 0.0034 | 0.0028 | 0.024 | 0.0074 |
| Ni, nickel | 0.0033 | 0.0026 | 0.0046 | 0.0031 | 0.015 | 0.0076 | 0.0085 | 0.0032 | 0.0047 | 0.0027 | 0.012 | 0.0035 | 0.0059 |
| Zn, zinc | 0.12 | 0.11 | 0.076 | 0.15 | 0.15 | 0.08 | 0.26 | 0.082 | 0.063 | 0.076 | 0.064 | 0.05 | 0.1068 |
| Pb, lead | 0.022 | 0.0078 | 0.013 | 0.013 | 0.02 | 0.019 | 0.11 | 0.0095 | 0.01 | 0.013 | 0.0082 | 0.01 | 0.0213 |
| Cd, cadmium | 0.0027 | 0.00064 | 0.011 | 0.0054 | 0.00042 | 9E-05 | 0.0017 | 0.0012 | 0.00051 | 0.00035 | 0.00065 | 0.00086 | 0.0021 |
| Hg, mercury | 0.00011 | 6E-05 | 6E-05 | 7E-05 | 0.00012 | 0.00026 | 0.0005 | 9E-05 | 6E-05 | 8E-05 | 0.00017 | 6E-05 | 0.00014 |
| As, arsenic | 0.00054 | 0.00026 | 0.00071 | 0.0012 | 0.0006 | 0.00054 | 0.0015 | 0.00038 | 0.00054 | 0.00052 | 0.00038 | 0.00026 | 0.00062 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 9E-05 | 0.00013 | 3E-05 | 6E-05 | 3E-05 | 3E-05 | 5.83E-05 |
| Ag, silver | 0.0028 | 0.0025 | 0.0042 | 0.00093 | 0.0033 | 0.001 | 0.0028 | 0.0015 | 0.0014 | 0.00093 | 0.0021 | 0.0015 | 0.00208 |
| | | | | | | | | | | | | | |
| HEAVY METALS, (effluent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.0078 | 0.019 | 0.0056 | 0.018 | 0.0075 | 0.0048 | 0.0053 | 0.045 | 0.0078 | 0.0057 | 0.0086 | 0.0072 | 0.0119 |
| Cr, chromium | 0.0021 | 0.0054 | 0.0005 | 0.0046 | 0.0011 | 0.0014 | 0.002 | 0.0034 | 0.0009 | 0.0036 | 0.0022 | 0.0063 | 0.0028 |
| Ni, nickel | 0.0026 | 0.0036 | 0.0039 | 0.002 | 0.0007 | 0.0042 | 0.0031 | 0.0016 | 0.0032 | 0.0018 | 0.0031 | 0.0029 | 0.0027 |
| Zn, zinc | 0.03 | 0.032 | 0.02 | 0.11 | 0.014 | 0.016 | 0.016 | 0.067 | 0.019 | 0.021 | 0.025 | 0.029 | 0.033 |
| Pb, lead | 0.0024 | 0.0054 | 0.0018 | 0.011 | 0.0034 | 0.002 | 0.0035 | 0.0099 | 0.0018 | 0.0022 | 0.0032 | 0.0024 | 0.0041 |
| Cd, cadmium | 0.00019 | 0.00013 | 3E-05 | 0.0004 | 3E-05 | 3E-05 | 0.00032 | 0.00018 | 0.00018 | 4E-05 | 0.00016 | 3E-05 | 0.00014 |
| Hg, mercury | 8E-05 | 6E-05 | 6E-05 | 6E-05 | 8E-05 | 0.00021 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 7.58E-05 |
| As, arsenic | 0.00036 | 0.00028 | 0.00038 | 0.00068 | 0.00064 | 0.0005 | 0.00057 | 0.00037 | 0.0005 | 0.00033 | 0.00029 | 0.00026 | 0.00043 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 5E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 4.42E-05 |
| Ag, silver | 0.0012 | 0.00096 | 0.00032 | 0.00022 | 0.0002 | 0.0002 | 0.00029 | 0.0015 | 0.00018 | 0.00033 | 0.00024 | 0.0002 | 0.00049 |
| | | | | | | | | | | | | | |
| NUTRIENTS (influent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 8.1 | 8.18 | 7.63 | 6.07 | 6.4 | 6.64 | 7.95 | 6.4 | 8.4 | 7.3 | 6.5 | 7 | 7.21 |
| organics | 11.43 | 12.08 | 17.4 | 8.95 | 13.13 | 11.13 | 6.55 | 17.15 | 14.1 | 13.2 | 20.5 | 14.5 | 13.34 |
| TKN (total kjeldahl nitrogen) | 19.5 | 20.3 | 25 | 15 | 19.5 | 17.8 | 14.5 | 23.5 | 22.5 | 20.5 | 27 | 21.5 | 20.55 |
| NO3 | 0.35 | 0.3375 | 0.1675 | 0.185 | 0.205 | 0.31 | 0.05 | 0.175 | 0.51 | 0.25 | 0.61 | 0.265 | 0.2846 |
| NO2 | 0.07 | 0.037 | 0.071 | 0.043 | 0.059 | 0.089 | 0.078 | 0.074 | 0.101 | 0.123 | 0.138 | 0.06 | 0.0786 |
| phosphates-total | 2.618 | 2.415 | 2.513 | 2.13 | 2.033 | 2.068 | 2.77 | 2.515 | 2.33 | 2.425 | 3.17 | 1.925 | 2.4093 |
| phosphates-ortho | 0.935 | 1.078 | 1.043 | 1.203 | 1.14 | 1.043 | 1.39 | 1.587 | 1.42 | 1.15 | 0.985 | 1.02 | 1.1662 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | | | | | | | | | | | | | |
| NUTRIENTS (effluent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 13.48 | 16.93 | 15.1 | 8.96 | 8.8 | 10.05 | 11.54 | 8.16 | 10.57 | 13.58 | 13.24 | 12.35 | 11.90 |
| organics | 8.53 | 10.58 | 9.9 | 7.55 | 8.48 | 9.95 | 12.17 | 7.49 | 8.86 | 10.19 | 11.53 | 10.68 | 9.66 |
| TKN (total kjeldahl nitrogen) | 22 | 27.5 | 25 | 16.5 | 17.3 | 20 | 23.7 | 15.6 | 19.4 | 23.8 | 24.7 | 23 | 21.54 |
| NO3 | 0.2025 | 0.1575 | 0.2625 | 1 | 1.325 | 0.925 | 1.3032 | 2.7367 | 1.4967 | 0.7474 | 0.7643 | 0.5171 | 0.9532 |
| NO2 | 0.267 | 0.048 | 0.495 | 0.939 | 0.99 | 1.227 | 0.819 | 0.817 | 0.698 | 0.735 | 0.527 | 0.409 | 0.664 |
| phosphates-total | 1.825 | 1.603 | 1.298 | 1.428 | 1.66 | 1.283 | 2.637 | 2.255 | 1.535 | 1.185 | 2.61 | 1.105 | 1.702 |
| phosphates-ortho | 1.503 | 0.943 | 0.975 | 1.225 | 1.413 | 1.088 | 1.21 | 1.655 | 0.98 | 0.555 | 0.99 | 0.88 | 1.118 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

| TALLMAN ISLAND WATER POLLUTION CONTROL PLANT (NY) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| FLOW (MGD) | 57 | 56 | 55 | 56 | 59 | 58 | 55 | 55 | 56 | 54 | 54 | 52 | 55.58 |
| SUSPENDED SOLIDS, RAW SEWAGE (mg/L) | 95 | 102 | 108 | 96 | 93 | 106 | 107 | 106 | 100 | 98 | n/a | n/a | 101.1 |
| SUSPENDED SOLIDS, PLANT EFFLUENT (mg/L) | 6 | 5 | 6 | 6 | 6 | 5 | 6 | 4 | 4 | 6 | n/a | n/a | 5.4 |
| BOD, TOTAL RAW SEWAGE (mg/L) | 113 | 127 | 132 | 117 | 110 | 123 | 116 | 127 | 111 | 118 | n/a | n/a | 119.4 |
| BOD, TOTAL PLANT EFFLUENT (mg/L) | 6 | 5 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 5 | n/a | n/a | 4.3 |
| | | | | | | | | | | | | | |
| HEAVY METALS (influent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.056 | 0.052 | 0.054 | 0.047 | 0.057 | 0.039 | 0.07 | 0.057 | 0.04 | 0.056 | 0.054 | 0.044 | 0.052 |
| Cr, chromium | 0.0092 | 0.011 | 0.008 | 0.0089 | 0.0052 | 0.0059 | 0.011 | 0.0092 | 0.011 | 0.011 | 0.0061 | 0.0058 | 0.008525 |
| Ni, nickel | 0.003 | 0.017 | 0.021 | 0.0084 | 0.014 | 0.013 | 0.017 | 0.0069 | 0.0066 | 0.011 | 0.009 | 0.023 | 0.0124917 |
| Zn, zinc | 0.12 | 0.1 | 0.092 | 0.1 | 0.11 | 0.072 | 0.098 | 0.079 | 0.078 | 0.13 | 0.093 | 0.082 | 0.0961667 |
| Pb, lead | 0.014 | 0.0076 | 0.0076 | 0.008 | 0.0066 | 0.011 | 0.0086 | 0.014 | 0.01 | 0.012 | 0.012 | 0.0049 | 0.0096917 |
| Cd, cadmium | 0.00021 | 0.00088 | 0.00039 | 0.00029 | 0.0011 | 0.00025 | 0.00038 | 0.00028 | 0.00028 | 0.00048 | 0.0011 | 0.00027 | 0.0004925 |
| Hg, mercury | 0.0002 | 6E-05 | 9E-05 | 9E-05 | 0.00016 | 0.00012 | 0.00021 | 0.00035 | 0.00013 | 0.00012 | 0.0002 | 6E-05 | 0.0001492 |
| As, arsenic | 0.00045 | 0.00051 | 0.00053 | 0.00035 | 0.00045 | 0.00022 | 0.0006 | 0.00035 | 0.00076 | 0.00045 | 0.00064 | 0.00037 | 0.0004733 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 6E-05 | 3E-05 | 4E-05 | 4E-05 | 3E-05 | 3E-05 | 4.667E-05 |
| Ag, silver | 0.0058 | 0.0053 | 0.0076 | 0.0043 | 0.0068 | 0.0045 | 0.0068 | 0.0068 | 0.0043 | 0.007 | 0.0055 | 0.005 | 0.0058 |
| | | | | | | | | | | | | | |
| HEAVY METALS, (effluent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.011 | 0.012 | 0.048 | 0.013 | 0.017 | 0.0072 | 0.015 | 0.01 | 0.0077 | 0.0059 | 0.009 | 0.011 | 0.0139 |
| Cr, chromium | 0.0023 | 0.0064 | 0.0018 | 0.0023 | 0.0015 | 0.0021 | 0.0018 | 0.0015 | 0.0011 | 0.0031 | 0.0022 | 0.002 | 0.0023417 |
| Ni, nickel | 0.003 | 0.011 | 0.018 | 0.0047 | 0.0094 | 0.007 | 0.0056 | 0.005 | 0.0049 | 0.0066 | 0.0066 | 0.01 | 0.00765 |
| Zn, zinc | 0.027 | 0.028 | 0.036 | 0.043 | 0.032 | 0.038 | 0.029 | 0.032 | 0.03 | 0.03 | 0.042 | 0.032 | 0.03325 |
| Pb, lead | 0.0008 | 0.0007 | 0.0012 | 0.0019 | 0.0006 | 0.0022 | 0.0011 | 0.001 | 0.0008 | 0.0024 | 0.0019 | 0.001 | 0.0013 |
| Cd, cadmium | 3E-05 | 0.00012 | 0.00013 | 9E-05 | 0.0003 | 0.00012 | 0.00012 | 0.00017 | 0.0001 | 0.00035 | 0.00034 | 0.00013 | 0.0001667 |
| Hg, mercury | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 0.00013 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6.583E-05 |
| As, arsenic | 0.0003 | 0.00025 | 0.00044 | 0.00028 | 0.00031 | 0.00011 | 0.00034 | 0.00023 | 0.00051 | 0.00031 | 0.00038 | 0.00039 | 0.0003208 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 5E-05 | 3E-05 | 3E-05 | 4E-05 | 3E-05 | 3E-05 | 4.5E-05 |
| Ag, silver | 0.00071 | 0.0012 | 0.001 | 0.00075 | 0.00095 | 0.0011 | 0.0061 | 0.00049 | 0.00034 | 0.00064 | 0.00051 | 0.00085 | 0.00122 |
| | | | | | | | | | | | | | |
| NUTRIENTS (influent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 14.03 | 15.93 | 13.73 | 13.4 | 11.83 | 14.2 | 13.45 | 12.55 | 8.9 | 11.55 | 11.36 | 15.45 | 13.03 |
| organics | 9.73 | 12.15 | 10.48 | 7.63 | 7.05 | 8.25 | 8.15 | 8.05 | 12.95 | 7.9 | 12.75 | 8.15 | 9.44 |
| TKN (total kjeldahl nitrogen) | 23.8 | 28.1 | 24.2 | 21 | 18.9 | 22.5 | 21.6 | 20.6 | 21.9 | 19.5 | 24.1 | 23.6 | 22.48 |
| NO3 | 0.485 | 0.575 | 0.3475 | 0.3435 | 0.3125 | 0.0535 | 0.167 | 0.3395 | 0.207 | 0.2415 | 0.136 | 0.167 | 0.281 |
| NO2 | 0.095 | 0.1 | 0.035 | 0.015 | 0.035 | 0.017 | 0.012 | 0.058 | 0.057 | 0.025 | 0.044 | 0.042 | 0.045 |
| phosphates-total | 3.16 | 3.035 | 2.623 | 2.51 | 2.245 | 3.01 | 2.63 | 2.63 | 2.945 | 2.88 | 2.375 | 2.975 | 2.752 |
| phosphates-ortho | 1.69 | 1.793 | 1.603 | 1.475 | 1.408 | 1.553 | 1.56 | 1.38 | 1.37 | 1.265 | 1.15 | 1.415 | 1.472 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | | | | | | | | | | | | | |
| NUTRIENTS (effluent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 5.15 | 5.96 | 9.03 | 5.46 | 4.35 | 6.02 | 4.87 | 4.64 | 5.24 | 7.63 | 7.93 | 10.85 | 6.43 |
| organics | 4.35 | 2.13 | 3.55 | 2.25 | 2.18 | 2.35 | 2.45 | 1.01 | 1.29 | 1.42 | 1.7 | 2.35 | 2.25 |
| TKN (total kjeldahl nitrogen) | 9.5 | 8.1 | 12.6 | 7.7 | 6.5 | 8.4 | 7.3 | 5.6 | 6.5 | 9 | 9.6 | 13.2 | 8.67 |
| NO3 | 3.6175 | 3.0425 | 3.99 | 7.425 | 6.9575 | 4.8275 | 4.091 | 4.5543 | 4.7074 | 3.3535 | 3.5393 | 2.5839 | 4.3908 |
| NO2 | 0.462 | 0.585 | 0.437 | 0.33 | 0.221 | 0.276 | 0.273 | 0.276 | 0.287 | 0.506 | 0.899 | 0.632 | 0.432 |
| phosphates-total | 1.625 | 1.508 | 1.48 | 1.625 | 1.365 | 2.053 | 1.79 | 1.415 | 1.9 | 1.9 | 1.28 | 1.7 | 1.637 |
| phosphates-ortho | 1.123 | 1.213 | 1.32 | 1.373 | 1.14 | 1.393 | 1.17 | 1.16 | 1.04 | 1.17 | 0.817 | 1.195 | 1.176 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

| OAKWOOD BEACH WATER POLLUTION CONTROL PLANT (NY) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | APR 94 | MAY 94 | JUNE 94 | JULY 94 | AUG 94 | SEPT 94 | OCT 94 | NOV 94 | DEC 94 | JAN 95 | FEB 95 | MAR 95 | YEARLY AVERAGE |
| FLOW (MGD) | 30 | 28 | 27 | 27 | 28 | 28 | 26 | 28 | 31 | 31 | 24 | 24 | 27.67 |
| SUSPENDED SOLIDS, RAW SEWAGE (mg/L) | 125 | 172 | 176 | 180 | 192 | 173 | 170 | 177 | 151 | 147 | n/a | n/a | 166.3 |
| SUSPENDED SOLIDS, PLANT EFFLUENT (mg/L) | 9 | 14 | 8 | 5 | 5 | 5 | 5 | 5 | 6 | 8 | n/a | n/a | 7 |
| BOD, TOTAL RAW SEWAGE (mg/L) | 114 | 144 | 156 | 146 | 147 | 150 | 152 | 168 | 126 | 130 | n/a | n/a | 143.3 |
| BOD, TOTAL PLANT EFFLUENT (mg/L) | 12 | 14 | 12 | 13 | 7 | 6 | 6 | 7 | 6 | 7 | n/a | n/a | 9 |
| | | | | | | | | | | | | | |
| HEAVY METALS (influent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.039 | 0.043 | 0.11 | 0.2 | 0.2 | 0.12 | 0.049 | 0.15 | 0.1 | 0.069 | 0.18 | 0.033 | 0.108 |
| Cr, chromium | 0.0042 | 0.0073 | 0.0061 | 0.0086 | 0.011 | 0.0033 | 0.0021 | 0.0052 | 0.0066 | 0.0037 | 0.031 | 0.0039 | 0.0078 |
| Ni, nickel | 0.0076 | 0.069 | 0.022 | 0.019 | 0.025 | 0.016 | 0.011 | 0.016 | 0.021 | 0.014 | 0.034 | 0.017 | 0.023 |
| Zn, zinc | 0.076 | 0.084 | 0.15 | 0.29 | 0.27 | 0.13 | 0.07 | 0.2 | 0.14 | 0.098 | 0.27 | 0.048 | 0.152 |
| Pb, lead | 0.0066 | 0.0076 | 0.023 | 0.039 | 0.0059 | 0.016 | 0.008 | 0.026 | 0.016 | 0.011 | 0.092 | 0.0054 | 0.021 |
| Cd, cadmium | 0.0004 | 0.0004 | 0.00038 | 0.0006 | 0.0011 | 0.00052 | 0.00035 | 0.00078 | 0.00066 | 8E-05 | 0.00064 | 7E-05 | 0.00050 |
| Hg, mercury | 0.00016 | 6E-05 | 0.00019 | 0.00082 | 0.0005 | 0.00035 | 0.00011 | 0.0016 | 6E-05 | 0.0001 | 0.00082 | 8E-05 | 0.00040 |
| As, arsenic | 0.00042 | 0.00049 | 0.0011 | 0.0018 | 0.0013 | 0.00052 | 0.0006 | 0.0012 | 0.0009 | 0.00052 | 0.00077 | 0.00066 | 0.00086 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 5E-05 | 5E-05 | 3E-05 | 4E-05 | 7E-05 | 8E-05 | 4E-05 | 5.5E-05 |
| Ag, silver | 0.0027 | 0.0048 | 0.018 | 0.019 | 0.027 | 0.0064 | 0.0036 | 0.019 | 0.015 | 0.0052 | 0.013 | 0.0032 | 0.0114 |
| | | | | | | | | | | | | | |
| HEAVY METALS, (effluent), mg/L | | | | | | | | | | | | | |
| Cu, copper | 0.0082 | 0.0097 | 0.024 | 0.019 | 0.0054 | 0.0074 | 0.0084 | 0.0089 | 0.0058 | 0.0043 | 0.0057 | 0.007 | 0.0095 |
| Cr, chromium | 0.0008 | 0.0012 | 0.0006 | 0.0011 | 0.0013 | 0.0005 | 0.001 | 0.0006 | 0.0006 | 0.0008 | 0.001 | 0.0004 | 0.0008 |
| Ni, nickel | 0.0059 | 0.0098 | 0.01 | 0.0066 | 0.0038 | 0.0036 | 0.008 | 0.0045 | 0.0079 | 0.0063 | 0.0072 | 0.012 | 0.0071 |
| Zn, zinc | 0.051 | 0.021 | 0.018 | 0.028 | 0.017 | 0.022 | 0.03 | 0.017 | 0.025 | 0.033 | 0.026 | 0.029 | 0.026 |
| Pb, lead | 0.0005 | 0.0008 | 0.0004 | 0.0006 | 0.0009 | 0.0019 | 0.002 | 0.0017 | 0.0016 | 0.0019 | 0.0018 | 0.001 | 0.0013 |
| Cd, cadmium | 0.00026 | 0.0001 | 6E-05 | 3E-05 | 5E-05 | 0.0001 | 0.00018 | 3E-05 | 4E-05 | 4E-05 | 4E-05 | 3E-05 | 8E-05 |
| Hg, mercury | 8E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6E-05 | 6.167E-05 |
| As, arsenic | 0.00042 | 0.00026 | 0.00048 | 0.00065 | 0.00041 | 0.00023 | 0.00043 | 0.00021 | 0.00056 | 0.00024 | 0.00044 | 0.00047 | 0.0004 |
| Be, beryllium | 8E-05 | 3E-05 | 3E-05 | 8E-05 | 8E-05 | 3E-05 | 5E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 3E-05 | 4.417E-05 |
| Ag, silver | 0.00018 | 0.0011 | 0.00039 | 0.00022 | 0.0033 | 0.00072 | 0.00038 | 0.00052 | 0.00049 | 0.00057 | 0.0039 | 0.00038 | 0.0010 |
| | | | | | | | | | | | | | |
| NUTRIENTS (influent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 11.64 | 16.98 | 14.99 | 16.91 | 15.32 | 17.32 | 18.64 | 16.39 | 17.32 | 15.93 | 19.29 | 26.07 | 17.23 |
| organics | 15.85 | 18.8 | 15.17 | 22.75 | 21.58 | 12.23 | 21.05 | 36.6 | 15.45 | 14.85 | 17.68 | 38.35 | 20.86 |
| TKN (total kjeldahl nitrogen) | 27.5 | 35.8 | 30.1 | 39.7 | 36.9 | 29.6 | 39.7 | 53 | 32.8 | 30.8 | 37 | 64.4 | 38.11 |
| NO3 | 0.3825 | 0.6625 | 0.245 | 0.5788 | 0.3933 | 0.4053 | 0.3013 | 0.4468 | 0.569 | 0.4853 | 0.59 | 0.285 | 0.444 |
| NO2 | 0.393 | 0.112 | 0.051 | 0.021 | 0.032 | 0.025 | 0.06 | 0.053 | 0.081 | 0.065 | 0.16 | 0.035 | 0.091 |
| phosphates-total | 3.975 | 6.466 | 5.973 | 6.393 | 6.492 | 4.836 | 6.163 | 10.289 | 5.1 | 4.463 | 5.337 | 11.837 | 6.444 |
| phosphates-ortho | 1.823 | 2.317 | 2.428 | 2.277 | 2.463 | 2.355 | 2.79 | 3.138 | 2.72 | 2.424 | 2.8 | 4.499 | 2.670 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |
| | | | | | | | | | | | | | |
| NUTRIENTS (effluent), mg/L | | | | | | | | | | | | | |
| NH3, ammonia | 5.2 | 6.34 | 10.14 | 10.19 | 5.48 | 4.29 | 5.65 | 5.56 | 6.74 | 6.7 | 9.24 | 13.08 | 7.38 |
| organics | 7.43 | 5.43 | 3.13 | 3.08 | 2.8 | 1.48 | 1.63 | 1.6 | 2.53 | 1.83 | 2.78 | 2.9 | 3.05 |
| TKN (total kjeldahl nitrogen) | 12.6 | 11.8 | 13.3 | 13.3 | 8.3 | 5.8 | 7.3 | 7.2 | 9.3 | 8.5 | 12 | 16 | 10.45 |
| NO3 | 2.9223 | 2.7355 | 2.05 | 3.1525 | 4.2158 | 5.0495 | 5.5205 | 6.0798 | 5.3878 | 4.0005 | 3.345 | 1.349 | 3.817 |
| NO2 | 0.303 | 0.302 | 0.313 | 0.61 | 0.461 | 0.363 | 0.344 | 0.4 | 0.429 | 0.345 | 0.561 | 0.401 | 0.403 |
| phosphates-total | 2.875 | 2.746 | 2.465 | 2.645 | 3.486 | 2.987 | 2.898 | 3.18 | 3.39 | 2.395 | 1.414 | 2.982 | 2.789 |
| phosphates-ortho | 1.415 | 1.483 | 2.143 | 2.324 | 2.244 | 2.409 | 2.636 | 3.065 | 2.75 | 2.065 | 0.908 | 1.555 | 2.083 |
| cyanide | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 |

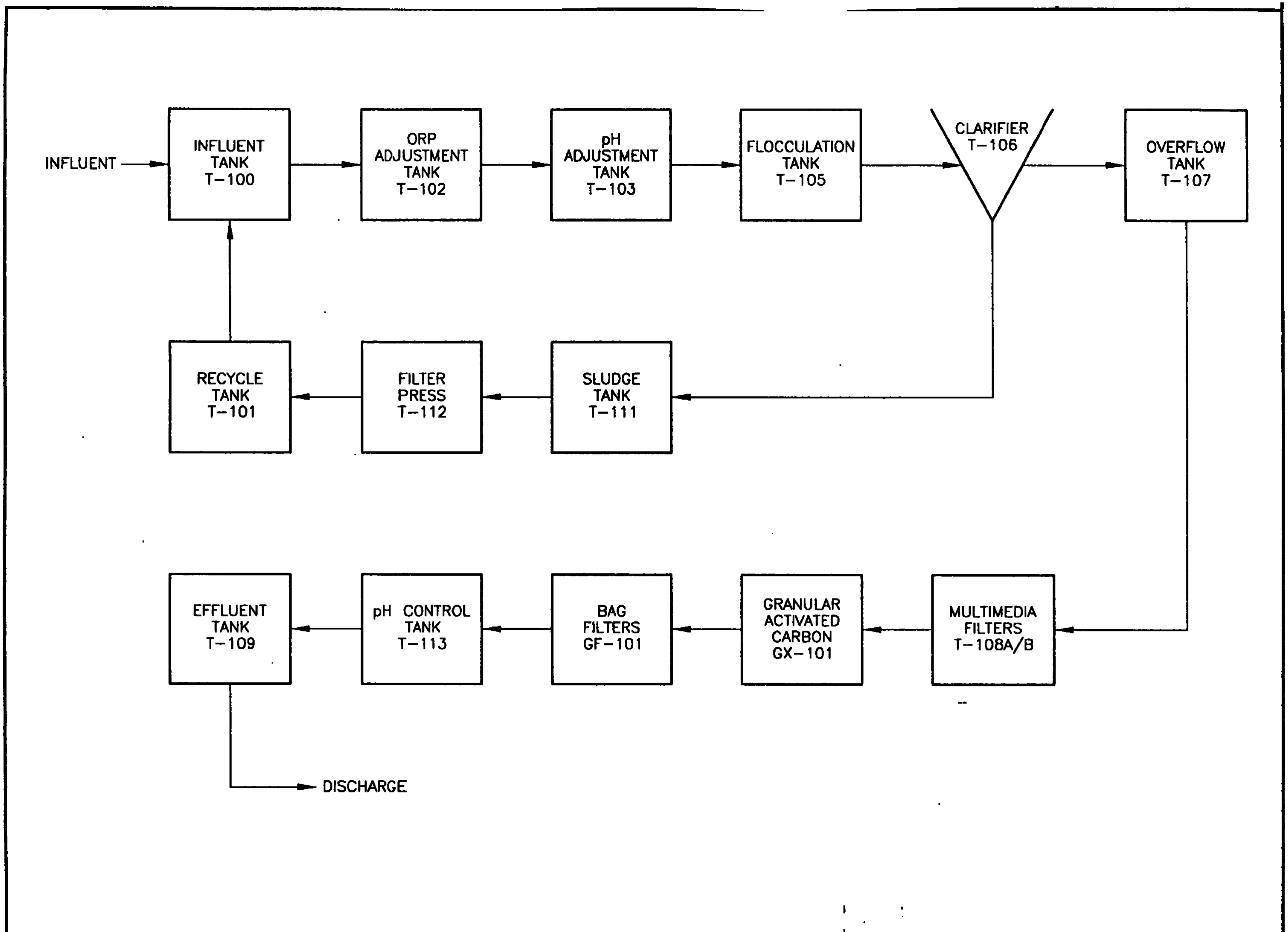
**INFLUENT WASTEWATER STREAM OF A TYPICAL ELECTROCHEMICAL INDUSTRY**

| | *Cr* | *Cu* | *As* | *Benzene* | *Ethyl Benzene* | *Toluene* | *Xylene* | *TPH* |
|---|---|---|---|---|---|---|---|---|
| | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* |
| **Oct 3** | 1580 | <4 | <2 | 95 | 1.2 | 53 | 47 | 440 |
| **Oct 5** | 1600 | <4 | 4.9 | 120 | 2 | 75 | 57 | 550 |
| **Oct 10** | 1610 | <4 | 4.1 | 110 | 1.2 | 74 | 55 | 520 |
| **Oct 12** | 1680 | <4 | <2 | 120 | 1.3 | 74 | 60 | 540 |
| **Oct 17** | 1700 | <4 | <2 | 150 | 1.7 | 100 | 74 | 690 |
| **Oct 19** | 1710 | <4 | <2 | 99 | 1.2 | 69 | 50 | 470 |
| **Oct 24** | 1760 | <4 | 3.4 | 170 | 2.8 | 120 | 84 | 820 |
| **Oct 26** | 1770 | <4 | <2 | 160 | 2.1 | 120 | 84 | 810 |
| **Oct 30** | 1810 | <4 | <2 | 190 | 6.3 | 140 | 96 | 1000 |
| **Nov 2** | 1930 | <4 | 2.2 | 160 | 2.4 | 110 | 78 | 730 |
| **Nov 7** | 1880 | <4 | <2 | 200 | 3.5 | 150 | 88 | 920 |
| **Nov 9** | 1800 | <4 | 2 | 200 | 2.7 | 150 | 95 | 980 |
| **Nov 14** | 1850 | <4 | <2 | 200 | 2.1 | 140 | 89 | 950 |
| **Nov 16** | 1790 | <4 | 3.5 | 190 | 2.2 | 140 | 90 | 1000 |
| **Nov 20** | 1870 | <4 | <2 | 200 | 2.5 | 130 | 78 | 890 |
| **Nov 21** | 1840 | <4 | <2 | 240 | 4.8 | 186 | 107 | 1100 |
| **Nov 28** | 2090 | <4 | 2.7 | 220 | 4.3 | 160 | 94 | 930 |
| **Nov 30** | 2070 | <4 | <2 | 190 | 3.6 | 130 | 82 | 1200 |
| **Dec 5** | 2040 | <4 | <2 | 190 | 2.8 | 130 | 91 | 790 |
| **Dec 7** | 2040 | <4 | <2 | 200 | 4.1 | 140 | 90 | 1200 |
| **Dec 12** | 2120 | <4 | 4.9 | 250 | 4.8 | 150 | 97 | 1200 |
| **Dec 14** | 2170 | <4 | 3 | 240 | 4.3 | 150 | 100 | 1200 |
| **Dec 19** | 2630 | <4 | 2.5 | 200 | 2.6 | 110 | 96 | 930 |
| **Dec 20** | 2230 | <4 | <2 | 210 | 3.2 | 130 | 100 | 1100 |
| **Dec 26** | 2470 | <4 | 2.2 | 110 | 1.4 | 60 | 60 | 540 |
| **Dec 27** | 2270 | <4 | 2.5 | 180 | 3.2 | 110 | 86 | 850 |

**EFFLUENT WASTEWATER STREAM OF A TYPICAL ELECTROCHEMICAL INDUSTRY**

| | *Cr* | *Cu* | *As* | *Cr +6* | *Benzene* | *Ethyl Benzene* | *Toluene* | *Xylene* | *TPH* |
|---|---|---|---|---|---|---|---|---|---|
| | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* | *ug/l* |
| **Oct 3** | 10.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 5** | 11.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 10** | 6 | <4 | 4.6 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 12** | 5.5 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 17** | 5 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 19** | 6.2 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 24** | 9.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 26** | 9.7 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Oct 30** | 17.2 | <4 | <2 | <20 | <0.2 | <0.2 | 0.1 | <0.3 | <4 |
| **Nov 2** | 20.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 7** | 8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 9** | 8.1 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 14** | 10.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 16** | 19 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 20** | 8.2 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 21** | 6.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 28** | 10.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Nov 30** | 23.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 5** | 12.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 7** | 13.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 12** | 13.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 14** | 10.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 19** | 22 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 20** | 11.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 26** | <3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| **Dec 27** | 4.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |

TPH: Total Petroleum Hydrocarbons




MR-WFSCH(MR57)

## ELECTROCHEMICAL TREATMENT SYSTEM

T-102 ORP ADJUSTMENT TANK-- INTRODUCTION OF FERROUS ION SOLUTION USING AN EXCESS OF STOICHIOMETRIC 3.2 POUNDS OF IRON PER ONE POUND CHROMIUM. Cr6 REDUCED TO Cr3. $3Fe(OH)_2 + CrO_4^{-2} + 4H_2O \rightarrow 3Fe(OH)_3 + Cr(OH)_3 + 2OH^{-2}$ SULFURIC ACID USED TO REDUCE PH TO 3 TO PROMOTE REDOX REACTION.

T-103 PH ADJUSTMENT TANK-- PH ADJUSTED TO 8.5 USING SODIUM HYDROXIDE TO PROMOTE PRECIPITATION OF METALIC HYDROXIDES.

T-105 FLOCCULATION TANK-- POLYELECTROLYTE IS ADDED TO PROMOTE COAGULATION AND FLOCCULATION OF METALLIC HYDROXIDE PRECIPITATES.

T-106 CLARIFER-- INCLINED PLATE CLARIFIER TO INHANCE SOLID SEPARATION.

T-107 OVERFLOW TANK-- CLARIFIED WATER.

T-108 A/B MULTIMEDIA FILTERS-- SUSPENDED SOLIDS REMOVAL.

GRANULAR ACTIVATED CARBON-- REMOVE BETX / METAL POLISHING.

BAG FILTERS-- FURTHER REDUCE SUSPENDED SOLIDS.

PH CONTROL TANK-- PH ADJUSTMENT TO A DISCHARGE RANGE 6 TO 8.5

| Oct 95 | Const. / Units | INFLUENT (T100) | | | | | | | | EFFLUENT (T109) | | | | | | | | | CARBON MID-BED | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cr ug/l | Cu ug/l | As ug/l | B ug/l | E ug/l | T ug/l | X ug/l | TPH-g ug/l | Cr ug/l | Cu ug/l | As ug/l | Cr+6 ug/l | B ug/l | E ug/l | T ug/l | X ug/l | TPH-g ug/l | B ug/l | E ug/l | T ug/l | X ug/l | TPH-g ug/l |
| Date | Day | | | | | | | | | | | | | | | | | | | | | | |
| 1 | S | | | | | | | | | | | | | | | | | | | | | | |
| 2 | M | | | | | | | | | | | | | | | | | | | | | | |
| 3 | T | 1580 | <4 | <2 | 95 | 1.2 | 53 | 47 | 440 | 10.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 4 | W | | | | | | | | | | | | | | | | | | | | | | |
| 5 | TH | 1600 | <4 | 4.9 | 120 | 2.0 | 75 | 57 | 550 | 11.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 6 | F | | | | | | | | | | | | | | | | | | | | | | |
| 7 | S | | | | | | | | | | | | | | | | | | | | | | |
| 8 | S | | | | | | | | | | | | | | | | | | | | | | |
| 9 | M | | | | | | | | | | | | | | | | | | | | | | |
| 10 | T | 1610 | <4 | 4.1 | 110 | 1.2 | 74 | 55 | 520 | 6.0 | <4 | 4.6 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 11 | W | | | | | | | | | | | | | | | | | | | | | | |
| 12 | TH | 1680 | <4 | <2 | 120 | 1.3 | 74 | 60 | 540 | 5.5 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 13 | F | | | | | | | | | | | | | | | | | | | | | | |
| 14 | S | | | | | | | | | | | | | | | | | | | | | | |
| 15 | S | | | | | | | | | | | | | | | | | | | | | | |
| 16 | M | | | | | | | | | | | | | | | | | | | | | | |
| 17 | T | 1700 | <4 | <2 | 150 | 1.7 | 100 | 74 | 690 | 5.0 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 18 | W | | | | | | | | | | | | | | | | | | | | | | |
| 19 | TH | 1710 | <4 | <2 | 99 | 1.2 | 69 | 50 | 470 | 6.2 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 20 | F | | | | | | | | | | | | | | | | | | | | | | |
| 21 | S | | | | | | | | | | | | | | | | | | | | | | |
| 22 | S | | | | | | | | | | | | | | | | | | | | | | |
| 23 | M | | | | | | | | | | | | | | | | | | | | | | |
| 24 | T | 1760 | <4 | 3.4 | 170 | 2.8 | 120 | 84 | 820 | 9.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 25 | W | | | | | | | | | | | | | | | | | | | | | | |
| 26 | TH | 1770 | <4 | <2 | 160 | 2.1 | 120 | 84 | 810 | 9.7 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 27 | F | | | | | | | | | | | | | | | | | | | | | | |
| 28 | S | | | | | | | | | | | | | | | | | | | | | | |
| 29 | S | | | | | | | | | | | | | | | | | | | | | | |
| 30 | M | 1810 | <4 | <2 | 190 | 6.3 | 140 | 96 | 1000 | 17.2 | <4 | <2 | <20 | <0.2 | <0.2 | 0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 31 | T | | | | | | | | | | | | | | | | | | | | | | |
| Median | | 1700 | <4 | <2 | 120 | 1.7 | 75 | 60 | 550 | 9.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 20 | 100 | 10 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| Maximum | | 1810 | <4 | 4.9 | 190 | 6.3 | 140 | 96 | 1000 | 17.2 | <4 | 4.6 | <20 | <0.2 | <0.2 | 0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 50 | 200 | 50 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| MDL | ug/l | 3 | 4 | 2 | 0.2 | 0.2 | 0.1 | 0.3 | 4.0 | 3 | 4 | 2 | 20 | 0.2 | 0.2 | 0.1 | 0.3 | 4.0 | 0.2 | 0.2 | 0.1 | 0.3 | 4.0 |
| PQL | ug/l | 20 | 20 | 40 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 20 | 20 | 40 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 |

| Nov 95 | | INFLUENT (T100) | | | | | | | | EFFLUENT (T109) | | | | | | | | | CARBON MID-BED | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Const. | | Cr | Cu | As | B | E | T | X | TPH-g | Cr | Cu | As | Cr+6 | B | E | T | X | TPH-g | B | E | T | X | TPH-g |
| Units | | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l |
| Date | Day | | | | | | | | | | | | | | | | | | | | | | |
| 1 | W | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Th | 1930 | <4 | 2.2 | 160 | 2.4 | 110 | 78 | 730 | 20.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 3 | F | | | | | | | | | | | | | | | | | | | | | | |
| 4 | S | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 6 | M | | | | | | | | | | | | | | | | | | | | | | |
| 7 | T | 1880 | <4 | <2 | 200 | 3.5 | 150 | 88 | 920 | 8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 8 | W | | | | | | | | | | | | | | | | | | | | | | |
| 9 | TH | 1800 | <4 | 2.0 | 200 | 2.7 | 150 | 95 | 980 | 8.1 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 10 | F | | | | | | | | | | | | | | | | | | | | | | |
| 11 | S | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 13 | M | | | | | | | | | | | | | | | | | | | | | | |
| 14 | T | 1850 | <4 | <2 | 200 | 2.1 | 140 | 89 | 950 | 10.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 15 | W | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Th | 1790 | <4 | 3.5 | 190 | 2.2 | 140 | 90 | 1000 | 19 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 17 | F | | | | | | | | | | | | | | | | | | | | | | |
| 18 | S | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 20 | M | 1870 | <4 | <2 | 200 | 2.5 | 130 | 78 | 890 | 8.2 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 21 | T | 1940 | <4 | <2 | 240 | 4.8 | 186 | 107 | 1100 | 6.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 22 | W | | | | | | | | | | | | | | | | | | | | | | |
| 23 | Th | | | | | | | | | | | | | | | | | | | | | | |
| 24 | F | | | | | | | | | | | | | | | | | | | | | | |
| 25 | S | | | | | | | | | | | | | | | | | | | | | | |
| 26 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 27 | M | | | | | | | | | | | | | | | | | | | | | | |
| 28 | T | 2090 | <4 | 2.7 | 220 | 4.3 | 160 | 94 | 930 | 10.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 29 | W | | | | | | | | | | | | | | | | | | | | | | |
| 30 | Th | 2070 | <4 | <2 | 190 | 3.6 | 130 | 82 | 1200.0 | 23.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Median | | 1880 | <4 | <2 | 200 | 2.7 | 140 | 89 | 950 | 10.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 20 | 100 | 10 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| Maximum | | 2090 | <4 | 3.5 | 240 | 4.8 | 186 | 107 | 1200 | 23.8 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 50 | 200 | 50 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| MDL ug/l | | 3 | 4 | 2 | 0.2 | 0.2 | 0.1 | 0.3 | 4 | 3 | 4 | 2 | 20 | 0.2 | 0.2 | 0.1 | 0.3 | 4 | 0.2 | 0.2 | 0.1 | 0.3 | 4 |
| PQL ug/l | | 20 | 20 | 40 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 20 | 20 | 40 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 |

| Dec 95 | | INFLUENT (T100) | | | | | | | | EFFLUENT (T109) | | | | | | | | | CARBON MID-BED | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Const. | | Cr | Cu | As | B | E | T | X | TPH-g | Cr | Cu | As | Cr+6 | B | E | T | X | TPH-g | B | E | T | X | TPH-g |
| Units | | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l | ug/l |
| Date | Day | | | | | | | | | | | | | | | | | | | | | | |
| 1 | F | | | | | | | | | | | | | | | | | | | | | | |
| 2 | S | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 4 | M | | | | | | | | | | | | | | | | | | | | | | |
| 5 | T | 2040 | <4 | <2 | 190 | 2.8 | 130 | 91 | 790.0 | | | | | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 6 | W | | | | | | | | | 12.3 | <4 | <2 | <20 | | | | | | | | | | |
| 7 | Th | 2040 | <4 | <2 | 200 | 4.1 | 140 | 90 | 1200.0 | 13.9 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 8 | F | | | | | | | | | | | | | | | | | | | | | | |
| 9 | S | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 11 | M | | | | | | | | | | | | | | | | | | | | | | |
| 12 | T | 2120 | <4 | 4.9 | 250 | 4.8 | 150 | 97 | 1200 | 13.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 13 | W | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Th | 2170 | <4 | 3.0 | 240 | 4.3 | 150 | 100 | 1200 | 10.3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 15 | F | | | | | | | | | | | | | | | | | | | | | | |
| 16 | S | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 18 | M | | | | | | | | | | | | | | | | | | | | | | |
| 19 | T | 2630 | <4 | 2.5 | 200 | 2.6 | 110 | 96 | 930 | 22.0 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 20 | W | 2230 | <4 | <2 | 210 | 3.2 | 130 | 100 | 1100 | 11.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 21 | Th | | | | | | | | | | | | | | | | | | | | | | |
| 22 | F | | | | | | | | | | | | | | | | | | | | | | |
| 23 | S | | | | | | | | | | | | | | | | | | | | | | |
| 24 | Su | | | | | | | | | | | | | | | | | | | | | | |
| 25 | M | | | | | | | | | | | | | | | | | | | | | | |
| 26 | T | 2470 | <4 | 2.2 | 110 | 1.4 | 60 | 60 | 540 | <3 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 27 | W | 2270 | <4 | 2.5 | 180 | 3.2 | 110 | 86 | 850 | 4.4 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| 28 | Th | | | | | | | | | | | | | | | | | | | | | | |
| 29 | F | | | | | | | | | | | | | | | | | | | | | | |
| 30 | S | | | | | | | | | | | | | | | | | | | | | | |
| 31 | Su | | | | | | | | | | | | | | | | | | | | | | |
| Median | | 2200 | <4 | 2.3 | 200 | 3.2 | 130 | 93.5 | 1015 | 11.85 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 20 | 100 | 10 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| Maximum | | 2630 | <4 | 4.9 | 250 | 4.8 | 150 | 100 | 1200 | 22 | <4 | <2 | <20 | <0.2 | <0.2 | <0.1 | <0.3 | <4 | <0.2 | <0.2 | <0.1 | <0.3 | <4 |
| Limit | | | | | | | | | | 50 | 200 | 50 | | <DL | <DL | <DL | <DL | <DL | | | | | |
| MDL | ug/l | 3 | 4 | 2 | 0.2 | 0.2 | 0.1 | 0.3 | 4 | 3 | 4 | 2 | 20 | 0.2 | 0.2 | 0.1 | 0.3 | 4 | 0.2 | 0.2 | 0.1 | 0.3 | 4 |
| PQL | ug/l | 20 | 20 | 40 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 20 | 20 | 40 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 | 0.5 | 0.5 | 0.5 | 0.5 | 20 |

**EFFLUENT STREAM OF A PHARMACEUTICAL INDUSTRY**

| Date | *O & G* mg/L | *PHC* mg/L | *TSS* mg/L | *BOD5* mg/L |
|---|---|---|---|---|
| Jan 19, 94 | 64 | 33 | N/A | N/A |
| Feb 10, 94 | 25 | 19 | N/A | N/A |
| Mar 4, 94 | 30 | 15 | N/A | N/A |
| Apr 14, 94 | 82 | 61 | N/A | N/A |
| May 6, 94 | 96 | 79 | 110 | 2020 |
| May 19, 94 | N/A | N/A | N/A | N/A |
| Jun 16, 94 | 509 | 377 | N/A | N/A |
| Jun 23, 94 | 87 | 65 | N/A | N/A |
| July 14, 94 | 57 | 28 | N/A | N/A |
| Aug 5, 94 | 211 | 168 | N/A | N/A |
| Aug 26, 94 | 21.2 | 10.7 | N/A | N/A |
| Sept 2, 94 | 6.2 | 0.9 | N/A | N/A |
| Sept 9, 94 | 250 | 160 | N/A | N/A |
| Sept 16, 94 | 108 | 26 | N/A | N/A |
| Sept 23, 94 | 134 | 129 | N/A | N/A |
| Sept 30, 94 | 60 | 38 | N/A | N/A |
| Oct 7, 94 | 143 | 138 | N/A | N/A |
| Oct 14, 94 | 18 | 15 | N/A | N/A |
| Oct 21, 94 | 111 | 89 | N/A | N/A |
| Oct 28, 94 | 22 | 6.9 | N/A | N/A |
| Nov 4, 94 | 20 | 11 | 110 | 2235 |
| Nov 11, 94 | 336 | 301 | N/A | N/A |
| Nov 18, 94 | 5.8 | 4 | N/A | N/A |
| Nov 22, 94 | 58 | 56 | N/A | N/A |
| Nov 29, 94 | 30 | 30 | N/A | N/A |
| Dec 2, 94 | 22 | 18 | N/A | N/A |
| Dec 9, 94 | 9.4 | 5.4 | N/A | N/A |
| Dec 16, 94 | 5.2 | 2.7 | N/A | N/A |
| Dec 22, 94 | 317 | 156 | N/A | N/A |
| Dec 30, 94 | 34 | 34 | N/A | N/A |
| Jan 6, 95 | 5.9 | 5.8 | N/A | N/A |
| Jan 13, 95 | 28 | 19 | N/A | N/A |
| Jan 20, 95 | 180 | 110 | N/A | N/A |
| Jan 27, 95 | 90 | 61 | N/A | N/A |
| Feb 3, 95 | 128 | 105 | N/A | N/A |
| Feb 10, 95 | 24 | 21 | N/A | N/A |
| Feb 17, 95 | 135 | 57 | N/A | N/A |
| Feb 24, 95 | 5.3 | 4.2 | N/A | N/A |
| Mar 3, 95 | 32 | 23 | N/A | N/A |
| Mar 10, 95 | 13 | 5.5 | N/A | N/A |
| Mar 17, 95 | 10 | 6.6 | N/A | N/A |
| Mar 24, 95 | 142 | 116 | N/A | N/A |
| Mar 31, 95 | 28 | 5.6 | N/A | N/A |
| Apr 7, 95 | 16 | 11 | N/A | N/A |
| Apr 14, 95 | 53 | 33 | N/A | N/A |
| Apr 21, 95 | 258 | 182 | N/A | N/A |
| Apr 28, 95 | 91 | 77 | N/A | N/A |
| May 5, 95 | 22 | 7.2 | N/A | N/A |
| May 12, 95 | 110 | 78 | N/A | N/A |
| May 19, 95 | 38 | 26 | 94 | 4842 |
| May 26, 95 | 407 | 340 | N/A | N/A |

**EFFLUENT STREAM OF A PHARMACEUTICAL INDUSTRY**

| Date | *O & G* mg/L | *PHC* mg/L | *TSS* mg/L | *BOD5* mg/L |
|---|---|---|---|---|
| Jun 2, 95 | 27 | 6.2 | N/A | N/A |
| Jun 9, 95 | 376 | 334 | N/A | N/A |
| Jun 16, 95 | 104 | 36 | N/A | N/A |
| Jun 23, 95 | 5.6 | 3.4 | N/A | N/A |
| Jun 30, 95 | 13 | 7.8 | N/A | N/A |
| Jul 7, 95 | 8.1 | 0.9 | N/A | N/A |
| Jul 14, 95 | 4 | 1.6 | N/A | N/A |
| Jul 21, 95 | 15 | 11 | N/A | N/A |
| Jul 28, 95 | 145 | 139.8 | N/A | N/A |
| Aug 4, 95 | 45 | 22 | N/A | N/A |
| Aug 11, 95 | 368 | 308 | N/A | N/A |
| Aug 18, 95 | 9.8 | 5.4 | N/A | N/A |
| Aug 25, 95 | 26 | 3.8 | N/A | N/A |
| Sept 1, 95 | 17 | 4.6 | N/A | N/A |
| Sept 8, 95 | 2.6 | 1.8 | N/A | N/A |
| Sept 15, 95 | 6 | 3 | N/A | N/A |
| Sept 22, 95 | 72 | 59 | N/A | N/A |
| Sept 29, 95 | 35 | 21 | N/A | N/A |
| Oct 6, 95 | 188 | 146 | N/A | N/A |
| Oct 13, 95 | 85 | 63 | N/A | N/A |
| Oct 20, 95 | 22 | 5.6 | N/A | N/A |
| Oct 27, 95 | 66 | 34 | N/A | N/A |
| Nov 3, 95 | 31 | 21 | N/A | N/A |
| Nov 10, 95 | 75 | 30 | 65 | 1500 |
| Nov 17, 95 | 8 | 4 | N/A | N/A |
| Nov 22, 95 | 25 | 15 | N/A | N/A |
| Dec 1, 95 | 18 | 8.2 | N/A | N/A |
| Dec 8, 95 | 27 | 14 | N/A | N/A |
| Dec 15, 95 | 3.4 | 1.4 | N/A | N/A |
| Dec 21, 95 | 131 | 53 | N/A | N/A |
| Dec 29, 95 | 27 | 7.2 | N/A | N/A |
| Jan 5, 96 | 1.8 | 0.8 | N/A | N/A |
| Jan 12, 96 | 19 | 9.3 | N/A | N/A |
| Jan 19, 96 | 17 | 8.4 | N/A | N/A |
| Jan 26, 96 | 1 | 0.4 | N/A | N/A |

O & G: Total Oil and Grease
PHC: Petroleum Hydrocarbons
TSS: Total Suspended Solids

## BATTERY INDUSTRY

*Influent Stream*

| PARAMETERS (mg/L) | Time Period A |
|---|---|
| *Chemical Oxygen Demand (COD)* | 1240 |
| *Total Suspended Solids (TSS)* | 62 |
| **HEAVY METALS (mg/L)** | |
| *Copper, Cu* | 1.3 |
| *Lead, Pb* | 32.0 |
| *Nickel, Ni* | 0.63 |
| *Silver, Ag* | < 0.01 |
| *Zinc, Zn* | 4.0 |
| *Chromium (total), Cr* | 1.1 |
| *Cadmium, Cd* | 0.1 |
| *Arsenic, As* | <0.3 |
| **OTHER SUBSTANCES (mg/L)** | |
| *Oil & Grease* | < 10 |
| *Cyanide (total), CN* | < 0.05 |
| *Dissolved Sulfides* | < 0.02 |

| | |
|---|---|
| Time Period A | Jul-Sep 1995 |
| Time Period B | Apr-Jun 1996 |
| Time Period C | Jan-Mar 1996 |

*Effluent Stream*

| PARAMETERS (mg/L) | Time Period B | Time Period C |
|---|---|---|
| *Flow Rate (GPD)* | 444 | 1260 |
| *Chemical Oxygen Demand (COD)* | 161 | 8.8 |
| *Total Suspended Solids (TSS)* | 25 | 5 |
| **HEAVY METALS (mg/L)** | | |
| *Copper, Cu* | 0.1 | < 0.01 |
| *Lead, Pb* | 0.15 | < 0.05 |
| *Nickel, Ni* | 0.24 | 0.07 |
| *Silver, Ag* | < 0.01 | 0.01 |
| *Zinc, Zn* | 0.15 | 0.07 |
| *Chromium (total), Cr* | < 0.01 | < 0.01 |
| *Cadmium, Cd* | < 0.01 | < 0.01 |
| *Arsenic, As* | < 0.3 | < 0.3 |
| *Mercury, Hg* | < 0.005 | < 0.005 |
| **OTHER SUBSTANCES (mg/L)** | | |
| *Oil & Grease* | < 10 | < 10 |
| *Cyanide (total), CN* | < 0.05 | < 0.05 |
| *Dissolved Sulfides* | 0.07 | 0.03 |

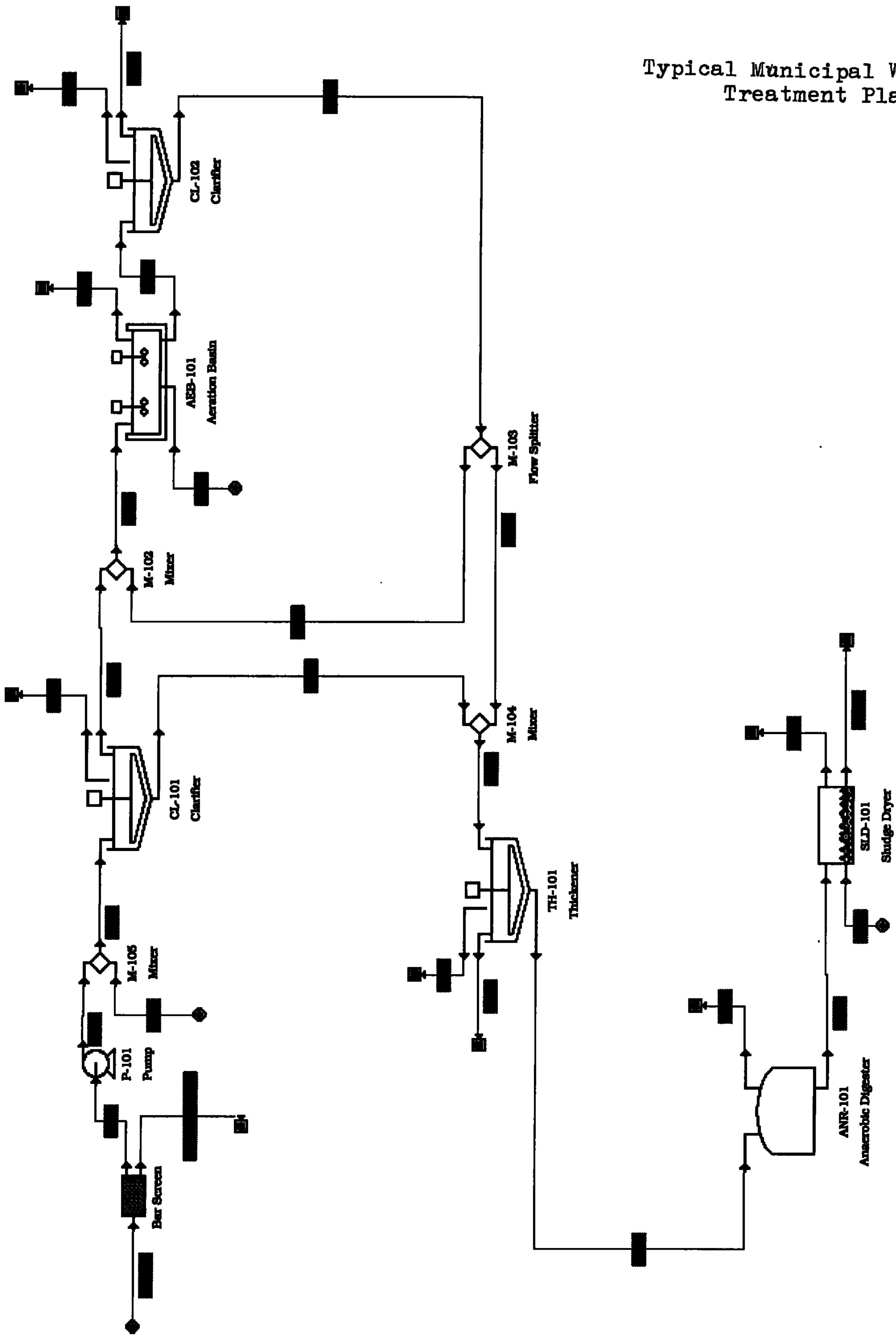
| PARAMETERS | EXPOSURE LIMITS NIOSH (mg/m3) | OSHA (mg/m3) | IDLH (mg/m3) | HEALTH HAZARDS route | symptoms | TARGET ORGANS | SPECIFIC GRAVITY | FLASH POINT (F) |
|---|---|---|---|---|---|---|---|---|
| **VOLATILE ORGANICS** | | | | | | | | |
| *1,2-dichloroethene, trans* | 790 | 790 | 3950 | In/Ig/Co | irritable eyes, respiratory system, CNS, depression | eyes, respiratory system, CNS | 1.27 | 36-39 |
| *chloroform* | 9.78 | 240 | 2445 | In/Ab/Ig/Co | irritable eyes, skin; dizziness, mental dullness, nausea, confusion, fatigue; anesthesia; headache; enlarged liver, carcinogenic | liver, kidneys, heart, eyes, skin, CNS; in animals, liver & kidney cancers | 1.48 | NA |
| *1,1,1-trichloroethane* | 350 ppm | 350 ppm/15 m | | In/Ig/Co | irritating to the eyes, skin, mucous membranes, and upper respiratory tract; prolonged exposure can cause narcotic effect and dermatitis | skin, eyes, respiratory system; liver, kidneys | 1.338 | NA |
| *bromodichloromethane* | | | | In/Ab/Co | causes eye and skin irritation; material is irritating to mucous membranes and upper respiratory tract; prolonged exposure can cause nausea, dizziness, headache, and narcotic effect; carcinogen | eye, skin, respiratory system | 1.98 | NA |
| *tetrachloroethene* | *minimum | 689 | 1033.5 | In/Ab/Ig/Co | irritable eyes, nose, throat; nausea; flush face, neck; vertigo, dizziness, incoordination, headache, somnolence; skin erythema (skin redness) | eyes, skin, respiratory system, liver kidneys, CNS; in animals: liver tumors | 1.62 | NA |
| *toluene* | 375 | 750 | 1875 | In/Ab/Ig/Co | irritable eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation, nervousness, muscule fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage | eyes, skin, respiraory system, CNS, kidneys, liver | 0.87 | 40 |
| *m-xylene* | 435 | 435 | 3915 | In/Ab/Ig/Co | irritable eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization; anorexia, nausea, vomiting; abdominal pain, dermatitis | CNS, GI tract, blood, liver, kidneys | 0.86 | 82 |
| *o,p-xylenes* | 435/435 | 435/435 | 3915/3915 | In/Ab/Ig/Co | irritable eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization; anorexia, nausea, vomiting; abdominal pain, dermatitis | CNS, GI tract, blood, liver, kidneys | 0.88/0.86 | 90/81 |

| HEAVY METALS | EXPOSURE LIMITS NIOSH (mg/m3) | OSHA (mg/m3) | IDLH (mg/m3) | HEALTH HAZARDS route | symptoms | TARGET ORGANS | SPECIFIC GRAVITY | FLASH POINT (F) |
|---|---|---|---|---|---|---|---|---|
| *Cu, copper* | 1 | 1 | 100 | In/Ig/Co | irritable eyes, nose, pharynx; nasal perforation, metallic taste, dermatitis; in animals, lung, liver, kidney damage, anemia | eyes, skin, liver, kidneys, respiratory system, Wilson's disease | 8.94 | NA |
| *Cr, chromium* | 0.5 | 1 | 250 | In/Ig/Co | irritating eyes, skin; lung fibrosis (histologic) | eyes, skin, respiratory system | 7.14 | NA |
| *Ni, nickel* | 0.015 | 1 | 10 | In/Ig/Co | sensitization, dermatitis, allergic asthma, pneuitis, carcinogenic | nasal cavities, lungs, skin, lung & nasal cancers | 8.9 | NA |
| *Zn, zinc* | | | | In/Ig | ingestion causes coughing, dyspnea, and sweating; a human skin irritant; inhalation may cause chills, throat dryness, cough, weakness, generalized aches, sweet taste, fever, nausea, vomiting | skin; causes "brass chills" | 7.14 | |
| *Pb, lead* | 0.1 | 0.05 | 100 | In/Ig/Co | weakness, lassitude, insomnia, facial pallor, pale eyes, anorexia, low-wgt, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis of wrist, ankles; encephalopathy, kidney disease, irritable eyes, hypotension | eyes, GI tract, CNS, kidneys, blood, gingival tissue | 11.34 | NA |
| *Cd, cadmium* | | 0.005 | 9 | In/Ig | pulmonary edema, dyspnea, cough, chest tightness, substernal pain, headache, chills, muscular aches, nausea, vomitting, diarrhea, anosmia, emphysema, proteinuria, mild anemia, carcinogenic | respiratory system, kidneys, prostate, blood, prostate & lung cancers | 8.65 | 62 |
| *Hg, mercury* | 0.1 C | 0.1 C | 10 | In/Ab/Ig/Co | irritable eyes, skin; coughing, chest pain, dyspnea, bronchitis, pneuitis, tremor, insomnia, irritablity, headache, fatigue, weakness, stomatitis, salivation, GI disturbance, anorexia, low-wgt, proteinuria | eyes, skin, respiratory system, CNS, kidneys | 13.6 | NA |
| *As, arsenic* | 0.002 SEL | 0.01 | 5 | In/Ab/Co/Ig | ulceration of nasal septum, respiratoty irritation, peripheral nueropathy, hyperpigmentation of skin, dermatitis, gastrointestinal (GI) disturbances, carcinogenic | liver, kidneys, skin, lungs, lymphatic system, lung & lymphatic cancers | 5.73 | NA |
| *Be, beryllium* | 0.0005 | 0.002 | 4 | In/Co | berylliosis, anorexia, low-wgt, weakness, chest pain, coughing, clubbing of fingers, cyanosis, pulmonary insufficiency; irritable eyes; dermatitis, carcinogenic | eyes, skin,respiratory system, lung cancer | 1.85 | NA |
| *Ag, silver* | 0.01 | 0.01 | 10 | In/Ig/Co | blue-gray eyes, nasal septum, throat, skin; irritability, ulceration of skin, GI disturbances | nasal septum, skin, eyes | 10.49 | NA |

| PARAMETERS | EXPOSURE LIMITS NIOSH (mg/m3) | OSHA (mg/m3) | IDLH (mg/m3) | HEALTH HAZARDS route | symptoms | TARGET ORGAN | SPECIFIC GRAVITY | FLASH POINT (F |
|---|---|---|---|---|---|---|---|---|
| **ADDITIONAL COMPOUNDS** | | | | | | | | |
| *acetone* | 590 | 2400 | 6050 | In/Ig/Co | irritable eyes, nose, throat; headache, dizziness, CNS, depression; dermatitis | eyes, skin, respiratory system, CNS | 0.79 | 0 |
| *2-chlorotoluene* | 250 | none | N.D. | In/Ab/Ig/Co | irritable eyes, skin, mucuos membrane; dermatitis; drowsines, incoordination, anesthesia,; cough; liver, kidney injury | eyes, skin, respiratory system, CNS, liver, kidneys | 1.08 | 96 |
| *4-chlorotoluene* | | | | In/Ig/Co | can be irritating to the eyes, skin, mucous membrane, and upper respiratory tract | eyes, skin, respiratory system | 1.07 | 121 |
| **BASE NEUTRALS** | | | | | | | | |
| *bis-2-ethyl hexyl phthalate* | 5 | 5 | 5000 | In/Ig/Co | Irritable eyes, mucous membrane; in animals: liver damage; teratogenic effects; carcinogenic | eyes, respiratory system, CNS, liver, reproductive system, GI tract; in animals: liver, tumors | 0.99 | 420 (oc) |
| *butyl benzyl phthalate* | | | | In/Ig/Co | irritating to skin, eyes, mucous membranes, and upper respiratory tract | skin, eyes, respiratory system | 1.106 | 230 |
| *dibutyl phthalate* | 5 | 5 | 4000 | In/Ig/Co | Irritable eyes, upper respiratory system, stomach | eyes, respiratory system, gastointestinal (GI) tract | 1.05 | 315 |
| *diethyl phthalate* | 5 | none | N.D. | In/Ig/Co | Irritable eyes, skin, nose, throat; headache, dizziness, nausea; lacrimation; possible polyneur, vestibular dysfunction; pain, numbeness, weakness, spasms in arms & legs; in animals: reproductive effects | eyes, skin, respiratory system, CNS, peripheral nervous system, reproductive system | 1.12 | 322 (oc) |
| *di-n-octyl-phthalate* | 5 | 5 | 5000 | In/Ig/Co | Irritable eyes, mucous membrane; in animals: liver damage; teratogenic effects; carcinogenic | eyes, respiratory system, CNS, liver, reproductive system, GI tract; in animals: liver, tumors | 0.99 | 420 (oc) |
| *naphthalene* | 50 | 50 | 1332.5 | In/Ab/Ig/Co | Irritable eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritable bladder; profuse sweat; jaundice; hematuria, hemoglobinuria, renal shutdowns, dermatitis; optical neuritis, corneal damage | eyes, skin, blood, liver, kidneys, CNS | 1.15 | 174 |
| *phenol* | 19 | 19 | 977.5 | In/Ab/Ig/Co | Irritable eyes, nose, throat; anorexia, low weight; weakness, muscular ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsion, twitch | eyes, skin, respiratory system, liver, kidneys | 1.06 | 175 |

| | EXPOSURE LIMITS NIOSH (mg/m3) | OSHA (mg/m3) | IDLH (mg/m3) | HEALTH HAZARDS route | symptoms | TARGET ORGANS | SPECIFIC GRAVITY | FLASH POINT (F) |
|---|---|---|---|---|---|---|---|---|
| *Cu, copper* | 1 | 1 | 100 | In/Ig/Co | irritable eyes, nose, pharynx; nasal perforation, metallic taste, dermatitis; in animals, lung, liver, kidney damage, anemia | eyes, skin, liver, kidneys, respiratory system, Wilson's disease | 8.94 | NA |
| *Cr, chromium* | 0.5 | 1 | 250 | In/Ig/Co | irritating eyes, skin; lung fibrosis (histologic) | eyes, skin, respiratory system | 7.14 | NA |
| *As, arsenic* | 0.002 SEL | 0.01 | 5 | In/Ab/Co/Ig | ulceration of nasal septum, respiratoty irritation, peripheral nueropathy, hyperpigmentation of skin, dermatitis, gastrointestinal (GI) disturbances, carcinogenic | liver, kidneys, skin, lungs, lymphatic system, lung & lymphatic cancers | 5.73 | NA |
| *Benzene* | 0.325 | 0.325 | 1625 | In/Ab/Co/Ig | irritable eyes, skin, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone marrow depression, carcinogenic | eyes, skin, blood, CNS, respiratory system, bone marrow, leukemia | 0.88 | 12 |
| *Ethyl Benzene* | 435 | 435 | 3528 | In/Ig/Co | irritable eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma | eyes, skin, respiratory system, CNS | 0.87 | 55 |
| *Toluene* | 375 | 750 | 1875 | In/Ab/Ig/Co | irritable eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation, nervousness, muscule fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage | eyes, skin, respiraory system, CNS, kidneys, liver | 0.87 | 40 |
| *m-Xylene* | 435 | 435 | 3915 | In/Ab/Ig/Co | irritable eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization; anorexia, nausea, vomiting; abdominal pain, dermatitis | CNS, GI tract, blood, liver, kidneys | 0.86 | 82 |
| *o,p-Xylenes* | 435/435 | 435/435 | 3915/3915 | In/Ab/Ig/Co | irritable eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization; anorexia, nausea, vomiting; abdominal pain, dermatitis | CNS, GI tract, blood, liver, kidneys | 0.88/0.86 | 90/81 |

Typical Municipal Wastewater
Treatment Plant



STREAM REPORT

| STREAM NAME | | Debris Remo | S-103 | Influent | S-107 | S-112 |
|---|---|---|---|---|---|---|
| SOURCE | | Bar Screen | Bar Screen | INPUT | CL-101 | M-102 |
| DESTINATION | | OUTPUT | P-101 | Bar Screen | M-102 | AEB-101 |
| **STREAM PROPERTIES** | | | | | | |
| ACTIVITY | U/ml | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TEMP | °C | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| PRES | bar | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| DENSITY | g/l | 1075.2 | 1000.0 | 1000.0 | 1000.0 | 999.9 |
| **COMPONENT FLOWRATES (kg/h averaged)** | | | | | | |
| Air | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Biomass | | 0.0000 | 107.5000 | 107.5000 | 80.6250 | 143.3832 |
| BOD | | 0.0000 | 692.0000 | 692.0000 | 484.4000 | 913.4470 |
| Carb. Dioxide | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1162 |
| Copper | | 0.0000 | 1.0000 | 1.0000 | 0.6000 | 1.0435 |
| Dead Biomass | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4.1010 |
| Debris | | 285.0000 | 15.0000 | 300.0000 | 0.0000 | 0.0000 |
| Lead | | 0.0000 | 0.5000 | 0.5000 | 0.3000 | 0.5217 |
| Mercury | | 0.0000 | 0.1000 | 0.1000 | 0.0600 | 0.1043 |
| Methane | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Nitrogen | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1162 |
| Oxygen | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.2324 |
| Suspended Solid | | 85.4000 | 768.6000 | 854.0000 | 384.3000 | 746.0750 |
| Water | | 0.0000 | 4739223.0000 | 4739223.0000 | 4723993.8220 | 4972625.0758 |
| TOTAL (kg/h) | | 370.4000 | 4740807.7000 | 4741178.1000 | 4724944.1070 | 4974434.2165 |
| TOTAL (m3/h) | | 0.3445 | 4740.7998 | 4741.1443 | 4724.9394 | 4974.7635 |

| STREAM NAME | | S-111 | S-114 | S-115 | S-116 | S-105 |
|---|---|---|---|---|---|---|
| SOURCE | | AEB-101 | CL-102 | CL-102 | M-103 | CL-101 |
| DESTINATION | | CL-102 | OUTPUT | M-103 | M-102 | M-104 |
| **STREAM PROPERTIES** | | | | | | |
| ACTIVITY | U/ml | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TEMP | °C | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| PRES | bar | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| DENSITY | g/l | 999.9 | 1000.0 | 998.7 | 998.7 | 1000.2 |
| **COMPONENT FLOWRATES (kg/h averaged)** | | | | | | |
| Air | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

| | | | | | |
|---|---|---|---|---|---|
| Biomass | 139.4627 | 13.9463 | 125.5164 | 62.7582 | 26.8750 |
| BOD | 912.8659 | 54.7720 | 858.0939 | 429.0470 | 207.6000 |
| Carb. Dioxide | 0.2324 | 0.0000 | 0.2324 | 0.1162 | 0.0000 |
| Copper | 1.0435 | 0.1565 | 0.8870 | 0.4435 | 0.4000 |
| Dead Biomass | 8.2849 | 0.0828 | 8.2021 | 4.1010 | 0.0000 |
| Debris | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 15.0000 |
| Lead | 0.5217 | 0.0783 | 0.4435 | 0.2217 | 0.2000 |
| Mercury | 0.1043 | 0.0157 | 0.0887 | 0.0443 | 0.0400 |
| Methane | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Nitrogen | 0.2324 | 0.0000 | 0.2324 | 0.1162 | 0.0000 |
| Oxygen | 0.4649 | 0.0000 | 0.4649 | 0.2324 | 0.0000 |
| Suspended Solid | 745.9279 | 22.3778 | 723.5500 | 361.7750 | 384.3000 |
| Water | 4972625.0758 | 4475362.5682 | 497262.5076 | 248631.2538 | 15229.1780 |
| TOTAL (kg/h) | 4974434.2165 | 4475453.9976 | 498980.2189 | 249490.1094 | 15863.5930 |
| TOTAL (m3/h) | 4975.1013 | 4475.4531 | 499.6482 | 249.8241 | 15.8604 |

| STREAM NAME | | S-117 | S-101 | S-104 | S-106 | S-120 |
|---|---|---|---|---|---|---|
| SOURCE | | M-103 | M-104 | P-101 | M-105 | TH-101 |
| DESTINATION | | M-104 | TH-101 | M-105 | CL-101 | ANR-101 |
| **STREAM PROPERTIES** | | | | | | |
| ACTIVITY | U/ml | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TEMP | °C | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| PRES | bar | 1.0 | 1.0 | 6.7 | 1.0 | 1.0 |
| DENSITY | g/l | 998.7 | 998.8 | 1000.0 | 1000.0 | 999.0 |
| **COMPONENT FLOWRATES (kg/h averaged)** | | | | | | |
| Air | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Biomass | | 62.7582 | 89.6332 | 107.5000 | 107.5000 | 85.1516 |
| BOD | | 429.0470 | 636.6470 | 692.0000 | 692.0000 | 604.8146 |
| Carb. Dioxide | | 0.1162 | 0.1162 | 0.0000 | 0.0000 | 0.0122 |
| Copper | | 0.4435 | 0.8435 | 1.0000 | 1.0000 | 0.8435 |
| Dead Biomass | | 4.1010 | 4.1010 | 0.0000 | 0.0000 | 4.1010 |
| Debris | | 0.0000 | 15.0000 | 15.0000 | 15.0000 | 15.0000 |
| Lead | | 0.2217 | 0.4217 | 0.5000 | 0.5000 | 0.4217 |
| Mercury | | 0.0443 | 0.0843 | 0.1000 | 0.1000 | 0.0843 |
| Methane | | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Nitrogen | | 0.1162 | 0.1162 | 0.0000 | 0.0000 | 0.0122 |
| Oxygen | | 0.2324 | 0.2324 | 0.0000 | 0.0000 | 0.0244 |
| Suspended Solid | | 361.7750 | 746.0750 | 768.6000 | 768.6000 | 746.0750 |
| Water | | 248631.2538 | 263860.4318 | 4739223.0000 | 4739223.0000 | 27644.5526 |
| TOTAL (kg/h) | | 249490.1094 | 265353.7024 | 4740807.7000 | 4740807.7000 | 29101.0931 |
| TOTAL (m3/h) | | 249.8241 | 265.6845 | 4740.7998 | 4740.7998 | 29.1298 |

| STREAM NAME | | S-122 | S-121 | S-123 | Sludge | S-125 |
|---|---|---|---|---|---|---|
| SOURCE | | ANR-101 | ANR-101 | INPUT | SLD-101 | SLD-101 |
| DESTINATION | | OUTPUT | SLD-101 | SLD-101 | OUTPUT | OUTPUT |
| **STREAM PROPERTIES** | | | | | | |
| ACTIVITY | U/ml | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| TEMP | °C | 30.0 | 30.0 | 25.0 | 60.0 | 115.0 |
| PRES | bar | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| DENSITY | g/l | 1.4 | 186.9 | 1.2 | 115.5 | 0.9 |
| **COMPONENT FLOWRATES (kg/h averaged)** | | | | | | |
| Air | | 0.0000 | 0.0000 | 213022.5139 | 0.0000 | 213022.5139 |
| Biomass | | 0.0000 | 40.9366 | 0.0000 | 40.9366 | 0.0000 |
| BOD | | 0.0000 | 397.7820 | 0.0000 | 397.7820 | 0.0000 |
| Carb. Dioxide | | 37.6932 | 37.6932 | 0.0000 | 37.6932 | 0.0000 |
| Copper | | 0.0000 | 0.8435 | 0.0000 | 0.8435 | 0.0000 |
| Dead Biomass | | 0.0000 | 8.5225 | 0.0000 | 8.5225 | 0.0000 |
| Debris | | 0.0000 | 15.0000 | 0.0000 | 15.0000 | 0.0000 |
| Lead | | 0.0000 | 0.4217 | 0.0000 | 0.4217 | 0.0000 |
| Mercury | | 0.0000 | 0.0843 | 0.0000 | 0.0843 | 0.0000 |
| Methane | | 7.5374 | 67.8369 | 0.0000 | 9.6357 | 58.2012 |
| Nitrogen | | 0.0000 | 0.0122 | 0.0000 | 0.0017 | 0.0104 |
| Oxygen | | 0.0122 | 0.0122 | 0.0000 | 0.0017 | 0.0104 |
| Suspended Solid | | 0.0000 | 746.0750 | 0.0000 | 746.0750 | 0.0000 |
| Water | | 0.0000 | 27740.6302 | 0.0000 | 3940.3307 | 23800.2995 |
| TOTAL (kg/h) | | 45.2428 | 29055.8503 | 213022.5139 | 5197.3287 | 236881.0355 |
| TOTAL (m3/h) | | 33.0094 | 155.4964 | 179741.4867 | 44.9911 | 276190.2210 |

| STREAM NAME | | S-118 |
|---|---|---|
| SOURCE | | TH-101 |
| DESTINATION | | OUTPUT |
| **STREAM PROPERTIES** | | |
| ACTIVITY | U/ml | 0.0 |
| TEMP | °C | 20.0 |
| PRES | bar | 1.0 |
| DENSITY | g/l | 998.7 |
| **COMPONENT FLOWRATES (kg/h averaged)** | | |
| Air | | 0.0000 |
| Biomass | | 4.4817 |
| BOD | | 31.8323 |

| | |
|---|---|
| Carb. Dioxide | 0.1040 |
| Copper | 0.0000 |
| Dead Biomass | 0.0000 |
| Debris | 0.0000 |
| Lead | 0.0000 |
| Mercury | 0.0000 |
| Methane | 0.0000 |
| Nitrogen | 0.1040 |
| Oxygen | 0.2081 |
| Suspended Solid | 0.0000 |
| Water | 236215.8791 |
| TOTAL (kg/h) | 236252.6093 |
| TOTAL (m3/h) | 236.5546 |

## OVERALL MATERIAL BALANCE (kg/h averaged)

| COMPONENT | IN | OUT | (OUT-IN) |
|---|---|---|---|
| Air | 213022.513923 | 213022.513923 | 0.000000 |
| Biomass | 107.500000 | 59.364492 | -48.135508 |
| BOD | 692.000000 | 484.386286 | -207.613714 |
| Carb. Dioxide | 0.000000 | 75.490503 | 75.490503 |
| Copper | 1.000000 | 1.000000 | -0.000000 |
| Dead Biomass | 0.000000 | 8.605381 | 8.605381 |
| Debris | 300.000000 | 300.000000 | 0.000000 |
| Lead | 0.500000 | 0.500000 | -0.000000 |
| Mercury | 0.100000 | 0.100000 | 0.000000 |
| Methane | 0.000000 | 75.374283 | 75.374283 |
| Nitrogen | 0.000000 | 0.116220 | 0.116220 |
| Oxygen | 0.000000 | 0.232439 | 0.232439 |
| Suspended Solid | 854.000000 | 853.852852 | -0.147148 |
| Water | 4739223.000000 | 4739319.077545 | 96.077545 |
| TOTAL | 4954200.613923 | 4954200.613923 | -0.000000 |

TABLE 1
SUMMARY OF WATER POLLUTION CONTROL OPERATIONS
AVERAGE DAILY FLOW, M.G.D.
FISCAL YEAR 1994

'93 '94

| PLANT | | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | YR.AVG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MANHATTAN: | WARDS ISLAND | 285 | 290 | 278 | 257 | 251 | 279 | 278 | 280 | 297 | 264 | 263 | 268 | 274 |
| | NORTH RIVER | 189 | 189 | 197 | 186 | 190 | 185 | 182 | 182 | 194 | 158 | 163 | 165 | 182 |
| BRONX: | HUNTS POINT | 145 | 147 | 148 | 148 | 151 | 156 | 153 | 148 | 172 | 146 | 147 | 143 | 150 |
| BROOKLYN: | 26TH WARD | 67 | 75 | 78 | 74 | 71 | 75 | 70 | 79 | 86 | 70 | 69 | 68 | 74 |
| | CONEY ISLAND | 103 | 104 | 109 | 108 | 100 | 105 | 106 | 103 | 113 | 106 | 106 | 103 | 106 |
| | OWLS HEAD | 127 | 131 | 142 | 135 | 125 | 131 | 133 | 130 | 137 | 122 | 126 | 127 | 131 |
| | NEWTOWN CREEK | 298 | 306 | 307 | 296 | 278 | 290 | 296 | 286 | 315 | 275 | 283 | 304 | 295 |
| | RED HOOK | 43 | 44 | 52 | 53 | 52 | 43 | 48 | 41 | 43 | 40 | 40 | 40 | 45 |
| QUEENS: | JAMAICA | 79 | 79 | 81 | 75 | 73 | 75 | 77 | 76 | 77 | 81 | 88 | 89 | 79 |
| | TALLMAN ISLAND | 57 | 58 | 61 | 62 | 58 | 60 | 61 | 57 | 63 | 57 | 56 | 55 | 59 |
| | BOWERY BAY | 124 | 127 | 133 | 125 | 114 | 121 | 129 | 127 | 134 | 119 | 119 | 117 | 124 |
| | ROCKAWAY | 22 | 22 | 22 | 21 | 22 | 24 | 23 | 24 | 25 | 23 | 24 | 24 | 23 |
| STATEN ISLAND: | OAKWOOD BEACH | 24 | 24 | 25 | 26 | 25 | 26 | 29 | 29 | 37 | 30 | 28 | 27 | 27 |
| | PORT RICHMOND | 34 | 36 | 40 | 39 | 38 | 40 | 41 | 43 | 53 | 44 | 42 | 42 | 41 |
| TOTAL | | 1597 | 1632 | 1672 | 1606 | 1548 | 1611 | 1625 | 1605 | 1746 | 1535 | 1553 | 1573 | 1608 |

WARDS ISLAND

PROCESS EFFICIENCY SUMMARY

TABLE NO. 4

SPDES ID. NY0026131

FISCAL YEAR 1994

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | | PLANT EFFLUENT | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | RAW SEWAGE mg/L | PRIMAY EFFLUENT mg/L | REMOVAL % | PLANT EFFLUENT mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 81 | 67 | 17 | 10 | 88 | 64 | 21 | 46 | 28 | 7 | 6 | 89 |
| AUG | 82 | 60 | 27 | 9 | 89 | 77 | 28 | 51 | 34 | 9 | 8 | 88 |
| SEP | 84 | 59 | 30 | 8 | 90 | 81 | 33 | 49 | 40 | 9 | 8 | 89 |
| OCT | 88 | 65 | 26 | 7 | 92 | 90 | 40 | 57 | 37 | 8 | 10 | 91 |
| NOV | 93 | 72 | 23 | 8 | 91 | 90 | 48 | 60 | 33 | 9 | 11 | 90 |
| DEC | 83 | 79 | 5 | 12 | 86 | 76 | 29 | 50 | 34 | 7 | 6 | 91 |
| JAN | 87 | 87 | 0 | 12 | 86 | 91 | 35 | 70 | 23 | 11 | 8 | 88 |
| FEB | 84 | 91 | 0 | 12 | 86 | 89 | 44 | 71 | 20 | 13 | 10 | 85 |
| MAR | 85 | 86 | 0 | 13 | 85 | 89 | 41 | 73 | 18 | 14 | 13 | 84 |
| APR | 94 | 73 | 22 | 12 | 87 | 97 | 41 | 68 | 30 | 14 | 11 | 86 |
| MAY | 98 | 70 | 29 | 15 | 85 | 90 | 38 | 58 | 36 | 13 | 11 | 86 |
| JUN | 104 | 80 | 23 | 16 | 85 | 81 | 28 | 57 | 30 | 12 | 9 | 85 |
| AVERAGE: | 87 | 74 | 15 | 11 | 87 | 85 | 36 | 60 | 29 | 10 | 9 | 88 |

NOTE: Average as flow weighted.

Wards Island
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.057 | 0.0230 | 0.0023 | 0.0012 | 0.0039 | 0.0026 | 0.053 | 0.025 | 0.0037 | 0.0012 | 0.00034 | 0.00020 | 0.00046 | 0.00010 | 0.00038 | 0.00029 | 0.00003 | 0.00003 | 0.00280 | 0.00048 |
| Aug. | 0.079 | 0.0370 | 0.0031 | 0.0013 | 0.0035 | 0.0026 | 0.078 | 0.034 | 0.0150 | 0.0052 | 0.00007 | 0.00003 | 0.00006 | 0.00006 | 0.00100 | 0.00110 | 0.00003 | 0.00003 | 0.00230 | 0.00083 |
| Sep. | 0.049 | 0.0190 | 0.0051 | 0.0009 | 0.0036 | 0.0030 | 0.055 | 0.020 | 0.0150 | 0.0019 | 0.00011 | 0.00003 | 0.00014 | 0.00006 | 0.00068 | 0.00054 | 0.00003 | 0.00003 | 0.00230 | 0.00041 |
| Oct. | 0.061 | 0.0130 | 0.0027 | 0.0005 | 0.0019 | 0.0018 | 0.063 | 0.022 | 0.0085 | 0.0012 | 0.00022 | 0.00010 | 0.00013 | 0.00006 | 0.00067 | 0.00068 | 0.00003 | 0.00003 | 0.00290 | 0.00040 |
| Nov. | 0.043 | 0.0086 | 0.0032 | 0.0014 | 0.0041 | 0.0032 | 0.058 | 0.018 | 0.0072 | 0.0052 | 0.00014 | 0.00003 | 0.00040 | 0.00010 | 0.00046 | 0.00038 | 0.00003 | 0.00003 | 0.00370 | 0.00044 |
| Dec. | 0.046 | 0.0190 | 0.0013 | 0.0038 | 0.0021 | 0.0009 | 0.058 | 0.022 | 0.0100 | 0.0035 | 0.00019 | 0.00003 | 0.00130 | 0.00009 | 0.00055 | 0.00039 | 0.00003 | 0.00003 | 0.00240 | 0.00042 |
| Jan. | 0.060 | 0.0300 | 0.0033 | 0.0011 | 0.0039 | 0.0020 | 0.065 | 0.032 | 0.0078 | 0.0017 | 0.00022 | 0.00003 | 0.00017 | 0.00018 | 0.00042 | 0.00027 | 0.00004 | 0.00003 | 0.00420 | 0.00051 |
| Feb. | 0.540 | 0.0130 | 0.0032 | 0.0015 | 0.0038 | 0.0038 | 0.062 | 0.023 | 0.0062 | 0.0012 | 0.00023 | 0.00003 | 0.00018 | 0.00013 | 0.00063 | 0.00045 | 0.00003 | 0.00003 | 0.00320 | 0.00051 |
| Mar. | 0.056 | 0.0130 | 0.0051 | 0.0017 | 0.0042 | 0.0030 | 0.080 | 0.057 | 0.0190 | 0.0026 | 0.00022 | 0.00008 | 0.00012 | 0.00011 | 0.00028 | 0.00010 | 0.00003 | 0.00003 | 0.00380 | 0.00063 |
| Apr. | 0.047 | 0.0097 | 0.0078 | 0.0019 | 0.0032 | 0.0015 | 0.056 | 0.023 | 0.0068 | 0.0012 | 0.00024 | 0.00005 | 0.00015 | 0.00008 | 0.00034 | 0.00027 | 0.00008 | 0.00008 | 0.00200 | 0.00045 |
| May. | 0.051 | 0.0093 | 0.0023 | 0.0012 | 0.0034 | 0.0073 | 0.059 | 0.020 | 0.0072 | 0.0011 | 0.00013 | 0.00005 | 0.00015 | 0.00006 | 0.00054 | 0.00052 | 0.00003 | 0.00003 | 0.00240 | 0.00080 |
| Jun. | 0.054 | 0.0350 | 0.0029 | 0.0015 | 0.0015 | 0.0019 | 0.041 | 0.016 | 0.0140 | 0.0026 | 0.00010 | 0.00003 | 0.00021 | 0.00006 | 0.00052 | 0.00043 | 0.00003 | 0.00006 | 0.00290 | 0.00100 |
| AVG. | 0.095 | 0.019 | 0.0035 | 0.0015 | 0.0033 | 0.0028 | 0.061 | 0.026 | 0.0100 | 0.0024 | 0.00018 | 0.00006 | 0.00029 | 0.00009 | 0.00054 | 0.00045 | 0.00004 | 0.00004 | 0.00291 | 0.00057 |

Wards Island
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 36 | 1636 | 8.2 | 373 | 3.10 | 141 | 26 | 1182 | 7.2 | 327 | 0.260 | 11.8 | 0.064 | 3.0 | 0.0760 | 3.5 | 0.0068 | 0.310 | 1.30 | 59 | 1.40 | 64 | 2.2 |
| Aug. | 32 | 1600 | 5.4 | 270 | 1.80 | 90 | 22 | 1100 | 5.6 | 280 | 0.087 | 4.4 | 0.076 | 3.8 | 0.0560 | 2.8 | 0.0049 | 0.250 | 0.93 | 47 | 1.40 | 70 | 2.0 |
| Sep. | 27 | 1350 | 4.9 | 245 | 1.90 | 95 | 23 | 1150 | 6.5 | 325 | 0.150 | 7.5 | 0.061 | 3.0 | 0.0620 | 3.1 | 0.0053 | 0.270 | 0.93 | 47 | 1.40 | 70 | 2.0 |
| Oct. | 19 | 1056 | 1.6 | 89 | 0.66 | 37 | 19 | 1056 | 5.0 | 278 | 0.068 | 3.8 | 0.049 | 2.7 | 0.0670 | 3.7 | 0.0048 | 0.270 | 0.61 | 34 | 1.00 | 56 | 1.8 |
| Nov. | 21 | 1235 | 1.8 | 106 | 0.77 | 45 | 16 | 941 | 2.6 | 153 | 0.053 | 3.1 | 0.055 | 3.0 | 0.0650 | 3.8 | 0.0038 | 0.220 | 0.67 | 39 | 1.20 | 71 | 1.7 |
| Dec. | 19 | 905 | 2.2 | 105 | 0.62 | 30 | 18 | 857 | 6.4 | 305 | 0.076 | 3.6 | 0.053 | 2.5 | 0.0720 | 3.4 | 0.0063 | 0.300 | 1.00 | 48 | 1.20 | 57 | 2.1 |
| Jan. | 17 | 810 | 1.8 | 86 | 0.70 | 33 | 20 | 952 | 3.6 | 171 | 0.085 | 4.0 | 0.059 | 2.8 | 0.0700 | 3.3 | 0.0062 | 0.300 | 0.95 | 45 | 0.87 | 41 | 2.1 |
| Feb. | 20 | 952 | 1.9 | 90 | 0.62 | 30 | 19 | 905 | 4.8 | 229 | 0.099 | 4.7 | 0.063 | 3.0 | 0.0880 | 4.2 | 0.0061 | 0.290 | 1.10 | 52 | 1.20 | 57 | 2.1 |
| Mar. | 21 | 875 | 2.3 | 96 | 0.91 | 38 | 24 | 1000 | 5.4 | 225 | 0.140 | 5.8 | 0.077 | 3.2 | 0.0570 | 2.4 | 0.0044 | 0.180 | 1.40 | 58 | 1.40 | 58 | 2.4 |
| Apr. | 23 | 958 | 2.4 | 100 | 1.10 | 46 | 24 | 1000 | 7.1 | 296 | 0.140 | 5.8 | 0.097 | 4.0 | 0.0890 | 3.7 | 0.0084 | 0.350 | 1.10 | 46 | 1.40 | 58 | 2.4 |
| May. | 21 | 955 | 1.7 | 77 | 0.68 | 31 | 23 | 1045 | 6.3 | 286 | 0.084 | 3.8 | 0.095 | 4.3 | 0.0810 | 3.7 | 0.0074 | 0.340 | 0.82 | 37 | 1.40 | 64 | 2.2 |
| Jun. | 24 | 960 | 2.2 | 88 | 1.20 | 48 | 25 | 1000 | 6.1 | 244 | 0.092 | 3.7 | 0.100 | 4.0 | 0.0930 | 3.7 | 0.0070 | 0.280 | 1.20 | 48 | 1.40 | 56 | 2.5 |
| AVG. | 23 | 1108 | 3.0 | 144 | 1.17 | 55 | 22 | 1016 | 5.6 | 260 | 0.111 | 5.2 | 0.071 | 3.28 | 0.0730 | 3.4 | 0.0060 | 0.280 | 1.00 | 47 | 1.27 | 60 | 2.1 |

Wards Island
Nutrients (mg/L)
Fiscal Year 1994

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 8.75 | 13.13 | 8.65 | 3.38 | 17.5 | 16.5 | 0.1505 | 0.2005 | 0.036 | 0.042 | 1.303 | 1.055 | 0.593 | 0.688 | 0.020 | 0.020 |
| Aug. | 9.51 | 11.63 | 12.20 | 8.23 | 21.7 | 19.9 | 0.1468 | 0.1990 | 0.046 | 0.100 | 2.043 | 1.421 | 0.728 | 0.990 | 0.020 | 0.020 |
| Sep. | 7.63 | 12.00 | 8.38 | 6.00 | 16.0 | 18.0 | 0.1493 | 0.1168 | 0.030 | 0.081 | 1.820 | 1.480 | 1.183 | 1.113 | 0.020 | 0.020 |
| Oct. | 11.11 | 13.59 | 10.25 | 5.93 | 21.3 | 19.5 | 0.1985 | 0.3190 | 0.072 | 0.099 | 2.081 | 1.436 | 1.383 | 1.167 | 0.020 | 0.020 |
| Nov. | 10.31 | 13.00 | 9.95 | 7.58 | 20.3 | 20.6 | 0.1043 | 0.1115 | 0.018 | 0.169 | 1.688 | 1.945 | 1.032 | 1.066 | 0.020 | 0.020 |
| Dec. | 13.10 | 11.94 | 9.55 | 7.33 | 22.6 | 19.3 | 0.0895 | 0.0715 | 0.058 | 0.061 | 1.863 | 1.250 | 0.999 | 1.032 | 0.020 | 0.020 |
| Jan. | 10.95 | 15.86 | 13.08 | 5.78 | 24.0 | 21.6 | 0.0820 | 0.1228 | 0.039 | 0.047 | 1.952 | 1.237 | 1.173 | 1.001 | 0.020 | 0.020 |
| Feb. | 9.68 | 13.58 | 10.40 | 7.95 | 20.1 | 21.5 | 0.1690 | 0.1548 | 0.036 | 0.038 | 1.985 | 1.498 | 1.294 | 1.014 | 0.020 | 0.020 |
| Mar. | 8.60 | 10.58 | 14.18 | 6.33 | 17.2 | 16.9 | 0.2160 | 0.1135 | 0.042 | 0.049 | 1.979 | 1.271 | 1.139 | 0.802 | 0.020 | 0.020 |
| Apr. | 8.54 | 10.69 | 11.48 | 4.83 | 20.0 | 15.5 | 0.2278 | 0.0730 | 0.054 | 0.068 | 2.125 | 1.127 | 1.040 | 0.926 | 0.020 | 0.020 |
| May. | 11.94 | 14.05 | 5.58 | 5.05 | 17.5 | 19.1 | 0.2893 | 0.1695 | 0.120 | 0.148 | 2.571 | 1.744 | 1.352 | 0.934 | 0.020 | 0.020 |
| Jun. | 11.28 | 11.19 | 8.43 | 8.80 | 19.7 | 20.0 | 0.1060 | 0.1550 | 0.053 | 0.143 | 1.841 | 1.469 | 1.138 | 1.062 | 0.020 | 0.020 |
| AVG. | 10.11 | 12.60 | 10.18 | 6.43 | 19.8 | 19.0 | 0.1607 | 0.1506 | 0.050 | 0.087 | 1.937 | 1.411 | 1.088 | 0.983 | 0.020 | 0.020 |

HUNTS POINT
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026191

FISCAL YEAR 1994

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | REMOVAL | PLANT EFFLUENT | REMOVAL | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | mg/L | mg/L | % | mg/L | % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 89 | 76 | 15 | 10 | 89 | 81 | 36 | 55 | 32 | 7 | 5 | 91 |
| AUG | 95 | 88 | 7 | 8 | 92 | 92 | 41 | 66 | 28 | 7 | 8 | 92 |
| SEP | 96 | 82 | 15 | 7 | 93 | 95 | 52 | 64 | 33 | 8 | 8 | 92 |
| OCT | 103 | 96 | 7 | 9 | 91 | 113 | 66 | 75 | 34 | 9 | 10 | 92 |
| NOV | 108 | 80 | 26 | 8 | 93 | 107 | 67 | 60 | 44 | 7 | 8 | 93 |
| DEC | 102 | 74 | 27 | 15 | 85 | 97 | 36 | 49 | 49 | 6 | 5 | 94 |
| JAN | 90 | 101 | 0 | 8 | 91 | 96 | 39 | 66 | 31 | 8 | 7 | 92 |
| FEB | 90 | 69 | 23 | 8 | 91 | 93 | 38 | 59 | 37 | 9 | 9 | 90 |
| MAR | 88 | 81 | 8 | 13 | 85 | 89 | 65 | 65 | 27 | 11 | 9 | 88 |
| APR | 99 | 80 | 19 | 9 | 91 | 101 | 61 | 69 | 32 | 8 | 7 | 92 |
| MAY | 101 | 77 | 24 | 11 | 89 | 104 | 41 | 61 | 41 | 9 | 7 | 91 |
| JUN | 104 | 86 | 17 | 7 | 93 | 95 | 34 | 71 | 25 | 7 | 6 | 93 |
| AVERAGE: | 97 | 83 | 14 | 10 | 90 | 97 | 49 | 63 | 35 | 8 | 8 | 92 |

NOTE: Average as flow weighted.

Hunts Point
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.080 | 0.0150 | 0.0089 | 0.0008 | 0.0065 | 0.0036 | 0.072 | 0.022 | 0.0055 | 0.0007 | 0.00049 | 0.00018 | 0.00024 | 0.00006 | 0.00044 | 0.00027 | 0.00003 | 0.00003 | 0.00300 | 0.00028 |
| Aug. | 0.160 | 0.0290 | 0.0200 | 0.0028 | 0.0160 | 0.0029 | 0.180 | 0.043 | 0.0350 | 0.0030 | 0.00130 | 0.00160 | 0.00015 | 0.00006 | 0.00110 | 0.00052 | 0.00005 | 0.00003 | 0.00650 | 0.00088 |
| Sep. | 0.150 | 0.0100 | 0.0650 | 0.0031 | 0.0270 | 0.0055 | 0.190 | 0.010 | 0.0530 | 0.0012 | 0.00120 | 0.00004 | 0.00110 | 0.00006 | 0.00130 | 0.00040 | 0.00006 | 0.00003 | 0.01100 | 0.00018 |
| Oct. | 0.110 | 0.0099 | 0.0250 | 0.0035 | 0.0130 | 0.0097 | 0.180 | 0.022 | 0.0300 | 0.0012 | 0.00170 | 0.00014 | 0.00020 | 0.00006 | 0.00098 | 0.00069 | 0.00004 | 0.00003 | 0.00930 | 0.00023 |
| Nov. | 0.076 | 0.0081 | 0.0160 | 0.0006 | 0.0100 | 0.0045 | 0.098 | 0.019 | 0.0240 | 0.0040 | 0.00085 | 0.00005 | 0.00035 | 0.00006 | 0.00074 | 0.00058 | 0.00003 | 0.00003 | 0.00800 | 0.00040 |
| Dec. | 0.069 | 0.0095 | 0.2500 | 0.0034 | 0.0066 | 0.0042 | 0.095 | 0.032 | 0.0250 | 0.0041 | 0.00076 | 0.00011 | 0.00019 | 0.00009 | 0.00087 | 0.00069 | 0.00003 | 0.00003 | 0.00560 | 0.00044 |
| Jan. | 0.071 | 0.0100 | 0.0520 | 0.0140 | 0.0060 | 0.0055 | 0.100 | 0.046 | 0.0150 | 0.0020 | 0.00081 | 0.00017 | 0.00017 | 0.00007 | 0.00080 | 0.00063 | 0.00003 | 0.00003 | 0.00540 | 0.00018 |
| Feb. | 0.079 | 0.0100 | 0.0450 | 0.0018 | 0.0081 | 0.0050 | 0.110 | 0.032 | 0.0160 | 0.0008 | 0.00100 | 0.00017 | 0.00015 | 0.00006 | 0.00040 | 0.00036 | 0.00006 | 0.00003 | 0.00530 | 0.00033 |
| Mar. | 0.069 | 0.0190 | 0.0150 | 0.0058 | 0.0090 | 0.0053 | 0.120 | 0.045 | 0.0310 | 0.0056 | 0.00074 | 0.00015 | 0.00012 | 0.00008 | 0.00016 | 0.00005 | 0.00003 | 0.00003 | 0.00520 | 0.00018 |
| Apr. | 0.085 | 0.0077 | 0.0190 | 0.0015 | 0.0064 | 0.0082 | 0.110 | 0.025 | 0.0170 | 0.0012 | 0.00098 | 0.00022 | 0.00026 | 0.00009 | 0.00069 | 0.00045 | 0.00008 | 0.00008 | 0.00530 | 0.00018 |
| May. | 0.054 | 0.0120 | 0.0210 | 0.0016 | 0.0120 | 0.0077 | 0.072 | 0.035 | 0.0130 | 0.0014 | 0.00059 | 0.00018 | 0.00058 | 0.00006 | 0.00083 | 0.00061 | 0.00003 | 0.00003 | 0.00330 | 0.00100 |
| Jun. | 0.090 | 0.0045 | 0.0210 | 0.0011 | 0.0100 | 0.0053 | 0.110 | 0.036 | 0.0250 | 0.0008 | 0.00091 | 0.00014 | 0.00015 | 0.00008 | 0.00090 | 0.00068 | 0.00003 | 0.00003 | 0.00510 | 0.00036 |
| AVG. | 0.091 | 0.012 | 0.0465 | 0.0033 | 0.0109 | 0.0056 | 0.120 | 0.031 | 0.0241 | 0.0022 | 0.00094 | 0.00026 | 0.00031 | 0.00007 | 0.00077 | 0.00049 | 0.00004 | 0.00003 | 0.00608 | 0.00039 |

Hunts Point
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 34 | 1214 | 12.0 | 429 | 4.00 | 143 | 34 | 1214 | 9.2 | 329 | 0.440 | 16.0 | 0.057 | 2.0 | 0.1100 | 3.9 | 0.0110 | 0.400 | 2.30 | 82 | 1.50 | 54 | 2.8 |
| Aug. | 26 | 1529 | 7.9 | 465 | 2.20 | 129 | 25 | 1471 | 5.6 | 329 | 0.250 | 15.0 | 0.079 | 4.6 | 0.0590 | 3.5 | 0.0077 | 0.453 | 1.60 | 94 | 1.20 | 71 | 1.7 |
| Sep. | 30 | 1579 | 5.0 | 263 | 1.50 | 79 | 28 | 1474 | 7.2 | 379 | 0.310 | 16.0 | 0.062 | 3.3 | 0.0840 | 4.4 | 0.0074 | 0.390 | 1.50 | 79 | 1.50 | 79 | 1.9 |
| Oct. | 22 | 1048 | 5.0 | 238 | 2.00 | 95 | 27 | 1286 | 7.1 | 338 | 0.300 | 14.0 | 0.063 | 3.0 | 0.1000 | 4.8 | 0.0082 | 0.390 | 1.50 | 71 | 0.84 | 40 | 2.1 |
| Nov. | 24 | 1043 | 5.5 | 239 | 1.60 | 70 | 28 | 1217 | 5.1 | 222 | 0.320 | 14.0 | 0.061 | 2.7 | 0.1300 | 5.7 | 0.0078 | 0.340 | 1.40 | 61 | 1.80 | 78 | 2.3 |
| Dec. | 21 | 913 | 4.5 | 196 | 1.20 | 52 | 24 | 1043 | 5.4 | 235 | 0.250 | 11.0 | 0.061 | 2.7 | 0.0820 | 3.6 | 0.0068 | 0.300 | 1.30 | 57 | 1.50 | 65 | 2.3 |
| Jan. | 19 | 905 | 3.5 | 167 | 1.10 | 52 | 27 | 1286 | 4.8 | 229 | 0.260 | 12.0 | 0.063 | 3.0 | 0.0650 | 3.1 | 0.0062 | 0.300 | 1.00 | 48 | 0.95 | 45 | 2.1 |
| Feb. | 24 | 1043 | 4.7 | 204 | 1.30 | 57 | 29 | 1261 | 6.4 | 278 | 0.200 | 8.7 | 0.059 | 2.6 | 0.1000 | 4.3 | 0.0080 | 0.300 | 1.40 | 61 | 1.60 | 70 | 2.3 |
| Mar. | 20 | 909 | 4.4 | 200 | 1.30 | 59 | 27 | 1227 | 6.5 | 295 | 0.280 | 12.7 | 0.064 | 2.9 | 0.1100 | 5.0 | 0.0056 | 0.300 | 1.10 | 50 | 1.50 | [illegible]8 | 2.2 |
| Apr. | 25 | 1000 | 5.5 | 220 | 1.90 | 76 | 31 | 1240 | 7.7 | 308 | 0.320 | 13.0 | 0.064 | 2.6 | 0.1000 | 4.0 | 0.0110 | 0.440 | 1.90 | 76 | 1.80 | 72 | 2.5 |
| May. | 23 | 958 | 4.6 | 192 | 1.40 | 58 | 27 | 1125 | 7.6 | 317 | 0.360 | 15.0 | 0.070 | 2.9 | 0.0700 | 2.9 | 0.0100 | 0.420 | 1.20 | 50 | 1.70 | 71 | 2.4 |
| Jun. | 18 | 818 | 3.0 | 136 | 1.00 | 45 | 21 | 955 | 5.1 | 232 | 0.210 | 9.5 | 0.071 | 3.2 | 0.0930 | 4.2 | 0.0065 | 0.300 | 1.10 | 50 | 0.98 | 45 | 2.2 |
| AVG. | 24 | 1080 | 5.5 | 246 | 1.71 | 76 | 27 | 1233 | 6.5 | 291 | 0.292 | 13.1 | 0.065 | 2.96 | 0.0919 | 4.1 | 0.0080 | 0.361 | 1.44 | 65 | 1.41 | 63 | 2.2 |

Hunts Point
Nutrients (mg/L)
Fiscal Year 1994

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 9.23 | 13.45 | 7.63 | 5.08 | 16.7 | 18.5 | 0.1168 | 1.1693 | 0.015 | 0.531 | 1.843 | 1.405 | 0.915 | 1.213 | 0.020 | 0.020 |
| Aug. | 11.50 | 13.82 | 7.35 | 10.25 | 18.8 | 24.1 | 0.1568 | 0.9245 | 0.031 | 0.483 | 4.882 | 2.081 | 1.402 | 1.638 | 0.020 | 0.020 |
| Sep. | 8.38 | 10.70 | 13.75 | 7.68 | 22.1 | 18.4 | 0.2965 | 2.1800 | 0.030 | 0.895 | 2.080 | 2.158 | 0.983 | 1.373 | 0.020 | 0.020 |
| Oct. | 11.95 | 9.55 | 10.38 | 7.73 | 22.3 | 17.3 | 0.1890 | 1.5700 | 0.055 | 0.199 | 2.215 | 1.763 | 1.356 | 1.528 | 0.020 | 0.020 |
| Nov. | 14.13 | 18.50 | 11.55 | 8.95 | 25.7 | 27.4 | 0.1593 | 0.6085 | 0.045 | 1.105 | 2.838 | 2.383 | 1.557 | 1.595 | 0.020 | 0.020 |
| Dec. | 10.59 | 9.61 | 8.80 | 4.53 | 19.4 | 14.1 | 0.4543 | 1.1655 | 0.077 | 0.665 | 1.701 | 1.393 | 0.918 | 1.132 | 0.020 | 0.020 |
| Jan. | 13.95 | 11.23 | 12.70 | 7.80 | 26.6 | 19.0 | 0.0860 | 4.2363 | 0.082 | 0.641 | 2.029 | 1.332 | 1.074 | 0.965 | 0.020 | 0.020 |
| Feb. | 12.78 | 16.38 | 9.13 | 9.23 | 21.9 | 25.6 | 0.3038 | 0.8500 | 0.102 | 0.160 | 1.871 | 1.473 | 1.373 | 1.198 | 0.020 | 0.020 |
| Mar. | 11.43 | 14.40 | 13.98 | 9.00 | 25.4 | 23.4 | 0.3310 | 0.5350 | 0.071 | 0.425 | 2.706 | 1.761 | 1.701 | 1.408 | 0.020 | 0.020 |
| Apr. | 13.54 | 15.31 | 8.85 | 3.95 | 22.4 | 19.3 | 0.3338 | 1.1820 | 0.052 | 0.716 | 2.101 | 1.791 | 1.118 | 1.774 | 0.020 | 0.020 |
| May. | 12.31 | 10.74 | 11.75 | 6.93 | 24.1 | 17.7 | 0.3083 | 2.1693 | 0.072 | 0.434 | 2.043 | 1.953 | 0.969 | 1.123 | 0.020 | 0.020 |
| Jun. | 14.80 | 11.25 | 10.30 | 9.50 | 25.1 | 20.8 | 0.1668 | 0.6845 | 0.088 | 0.239 | 3.103 | 1.394 | 1.194 | 1.313 | 0.020 | 0.020 |
| AVG. | 12.05 | 12.91 | 10.51 | 7.55 | 22.5 | 20.5 | 0.2418 | 1.4396 | 0.060 | 0.541 | 2.451 | 1.740 | 1.213 | 1.355 | 0.020 | 0.020 |

26TH WARD
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026212

FISCAL YEAR 1994

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | RAW SEWAGE mg/L | PRIMAY EFFLUENT mg/L | REMOVAL % | PLANT EFFLUENT mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 84 | 54 | 36 | 19 | 77 | 99 | 52 | 77 | 22 | 13 | 7 | 87 |
| AUG | 93 | 60 | 35 | 23 | 75 | 106 | 50 | 77 | 27 | 14 | 6 | 87 |
| SEP | 84 | 53 | 37 | 6 | 93 | 107 | 46 | 76 | 29 | 6 | 4 | 94 |
| OCT | 84 | 66 | 21 | 9 | 89 | 112 | 54 | 93 | 17 | 9 | 7 | 92 |
| NOV | 79 | 74 | 6 | 12 | 85 | 104 | 56 | 91 | 13 | 11 | 5 | 89 |
| DEC | 88 | 75 | 15 | 18 | 80 | 109 | 52 | 92 | 16 | 15 | 7 | 86 |
| JAN | 104 | 72 | 31 | 15 | 86 | 122 | 58 | 91 | 25 | 12 | 7 | 90 |
| FEB | 75 | 64 | 15 | 15 | 80 | 105 | 52 | 80 | 24 | 15 | 9 | 86 |
| MAR | 86 | 67 | 22 | 20 | 77 | 103 | 53 | 76 | 26 | 13 | 7 | 87 |
| APR | 83 | 68 | 18 | 24 | 71 | 115 | 70 | 92 | 20 | 14 | 8 | 88 |
| MAY | 94 | 69 | 27 | 22 | 77 | 115 | 57 | 99 | 14 | 17 | 9 | 85 |
| JUN | 99 | 62 | 37 | 11 | 89 | 118 | 61 | 76 | 36 | 9 | 5 | 92 |
| AVERAGE: | 88 | 65 | 26 | 16 | 82 | 110 | 55 | 85 | 22 | 12 | 7 | 89 |

NOTE:

26th Ward
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.140 | 0.0480 | 0.0030 | 0.0014 | 0.0043 | 0.0027 | 0.054 | 0.046 | 0.0110 | 0.0088 | 0.00037 | 0.00036 | 0.00012 | 0.00008 | 0.00041 | 0.00032 | 0.00003 | 0.00003 | 0.00049 | 0.00052 |
| Aug. | 0.084 | 0.0200 | 0.0180 | 0.0017 | 0.0021 | 0.0011 | 0.063 | 0.020 | 0.0100 | 0.0029 | 0.00015 | 0.00006 | 0.00006 | 0.00006 | 0.00044 | 0.00023 | 0.00003 | 0.00003 | 0.00280 | 0.00041 |
| Sep. | 0.029 | 0.0100 | 0.0036 | 0.0027 | 0.0047 | 0.0049 | 0.068 | 0.038 | 0.0180 | 0.0058 | 0.00003 | 0.00003 | 0.00018 | 0.00006 | 0.00058 | 0.00049 | 0.00003 | 0.00003 | 0.00140 | 0.00018 |
| Oct. | 0.025 | 0.0200 | 0.0020 | 0.0015 | 0.0023 | 0.0028 | 0.047 | 0.029 | 0.0160 | 0.0059 | 0.00026 | 0.00019 | 0.00006 | 0.00006 | 0.00087 | 0.00080 | 0.00003 | 0.00003 | 0.00056 | 0.00035 |
| Nov. | 0.033 | 0.0062 | 0.0250 | 0.0120 | 0.0040 | 0.0018 | 0.046 | 0.019 | 0.0075 | 0.0029 | 0.00016 | 0.00005 | 0.00007 | 0.00006 | 0.00041 | 0.00042 | 0.00003 | 0.00003 | 0.00150 | 0.00018 |
| Dec. | 0.030 | 0.0091 | 0.0036 | 0.0022 | 0.0044 | 0.0015 | 0.049 | 0.030 | 0.0089 | 0.0059 | 0.00014 | 0.00007 | 0.00006 | 0.00006 | 0.00076 | 0.00089 | 0.00005 | 0.00003 | 0.00074 | 0.00018 |
| Jan. | 0.050 | 0.0100 | 0.0031 | 0.0014 | 0.0048 | 0.0025 | 0.080 | 0.029 | 0.0140 | 0.0022 | 0.00074 | 0.00018 | 0.00006 | 0.00006 | 0.00040 | 0.00032 | 0.00003 | 0.00003 | 0.00130 | 0.00018 |
| Feb. | 0.032 | 0.0091 | 0.0031 | 0.0027 | 0.0026 | 0.0025 | 0.048 | 0.023 | 0.0061 | 0.0019 | 0.00003 | 0.00003 | 0.00015 | 0.00008 | 0.00041 | 0.00030 | 0.00003 | 0.00003 | 0.00110 | 0.00018 |
| Mar. | 0.051 | 0.0220 | 0.0100 | 0.0048 | 0.0045 | 0.0036 | 0.170 | 0.069 | 0.0520 | 0.0140 | 0.00160 | 0.00019 | 0.00011 | 0.00011 | 0.00007 | 0.00006 | 0.00004 | 0.00003 | 0.00046 | 0.00055 |
| Apr. | 0.054 | 0.0078 | 0.0051 | 0.0021 | 0.0033 | 0.0026 | 0.120 | 0.030 | 0.0220 | 0.0024 | 0.00270 | 0.00019 | 0.00011 | 0.00008 | 0.00054 | 0.00036 | 0.00008 | 0.00008 | 0.00280 | 0.00120 |
| May. | 0.059 | 0.0190 | 0.0030 | 0.0054 | 0.0026 | 0.0036 | 0.110 | 0.032 | 0.0078 | 0.0054 | 0.00064 | 0.00013 | 0.00006 | 0.00006 | 0.00026 | 0.00028 | 0.00003 | 0.00003 | 0.00250 | 0.00096 |
| Jun. | 0.053 | 0.0056 | 0.0022 | 0.0005 | 0.0046 | 0.0039 | 0.076 | 0.020 | 0.0130 | 0.0018 | 0.01100 | 0.00003 | 0.00006 | 0.00006 | 0.00071 | 0.00038 | 0.00003 | 0.00003 | 0.00420 | 0.00032 |
| AVG. | 0.053 | 0.016 | 0.0068 | 0.0032 | 0.0037 | 0.0028 | 0.078 | 0.032 | 0.0155 | 0.0050 | 0.00149 | 0.00013 | 0.00009 | 0.00007 | 0.00049 | 0.00040 | 0.00004 | 0.00003 | 0.00165 | 0.00043 |

26th Ward
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 15 | 789 | 4.8 | 253 | 1.60 | 84 | 22 | 1158 | 7.8 | 411 | 0.100 | 5.3 | 0.051 | 2.7 | 0.0840 | 4.4 | 0.0052 | 0.300 | 1.00 | 53 | 0.33 | 17 | 1.9 |
| Aug. | 13 | 929 | 6.4 | 457 | 2.20 | 157 | 17 | 1214 | 5.2 | 371 | 0.084 | 6.0 | 0.038 | 2.7 | 0.0560 | 4.0 | 0.0048 | 0.340 | 0.69 | 49 | 0.27 | 19 | 1.4 |
| Sep. | 15 | 750 | 2.8 | 140 | 0.87 | 44 | 31 | 1550 | 7.0 | 350 | 0.180 | 9.0 | 0.053 | 2.7 | 0.0750 | 3.8 | 0.0056 | 0.280 | 1.10 | 55 | 0.39 | 20 | 2.0 |
| Oct. | 11 | 611 | 1.7 | 94 | 0.77 | 43 | 18 | 1000 | 5.4 | 300 | 0.120 | 6.7 | 0.038 | 2.1 | 0.0870 | 4.8 | 0.0041 | 0.230 | 0.63 | 35 | 0.37 | 21 | 1.8 |
| Nov. | 13 | 722 | 1.8 | 100 | 0.59 | 33 | 20 | 1111 | 6.3 | 350 | 0.160 | 8.9 | 0.042 | 2.3 | 0.0930 | 5.2 | 0.0047 | 0.260 | 0.65 | 36 | 0.42 | 23 | 1.8 |
| Dec. | 11 | 550 | 1.7 | 85 | 0.72 | 36 | 17 | 850 | 4.8 | 240 | 0.120 | 6.0 | 0.042 | 2.1 | 0.0870 | 4.4 | 0.0065 | 0.330 | 0.85 | 43 | 0.33 | 17 | 2.0 |
| Jan. | 10 | 526 | 1.6 | 84 | 0.61 | 32 | 16 | 842 | 3.0 | 158 | 0.091 | 4.8 | 0.042 | 2.2 | 0.0690 | 3.6 | 0.0048 | 0.250 | 0.86 | 45 | 0.29 | 15 | 1.9 |
| Feb. | 11 | 550 | 2.1 | 105 | 0.62 | 31 | 17 | 850 | 5.7 | 285 | 0.120 | 6.0 | 0.034 | 1.7 | 0.1000 | 5.0 | 0.0054 | 0.300 | 0.92 | 46 | 0.29 | 14 | 2.0 |
| Mar. | 12 | 522 | 2.6 | 113 | 0.78 | 34 | 20 | 870 | 6.7 | 291 | 0.110 | 4.8 | 0.047 | 2.0 | 0.1100 | 4.8 | 0.0039 | 0.170 | 1.50 | 65 | 0.50 | 22 | 2.3 |
| Apr. | 14 | 667 | 3.2 | 152 | 0.79 | 38 | 20 | 952 | 7.3 | 348 | 0.150 | 7.1 | 0.038 | 1.8 | 0.1200 | 5.7 | 0.0092 | 0.440 | 1.30 | 62 | 0.45 | 21 | 2.1 |
| May. | 13 | 591 | 3.4 | 155 | 1.00 | 45 | 21 | 955 | 7.9 | 359 | 0.220 | 10.0 | 0.044 | 2.0 | 0.0740 | 3.4 | 0.0084 | 0.380 | 1.10 | 50 | 0.54 | 25 | 2.2 |
| Jun. | 14 | 583 | 2.9 | 121 | 0.71 | 30 | 23 | 958 | 6.9 | 288 | 0.120 | 5.0 | 0.054 | 2.3 | 0.1200 | 5.0 | 0.0069 | 0.290 | 1.20 | 50 | 0.55 | 23 | 2.4 |
| AVG. | 13 | 649 | 2.9 | 155 | 0.94 | 51 | 20 | 1026 | 6.2 | 313 | 0.131 | 6.6 | 0.044 | 2.22 | 0.0896 | 4.5 | 0.0058 | 0.298 | 0.98 | 49 | 0.39 | 20 | 2.0 |

26th Ward
Nutrients (mg/L)
Fiscal Year 1994

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 8.26 | 10.35 | 10.03 | 6.15 | 18.3 | 16.5 | 0.2675 | 0.2650 | 0.047 | 0.267 | 1.669 | 1.414 | 0.597 | 0.689 | 0.020 | 0.020 |
| Aug. | 7.59 | 6.98 | 6.43 | 5.53 | 14.0 | 12.5 | 0.3200 | 0.7575 | 0.052 | 0.568 | 2.030 | 1.813 | 0.533 | 0.736 | 0.020 | 0.020 |
| Sep. | 8.33 | 13.00 | 7.70 | 7.13 | 16.0 | 20.1 | 0.5800 | 0.9925 | 0.097 | 1.046 | 1.980 | 1.578 | 0.905 | 1.137 | 0.020 | 0.020 |
| Oct. | 9.00 | 11.60 | 9.75 | 7.90 | 18.8 | 19.5 | 0.4050 | 0.7575 | 0.076 | 0.668 | 2.235 | 1.405 | 1.315 | 0.959 | 0.020 | 0.020 |
| Nov. | 7.98 | 12.02 | 10.28 | 6.00 | 18.3 | 18.0 | 0.3768 | 0.7475 | 0.061 | 0.622 | 2.275 | 1.420 | 1.088 | 1.093 | 0.020 | 0.020 |
| Dec. | 7.69 | 12.06 | 13.35 | 8.57 | 21.0 | 18.0 | 0.2475 | 0.5900 | 0.094 | 0.293 | 2.320 | 1.740 | 1.013 | 0.750 | 0.020 | 0.020 |
| Jan. | 10.34 | 12.76 | 10.68 | 7.00 | 21.0 | 19.8 | 0.3750 | 0.3100 | 0.071 | 0.162 | 2.793 | 1.213 | 1.093 | 0.820 | 0.020 | 0.020 |
| Feb. | 8.69 | 9.31 | 9.58 | 8.45 | 18.3 | 17.8 | 0.3175 | 0.3150 | 0.165 | 0.236 | 1.928 | 0.863 | 0.880 | 0.563 | 0.020 | 0.020 |
| Mar. | 7.73 | 13.30 | 13.53 | 13.45 | 21.3 | 26.8 | 0.4975 | 0.7000 | 0.144 | 0.209 | 2.545 | 1.640 | 1.138 | 0.723 | 0.020 | 0.020 |
| Apr. | 8.10 | 13.48 | 11.43 | 8.53 | 19.5 | 22.0 | 0.3500 | 0.2025 | 0.070 | 0.267 | 2.618 | 1.825 | 0.935 | 1.503 | 0.020 | 0.020 |
| May. | 8.18 | 16.93 | 12.08 | 10.58 | 20.3 | 27.5 | 0.3375 | 0.1575 | 0.037 | 0.048 | 2.415 | 1.603 | 1.078 | 0.943 | 0.020 | 0.020 |
| Jun. | 7.63 | 15.10 | 17.40 | 9.90 | 25.0 | 25.0 | 0.1675 | 0.2625 | 0.071 | 0.495 | 2.513 | 1.298 | 1.043 | 0.975 | 0.020 | 0.020 |
| AVG. | 8.29 | 12.24 | 11.02 | 8.26 | 19.3 | 20.3 | 0.3535 | 0.5048 | 0.082 | 0.407 | 2.277 | 1.484 | 0.968 | 0.907 | 0.020 | 0.020 |

TALLMAN ISLAND
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026239

FISCAL YEAR 1994

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | RAW SEWAGE mg/L | PRIMAY EFFLUENT mg/L | REMOVAL % | PLANT EFFLUENT mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 98 | 59 | 40 | 4 | 96 | 113 | 64 | 62 | 45 | 4 | 3 | 96 |
| AUG | 92 | 57 | 38 | 5 | 95 | 104 | 60 | 56 | 46 | 3 | 3 | 97 |
| SEP | 93 | 45 | 52 | 4 | 96 | 102 | 61 | 49 | 52 | 3 | 3 | 97 |
| OCT | 99 | 50 | 49 | 8 | 92 | 110 | 61 | 59 | 46 | 5 | 4 | 95 |
| NOV | 99 | 56 | 43 | 6 | 94 | 121 | 65 | 66 | 45 | 5 | 5 | 96 |
| DEC | 98 | 54 | 45 | 8 | 92 | 126 | 65 | 64 | 49 | 5 | 3 | 96 |
| JAN | 98 | 58 | 41 | 9 | 91 | 113 | 59 | 67 | 41 | 8 | 4 | 93 |
| FEB | 86 | 62 | 28 | 6 | 93 | 114 | 64 | 75 | 34 | 7 | 5 | 94 |
| MAR | 88 | 60 | 32 | 8 | 91 | 104 | 63 | 64 | 38 | 7 | 4 | 93 |
| APR | 95 | 60 | 37 | 6 | 94 | 113 | 68 | 66 | 42 | 6 | 4 | 95 |
| MAY | 102 | 63 | 39 | 5 | 95 | 127 | 72 | 78 | 39 | 5 | 3 | 96 |
| JUN | 108 | 59 | 45 | 6 | 94 | 132 | 69 | 66 | 50 | 4 | 3 | 97 |
| AVERAGE: | 95 | 56 | 41 | 6 | 94 | 113 | 64 | 64 | 43 | 5 | 4 | 96 |

NOTE: Average as flow weighted.

Tallman Island

Heavy Metals

Influent/Effluent (mg/L)

Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.130 | 0.0120 | 0.0120 | 0.0017 | 0.0260 | 0.0100 | 0.110 | 0.039 | 0.0190 | 0.0009 | 0.00080 | 0.00036 | 0.00024 | 0.00006 | 0.00046 | 0.00017 | 0.00003 | 0.00003 | 0.00670 | 0.00043 |
| Aug. | 0.150 | 0.0280 | 0.0096 | 0.0022 | 0.0100 | 0.0060 | 0.093 | 0.039 | 0.0130 | 0.0015 | 0.00210 | 0.00180 | 0.00013 | 0.00006 | 0.00032 | 0.00018 | 0.00003 | 0.00003 | 0.01400 | 0.00039 |
| Sep. | 0.093 | 0.0090 | 0.0087 | 0.0024 | 0.0150 | 0.0068 | 0.120 | 0.055 | 0.0190 | 0.0008 | 0.00065 | 0.00021 | 0.00017 | 0.00006 | 0.00058 | 0.00034 | 0.00003 | 0.00003 | 0.00920 | 0.00030 |
| Oct. | 0.050 | 0.0130 | 0.0220 | 0.0013 | 0.0078 | 0.0020 | 0.070 | 0.025 | 0.0068 | 0.0008 | 0.00130 | 0.00063 | 0.00008 | 0.00006 | 0.00066 | 0.00056 | 0.00003 | 0.00003 | 0.01200 | 0.00033 |
| Nov. | 0.067 | 0.0090 | 0.0060 | 0.0020 | 0.0092 | 0.0087 | 0.120 | 0.040 | 0.0170 | 0.0020 | 0.00220 | 0.00160 | 0.00021 | 0.00006 | 0.00085 | 0.00050 | 0.00003 | 0.00003 | 0.00460 | 0.00068 |
| Dec. | 0.047 | 0.0096 | 0.0087 | 0.0029 | 0.0084 | 0.0094 | 0.073 | 0.033 | 0.0089 | 0.0014 | 0.00320 | 0.00046 | 0.00013 | 0.00006 | 0.00062 | 0.00036 | 0.00003 | 0.00003 | 0.00800 | 0.00050 |
| Jan. | 0.041 | 0.0140 | 0.0120 | 0.0020 | 0.0340 | 0.0120 | 0.120 | 0.052 | 0.0100 | 0.0019 | 0.00180 | 0.00062 | 0.00015 | 0.00012 | 0.00044 | 0.00033 | 0.00003 | 0.00003 | 0.00480 | 0.00053 |
| Feb. | 0.049 | 0.0130 | 0.0067 | 0.0027 | 0.0085 | 0.0082 | 0.093 | 0.039 | 0.0092 | 0.0004 | 0.00049 | 0.00025 | 0.00023 | 0.00006 | 0.00039 | 0.00028 | 0.00003 | 0.00003 | 0.00600 | 0.00840 |
| Mar. | 0.044 | 0.0140 | 0.0100 | 0.0036 | 0.0031 | 0.0040 | 0.100 | 0.045 | 0.0091 | 0.0039 | 0.00034 | 0.00014 | 0.00014 | 0.00009 | 0.00050 | 0.00050 | 0.00003 | 0.00003 | 0.00560 | 0.00088 |
| Apr. | 0.056 | 0.0110 | 0.0092 | 0.0023 | 0.0030 | 0.0030 | 0.120 | 0.027 | 0.0140 | 0.0008 | 0.00021 | 0.00003 | 0.00020 | 0.00006 | 0.00045 | 0.00030 | 0.00008 | 0.00008 | 0.00580 | 0.00071 |
| May. | 0.052 | 0.0120 | 0.0110 | 0.0064 | 0.0170 | 0.0110 | 0.100 | 0.028 | 0.0076 | 0.0007 | 0.00088 | 0.00012 | 0.00006 | 0.00006 | 0.00051 | 0.00025 | 0.00003 | 0.00003 | 0.00530 | 0.00120 |
| Jun. | 0.054 | 0.0480 | 0.0080 | 0.0018 | 0.0210 | 0.0180 | 0.092 | 0.036 | 0.0076 | 0.0012 | 0.00039 | 0.00013 | 0.00009 | 0.00006 | 0.00053 | 0.00044 | 0.00003 | 0.00003 | 0.00760 | 0.00100 |
| AVG. | 0.069 | 0.016 | 0.0103 | 0.0026 | 0.0136 | 0.0083 | 0.101 | 0.038 | 0.0118 | 0.0014 | 0.00120 | 0.00053 | 0.00015 | 0.00007 | 0.00053 | 0.00035 | 0.00003 | 0.00003 | 0.00747 | 0.00128 |

Tallman Island
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 14 | 933 | 6.6 | 440 | 4.00 | 267 | 18 | 1200 | 4.2 | 280 | 0.260 | 17.0 | 0.027 | 1.8 | 0.0570 | 3.8 | 0.0043 | 0.300 | 0.85 | 57 | 1.60 | 107 | 1.5 |
| Aug. | 9 | 573 | 6.7 | 447 | 2.50 | 167 | 17 | 1133 | 4.6 | 307 | 0.087 | 5.8 | 0.077 | 5.1 | 0.0560 | 3.7 | 0.0040 | 0.270 | 0.65 | 43 | 0.28 | 19 | 1.5 |
| Sep. | 16 | 1143 | 3.0 | 214 | 1.30 | 93 | 15 | 1071 | 4.0 | 286 | 0.280 | 20.0 | 0.065 | 4.6 | 0.0590 | 4.2 | 0.0057 | 0.410 | 0.72 | 51 | 1.00 | 71 | 1.4 |
| Oct. | 11 | 917 | 2.3 | 192 | 0.94 | 78 | 12 | 1000 | 2.8 | 233 | 0.210 | 18.0 | 0.045 | 3.8 | 0.0590 | 4.9 | 0.0043 | 0.360 | 0.52 | 43 | 0.80 | 67 | 1.2 |
| Nov. | 10 | 769 | 2.4 | 185 | 1.00 | 77 | 12 | 923 | 2.8 | 215 | 0.370 | 28.0 | 0.044 | 3.4 | 0.0560 | 4.3 | 0.0040 | 0.310 | 0.41 | 32 | 1.10 | 85 | 1.3 |
| Dec. | 9 | 708 | 1.6 | 133 | 0.67 | 56 | 11 | 917 | 2.3 | 192 | 0.350 | 29.0 | 0.041 | 3.4 | 0.0460 | 3.8 | 0.0037 | 0.310 | 0.33 | 28 | 0.88 | 73 | 1.2 |
| Jan. | 11 | 733 | 1.8 | 120 | 0.82 | 55 | 15 | 1000 | 3.1 | 207 | 0.240 | 16.0 | 0.049 | 3.3 | 0.0610 | 4.1 | 0.0043 | 0.290 | 0.49 | 33 | 1.10 | 73 | 1.5 |
| Feb. | 11 | 917 | 2.5 | 208 | 1.00 | 83 | 19 | 1583 | 4.0 | 333 | 0.170 | 14.0 | 0.048 | 4.0 | 0.0660 | 5.5 | 0.0053 | 0.440 | 0.84 | 70 | 1.10 | [illegible] | 1.2 |
| Mar. | 11 | 647 | 2.3 | 135 | 0.92 | 54 | 17 | 1000 | 3.6 | 212 | 0.170 | 10.0 | 0.044 | 2.6 | 0.0530 | 3.1 | 0.0590 | 3.500 | 0.89 | 52 | 1.20 | 71 | 1.7 |
| Apr. | 13 | 684 | 2.8 | 147 | 0.92 | 48 | 20 | 1053 | 4.5 | 237 | 0.130 | 6.8 | 0.052 | 2.7 | 0.1200 | 6.3 | 0.0084 | 0.440 | 0.97 | 51 | 1.30 | 68 | 1.9 |
| May. | 12 | 667 | 3.1 | 172 | 0.98 | 54 | 20 | 1111 | 4.7 | 261 | 0.180 | 10.0 | 0.047 | 2.6 | 0.0580 | 3.2 | 0.0062 | 0.340 | 1.40 | 78 | 1.10 | 61 | 1.8 |
| Jun. | 12 | 600 | 2.9 | 145 | 0.87 | 44 | 19 | 950 | 3.8 | 190 | 0.160 | 8.0 | 0.072 | 3.6 | 0.1000 | 5.0 | 0.0077 | 0.390 | 1.20 | 60 | 1.50 | 75 | 2.0 |
| AVG. | 12 | 774 | 3.2 | 212 | 1.33 | 90 | 16 | 1078 | 3.7 | 246 | 0.217 | 15.2 | 0.051 | 3.41 | 0.0659 | 4.3 | 0.0097 | 0.613 | 0.77 | 50 | 1.08 | 72 | 1.5 |

Tallman Island
Nutrients (mg/L)
Fiscal Year 1994

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 14.65 | 4.68 | 10.28 | 3.33 | 25.0 | 8.0 | 0.2883 | 2.6400 | 0.015 | 1.015 | 2.445 | 1.178 | 1.265 | 1.048 | 0.020 | 0.020 |
| Aug. | 12.92 | 3.60 | 11.86 | 5.88 | 24.6 | 9.5 | 0.1190 | 5.2678 | 0.046 | 0.245 | 2.774 | 1.816 | 1.448 | 1.466 | 0.020 | 0.020 |
| Sep. | 13.00 | 5.63 | 11.08 | 3.63 | 24.1 | 9.3 | 0.0818 | 4.1150 | 0.024 | 0.182 | 2.705 | 1.833 | 1.643 | 1.590 | 0.020 | 0.020 |
| Oct. | 13.35 | 6.10 | 14.65 | 4.65 | 28.0 | 10.8 | 0.0833 | 3.8200 | 0.030 | 0.307 | 2.875 | 1.723 | 1.633 | 1.438 | 0.020 | 0.020 |
| Nov. | 15.13 | 9.10 | 9.63 | 4.40 | 24.8 | 13.5 | 0.0503 | 5.1775 | 0.026 | 0.680 | 3.273 | 2.545 | 1.918 | 1.898 | 0.020 | 0.020 |
| Dec. | 12.88 | 7.20 | 14.73 | 4.88 | 27.6 | 12.1 | 0.1153 | 3.8175 | 0.048 | 0.752 | 2.780 | 1.870 | 1.590 | 1.470 | 0.020 | 0.020 |
| Jan. | 13.33 | 10.28 | 8.93 | 4.48 | 22.3 | 14.8 | 0.2168 | 2.7650 | 0.062 | 0.596 | 2.710 | 1.680 | 1.715 | 0.997 | 0.030 | 0.020 |
| Feb. | 14.18 | 10.50 | 12.93 | 4.78 | 27.1 | 15.3 | 0.2210 | 2.5200 | 0.095 | 0.934 | 2.945 | 1.700 | 1.348 | 0.973 | 0.020 | 0.020 |
| Mar. | 11.18 | 6.26 | 19.43 | 4.88 | 30.6 | 11.1 | 0.5605 | 2.5325 | 0.069 | 0.722 | 2.850 | 1.398 | 1.460 | 1.008 | 0.020 | 0.020 |
| Apr. | 14.03 | 5.15 | 9.73 | 4.35 | 23.8 | 9.5 | 0.4850 | 3.6175 | 0.095 | 0.462 | 3.160 | 1.625 | 1.690 | 1.123 | 0.020 | 0.020 |
| May. | 15.93 | 5.96 | 12.15 | 2.13 | 28.1 | 8.1 | 0.5750 | 3.0425 | 0.100 | 0.585 | 3.035 | 1.508 | 1.793 | 1.213 | 0.020 | 0.020 |
| Jun. | 13.73 | 9.03 | 10.48 | 3.55 | 24.2 | 12.6 | 0.3475 | 3.9900 | 0.035 | 0.437 | 2.623 | 1.480 | 1.603 | 1.320 | 0.020 | 0.020 |
| AVG. | 13.69 | 6.96 | 12.15 | 4.24 | 25.8 | 11.2 | 0.2620 | 3.6088 | 0.054 | 0.576 | 2.848 | 1.696 | 1.592 | 1.295 | 0.021 | 0.020 |

OAKWOOD BEACH
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026174

FISCAL YEAR 1994

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | RAW SEWAGE mg/L | PRIMAY EFFLUENT mg/L | REMOVAL % | PLANT EFFLUENT mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 151 | 66 | 56 | 6 | 96 | 107 | 27 | 50 | 53 | 6 | 3 | 94 |
| AUG | 144 | 73 | 49 | 4 | 97 | 118 | 29 | 55 | 53 | 4 | 3 | 97 |
| SEP | 136 | 70 | 49 | 7 | 95 | 114 | 27 | 44 | 61 | 6 | 4 | 95 |
| OCT | 126 | 60 | 52 | 5 | 96 | 110 | 24 | 44 | 60 | 5 | 3 | 95 |
| NOV | 153 | 73 | 52 | 5 | 97 | 117 | 26 | 56 | 52 | 4 | 2 | 97 |
| DEC | 118 | 69 | 42 | 9 | 92 | 96 | 32 | 74 | 23 | 8 | 4 | 92 |
| JAN | 99 | 54 | 45 | 5 | 95 | 98 | 27 | 55 | 44 | 6 | 3 | 94 |
| FEB | 101 | 57 | 44 | 10 | 90 | 86 | 29 | 50 | 42 | 10 | 3 | 88 |
| MAR | 99 | 44 | 56 | 10 | 90 | 80 | 24 | 43 | 46 | 15 | 7 | 81 |
| APR | 125 | 55 | 56 | 9 | 93 | 114 | 32 | 52 | 54 | 12 | 7 | 89 |
| MAY | 172 | 86 | 50 | 14 | 92 | 144 | 34 | 64 | 56 | 14 | 7 | 90 |
| JUN | 176 | 75 | 57 | 8 | 95 | 156 | 38 | 71 | 54 | 12 | 6 | 92 |
| AVERAGE: | 132 | 65 | 51 | 6 | 95 | 108 | 27 | 54 | 50 | 6 | 3 | 94 |

NOTE: Average as flow weighted.

Oakwood Beach
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.140 | 0.0120 | 0.0047 | 0.0014 | 0.0120 | 0.0059 | 0.170 | 0.036 | 0.0140 | 0.0026 | 0.00075 | 0.00029 | 0.00030 | 0.00008 | 0.00076 | 0.00020 | 0.00005 | 0.00003 | 0.00560 | 0.00032 |
| Aug. | 0.095 | 0.0210 | 0.0270 | 0.0011 | 0.0100 | 0.0061 | 0.084 | 0.021 | 0.0120 | 0.0012 | 0.00014 | 0.00003 | 0.00014 | 0.00006 | 0.00066 | 0.00043 | 0.00003 | 0.00003 | 0.00590 | 0.00020 |
| Sep. | 0.052 | 0.0050 | 0.0030 | 0.0006 | 0.0120 | 0.0055 | 0.085 | 0.027 | 0.0075 | 0.0004 | 0.00030 | 0.00005 | 0.00015 | 0.00006 | 0.00075 | 0.00044 | 0.00004 | 0.00005 | 0.00570 | 0.00026 |
| Oct. | 0.052 | 0.0094 | 0.0019 | 0.0007 | 0.0078 | 0.0057 | 0.071 | 0.018 | 0.0094 | 0.0010 | 0.00028 | 0.00004 | 0.00006 | 0.00006 | 0.00081 | 0.00067 | 0.00003 | 0.00003 | 0.00900 | 0.00067 |
| Nov. | 0.037 | 0.0089 | 0.0022 | 0.0007 | 0.0130 | 0.0091 | 0.066 | 0.019 | 0.0099 | 0.0022 | 0.00160 | 0.00003 | 0.00022 | 0.00006 | 0.00076 | 0.00048 | 0.00003 | 0.00003 | 0.00510 | 0.00031 |
| Dec. | 0.047 | 0.0056 | 0.0027 | 0.0004 | 0.0200 | 0.0090 | 0.074 | 0.028 | 0.0063 | 0.0036 | 0.00020 | 0.00004 | 0.00100 | 0.00006 | 0.00081 | 0.00059 | 0.00003 | 0.00003 | 0.00930 | 0.00030 |
| Jan. | 0.034 | 0.0098 | 0.0031 | 0.0013 | 0.0140 | 0.0110 | 0.052 | 0.030 | 0.0047 | 0.0005 | 0.00061 | 0.00040 | 0.00008 | 0.00006 | 0.00058 | 0.00030 | 0.00003 | 0.00003 | 0.00430 | 0.00032 |
| Feb. | 0.032 | 0.0082 | 0.0110 | 0.0110 | 0.0160 | 0.0110 | 0.057 | 0.040 | 0.0038 | 0.0007 | 0.00025 | 0.00011 | 0.00008 | 0.00006 | 0.00063 | 0.00050 | 0.00003 | 0.00003 | 0.00390 | 0.00045 |
| Mar. | 0.033 | 0.0038 | 0.0024 | 0.0008 | 0.0220 | 0.0160 | 0.081 | 0.024 | 0.0092 | 0.0004 | 0.00016 | 0.00030 | 0.00013 | 0.00012 | 0.00090 | 0.00058 | 0.00003 | 0.00003 | 0.00300 | 0.00026 |
| Apr. | 0.039 | 0.0082 | 0.0042 | 0.0008 | 0.0076 | 0.0059 | 0.076 | 0.051 | 0.0066 | 0.0005 | 0.00040 | 0.00026 | 0.00016 | 0.00008 | 0.00042 | 0.00042 | 0.00008 | 0.00008 | 0.00270 | 0.00018 |
| May. | 0.043 | 0.0097 | 0.0073 | 0.0012 | 0.0690 | 0.0098 | 0.084 | 0.021 | 0.0076 | 0.0008 | 0.00040 | 0.00010 | 0.00006 | 0.00006 | 0.00049 | 0.00026 | 0.00003 | 0.00003 | 0.00480 | 0.00110 |
| Jun. | 0.110 | 0.0240 | 0.0061 | 0.0006 | 0.0220 | 0.0100 | 0.150 | 0.018 | 0.0230 | 0.0004 | 0.00038 | 0.00006 | 0.00019 | 0.00006 | 0.00110 | 0.00048 | 0.00003 | 0.00003 | 0.01800 | 0.00039 |
| AVG. | 0.060 | 0.010 | 0.0063 | 0.0017 | 0.0188 | 0.0088 | 0.088 | 0.028 | 0.0095 | 0.0012 | 0.00046 | 0.00014 | 0.00021 | 0.00007 | 0.00072 | 0.00045 | 0.00004 | 0.00004 | 0.00644 | 0.00040 |

Oakwood Beach
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1994

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 9 | 775 | 1.7 | 142 | 1.30 | 108 | 10 | 817 | 1.5 | 125 | 0.024 | 2.0 | 0.079 | 6.6 | 0.0420 | 3.5 | 0.0021 | 0.200 | 0.11 | 9 | 0.64 | 53 | 1.2 |
| Aug. | 14 | 933 | 2.5 | 167 | 0.85 | 57 | 11 | 733 | 2.6 | 173 | 0.044 | 2.9 | 0.032 | 2.1 | 0.0560 | 3.7 | 0.0034 | 0.230 | 0.27 | 18 | 0.78 | 52 | 1.5 |
| Sep. | 7 | 600 | 1.0 | 90 | 0.96 | 87 | 8 | 727 | 1.5 | 136 | 0.110 | 10.0 | 0.036 | 3.3 | 0.0330 | 3.0 | 0.0022 | 0.200 | 0.30 | 27 | 0.52 | 47 | 1.1 |
| Oct. | 6 | 527 | 0.4 | 37 | 1.00 | 91 | 8 | 691 | 1.0 | 90 | 0.150 | 13.6 | 0.031 | 2.8 | 0.0410 | 3.7 | 0.0023 | 0.210 | 0.13 | 12 | 0.65 | 59 | 1.1 |
| Nov. | 6 | 545 | 0.6 | 57 | 0.79 | 72 | 8 | 736 | 1.2 | 109 | 0.027 | 2.5 | 0.044 | 4.0 | 0.0490 | 4.5 | 0.0022 | 0.200 | 0.33 | 30 | 0.71 | 65 | 1.1 |
| Dec. | 10 | 588 | 1.7 | 100 | 0.89 | 52 | 12 | 706 | 3.1 | 182 | 0.055 | 3.2 | 0.130 | 7.6 | 0.0630 | 3.7 | 0.0043 | 0.250 | 0.19 | 11 | 0.89 | 52 | 1.7 |
| Jan. | 9 | 538 | 1.0 | 63 | 0.89 | 56 | 15 | 938 | 2.0 | 125 | 0.066 | 4.1 | 0.100 | 6.3 | 0.0770 | 4.8 | 0.0044 | 0.280 | 0.17 | 11 | 0.62 | 39 | 1.6 |
| Feb. | 13 | 765 | 1.4 | 82 | 1.40 | 82 | 22 | 1294 | 4.6 | 271 | 0.130 | 7.6 | 0.063 | 3.7 | 0.1100 | 6.5 | 0.0068 | 0.400 | 0.41 | 24 | 0.85 | 50 | 1.7 |
| Mar. | 9 | 425 | 1.1 | 55 | 0.79 | 40 | 15 | 750 | 3.5 | 175 | 0.067 | 3.4 | 0.075 | 3.8 | 0.1000 | 5.0 | 0.0041 | 0.210 | 0.53 | 27 | 0.80 | 40 | 2.0 |
| Apr. | 10 | 485 | 1.1 | 55 | 1.70 | 85 | 15 | 750 | 3.3 | 165 | 0.075 | 3.8 | 0.064 | 3.2 | 0.1300 | 6.5 | 0.0085 | 0.430 | 0.36 | 18 | 0.78 | 39 | 2.0 |
| May. | 9 | 524 | 0.9 | 55 | 12.00 | 71 | 13 | 765 | 2.6 | 153 | 0.490 | 2.9 | 0.037 | 2.2 | 0.0780 | 4.6 | 0.0062 | 0.360 | 0.34 | 20 | 0.78 | 46 | 1.7 |
| Jun. | 11 | 524 | 1.2 | 57 | 1.30 | 62 | 15 | 714 | 3.2 | 152 | 0.063 | 3.0 | 0.074 | 3.5 | 0.1100 | 5.2 | 0.0069 | 0.330 | 0.31 | 15 | 0.93 | 44 | 2.1 |
| AVG. | 9 | 602 | 1.2 | 80 | 1.99 | 72 | 13 | 802 | 2.5 | 155 | 0.108 | 4.9 | 0.064 | 4.09 | 0.0741 | 4.6 | 0.0045 | 0.275 | 0.29 | 19 | 0.75 | 49 | 1.6 |

Oakwood Beach
Nutrients (mg/L)
Fiscal Year 1994

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 18.18 | 3.85 | 13.20 | 3.90 | 31.4 | 7.8 | 0.0683 | 2.6815 | 0.027 | 0.375 | 5.130 | 2.600 | 2.448 | 2.088 | 0.020 | 0.020 |
| Aug. | 17.96 | 4.93 | 14.73 | 2.83 | 32.7 | 7.8 | 0.1968 | 2.5775 | 0.131 | 0.348 | 5.013 | 2.547 | 2.611 | 2.024 | 0.020 | 0.020 |
| Sep. | 17.55 | 4.41 | 12.08 | 1.83 | 29.6 | 6.3 | 0.0933 | 2.8808 | 0.034 | 0.291 | 4.627 | 2.550 | 2.653 | 2.273 | 0.020 | 0.020 |
| Oct. | 15.96 | 2.87 | 13.53 | 1.63 | 29.5 | 4.5 | 0.1128 | 2.3440 | 0.070 | 0.434 | 4.702 | 2.464 | 2.489 | 1.929 | 0.020 | 0.020 |
| Nov. | 11.83 | 3.26 | 17.90 | 1.65 | 29.7 | 4.9 | 0.7255 | 2.2345 | 0.078 | 0.724 | 5.022 | 2.231 | 2.585 | 2.030 | 0.020 | 0.020 |
| Dec. | 14.74 | 7.19 | 18.50 | 3.98 | 33.2 | 11.2 | 0.0753 | 1.2983 | 0.050 | 0.666 | 4.024 | 2.091 | 1.818 | 1.718 | 0.020 | 0.020 |
| Jan. | 13.61 | 3.69 | 10.20 | 2.70 | 23.8 | 6.4 | 0.0803 | 1.1020 | 0.139 | 1.086 | 3.496 | 1.542 | 1.581 | 1.307 | 0.020 | 0.020 |
| Feb. | 11.48 | 2.03 | 10.50 | 3.70 | 22.0 | 5.8 | 0.5238 | 1.9313 | 0.220 | 0.503 | 3.313 | 1.578 | 1.431 | 0.879 | 0.020 | 0.020 |
| Mar. | 10.15 | 3.38 | 11.50 | 7.63 | 21.6 | 11.0 | 1.0195 | 3.0360 | 0.305 | 0.410 | 3.648 | 1.710 | 1.448 | 0.623 | 0.020 | 0.020 |
| Apr. | 11.64 | 5.20 | 15.85 | 7.43 | 27.5 | 12.6 | 0.3825 | 2.9223 | 0.393 | 0.303 | 3.975 | 2.875 | 1.823 | 1.415 | 0.020 | 0.020 |
| May. | 16.98 | 6.34 | 18.80 | 5.43 | 35.8 | 11.8 | 0.6625 | 2.7355 | 0.112 | 0.302 | 6.466 | 2.746 | 2.317 | 1.483 | 0.020 | 0.020 |
| Jun. | 14.99 | 10.14 | 15.17 | 3.13 | 30.1 | 13.3 | 0.2450 | 2.0500 | 0.051 | 0.313 | 5.973 | 2.465 | 2.428 | 2.143 | 0.020 | 0.020 |
| AVG. | 14.59 | 4.77 | 14.33 | 3.82 | 28.9 | 8.6 | 0.3488 | 2.3161 | 0.134 | 0.479 | 4.615 | 2.283 | 2.136 | 1.659 | 0.020 | 0.020 |

**TABLE 1**
**SUMMARY OF WATER POLLUTION CONTROL OPERATIONS**
**AVERAGE DAILY FLOW, M.G.D.**
**FISCAL YEAR 1995**

'94 '95

| PLANT | | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | YR.AVG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MANHATTAN: | WARDS ISLAND | 283 | 273 | 261 | 252 | 261 | 245 | 241 | 241 | 229 | 220 | 218 | | 248 |
| | NORTH RIVER | 170 | 167 | 166 | 158 | 167 | 155 | 157 | 156 | 149 | 146 | 147 | | 158 |
| BRONX: | HUNTS POINT | 148 | 143 | 138 | 136 | 137 | 133 | 132 | 133 | 125 | 125 | 121 | | 134 |
| BROOKLYN: | 26TH WARD | 76 | 76 | 78 | 76 | 70 | 80 | 74 | 74 | 72 | 68 | 72 | | 74 |
| | CONEY ISLAND | 104 | 107 | 106 | 103 | 105 | 100 | 102 | 99 | 95 | 95 | 99 | | 101 |
| | OWLS HEAD | 129 | 132 | 127 | 123 | 126 | 126 | 120 | 125 | 119 | 123 | 122 | | 125 |
| | NEWTOWN CREEK | 316 | 316 | 39 | 274 | 279 | 270 | 256 | 270 | 257 | 269 | 281 | | 257 |
| | RED HOOK | 43 | 42 | 40 | 42 | 43 | 42 | 39 | 38 | 38 | 40 | 38 | | 40 |
| QUEENS: | JAMAICA | 90 | 90 | 84 | 71 | 85 | 76 | 85 | 84 | 83 | 84 | 82 | | 83 |
| | TALLMAN ISLAND | 56 | 59 | 58 | 55 | 55 | 56 | 54 | 54 | 52 | 53 | 55 | | 55 |
| | BOWERY BAY | 119 | 125 | 121 | 118 | 119 | 119 | 114 | 115 | 106 | 108 | 112 | | 116 |
| | ROCKAWAY | 24 | 25 | 25 | 24 | 24 | 25 | 24 | 21 | 21 | 21 | 22 | | 23 |
| STATEN ISLAND: | OAKWOOD BEACH | 27 | 28 | 28 | 26 | 28 | 31 | 31 | 24 | 24 | 18 | 23 | | 26 |
| | PORT RICHMOND | 41 | 41 | 38 | 37 | 38 | 38 | 39 | 40 | 39 | 37 | 37 | | 39 |
| TOTAL | | 1626 | 1623 | 1309 | 1495 | 1537 | 1496 | 1468 | 1473 | 1409 | 1408 | 1429 | | 1479 |

WARDS ISLAND
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

PDES ID. NY0026131

FISCAL YEAR 1995

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | REMOVAL | PLANT EFFLUENT | REMOVAL | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| ONTH | mg/L | mg/L | % | mg/L | % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 84 | 60 | 29 | 9 | 89 | 69 | 25 | 49 | 29 | 9 | 9 | 87 |
| AUG | 83 | 63 | 24 | 6 | 93 | 77 | 27 | 48 | 38 | 7 | 7 | 91 |
| SEP | 92 | 64 | 30 | 7 | 92 | 80 | 35 | 54 | 33 | 8 | 10 | 90 |
| OCT | 91 | 85 | 7 | 12 | 87 | 94 | 45 | 62 | 34 | 9 | 7 | 90 |
| NOV | 95 | 70 | 26 | 11 | 88 | 96 | 45 | 60 | 38 | 9 | 8 | 91 |
| DEC | 91 | 61 | 33 | 7 | 92 | 86 | 43 | 56 | 35 | 9 | 9 | 90 |
| JAN | 101 | 63 | 38 | 8 | 92 | 97 | 44 | 60 | 38 | 10 | 9 | 90 |
| VERAGE: | 90 | 67 | 26 | 9 | 90 | 83 | 36 | 55 | 34 | 8 | 9 | 90 |

OTE: Average as flow weighted.

Wards Island
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1995

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.039 | 0.0180 | 0.0071 | 0.0027 | 0.0040 | 0.0026 | 0.065 | 0.045 | 0.0088 | 0.0022 | 0.00019 | 0.00005 | 0.00007 | 0.00007 | 0.00073 | 0.00061 | 0.00008 | 0.00008 | 0.00120 | 0.00022 |
| Aug. | 0.044 | 0.0100 | 0.0120 | 0.0018 | 0.0043 | 0.0031 | 0.051 | 0.018 | 0.0087 | 0.0014 | 0.00019 | 0.00006 | 0.00018 | 0.00006 | 0.00039 | 0.00038 | 0.00008 | 0.00008 | 0.00300 | 0.00025 |
| Sep. | 0.044 | 0.0056 | 0.0063 | 0.0013 | 0.0068 | 0.0030 | 0.054 | 0.017 | 0.0069 | 0.0016 | 0.00029 | 0.00003 | 0.00019 | 0.00006 | 0.00058 | 0.00043 | 0.00003 | 0.00004 | 0.00520 | 0.00034 |
| Oct. | 0.038 | 0.0100 | 0.0025 | 0.0009 | 0.0036 | 0.0007 | 0.046 | 0.028 | 0.0100 | 0.0026 | 0.00050 | 0.00042 | 0.00016 | 0.00006 | 0.00064 | 0.00041 | 0.00005 | 0.00005 | 0.00460 | 0.00110 |
| Nov. | 0.035 | 0.0091 | 0.0041 | 0.0004 | 0.0010 | 0.0010 | 0.044 | 0.025 | 0.0071 | 0.0018 | 0.00003 | 0.00003 | 0.00009 | 0.00006 | 0.00057 | 0.00048 | 0.00003 | 0.00003 | 0.00097 | 0.00055 |
| Dec. | 0.038 | 0.0062 | 0.0018 | 0.0007 | 0.0025 | 0.0010 | 0.047 | 0.023 | 0.0056 | 0.0014 | 0.00011 | 0.00004 | 0.00006 | 0.00006 | 0.00072 | 0.00051 | 0.00003 | 0.00003 | 0.00230 | 0.00045 |
| Jan. | 0.055 | 0.0080 | 0.0047 | 0.0005 | 0.0057 | 0.0034 | 0.082 | 0.017 | 0.0190 | 0.0013 | 0.00057 | 0.00006 | 0.00030 | 0.00006 | 0.00036 | 0.00026 | 0.00003 | 0.00003 | 0.00260 | 0.00070 |
| Feb. | 0.035 | 0.0062 | 0.0041 | 0.0018 | 0.0022 | 0.0026 | 0.050 | 0.050 | 0.0055 | 0.0023 | 0.00018 | 0.00005 | 0.00013 | 0.00006 | 0.00061 | 0.00054 | 0.00003 | 0.00003 | 0.00190 | 0.00055 |
| Mar. | 0.045 | 0.0120 | 0.0024 | 0.0027 | 0.0120 | 0.0093 | 0.100 | 0.059 | 0.0290 | 0.0120 | 0.00580 | 0.00003 | 0.00006 | 0.00006 | 0.00084 | 0.00072 | 0.00005 | 0.00003 | 0.00350 | 0.00180 |
| Apr. | 0.031 | 0.0068 | 0.0029 | 0.0007 | 0.0029 | 0.0020 | 0.037 | 0.015 | 0.0063 | 0.0010 | 0.00009 | 0.00003 | 0.00011 | 0.00006 | 0.00047 | 0.00045 | 0.00003 | 0.00003 | 0.00260 | 0.00180 |
| May. | 0.037 | 0.0086 | 0.0016 | 0.0002 | 0.0029 | 0.0022 | 0.052 | 0.019 | 0.0081 | 0.0023 | 0.00011 | 0.00012 | 0.00011 | 0.00006 | 0.00037 | 0.00024 | 0.00003 | 0.00003 | 0.00250 | 0.00029 |
| Jun. | 0.047 | 0.0098 | 0.0020 | 0.0016 | 0.0023 | 0.0035 | 0.049 | 0.017 | 0.0079 | 0.0010 | 0.00016 | 0.00003 | 0.00010 | 0.00006 | 0.00056 | 0.00035 | 0.00003 | 0.00003 | 0.00086 | 0.00200 |
| AVG. | 0.041 | 0.009 | 0.0043 | 0.0013 | 0.0042 | 0.0029 | 0.056 | 0.028 | 0.0102 | 0.0026 | 0.00069 | 0.00008 | 0.00013 | 0.00006 | 0.00057 | 0.00045 | 0.00004 | 0.00004 | 0.00260 | 0.00084 |

Wards Island
Nutrients (mg/L)
Fiscal Year 1995

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 7.36 | 11.91 | 9.18 | 2.93 | 16.5 | 16.4 | 0.2155 | 0.1618 | 0.057 | 0.108 | 1.925 | 1.439 | 1.088 | 1.163 | 0.020 | 0.020 |
| Aug. | 7.51 | 11.84 | 6.25 | 6.40 | 13.8 | 18.2 | 0.3850 | 0.2700 | 0.063 | 0.095 | 1.756 | 1.877 | 1.335 | 1.485 | 0.020 | 0.020 |
| Sep. | 6.25 | 9.38 | 10.28 | 8.38 | 16.5 | 17.8 | 0.1343 | 0.0730 | 0.033 | 0.067 | 1.765 | 1.458 | 0.969 | 1.074 | 0.020 | 0.020 |
| Oct. | 12.15 | 14.05 | 9.75 | 6.43 | 21.9 | 20.5 | 0.1120 | 0.2412 | 0.046 | 0.079 | 1.962 | 2.124 | 1.592 | 0.972 | 0.020 | 0.020 |
| Nov. | 6.73 | 13.65 | 15.97 | 9.54 | 22.7 | 23.2 | 0.2567 | 0.1910 | 0.039 | 0.068 | 1.817 | 1.165 | 1.213 | 1.319 | 0.020 | 0.020 |
| Dec. | 8.58 | 11.20 | 8.95 | 7.20 | 17.5 | 18.4 | 0.1085 | 0.1286 | 0.021 | 0.084 | 2.105 | 1.298 | 1.125 | 1.085 | 0.020 | 0.020 |
| Jan. | 8.58 | 11.72 | 12.05 | 10.62 | 20.6 | 22.3 | 0.2870 | 0.2744 | 0.043 | 0.073 | 1.994 | 3.432 | 1.400 | 1.185 | 0.020 | 0.020 |
| Feb. | 7.65 | 11.70 | 9.50 | 8.86 | 17.1 | 20.5 | 0.2050 | 0.1289 | 0.030 | 0.055 | 2.711 | 1.390 | 1.072 | 1.090 | 0.020 | 0.020 |
| Mar. | 8.50 | 10.60 | 9.00 | 8.27 | 17.5 | 18.9 | 0.1130 | 0.0975 | 0.022 | 0.047 | 2.195 | 1.968 | 1.105 | 1.078 | 0.020 | 0.020 |
| Apr. | 12.75 | 13.17 | 11.30 | 6.83 | 24.0 | 20.0 | 0.1590 | 0.1082 | 0.086 | 0.074 | 2.183 | 1.553 | 1.612 | 1.332 | 0.020 | 0.020 |
| May. | 10.95 | 12.60 | 14.10 | 5.97 | 25.1 | 18.6 | 0.1475 | 0.1005 | 0.038 | 0.052 | 2.512 | 1.807 | 1.873 | 1.374 | 0.020 | 0.020 |
| Jun. | 8.10 | 11.74 | 8.45 | 4.79 | 16.5 | 16.3 | 0.0830 | 0.1321 | 0.020 | 0.074 | 2.165 | 1.164 | 1.125 | 1.082 | 0.020 | 0.020 |
| AVG. | 8.76 | 11.96 | 10.40 | 7.18 | 19.1 | 19.3 | 0.1839 | 0.1589 | 0.041 | 0.073 | 2.091 | 1.723 | 1.292 | 1.186 | 0.020 | 0.020 |

HUNTS POINT
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026191 FISCAL YEAR 1995

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | | PLANT EFFLUENT | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | mg/L | mg/L | REMOVAL % | mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 99 | 72 | 27 | 7 | 93 | 84 | 31 | 59 | 30 | 6 | 5 | 93 |
| AUG | 101 | 72 | 29 | 6 | 94 | 89 | 35 | 60 | 33 | 5 | 4 | 94 |
| SEP | 104 | 90 | 13 | 6 | 94 | 96 | 39 | 68 | 29 | 5 | 5 | 95 |
| OCT | 101 | 95 | 6 | 10 | 90 | 105 | 43 | 76 | 28 | 7 | 7 | 93 |
| NOV | 102 | 83 | 19 | 10 | 90 | 97 | 44 | 67 | 31 | 8 | 7 | 92 |
| DEC | 93 | 80 | 14 | 8 | 91 | 98 | 85 | 83 | 15 | 10 | 11 | 90 |
| JAN | 82 | 84 | 0 | 6 | 93 | 106 | 49 | 84 | 21 | 9 | 8 | 92 |
| AVERAGE: | 98 | 83 | 18 | 8 | 92 | 96 | 46 | 70 | 28 | 7 | 7 | 93 |

NOTE: Average as flow weighted.

Hunts Point
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1995

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.042 | 0.0047 | 0.0120 | 0.0016 | 0.0031 | 0.0040 | 0.100 | 0.029 | 0.0094 | 0.0004 | 0.00270 | 0.00038 | 0.00021 | 0.00007 | 0.00086 | 0.00057 | 0.00008 | 0.00008 | 0.00190 | 0.00022 |
| Aug. | 0.073 | 0.0068 | 0.0100 | 0.0013 | 0.0095 | 0.0047 | 0.150 | 0.021 | 0.0270 | 0.0006 | 0.00140 | 0.00021 | 0.00022 | 0.00007 | 0.00098 | 0.00049 | 0.00008 | 0.00008 | 0.00410 | 0.00032 |
| Sep. | 0.074 | 0.0053 | 0.0014 | 0.0014 | 0.0077 | 0.0028 | 0.100 | 0.019 | 0.0180 | 0.0017 | 0.00094 | 0.00034 | 0.00035 | 0.00016 | 0.00073 | 0.00046 | 0.00003 | 0.00003 | 0.00680 | 0.00020 |
| Oct. | 0.120 | 0.0210 | 0.0220 | 0.0019 | 0.0120 | 0.0110 | 0.180 | 0.050 | 0.0310 | 0.0034 | 0.00210 | 0.00017 | 0.00026 | 0.00006 | 0.00088 | 0.00063 | 0.00006 | 0.00005 | 0.00600 | 0.00074 |
| Nov. | 0.059 | 0.0085 | 0.0770 | 0.0037 | 0.0120 | 0.0073 | 0.078 | 0.034 | 0.0130 | 0.0016 | 0.00200 | 0.00110 | 0.00023 | 0.00530 | 0.00086 | 0.00067 | 0.00003 | 0.00003 | 0.00380 | 0.00062 |
| Dec. | 0.096 | 0.0120 | 0.0230 | 0.0018 | 0.0071 | 0.0041 | 0.130 | 0.023 | 0.0130 | 0.0019 | 0.00170 | 0.00019 | 0.00019 | 0.00006 | 0.00084 | 0.00016 | 0.00003 | 0.00003 | 0.00600 | 0.00060 |
| Jan. | 0.088 | 0.0042 | 0.0150 | 0.0034 | 0.0064 | 0.0062 | 0.110 | 0.043 | 0.0190 | 0.0029 | 0.00160 | 0.00069 | 0.00006 | 0.00006 | 0.00050 | 0.00043 | 0.00004 | 0.00003 | 0.00740 | 0.00150 |
| Feb. | 0.094 | 0.0074 | 0.0150 | 0.0018 | 0.0110 | 0.0140 | 0.130 | 0.036 | 0.0120 | 0.0023 | 0.00140 | 0.00044 | 0.00012 | 0.00006 | 0.00076 | 0.00049 | 0.00004 | 0.00003 | 0.00630 | 0.00057 |
| Mar. | 0.038 | 0.0084 | 0.0073 | 0.0009 | 0.0099 | 0.0077 | 0.051 | 0.037 | 0.0072 | 0.0010 | 0.00034 | 0.00008 | 0.00006 | 0.00006 | 0.00043 | 0.00029 | 0.00003 | 0.00003 | 0.00330 | 0.00020 |
| Apr. | 0.079 | 0.0077 | 0.0130 | 0.0015 | 0.0230 | 0.0160 | 0.110 | 0.028 | 0.0160 | 0.0012 | 0.00150 | 0.00022 | 0.00006 | 0.00006 | 0.00079 | 0.00059 | 0.00003 | 0.00003 | 0.00560 | 0.00020 |
| May. | 0.140 | 0.0092 | 0.0160 | 0.0006 | 0.0120 | 0.0089 | 0.180 | 0.028 | 0.0260 | 0.0010 | 0.00150 | 0.00003 | 0.00021 | 0.00006 | 0.00075 | 0.00033 | 0.00003 | 0.00003 | 0.00710 | 0.00031 |
| Jun. | 0.180 | 0.0140 | 0.0260 | 0.0014 | 0.0700 | 0.0110 | 0.240 | 0.031 | 0.0420 | 0.0024 | 0.00230 | 0.00014 | 0.00038 | 0.00006 | 0.00100 | 0.00050 | 0.00006 | 0.00003 | 0.01300 | 0.00180 |
| AVG. | 0.090 | 0.009 | 0.0198 | 0.0018 | 0.0153 | 0.0081 | 0.130 | 0.032 | 0.0195 | 0.0017 | 0.00162 | 0.00033 | 0.00020 | 0.00051 | 0.00078 | 0.00047 | 0.00005 | 0.00004 | 0.00594 | 0.00061 |

Hunts Point
Heavy Metals
Sludge (mg/kg)
Fiscal Year 1995

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | V | | Ag | | SOL % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | WET | DRY | |
| Jul. | 20 | 952 | 3.8 | 181 | 0.97 | 46 | 27 | 1286 | 8.1 | 386 | 0.300 | 14.0 | 0.082 | 3.9 | 0.1100 | 5.2 | 0.0071 | 0.340 | 1.40 | 67 | 0.96 | 46 | 2.1 |
| Aug. | 18 | 900 | 3.1 | 155 | 1.20 | 60 | 25 | 1250 | 6.6 | 330 | 0.500 | 25.0 | 0.079 | 4.0 | 0.1100 | 5.5 | 0.0076 | 0.380 | 1.10 | 55 | 1.30 | 65 | 2.0 |
| Sep. | 21 | 1105 | 4.2 | 221 | 2.20 | 116 | 24 | 1263 | 6.5 | 342 | 0.240 | 13.0 | 0.084 | 4.4 | 0.0880 | 4.6 | 0.0054 | 0.280 | 0.91 | 48 | 1.20 | 63 | 1.9 |
| Oct. | 22 | 1000 | 4.3 | 195 | 1.30 | 59 | 26 | 1182 | 5.6 | 255 | 0.290 | 13.0 | 0.068 | 3.1 | 0.0970 | 4.4 | 0.0047 | 0.200 | 1.60 | 73 | 1.80 | 82 | 2.2 |
| Nov. | 26 | 1130 | 4.6 | 200 | 1.50 | 65 | 29 | 1261 | 6.8 | 296 | 0.420 | 18.0 | 0.087 | 3.8 | 0.1200 | 5.2 | 0.0069 | 0.300 | 1.20 | 52 | 2.00 | 87 | 2.3 |
| Dec. | 24 | 1143 | 4.8 | 229 | 1.40 | 67 | 30 | 1429 | 6.7 | 319 | 0.440 | 21.0 | 0.084 | 4.0 | 0.1000 | 4.8 | 0.0083 | 0.400 | 1.70 | 81 | 2.00 | 95 | 2.1 |
| Jan. | 25 | 1087 | 5.4 | 235 | 1.50 | 65 | 31 | 1348 | 6.8 | 296 | 0.410 | 18.0 | 0.100 | 4.3 | 0.0590 | 2.6 | 0.0070 | 0.300 | 1.70 | 74 | 1.60 | 70 | 2.3 |
| Feb. | 23 | 1211 | 4.2 | 221 | 2.10 | 111 | 25 | 1316 | 5.0 | 263 | 0.260 | 14.0 | 0.072 | 3.8 | 0.1100 | 5.8 | 0.0074 | 0.390 | 1.20 | 63 | 1.70 | 89 | 1.9 |
| Mar. | 20 | 1111 | 3.7 | 206 | 1.30 | 72 | 24 | 1333 | 4.2 | 233 | 0.270 | 15.0 | 0.064 | 3.6 | 0.1200 | 6.7 | 0.0050 | 0.280 | 0.96 | 53 | 1.50 | 83 | 1.8 |
| Apr. | 19 | 1056 | 3.2 | 178 | 0.96 | 53 | 23 | 1278 | 4.0 | 222 | 0.280 | 16.0 | 0.060 | 3.3 | 0.0830 | 4.6 | 0.0058 | 0.320 | 0.75 | 42 | 1.40 | 78 | 1.8 |
| May. | | | | | | | | | | | | | | | | | | | | | | | |
| Jun. | | | | | | | | | | | | | | | | | | | | | | | |
| AVG. | 22 | 1070 | 4.1 | 202 | 1.44 | 71 | 26 | 1295 | 6.0 | 294 | 0.341 | 16.7 | 0.078 | 3.82 | 0.0997 | 4.9 | 0.0065 | 0.319 | 1.25 | 61 | 1.55 | 76 | 2.0 |

Hunts Point
Nutrients (mg/L)
Fiscal Year 1995

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 10.40 | 9.58 | 11.16 | 8.12 | 21.6 | 17.7 | 0.2060 | 1.1300 | 0.056 | 0.401 | 1.899 | 1.187 | 1.168 | 1.037 | 0.020 | 0.020 |
| Aug. | 10.86 | 13.84 | 12.53 | 14.15 | 23.4 | 28.0 | 0.4113 | 0.6313 | 0.077 | 0.256 | 2.311 | 1.817 | 1.387 | 1.500 | 0.020 | 0.020 |
| Sep. | 8.41 | 13.70 | 10.60 | 5.68 | 19.0 | 19.4 | 0.1598 | 0.4993 | 0.030 | 0.264 | 2.358 | 2.021 | 1.333 | 1.688 | 0.020 | 0.020 |
| Oct. | 12.32 | 13.11 | 15.70 | 7.41 | 28.0 | 20.5 | 0.1350 | 3.3347 | 0.011 | 0.769 | 1.854 | 0.978 | 1.218 | 0.897 | 0.020 | 0.020 |
| Nov. | 10.60 | 15.35 | 17.90 | 9.04 | 28.5 | 24.4 | 0.2525 | 3.8892 | 0.043 | 0.987 | 2.162 | 1.934 | 1.135 | 1.724 | 0.020 | 0.020 |
| Dec. | 10.05 | 12.61 | 10.95 | 8.52 | 21.0 | 21.1 | 0.0870 | 4.6800 | 0.028 | 0.391 | 1.929 | 1.789 | 1.201 | 1.597 | 0.020 | 0.020 |
| Jan. | 12.87 | 11.94 | 6.65 | 9.74 | 19.5 | 21.7 | 0.3360 | 3.6233 | 0.097 | 0.345 | 2.767 | 1.794 | 1.455 | 1.370 | 0.020 | 0.020 |
| Feb. | 11.85 | 10.39 | 13.80 | 8.89 | 25.7 | 19.3 | 0.2670 | 3.3018 | 0.053 | 0.279 | 2.580 | 2.310 | 1.510 | 1.910 | 0.020 | 0.020 |
| Mar. | 9.93 | 10.84 | 9.75 | 7.92 | 19.7 | 18.7 | 0.1225 | 5.6922 | 0.043 | 0.512 | 2.157 | 2.119 | 0.981 | 1.821 | 0.020 | 0.020 |
| Apr. | 12.60 | 12.06 | 10.90 | 7.17 | 23.5 | 19.2 | 0.0885 | 4.3963 | 0.042 | 0.702 | 2.242 | 1.979 | 1.425 | 1.319 | 0.020 | 0.020 |
| May. | 11.98 | 15.88 | 13.55 | 8.36 | 25.5 | 24.2 | 0.0695 | 2.8538 | 0.021 | 0.731 | 2.487 | 2.264 | 1.281 | 1.772 | 0.020 | 0.020 |
| Jun. | 13.33 | 16.09 | 6.45 | 6.46 | 19.8 | 22.5 | 0.0950 | 4.0172 | 0.030 | 1.019 | 1.988 | 1.758 | 1.425 | 1.545 | 0.020 | 0.020 |
| AVG. | 11.26 | 12.95 | 11.66 | 8.45 | 22.9 | 21.4 | 0.1858 | 3.1708 | 0.044 | 0.555 | 2.228 | 1.829 | 1.293 | 1.515 | 0.020 | 0.020 |

26th WARD
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026212

FISCAL YEAR 1995

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | REMOVAL | PLANT EFFLUENT | REMOVAL | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | mg/L | mg/L | % | mg/L | % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 91 | 50 | 45 | 7 | 92 | 102 | 67 | 73 | 28 | 8 | 6 | 92 |
| AUG | 88 | 45 | 49 | 8 | 91 | 115 | 55 | 82 | 29 | 10 | 6 | 91 |
| SEP | 90 | 55 | 39 | 9 | 90 | 98 | 51 | 76 | 22 | 9 | 5 | 91 |
| OCT | 90 | 57 | 37 | 8 | 91 | 120 | 60 | 92 | 23 | 11 | 6 | 91 |
| NOV | 90 | 53 | 41 | 22 | 76 | 118 | 61 | 90 | 24 | 18 | 7 | 85 |
| DEC | 80 | 60 | 25 | 13 | 84 | 106 | 60 | 91 | 14 | 16 | 9 | 85 |
| JAN | 79 | 67 | 15 | 12 | 85 | 117 | 62 | 92 | 21 | 15 | 8 | 87 |
| AVERAGE: | 87 | 55 | 39 | 11 | 88 | 111 | 59 | 85 | 24 | 12 | 7 | 89 |

NOTE: Average as flow weighted.

26th Ward
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1995

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.066 | 0.0180 | 0.0046 | 0.0046 | 0.0031 | 0.0020 | 0.150 | 0.110 | 0.0130 | 0.0110 | 0.00540 | 0.00040 | 0.00007 | 0.00006 | 0.00120 | 0.00068 | 0.00008 | 0.00008 | 0.00093 | 0.00022 |
| Aug. | 0.210 | 0.0075 | 0.0048 | 0.0011 | 0.0150 | 0.0007 | 0.150 | 0.014 | 0.0200 | 0.0034 | 0.00042 | 0.00003 | 0.00012 | 0.00008 | 0.00060 | 0.00064 | 0.00008 | 0.00008 | 0.00330 | 0.00020 |
| Sep. | 0.050 | 0.0048 | 0.0039 | 0.0014 | 0.0076 | 0.0042 | 0.080 | 0.016 | 0.0190 | 0.0020 | 0.00009 | 0.00003 | 0.00026 | 0.00021 | 0.00054 | 0.00050 | 0.00003 | 0.00003 | 0.00100 | 0.00020 |
| Oct. | 0.110 | 0.0053 | 0.0270 | 0.0020 | 0.0085 | 0.0031 | 0.260 | 0.016 | 0.1100 | 0.0035 | 0.00170 | 0.00032 | 0.00050 | 0.00006 | 0.00150 | 0.00057 | 0.00009 | 0.00005 | 0.00280 | 0.00029 |
| Nov. | 0.067 | 0.0450 | 0.0038 | 0.0034 | 0.0032 | 0.0016 | 0.082 | 0.067 | 0.0095 | 0.0099 | 0.00120 | 0.00018 | 0.00009 | 0.00006 | 0.00038 | 0.00037 | 0.00013 | 0.00003 | 0.00150 | 0.00150 |
| Dec. | 0.042 | 0.0078 | 0.0036 | 0.0009 | 0.0047 | 0.0032 | 0.063 | 0.019 | 0.0100 | 0.0018 | 0.00051 | 0.00018 | 0.00006 | 0.00006 | 0.00054 | 0.00050 | 0.00003 | 0.00003 | 0.00140 | 0.00018 |
| Jan. | 0.032 | 0.0057 | 0.0034 | 0.0036 | 0.0027 | 0.0018 | 0.076 | 0.021 | 0.0130 | 0.0022 | 0.00035 | 0.00004 | 0.00008 | 0.00006 | 0.00052 | 0.00033 | 0.00006 | 0.00003 | 0.00093 | 0.00033 |
| Feb. | 0.052 | 0.0086 | 0.0028 | 0.0022 | 0.0120 | 0.0031 | 0.064 | 0.025 | 0.0082 | 0.0032 | 0.00065 | 0.00016 | 0.00017 | 0.00006 | 0.00038 | 0.00029 | 0.00003 | 0.00003 | 0.00210 | 0.00024 |
| Mar. | 0.029 | 0.0072 | 0.0240 | 0.0063 | 0.0035 | 0.0029 | 0.050 | 0.029 | 0.0100 | 0.0024 | 0.00086 | 0.00003 | 0.00006 | 0.00006 | 0.00026 | 0.00026 | 0.00003 | 0.00003 | 0.00150 | 0.00020 |
| Apr. | 0.036 | 0.0063 | 0.0023 | 0.0009 | 0.0021 | 0.0013 | 0.054 | 0.012 | 0.0072 | 0.0021 | 0.00018 | 0.00017 | 0.00006 | 0.00006 | 0.00064 | 0.00043 | 0.00004 | 0.00004 | 0.00130 | 0.00020 |
| May. | 0.065 | 0.0088 | 0.0019 | 0.0012 | 0.0038 | 0.0026 | 0.170 | 0.019 | 0.0066 | 0.0044 | 0.00017 | 0.00003 | 0.00024 | 0.00006 | 0.00031 | 0.00028 | 0.00003 | 0.00003 | 0.00170 | 0.00021 |
| Jun. | 0.076 | 0.0070 | 0.0051 | 0.0012 | 0.0051 | 0.0025 | 0.150 | 0.026 | 0.0420 | 0.0053 | 0.00037 | 0.00003 | 0.00006 | 0.00006 | 0.00087 | 0.00054 | 0.00003 | 0.00003 | 0.00160 | 0.00020 |
| AVG. | 0.070 | 0.011 | 0.0073 | 0.0024 | 0.0059 | 0.0024 | 0.112 | 0.031 | 0.0224 | 0.0043 | 0.00099 | 0.00013 | 0.00015 | 0.00007 | 0.00065 | 0.00045 | 0.00006 | 0.00004 | 0.00167 | 0.00033 |

26th Ward
Nutrients (mg/L)
Fiscal Year 1995

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 6.07 | 8.96 | 8.95 | 7.55 | 15.0 | 16.5 | 0.1850 | 1.0000 | 0.043 | 0.939 | 2.130 | 1.428 | 1.203 | 1.225 | 0.020 | 0.020 |
| Aug. | 6.40 | 8.80 | 13.13 | 8.48 | 19.5 | 17.3 | 0.2050 | 1.3250 | 0.059 | 0.990 | 2.033 | 1.660 | 1.140 | 1.413 | 0.020 | 0.020 |
| Sep. | 6.64 | 10.05 | 11.13 | 9.95 | 17.8 | 20.0 | 0.3100 | 0.9250 | 0.089 | 1.227 | 2.068 | 1.283 | 1.043 | 1.088 | 0.020 | 0.020 |
| Oct. | 7.95 | 11.54 | 6.55 | 12.17 | 14.5 | 23.7 | 0.0500 | 1.3032 | 0.078 | 0.819 | 2.770 | 2.637 | 1.390 | 1.210 | 0.020 | 0.020 |
| Nov. | 6.40 | 8.16 | 17.15 | 7.49 | 23.5 | 15.6 | 0.1750 | 2.7367 | 0.074 | 0.817 | 2.515 | 2.255 | 1.587 | 1.655 | 0.020 | 0.020 |
| Dec. | 8.40 | 10.57 | 14.10 | 8.86 | 22.5 | 19.4 | 0.5100 | 1.4967 | 0.101 | 0.698 | 2.330 | 1.535 | 1.420 | 0.980 | 0.020 | 0.020 |
| Jan. | 7.30 | 13.58 | 13.20 | 10.19 | 20.5 | 23.8 | 0.2500 | 0.7474 | 0.123 | 0.735 | 2.425 | 1.185 | 1.150 | 0.555 | 0.020 | 0.020 |
| Feb. | 6.50 | 13.24 | 20.50 | 11.53 | 27.0 | 24.7 | 0.6100 | 0.7643 | 0.138 | 0.527 | 3.170 | 2.610 | 0.985 | 0.990 | 0.020 | 0.020 |
| Mar. | 7.00 | 12.35 | 14.50 | 10.68 | 21.5 | 23.0 | 0.2650 | 0.5171 | 0.060 | 0.409 | 1.925 | 1.105 | 1.020 | 0.880 | 0.020 | 0.020 |
| Apr. | 9.28 | 16.52 | 13.75 | 10.02 | 23.0 | 26.5 | 0.2150 | 0.3553 | 0.061 | 0.359 | 2.295 | 1.625 | 1.515 | 1.350 | 0.020 | 0.020 |
| May. | 12.30 | 16.90 | 11.20 | 9.23 | 23.5 | 26.1 | 0.0400 | 0.3468 | 0.041 | 0.315 | 2.420 | 1.920 | 1.370 | 1.155 | 0.020 | 0.020 |
| Jun. | 8.85 | 16.85 | 13.65 | 8.22 | 22.5 | 25.1 | 3.7900 | 0.5253 | 0.078 | 0.807 | 2.255 | 1.330 | 1.215 | 1.096 | 0.020 | 0.020 |
| AVG. | 7.76 | 12.29 | 13.15 | 9.53 | 20.9 | 21.8 | 0.5504 | 1.0036 | 0.079 | 0.720 | 2.361 | 1.714 | 1.253 | 1.133 | 0.020 | 0.020 |

TALLMAN ISLAND
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

PDES ID. NY0026239

FISCAL YEAR 1995

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RAW SEWAGE | PRIMAY EFFLUENT | | PLANT EFFLUENT | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| ONTH | mg/L | mg/L | REMOVAL % | mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 96 | 56 | 42 | 6 | 94 | 117 | 65 | 64 | 45 | 4 | 3 | 97 |
| AUG | 93 | 51 | 45 | 6 | 94 | 110 | 57 | 55 | 50 | 4 | 4 | 96 |
| SEP | 106 | 55 | 49 | 5 | 95 | 123 | 76 | 65 | 47 | 4 | 4 | 97 |
| OCT | 107 | 53 | 50 | 6 | 94 | 116 | 67 | 67 | 42 | 4 | 3 | 97 |
| NOV | 106 | 47 | 56 | 4 | 96 | 127 | 67 | 64 | 50 | 3 | 3 | 98 |
| DEC | 100 | 63 | 38 | 4 | 96 | 111 | 63 | 64 | 42 | 4 | 3 | 96 |
| JAN | 98 | 64 | 35 | 6 | 94 | 118 | 63 | 71 | 40 | 5 | 3 | 96 |
| VERAGE: | 101 | 55 | 47 | 5 | 95 | 118 | 66 | 65 | 46 | 4 | 3 | 97 |

OTE: Average as flow weighted.

Tallman Island
Heavy Metals
Influent/Effluent (mg/L)
Fiscal Year 1995

| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.047 | 0.0130 | 0.0089 | 0.0023 | 0.0084 | 0.0047 | 0.100 | 0.043 | 0.0080 | 0.0019 | 0.00029 | 0.00009 | 0.00009 | 0.00006 | 0.00035 | 0.00028 | 0.00008 | 0.00008 | 0.00430 | 0.00075 |
| Aug. | 0.057 | 0.0170 | 0.0052 | 0.0015 | 0.0140 | 0.0094 | 0.110 | 0.032 | 0.0066 | 0.0006 | 0.00110 | 0.00030 | 0.00016 | 0.00006 | 0.00045 | 0.00031 | 0.00008 | 0.00008 | 0.00680 | 0.00095 |
| Sep. | 0.039 | 0.0072 | 0.0059 | 0.0021 | 0.0130 | 0.0070 | 0.072 | 0.038 | 0.0110 | 0.0022 | 0.00025 | 0.00012 | 0.00012 | 0.00006 | 0.00022 | 0.00011 | 0.00003 | 0.00003 | 0.00450 | 0.00110 |
| Oct. | 0.070 | 0.0150 | 0.0110 | 0.0018 | 0.0170 | 0.0056 | 0.098 | 0.029 | 0.0086 | 0.0011 | 0.00038 | 0.00012 | 0.00021 | 0.00013 | 0.00060 | 0.00034 | 0.00006 | 0.00005 | 0.00680 | 0.00610 |
| Nov. | 0.057 | 0.0100 | 0.0092 | 0.0015 | 0.0069 | 0.0050 | 0.079 | 0.032 | 0.0140 | 0.0010 | 0.00028 | 0.00017 | 0.00035 | 0.00006 | 0.00035 | 0.00023 | 0.00003 | 0.00003 | 0.00680 | 0.00049 |
| Dec. | 0.040 | 0.0077 | 0.0110 | 0.0011 | 0.0066 | 0.0049 | 0.078 | 0.030 | 0.0100 | 0.0008 | 0.00028 | 0.00010 | 0.00013 | 0.00006 | 0.00076 | 0.00051 | 0.00004 | 0.00003 | 0.00430 | 0.00034 |
| Jan. | 0.056 | 0.0059 | 0.0110 | 0.0031 | 0.0110 | 0.0066 | 0.130 | 0.030 | 0.0120 | 0.0024 | 0.00048 | 0.00035 | 0.00012 | 0.00006 | 0.00045 | 0.00031 | 0.00004 | 0.00004 | 0.00700 | 0.00064 |
| Feb. | 0.054 | 0.0090 | 0.0061 | 0.0022 | 0.0090 | 0.0066 | 0.093 | 0.042 | 0.0120 | 0.0019 | 0.00110 | 0.00034 | 0.00020 | 0.00006 | 0.00064 | 0.00038 | 0.00003 | 0.00003 | 0.00550 | 0.00051 |
| Mar. | 0.044 | 0.0110 | 0.0058 | 0.0020 | 0.0230 | 0.0100 | 0.082 | 0.032 | 0.0049 | 0.0010 | 0.00027 | 0.00013 | 0.00006 | 0.00006 | 0.00037 | 0.00039 | 0.00003 | 0.00003 | 0.00500 | 0.00085 |
| Apr. | 0.065 | 0.0110 | 0.0120 | 0.0038 | 0.0084 | 0.0064 | 0.110 | 0.021 | 0.0120 | 0.0011 | 0.00039 | 0.00019 | 0.00010 | 0.00006 | 0.00056 | 0.00040 | 0.00003 | 0.00003 | 0.00770 | 0.00110 |
| May. | 0.057 | 0.0084 | 0.0044 | 0.0014 | 0.0057 | 0.0081 | 0.081 | 0.036 | 0.0093 | 0.0024 | 0.00031 | 0.00012 | 0.00006 | 0.00006 | 0.00035 | 0.00021 | 0.00003 | 0.00003 | 0.00570 | 0.00160 |
| Jun. | 0.110 | 0.0120 | 0.0130 | 0.0012 | 0.0150 | 0.0075 | 0.310 | 0.048 | 0.0120 | 0.0037 | 0.00049 | 0.00033 | 0.00020 | 0.00006 | 0.00052 | 0.00037 | 0.00003 | 0.00003 | 0.00800 | 0.00062 |
| AVG. | 0.058 | 0.011 | 0.0086 | 0.0020 | 0.0115 | 0.0068 | 0.112 | 0.034 | 0.0100 | 0.0017 | 0.00047 | 0.00020 | 0.00015 | 0.00007 | 0.00047 | 0.00032 | 0.00004 | 0.00004 | 0.00603 | 0.00125 |

Tallman Island
Nutrients (mg/L)
Fiscal Year 1995

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 13.40 | 5.46 | 7.63 | 2.25 | 21.0 | 7.7 | 0.3435 | 7.4250 | 0.015 | 0.330 | 2.510 | 1.625 | 1.475 | 1.373 | 0.020 | 0.020 |
| Aug. | 11.83 | 4.35 | 7.05 | 2.18 | 18.9 | 6.5 | 0.3125 | 6.9575 | 0.035 | 0.221 | 2.245 | 1.365 | 1.408 | 1.140 | 0.020 | 0.020 |
| Sep. | 14.20 | 6.02 | 8.25 | 2.35 | 22.5 | 8.4 | 0.0535 | 4.8275 | 0.017 | 0.276 | 3.010 | 2.053 | 1.553 | 1.393 | 0.020 | 0.020 |
| Oct. | 13.45 | 4.87 | 8.15 | 2.45 | 21.6 | 7.3 | 0.1670 | 4.0910 | 0.012 | 0.273 | 2.630 | 1.790 | 1.560 | 1.170 | 0.020 | 0.020 |
| Nov. | 12.55 | 4.64 | 8.05 | 1.01 | 20.6 | 5.6 | 0.3395 | 4.5543 | 0.058 | 0.276 | 2.630 | 1.415 | 1.380 | 1.160 | 0.020 | 0.020 |
| Dec. | 8.90 | 5.24 | 12.95 | 1.29 | 21.9 | 6.5 | 0.2070 | 4.7074 | 0.057 | 0.287 | 2.945 | 1.900 | 1.370 | 1.040 | 0.020 | 0.020 |
| Jan. | 11.55 | 7.63 | 7.90 | 1.42 | 19.5 | 9.0 | 0.2415 | 3.3535 | 0.025 | 0.506 | 2.880 | 1.900 | 1.265 | 1.170 | 0.020 | 0.020 |
| Feb. | 11.36 | 7.93 | 12.75 | 1.70 | 24.1 | 9.6 | 0.1360 | 3.5393 | 0.044 | 0.899 | 2.375 | 1.280 | 1.150 | 0.817 | 0.020 | 0.020 |
| Mar. | 15.45 | 10.85 | 8.15 | 2.35 | 23.6 | 13.2 | 0.1670 | 2.5839 | 0.042 | 0.632 | 2.975 | 1.700 | 1.415 | 1.195 | 0.020 | 0.020 |
| Apr. | 18.90 | 12.55 | 10.75 | 2.42 | 29.7 | 15.0 | 0.2645 | 2.6587 | 0.066 | 0.296 | 3.315 | 2.240 | 1.870 | 1.510 | 0.020 | 0.020 |
| May. | 14.50 | 15.26 | 9.05 | 3.35 | 23.6 | 18.6 | 0.3670 | 0.8264 | 0.043 | 0.278 | 3.105 | 2.020 | 1.650 | 1.450 | 0.020 | 0.020 |
| Jun. | 18.15 | 15.55 | 7.35 | 3.13 | 25.5 | 18.7 | 0.3550 | 0.2595 | 0.045 | 0.262 | 3.580 | 2.415 | 2.160 | 1.230 | 0.020 | 0.020 |
| AVG. | 13.69 | 8.36 | 9.00 | 2.16 | 22.7 | 10.5 | 0.2462 | 3.8153 | 0.038 | 0.378 | 2.850 | 1.809 | 1.521 | 1.221 | 0.020 | 0.020 |

OAKWOOD BEACH
PROCESS EFFICIENCY SUMMARY
TABLE NO. 4

SPDES ID. NY0026174

FISCAL YEAR 1995

| | SUSPENDED SOLIDS | | | | | BIOCHEMICAL OXYGEN DEMAND | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | RAW SEWAGE | | PRIMARY EFFLUENT | | PLANT EFFLUENT | | |
| MONTH | RAW SEWAGE mg/L | PRIMAY EFFLUENT mg/L | REMOVAL % | PLANT EFFLUENT mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | TOTAL mg/L | REMOVAL % | TOTAL mg/L | FILTRATE mg/L | REMOVAL % |
| JUL | 180 | 73 | 59 | 5 | 97 | 146 | 27 | 60 | 59 | 13 | 6 | 91 |
| AUG | 192 | 54 | 72 | 5 | 97 | 147 | 26 | 52 | 65 | 7 | 4 | 95 |
| SEP | 173 | 61 | 65 | 5 | 97 | 150 | 33 | 75 | 50 | 6 | 3 | 96 |
| OCT | 170 | 72 | 58 | 5 | 97 | 152 | 33 | 64 | 58 | 6 | 3 | 96 |
| NOV | 177 | 59 | 67 | 5 | 97 | 168 | 36 | 49 | 71 | 7 | 3 | 96 |
| DEC | 151 | 54 | 64 | 6 | 96 | 126 | 38 | 54 | 57 | 6 | 3 | 95 |
| JAN | 147 | 60 | 59 | 8 | 95 | 130 | 32 | 58 | 55 | 7 | 3 | 95 |
| AVERAGE: | 173 | 62 | 64 | 6 | 97 | 148 | 32 | 59 | 60 | 7 | 3 | 95 |

NOTE: Average as flow weighted.

# Oakwood Beach
## Heavy Metals
## Influent/Effluent (mg/L)
## Fiscal Year 1995

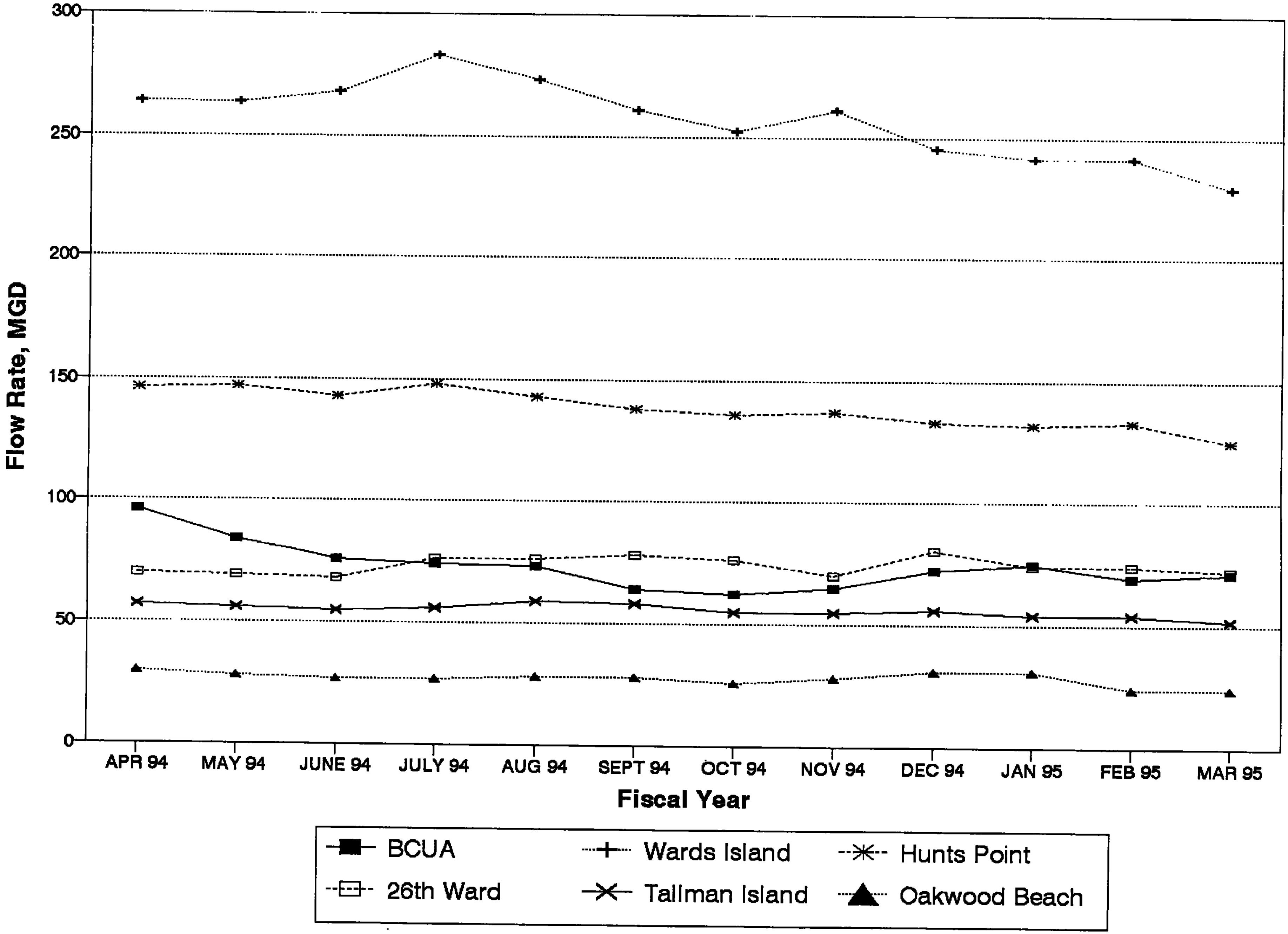
| DATE | Cu | | Cr | | Ni | | Zn | | Pb | | Cd | | Hg | | As | | Be | | Ag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 0.200 | 0.0190 | 0.0086 | 0.0011 | 0.0190 | 0.0066 | 0.290 | 0.028 | 0.0390 | 0.0006 | 0.00060 | 0.00003 | 0.00082 | 0.00006 | 0.00180 | 0.00065 | 0.00008 | 0.00008 | 0.01900 | 0.00022 |
| Aug. | 0.200 | 0.0054 | 0.0110 | 0.0013 | 0.0250 | 0.0038 | 0.270 | 0.017 | 0.0059 | 0.0009 | 0.00110 | 0.00005 | 0.00050 | 0.00006 | 0.00130 | 0.00041 | 0.00008 | 0.00008 | 0.02700 | 0.00330 |
| Sep. | 0.120 | 0.0074 | 0.0033 | 0.0005 | 0.0160 | 0.0036 | 0.130 | 0.022 | 0.0160 | 0.0019 | 0.00052 | 0.00010 | 0.00035 | 0.00006 | 0.00052 | 0.00023 | 0.00005 | 0.00003 | 0.00640 | 0.00072 |
| Oct. | 0.049 | 0.0084 | 0.0021 | 0.0010 | 0.0110 | 0.0080 | 0.070 | 0.030 | 0.0080 | 0.0020 | 0.00035 | 0.00018 | 0.00011 | 0.00006 | 0.00060 | 0.00043 | 0.00005 | 0.00005 | 0.00360 | 0.00038 |
| Nov. | 0.150 | 0.0089 | 0.0052 | 0.0006 | 0.0160 | 0.0045 | 0.200 | 0.017 | 0.0260 | 0.0017 | 0.00078 | 0.00003 | 0.00160 | 0.00006 | 0.00120 | 0.00021 | 0.00003 | 0.00003 | 0.01900 | 0.00052 |
| Dec. | 0.100 | 0.0058 | 0.0066 | 0.0006 | 0.0210 | 0.0079 | 0.140 | 0.025 | 0.0160 | 0.0016 | 0.00066 | 0.00004 | 0.00006 | 0.00006 | 0.00090 | 0.00056 | 0.00004 | 0.00003 | 0.01500 | 0.00049 |
| Jan. | 0.069 | 0.0043 | 0.0037 | 0.0008 | 0.0140 | 0.0063 | 0.098 | 0.033 | 0.0110 | 0.0019 | 0.00008 | 0.00004 | 0.00010 | 0.00006 | 0.00052 | 0.00024 | 0.00007 | 0.00003 | 0.00520 | 0.00057 |
| Feb. | 0.180 | 0.0057 | 0.0310 | 0.0010 | 0.0340 | 0.0072 | 0.270 | 0.026 | 0.0920 | 0.0018 | 0.00064 | 0.00004 | 0.00082 | 0.00006 | 0.00077 | 0.00044 | 0.00008 | 0.00003 | 0.01300 | 0.00390 |
| Mar. | 0.033 | 0.0070 | 0.0039 | 0.0004 | 0.0170 | 0.0120 | 0.048 | 0.029 | 0.0054 | 0.0010 | 0.00007 | 0.00003 | 0.00008 | 0.00006 | 0.00066 | 0.00047 | 0.00004 | 0.00003 | 0.00320 | 0.00038 |
| Apr. | 0.120 | 0.0087 | 0.0050 | 0.0005 | 0.0180 | 0.0077 | 0.140 | 0.010 | 0.0200 | 0.0010 | 0.00034 | 0.00004 | 0.00071 | 0.00006 | 0.00080 | 0.00057 | 0.00003 | 0.00003 | 0.00700 | 0.00077 |
| May. | 0.071 | 0.0093 | 0.0026 | 0.0013 | 0.0140 | 0.0087 | 0.100 | 0.016 | 0.0120 | 0.0013 | 0.00022 | 0.00003 | 0.00035 | 0.00006 | 0.00078 | 0.00052 | 0.00003 | 0.00003 | 0.00580 | 0.00044 |
| Jun. | 0.300 | 0.0190 | 0.0096 | 0.0005 | 0.0280 | 0.0014 | 0.340 | 0.011 | 0.0070 | 0.0020 | 0.00091 | 0.00017 | 0.00200 | 0.00006 | 0.00180 | 0.00034 | 0.00007 | 0.00003 | 0.02600 | 0.00200 |
| AVG. | 0.133 | 0.009 | 0.0077 | 0.0008 | 0.0194 | 0.0065 | 0.175 | 0.022 | 0.0215 | 0.0015 | 0.00052 | 0.00007 | 0.00063 | 0.00006 | 0.00097 | 0.00042 | 0.00005 | 0.00004 | 0.01252 | 0.00114 |

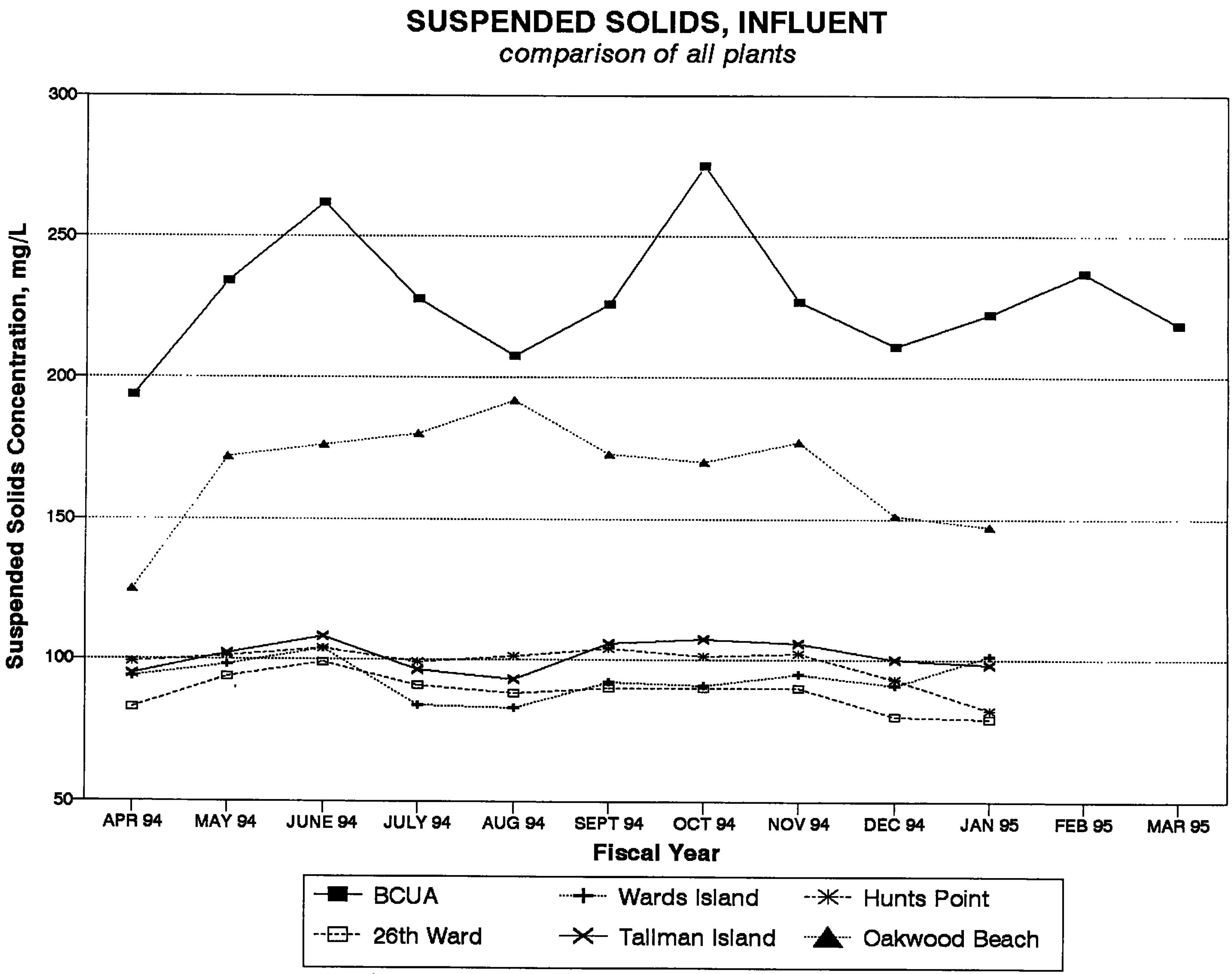
Oakwood Beach
Nutrients (mg/L)
Fiscal Year 1995

| DATE | NH3 | | ORG | | TKN | | NO3 | | NO2 | | PHOS.-TOTAL | | PHOS.-ORTHO | | CYANIDE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. | INF. | EFF. |
| Jul. | 16.91 | 10.19 | 22.75 | 3.08 | 39.7 | 13.3 | 0.5788 | 3.1525 | 0.021 | 0.610 | 6.393 | 2.645 | 2.277 | 2.324 | 0.020 | 0.020 |
| Aug. | 15.32 | 5.48 | 21.58 | 2.80 | 36.9 | 8.3 | 0.3933 | 4.2158 | 0.032 | 0.461 | 6.492 | 3.486 | 2.463 | 2.244 | 0.020 | 0.020 |
| Sep. | 17.32 | 4.29 | 12.23 | 1.48 | 29.6 | 5.8 | 0.4053 | 5.0495 | 0.025 | 0.363 | 4.836 | 2.987 | 2.355 | 2.409 | 0.020 | 0.020 |
| Oct. | 18.64 | 5.65 | 21.05 | 1.63 | 39.7 | 7.3 | 0.3013 | 5.5205 | 0.060 | 0.344 | 6.163 | 2.898 | 2.790 | 2.636 | 0.020 | 0.020 |
| Nov. | 16.39 | 5.56 | 36.60 | 1.60 | 53.0 | 7.2 | 0.4468 | 6.0798 | 0.053 | 0.400 | 10.289 | 3.180 | 3.138 | 3.065 | 0.020 | 0.020 |
| Dec. | 17.32 | 6.74 | 15.45 | 2.53 | 32.8 | 9.3 | 0.5690 | 5.3878 | 0.081 | 0.429 | 5.100 | 3.390 | 2.720 | 2.750 | 0.020 | 0.020 |
| Jan. | 15.93 | 6.70 | 14.85 | 1.83 | 30.8 | 8.5 | 0.4853 | 4.0005 | 0.065 | 0.345 | 4.463 | 2.395 | 2.424 | 2.065 | 0.020 | 0.020 |
| Feb. | 19.29 | 9.24 | 17.68 | 2.78 | 37.0 | 12.0 | 0.5900 | 3.3450 | 0.160 | 0.561 | 5.337 | 1.414 | 2.800 | 0.908 | 0.020 | 0.020 |
| Mar. | 26.07 | 13.08 | 38.35 | 2.90 | 64.4 | 16.0 | 0.2650 | 1.3490 | 0.035 | 0.401 | 11.837 | 2.982 | 4.499 | 1.555 | 0.020 | 0.020 |
| Apr. | 20.20 | 15.29 | 19.10 | 12.75 | 39.3 | 28.0 | 0.2335 | 2.9490 | 0.017 | 0.426 | 4.962 | 3.629 | 2.899 | 2.644 | 0.020 | 0.020 |
| May. | 18.86 | 14.58 | 24.65 | 1.45 | 43.5 | 16.0 | 0.2200 | 2.7680 | 0.030 | 0.420 | 8.596 | 2.455 | 2.948 | 2.104 | 0.020 | 0.020 |
| Jun. | 28.04 | 22.23 | 26.45 | 5.80 | 54.5 | 28.0 | 0.3150 | 0.8080 | 0.035 | 0.143 | 7.595 | 4.272 | 4.382 | 3.941 | 0.020 | 0.020 |
| AVG. | 19.19 | 9.92 | 22.56 | 3.38 | 41.7 | 13.3 | 0.4003 | 3.7188 | 0.051 | 0.408 | 6.838 | 2.978 | 2.975 | 2.387 | 0.020 | 0.020 |

# MONTHLY FLOW RATE

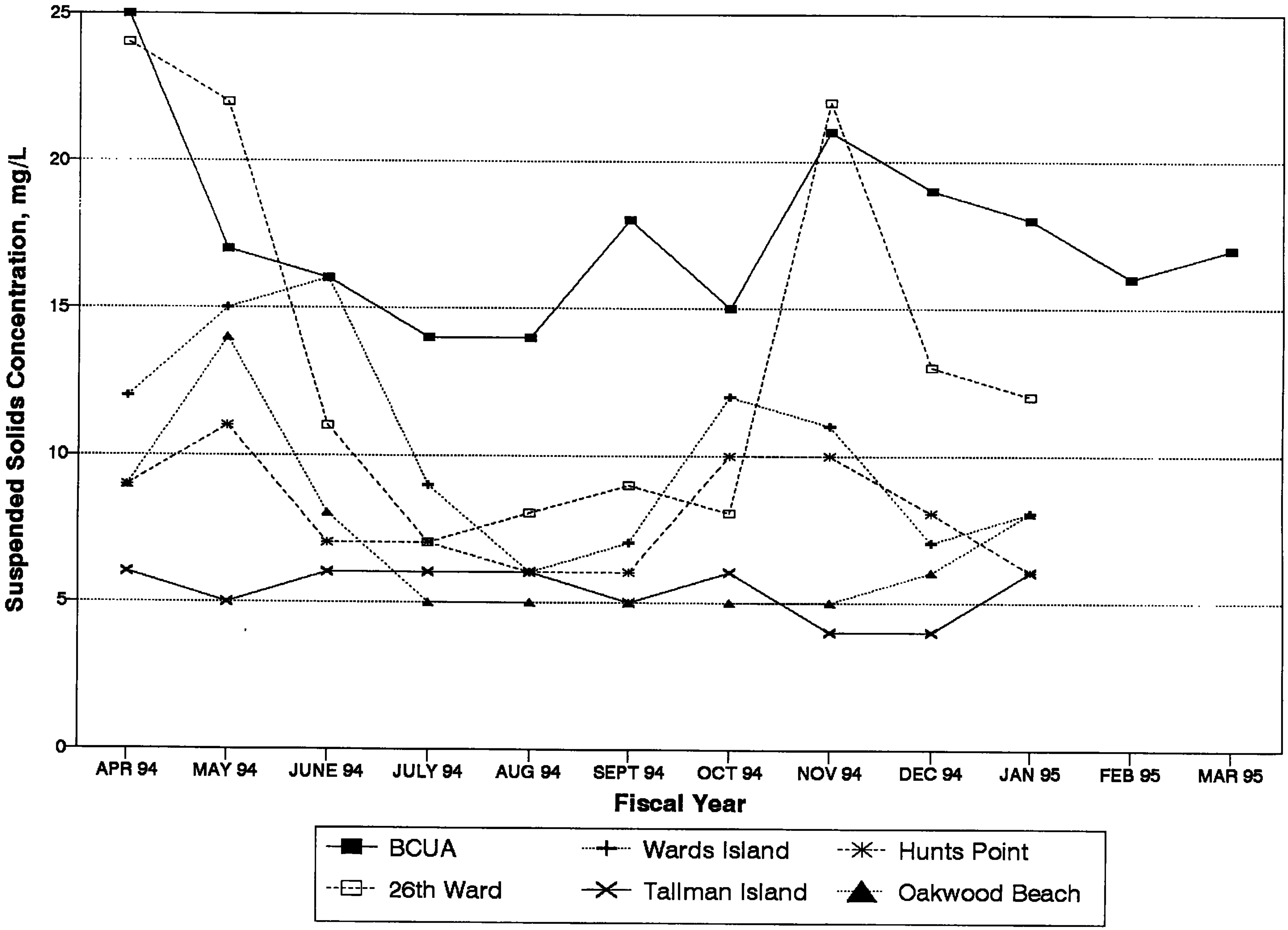
*comparison of all plants*

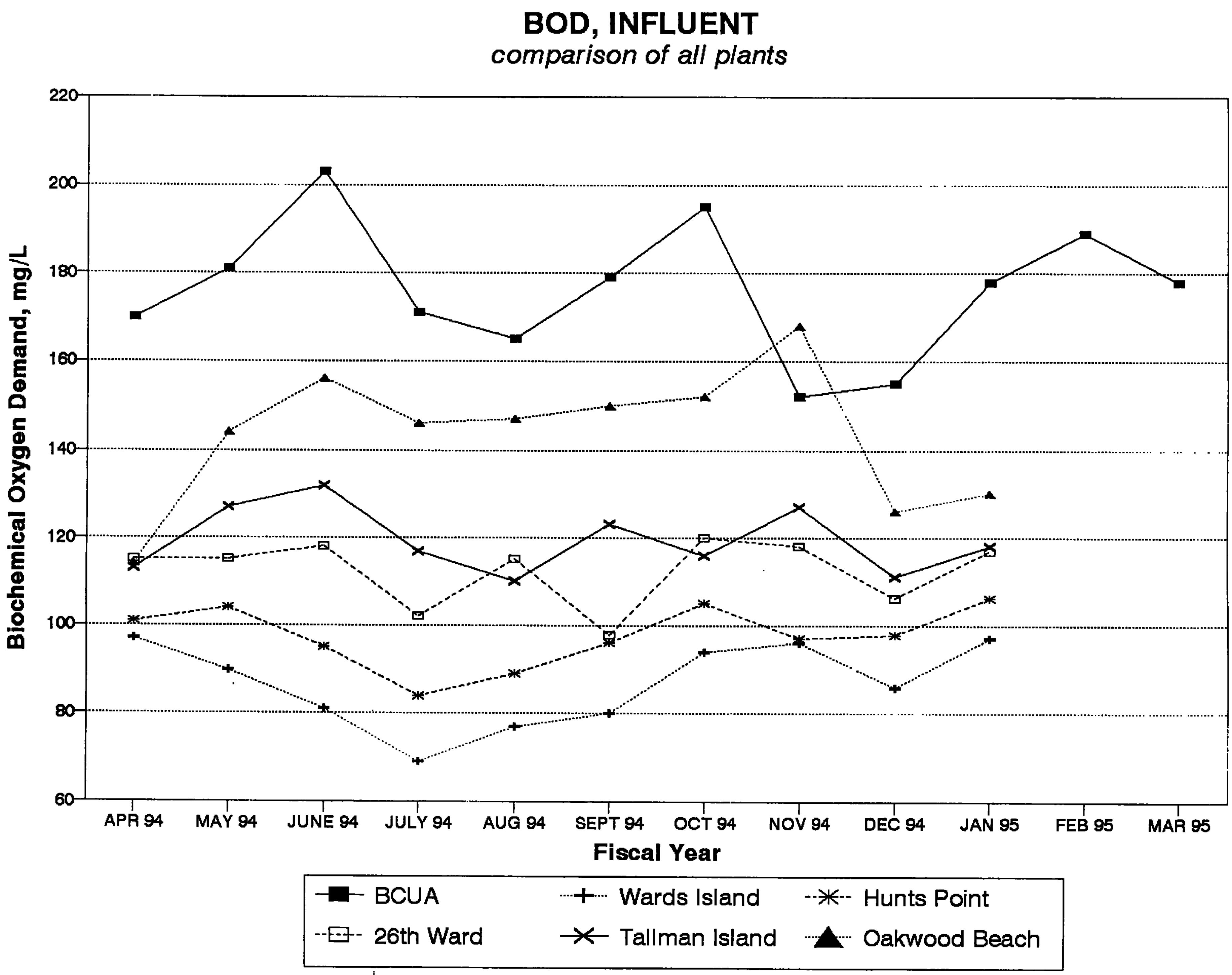



SUSPENDED SOLIDS, INFLUENT
comparison of all plants
Suspended Solids Concentration, mg/L
300
250
200
150
100
50
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

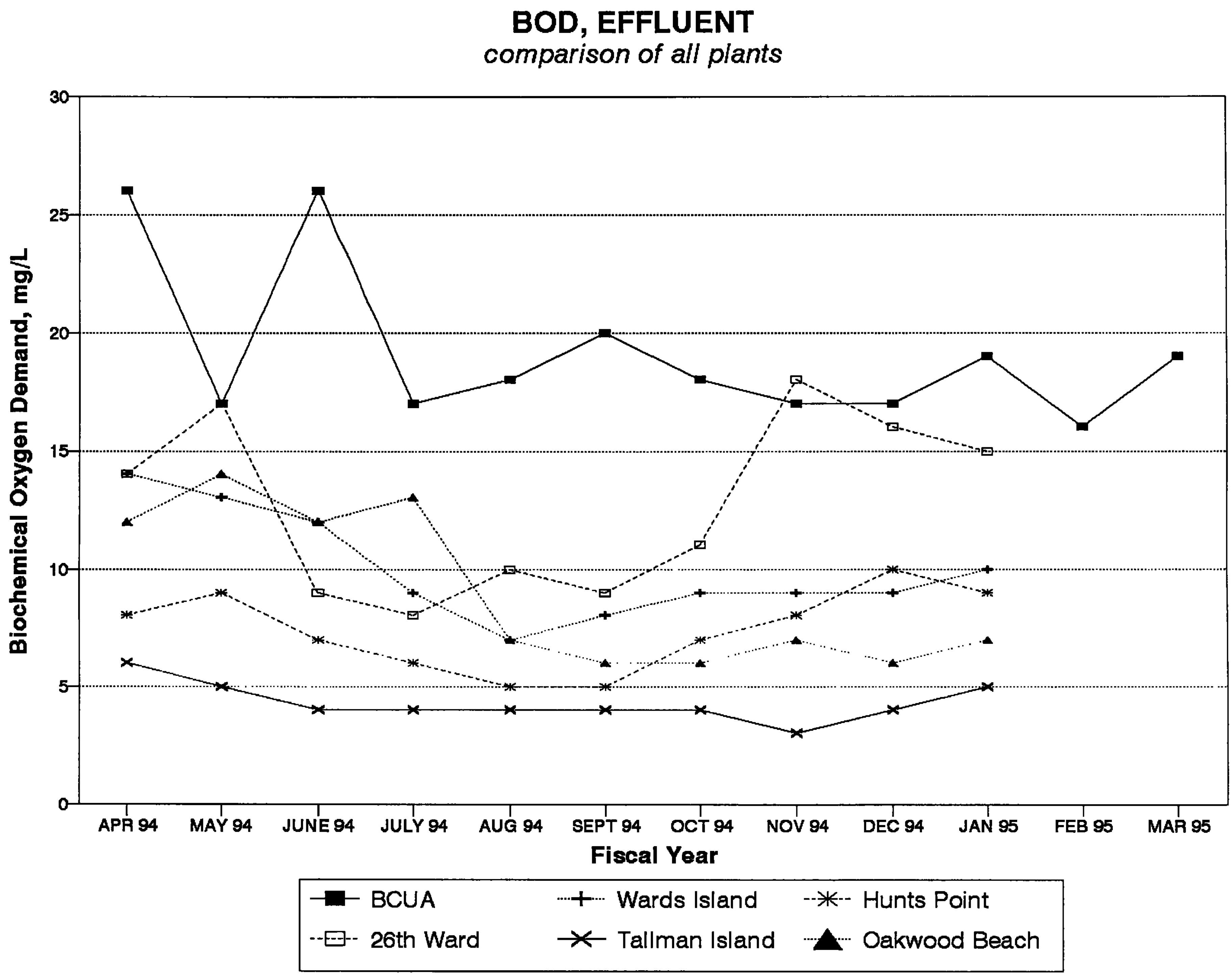
# SUSPENDED SOLIDS, EFFLUENT

*comparison of all plants*

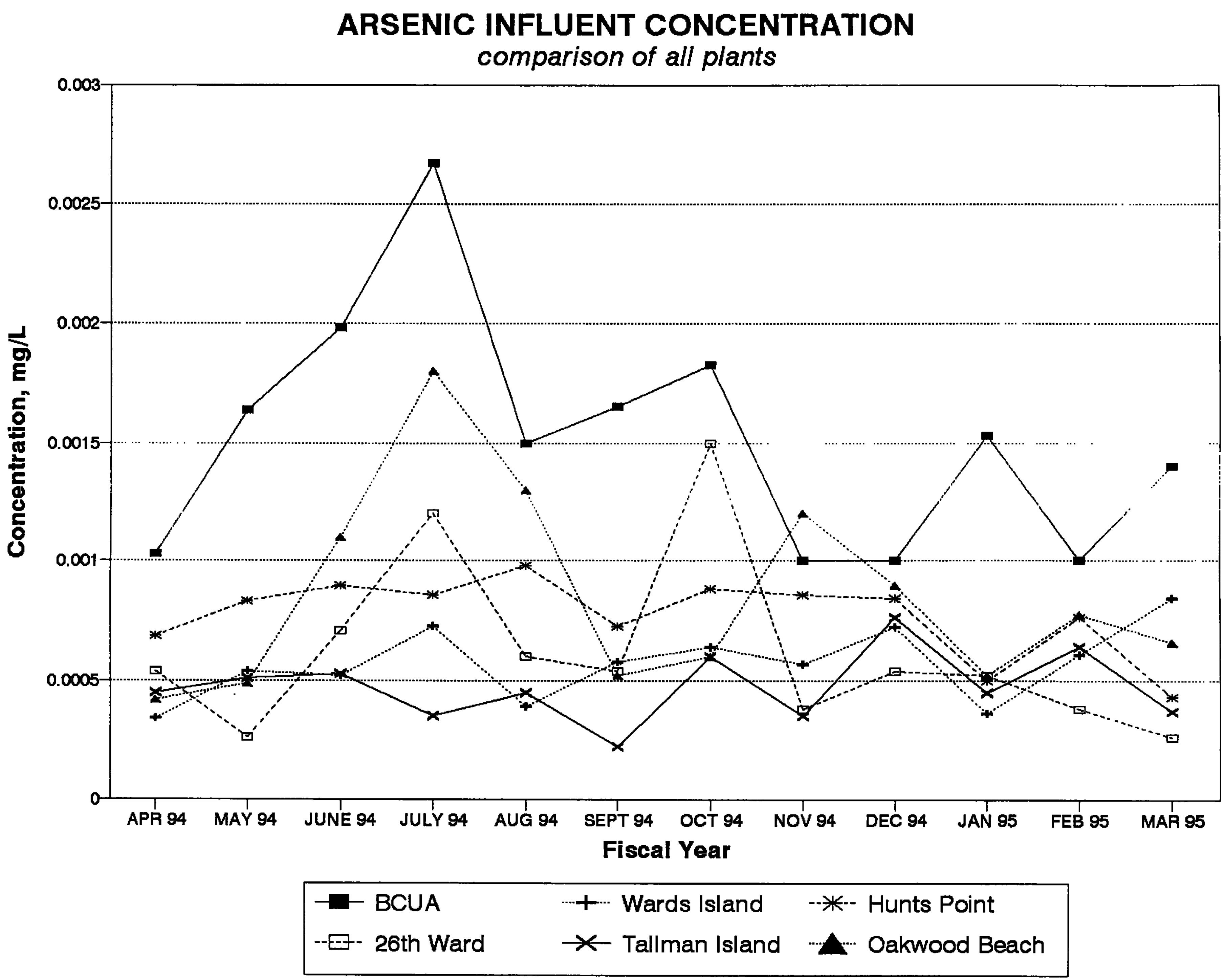




BOD, INFLUENT
comparison of all plants
Biochemical Oxygen Demand, mg/L
220
200
180
160
140
120
100
80
60
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

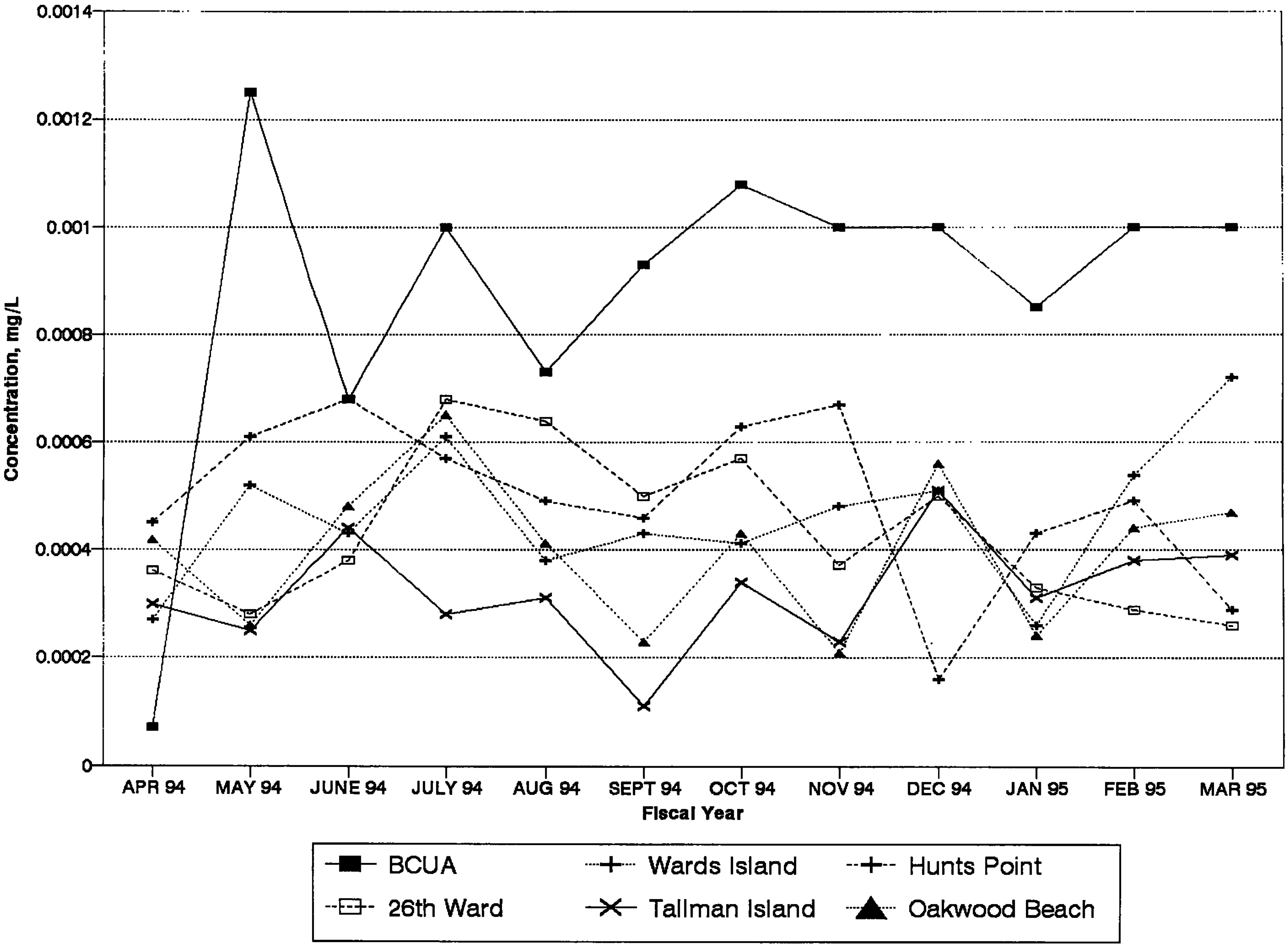


BOD, EFFLUENT
comparison of all plants
Biochemical Oxygen Demand, mg/L
30
25
20
15
10
5
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach


ARSENIC INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

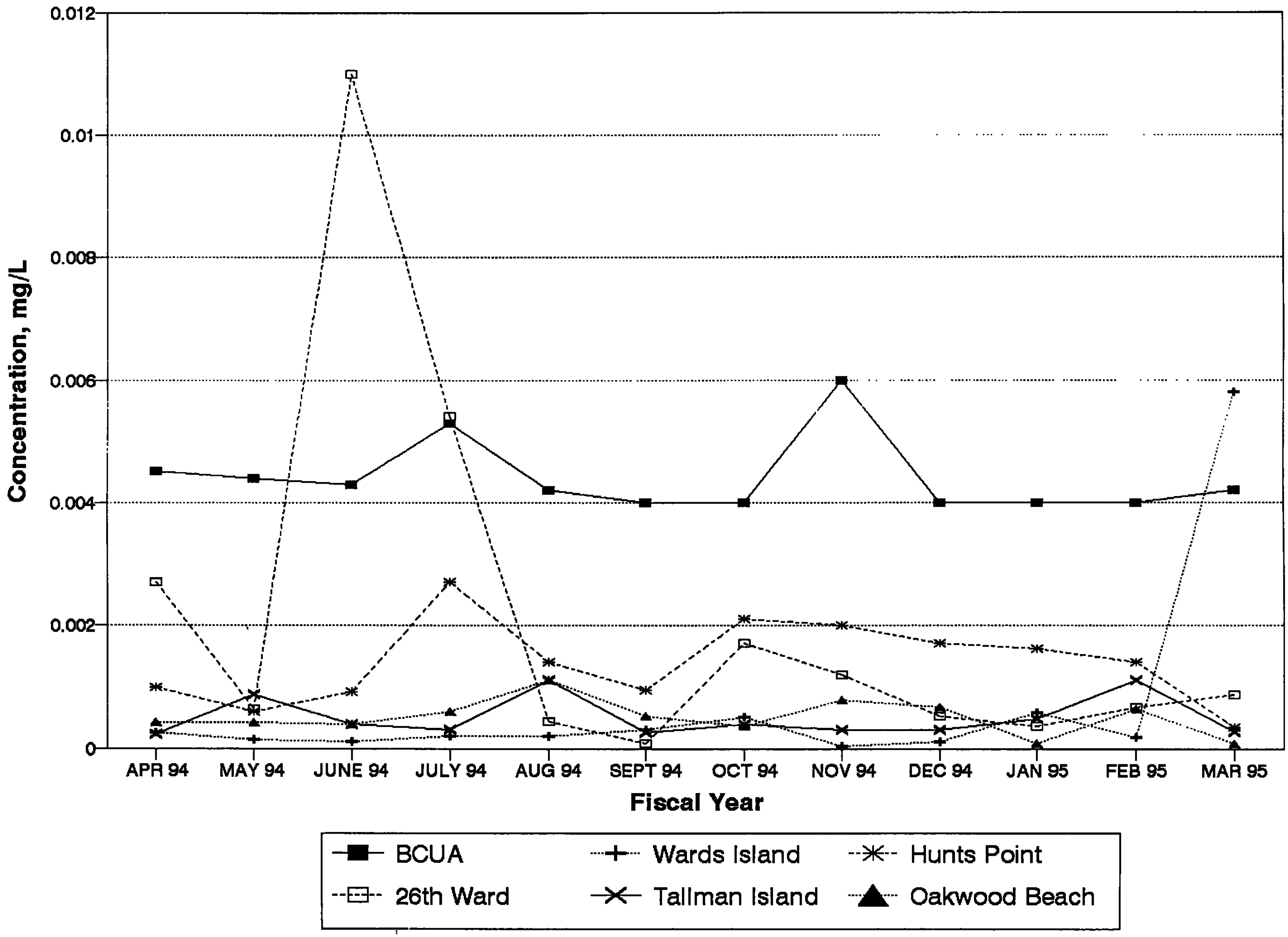
# ARSENIC EFFLUENT CONCENTRATION

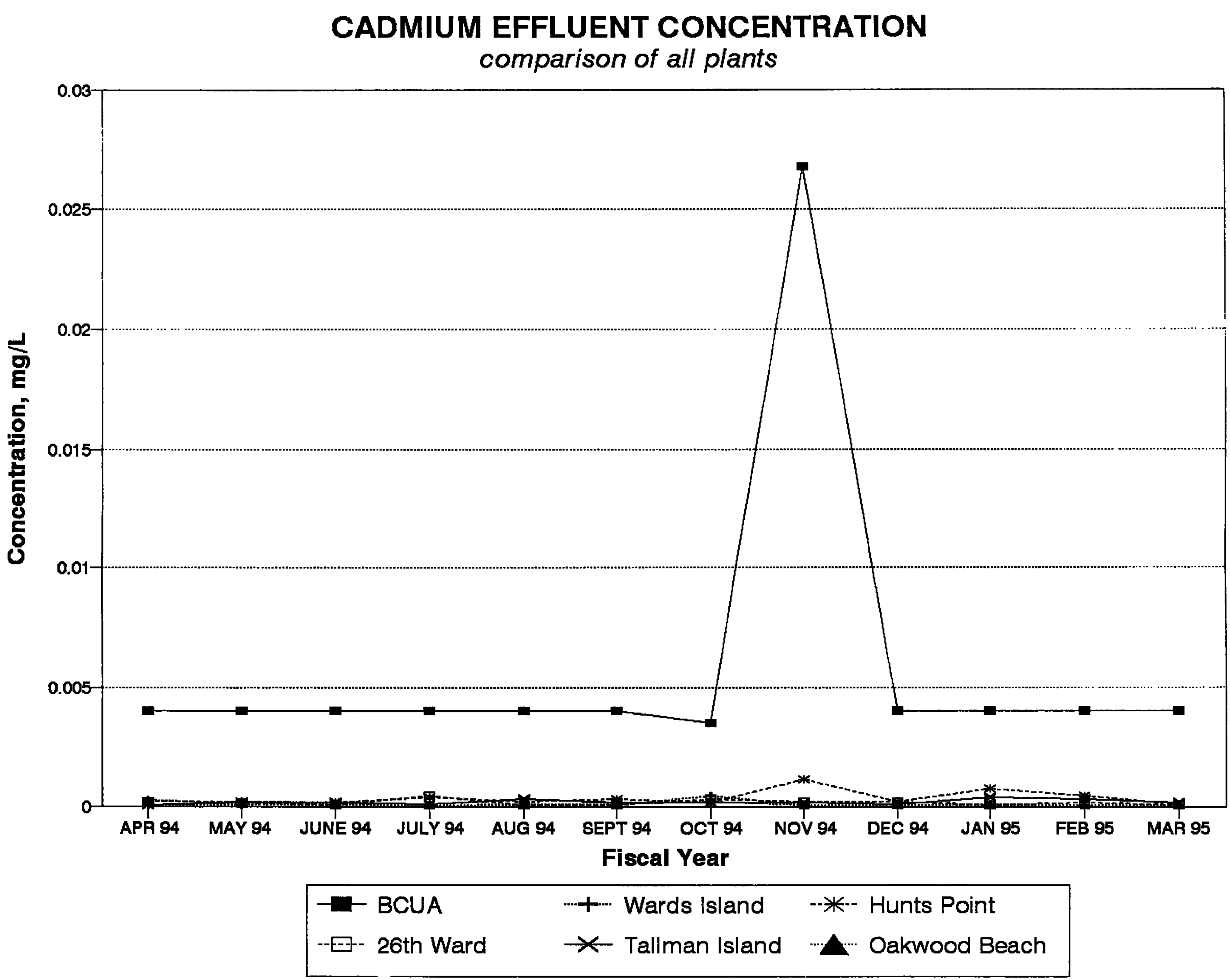
*comparison of all plants*

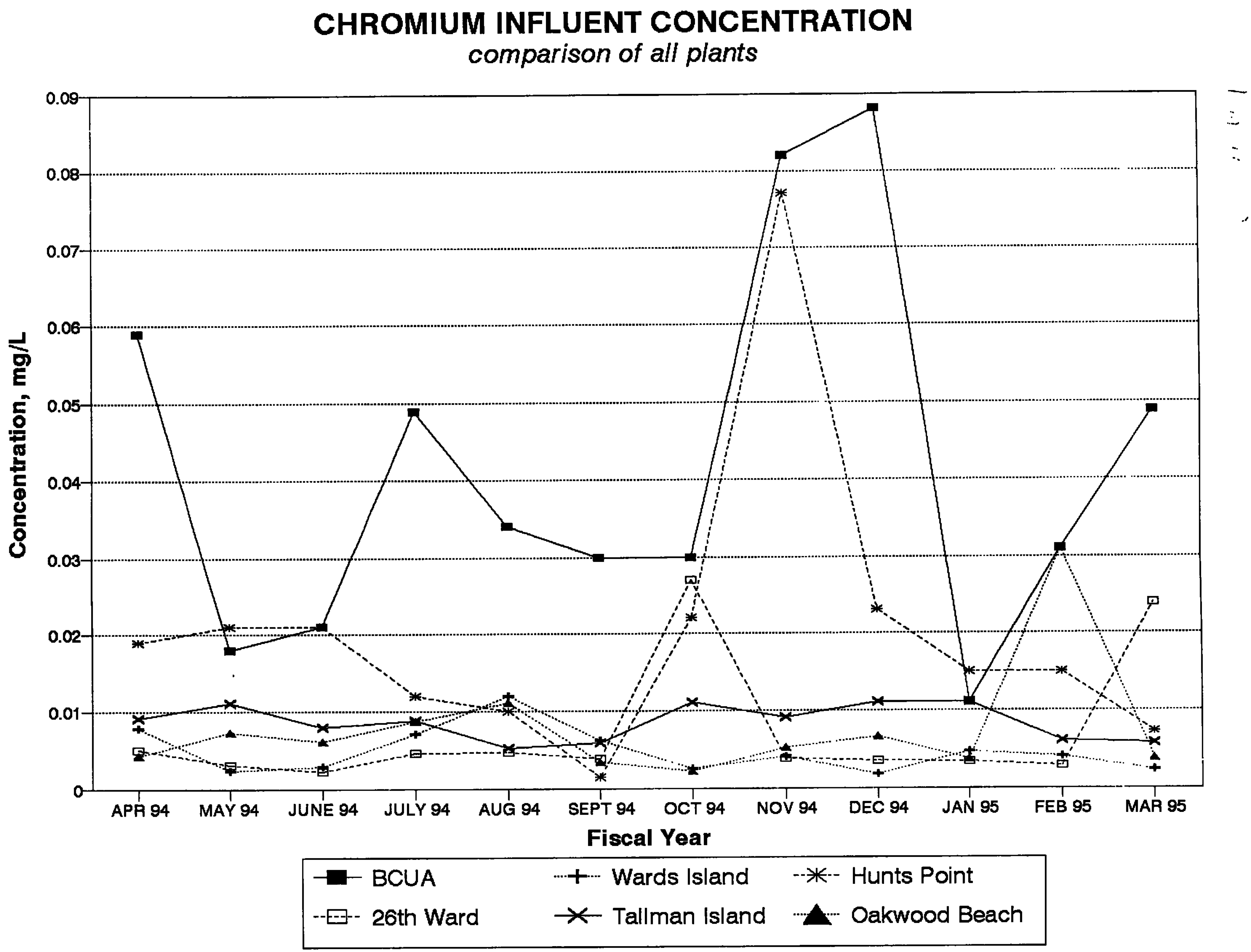


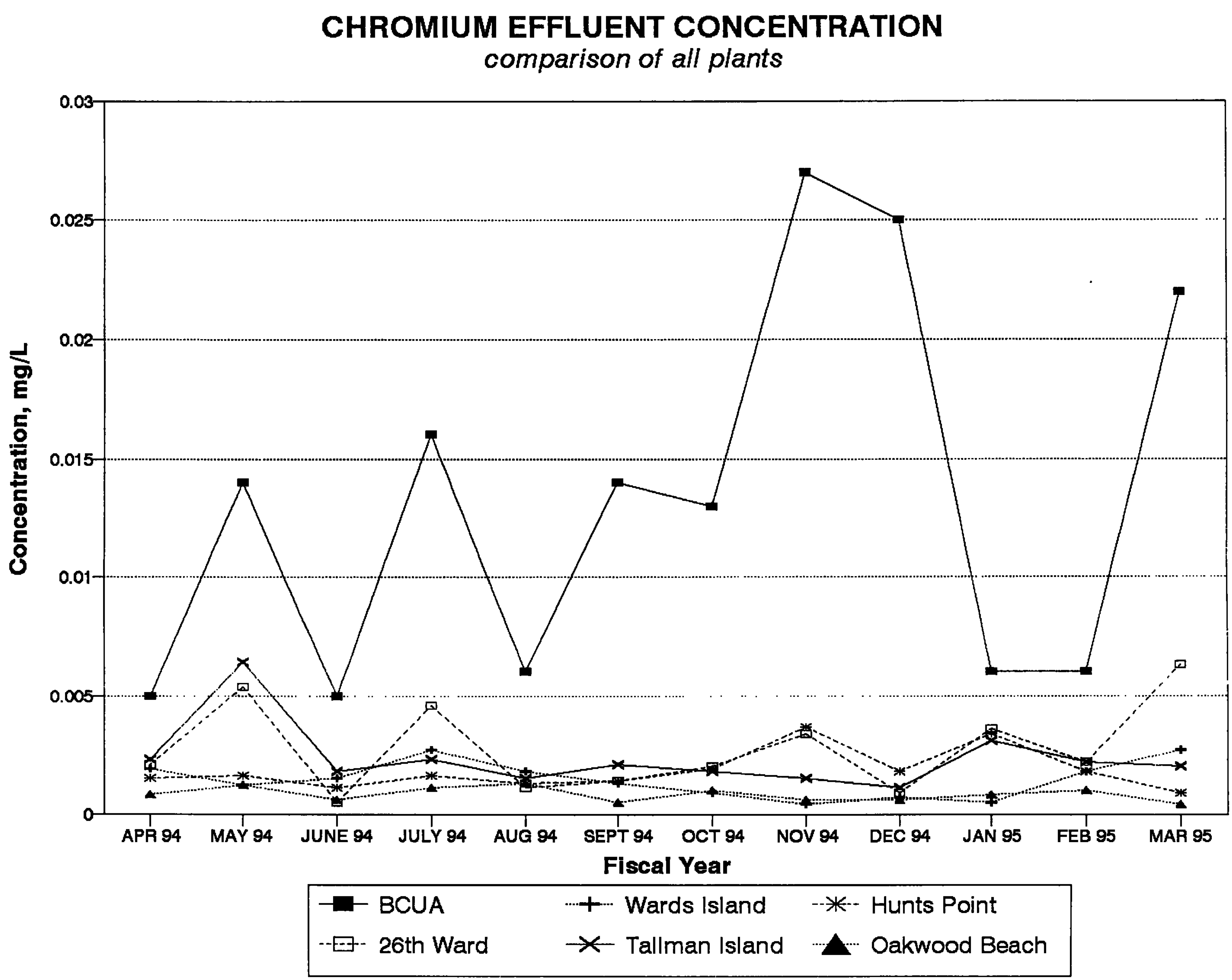
## CADMIUM INFLUENT CONCENTRATION

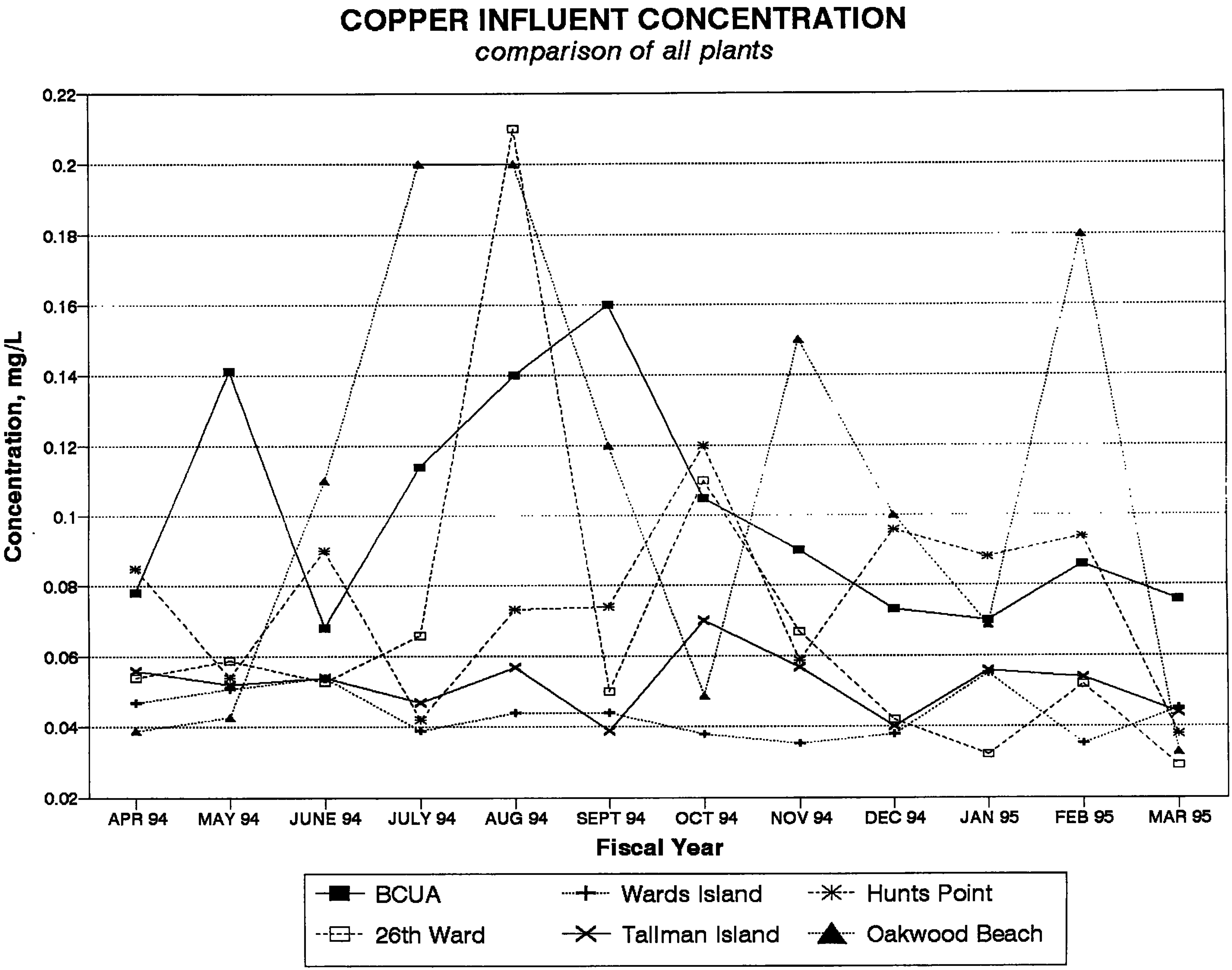
*comparison of all plants*




CADMIUM EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach


CHROMIUM INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

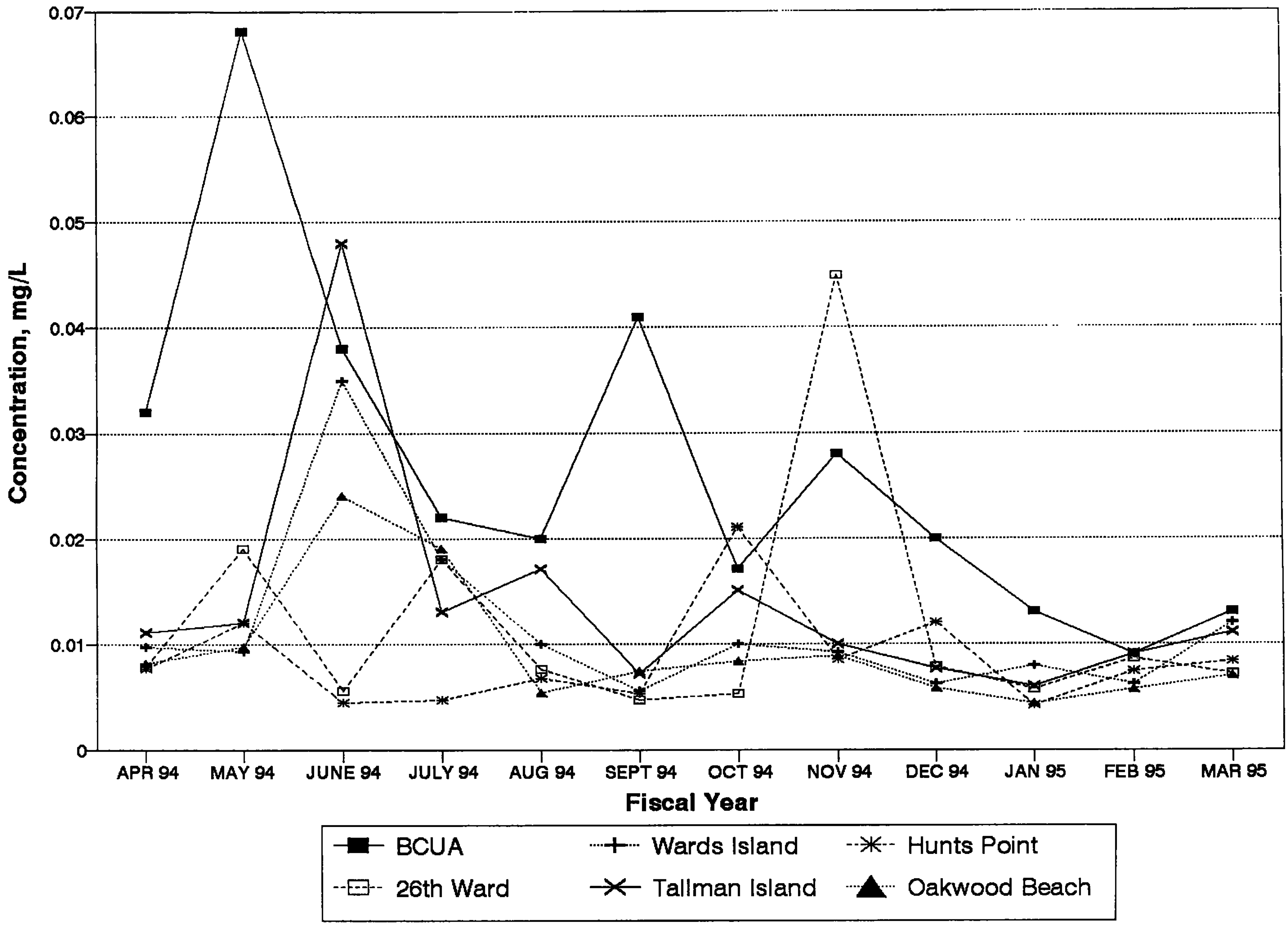

CHROMIUM EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

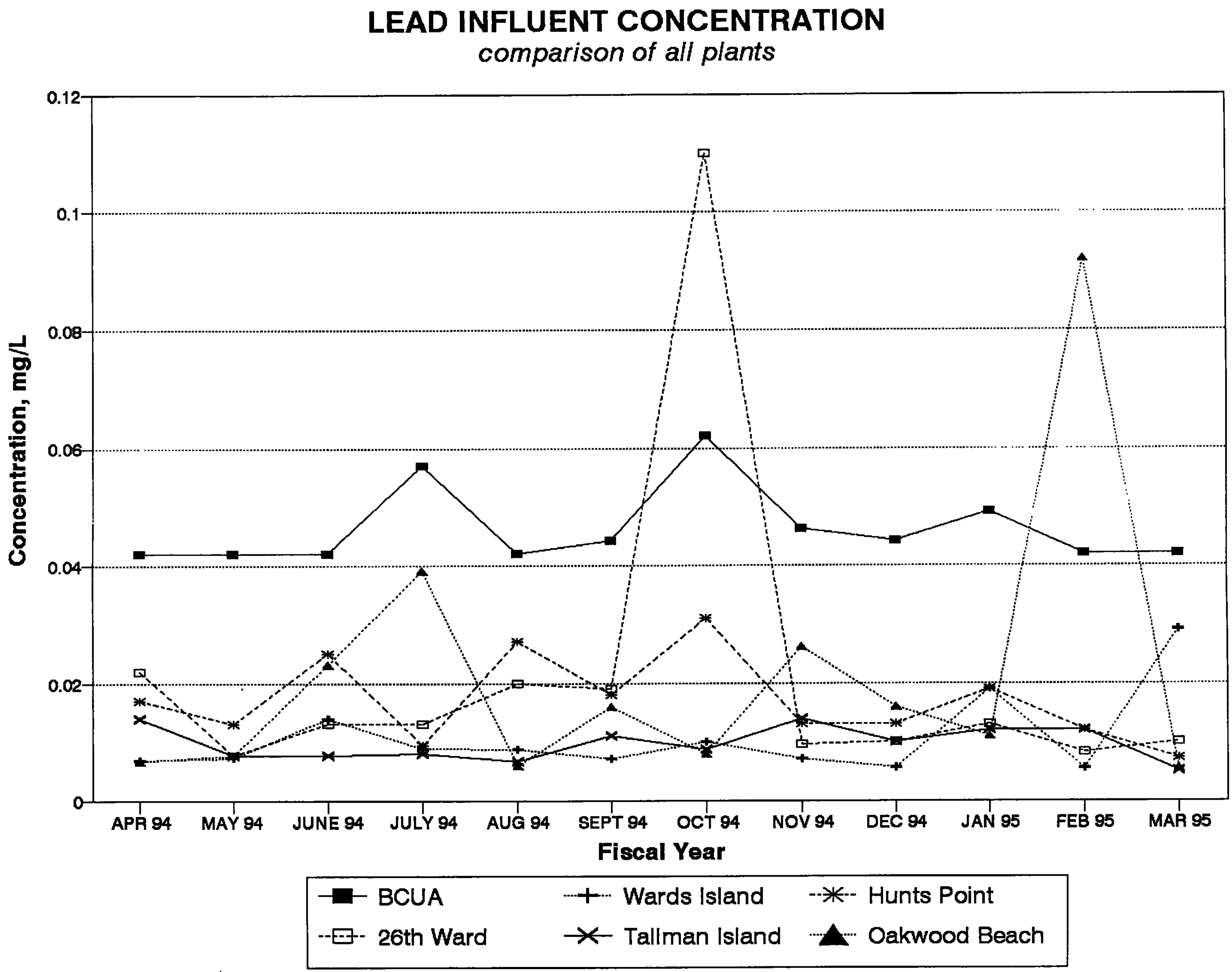


COPPER INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach

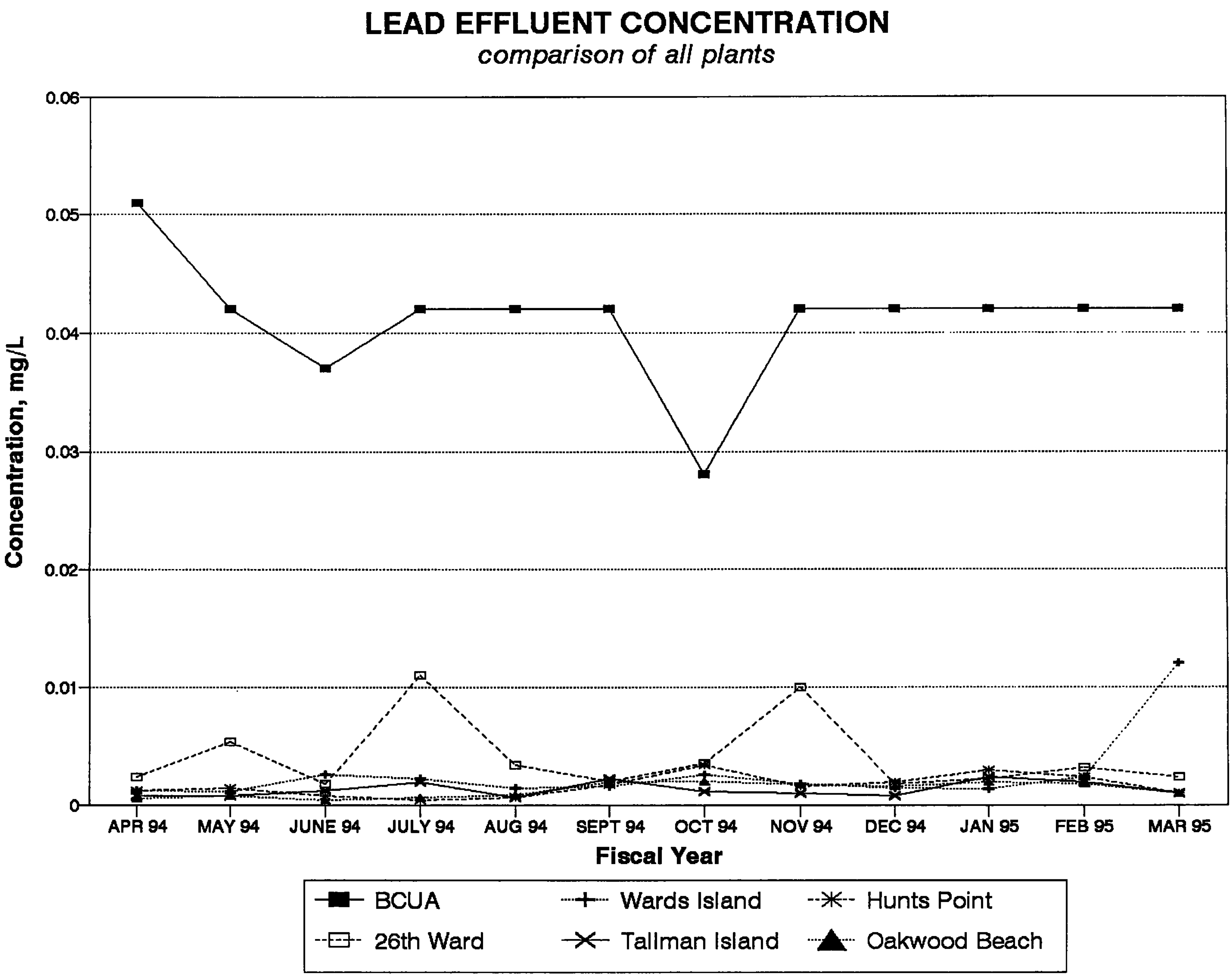
# COPPER EFFLUENT CONCENTRATION

*comparison of all plants*





LEAD INFLUENT CONCENTRATION
comparison of all plants
0.12
0.1
0.08
0.06
0.04
0.02
0
Concentration, mg/L
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach



LEAD EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.06
0.05
0.04
0.03
0.02
0.01
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
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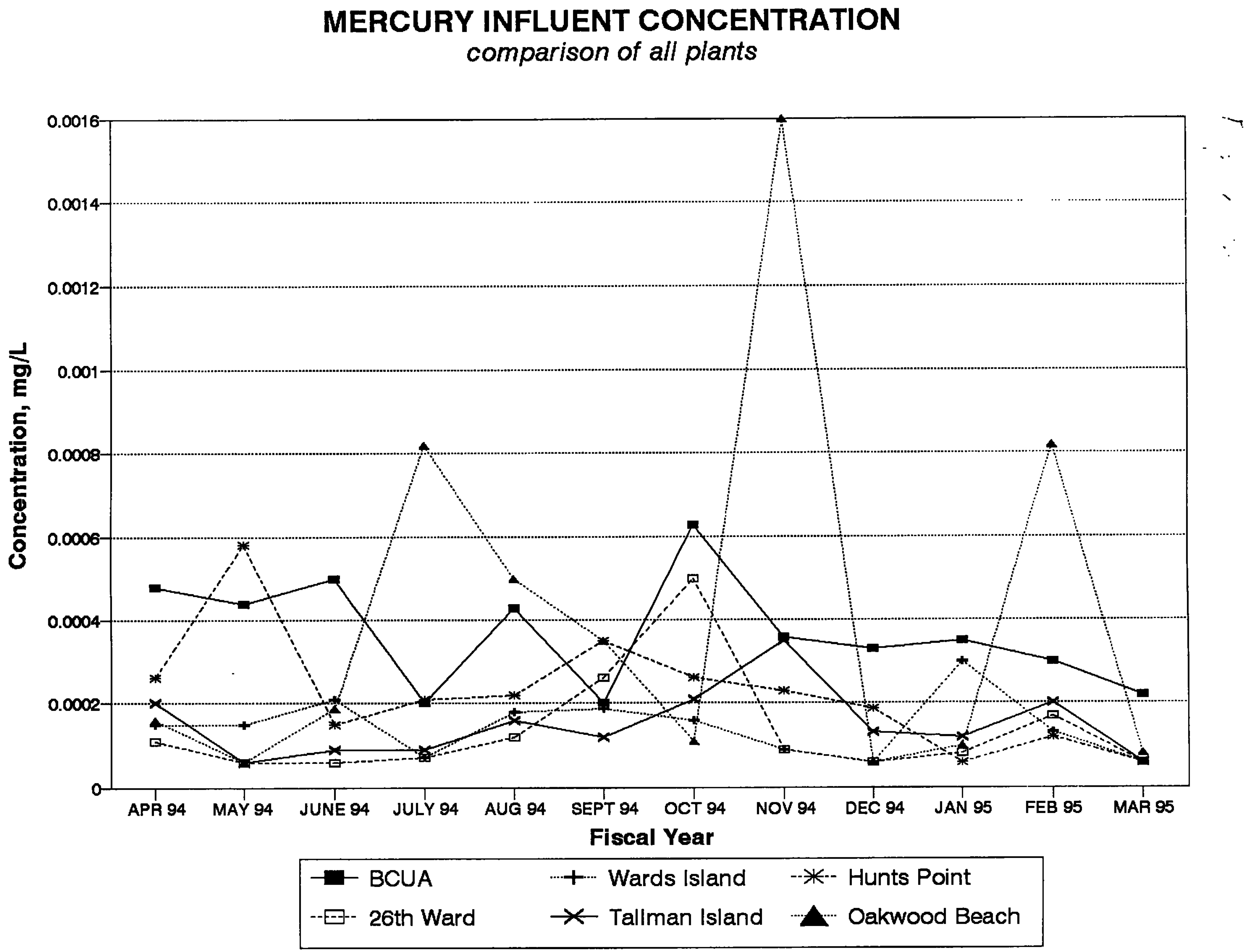
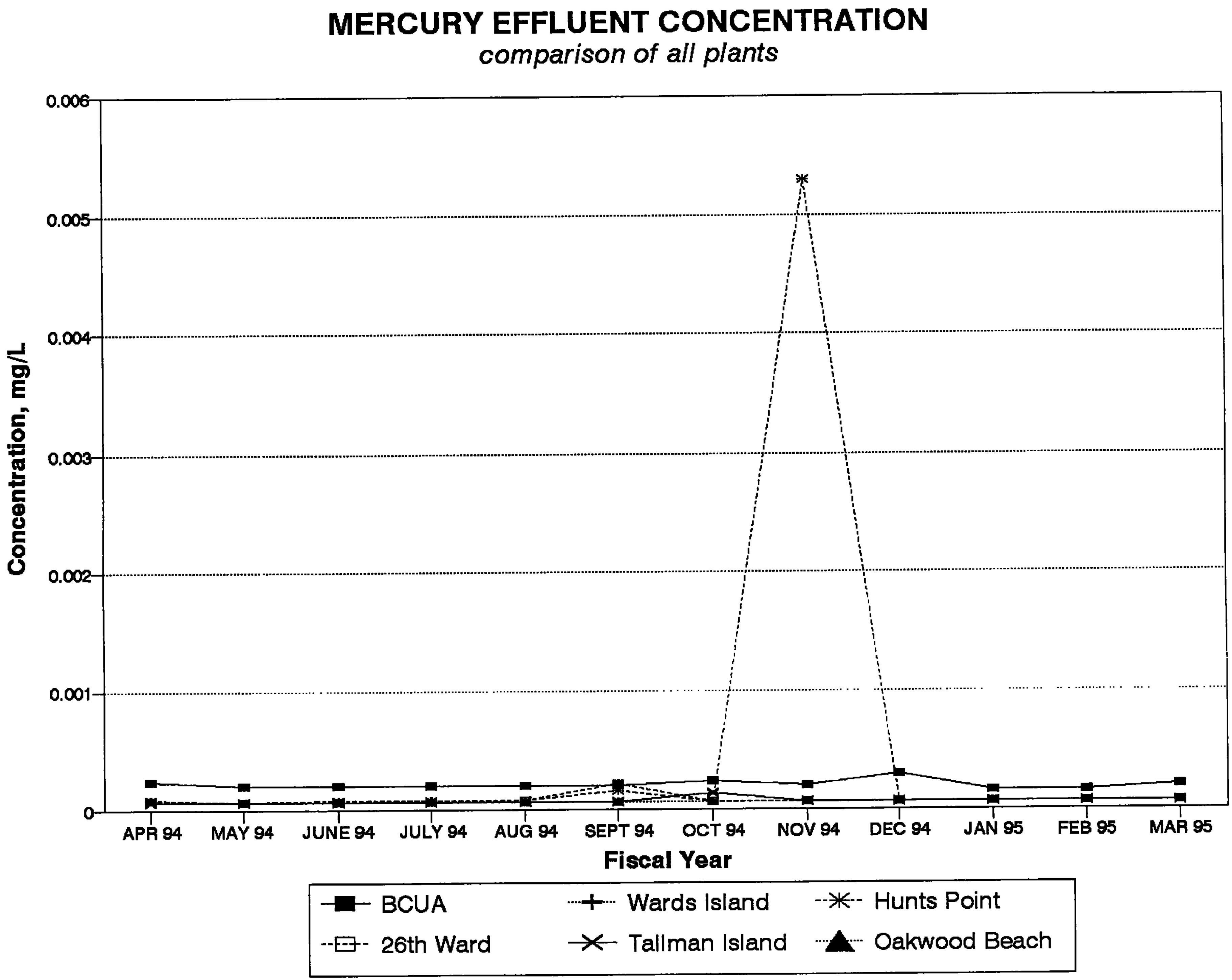
Tallman Island
Oakwood Beach



MERCURY INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
Fiscal Year
BCUA
Wards Island
Hunts Point
26th Ward
Tallman Island
Oakwood Beach


MERCURY EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
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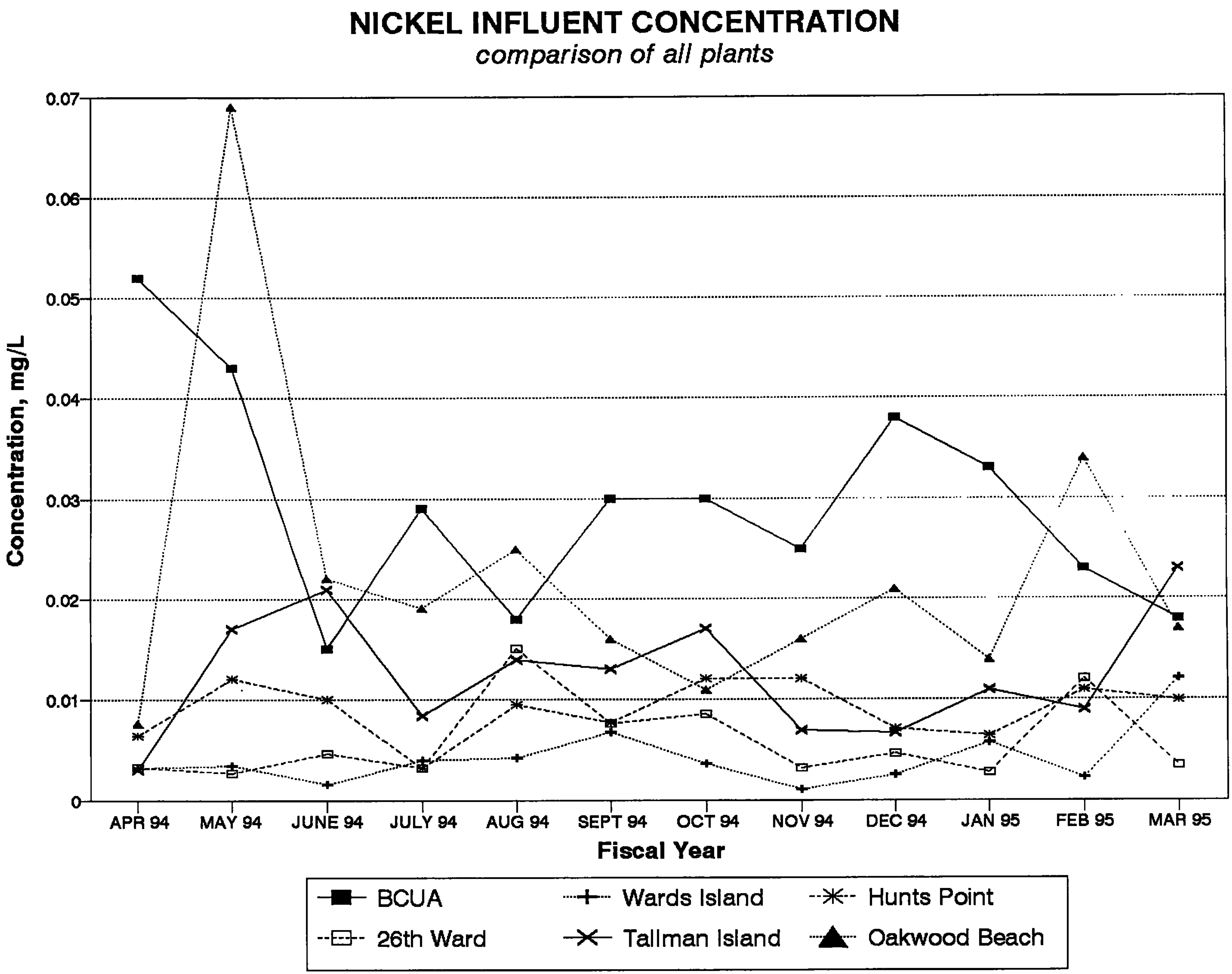
NICKEL INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
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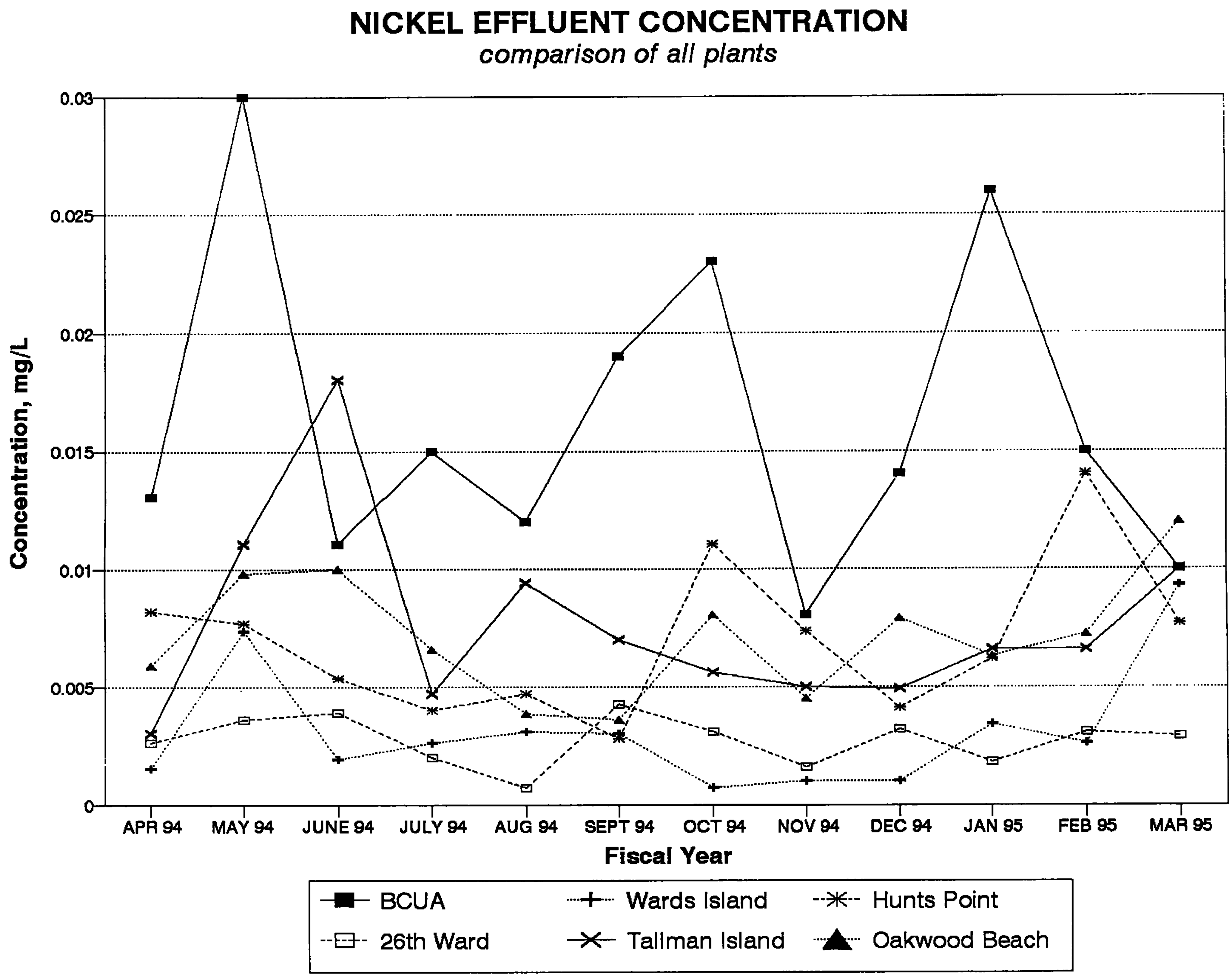
Oakwood Beach


NICKEL EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
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JAN 95
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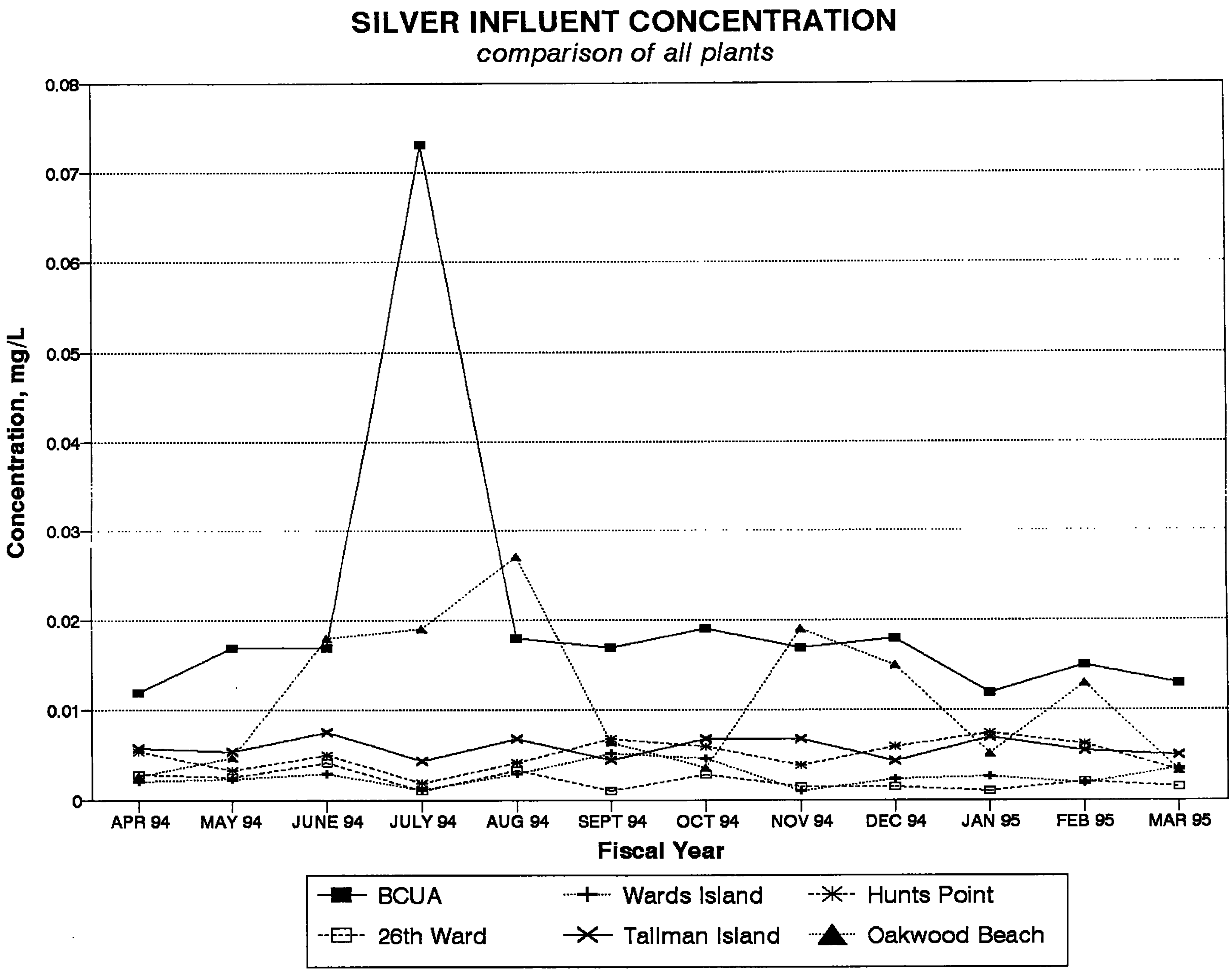
SILVER INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
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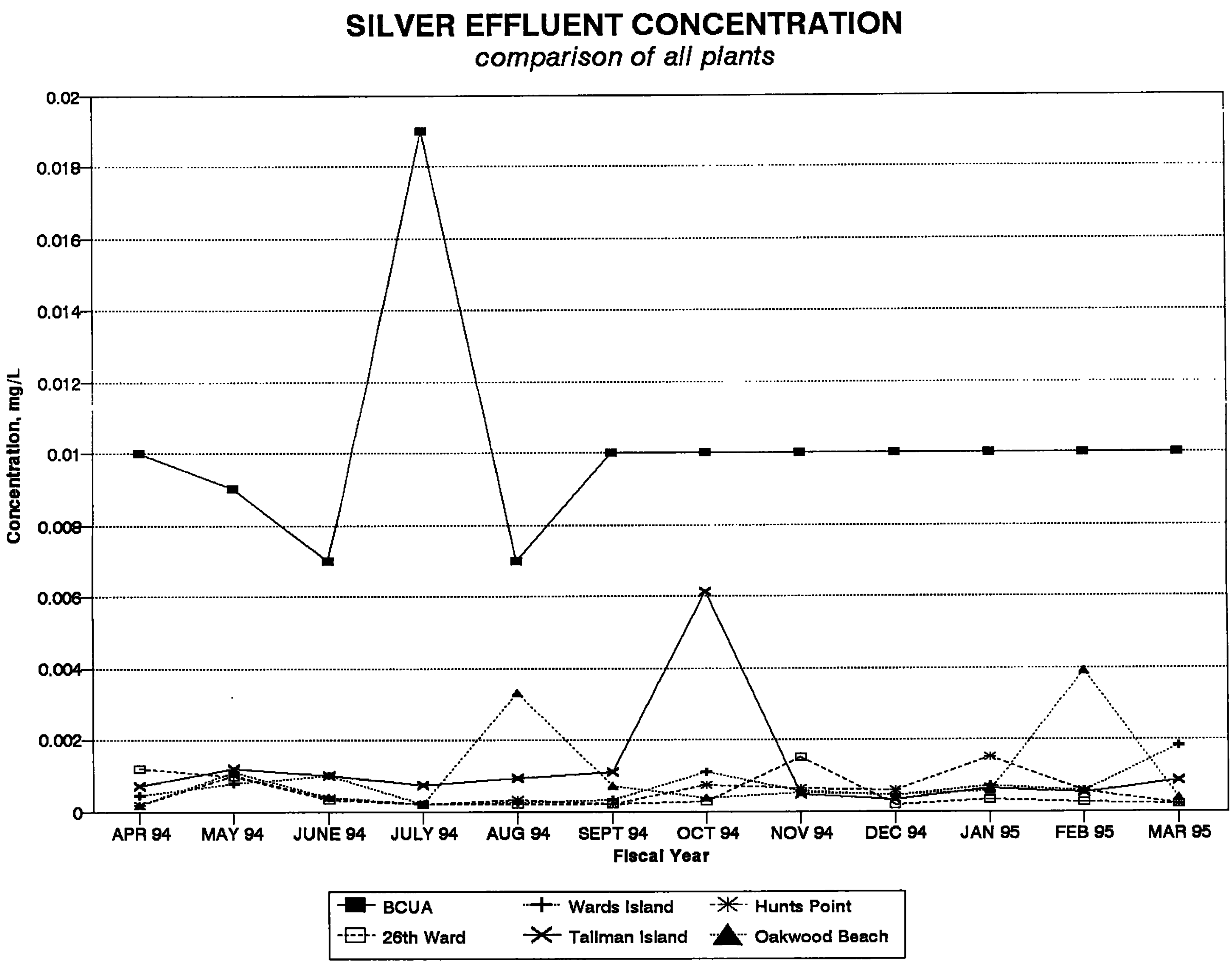
Tallman Island
Oakwood Beach


SILVER EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
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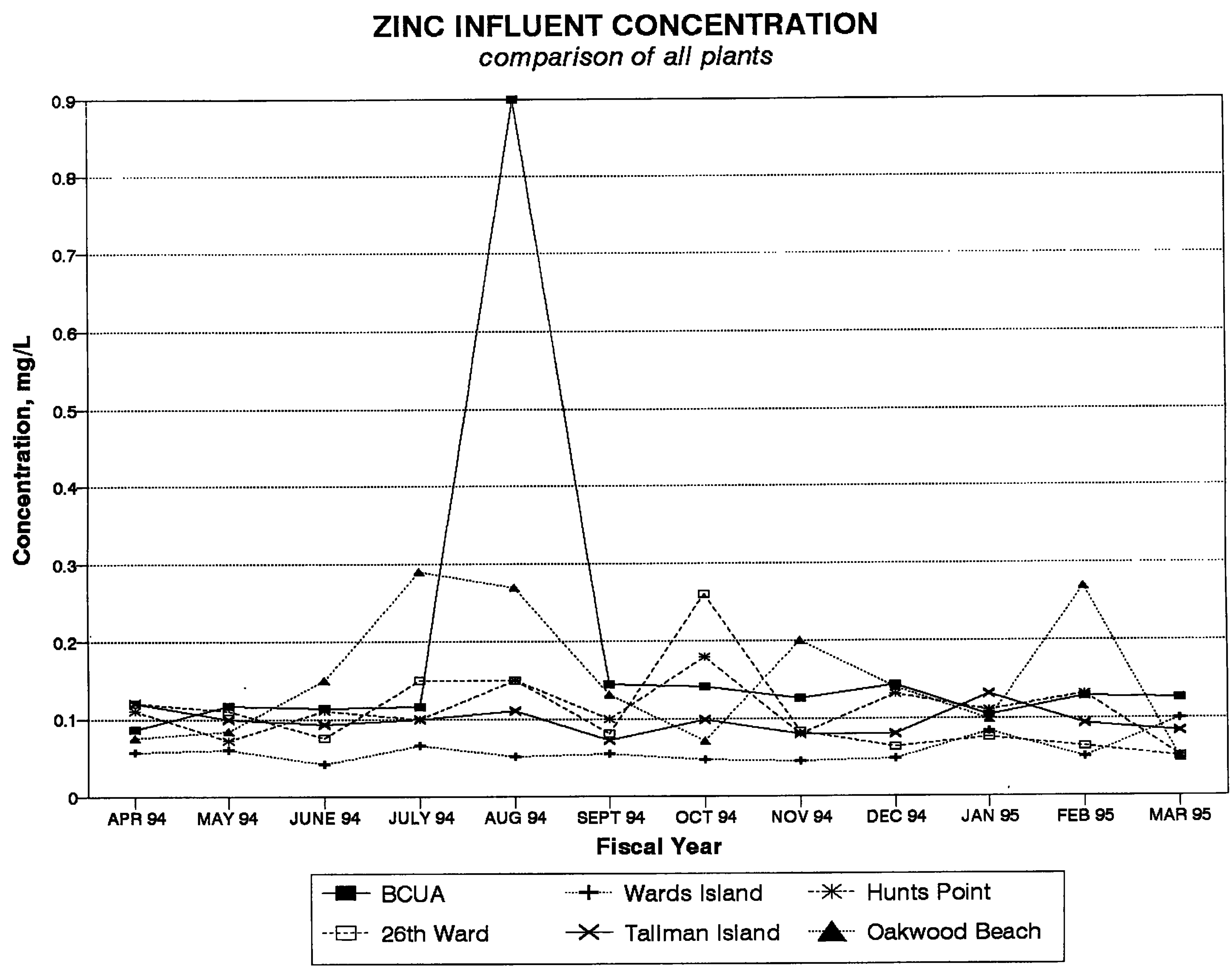

ZINC INFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
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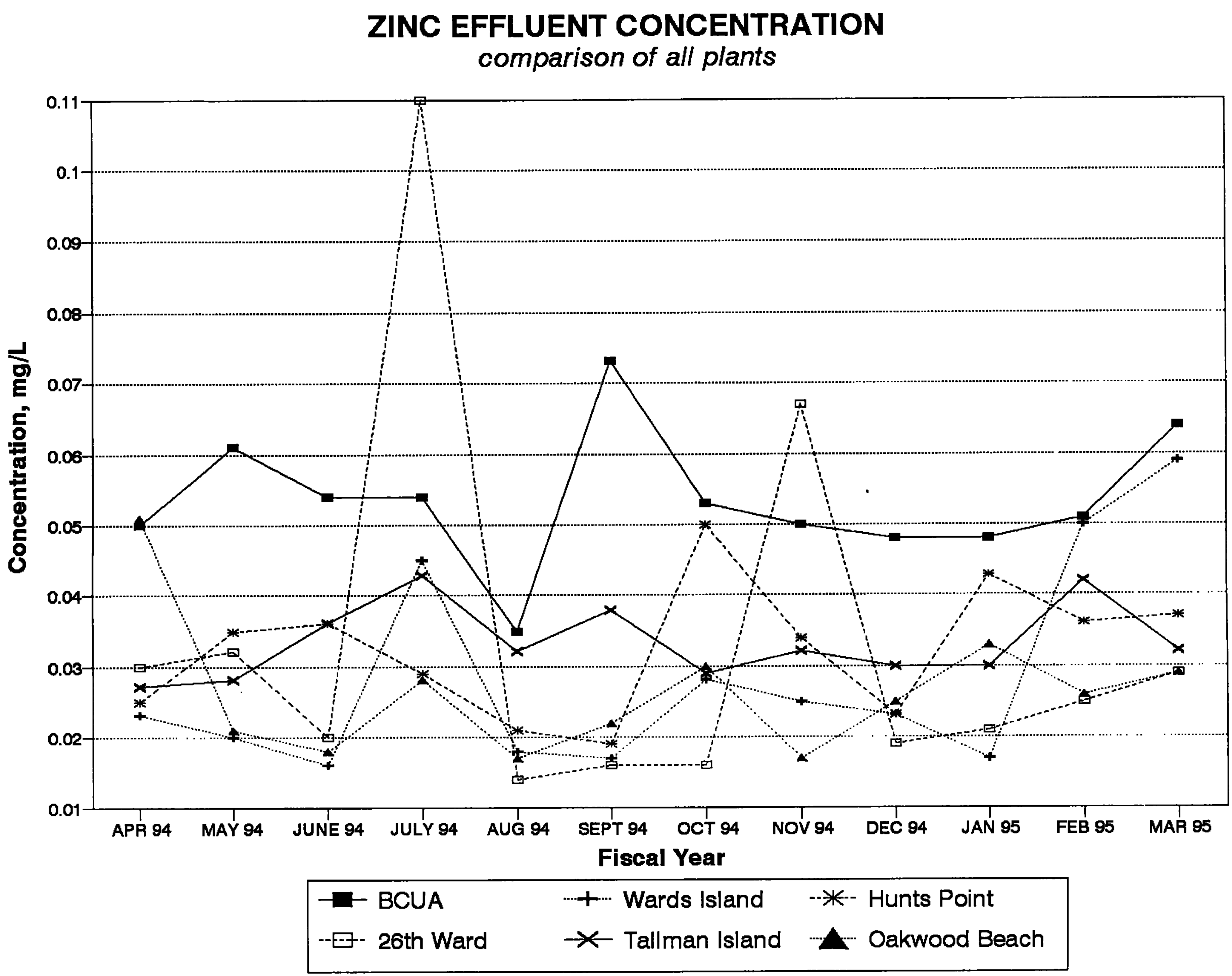
ZINC EFFLUENT CONCENTRATION
comparison of all plants
Concentration, mg/L
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
APR 94
MAY 94
JUNE 94
JULY 94
AUG 94
SEPT 94
OCT 94
NOV 94
DEC 94
JAN 95
FEB 95
MAR 95
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