

# **QUARTERLY PROGRESS REPORT**

**PACIFIC NORTHWEST  
WATER LABORATORY  
CORVALLIS, OREGON**

**January 1 — March 31, 1972**

**ENVIRONMENTAL PROTECTION AGENCY**

ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL ENVIRONMENTAL RESEARCH CENTER  
200 S.W. 35th STREET  
CORVALLIS, OREGON 97330



NATIONAL ENVIRONMENTAL RESEARCH CENTER

QUARTERLY REPORT

January 1 through March 31, 1972

Environmental Protection Agency  
200 S.W. 35th Street  
Corvallis, Oregon 97330

April 1972

## CONTENTS

|   |    |
|---|----|
| NATIONAL WASTE TREATMENT RESEARCH PROGRAM . . . . .   | 1  |
| NATIONAL THERMAL POLLUTION RESEARCH PROGRAM . . . . . | 14 |
| NATIONAL COASTAL POLLUTION RESEARCH PROGRAM . . . . . | 21 |
| NATIONAL EUTROPHICATION RESEARCH PROGRAM . . . . .    | 27 |
| CONSOLIDATED LABORATORY SERVICES PROGRAM . . . . .    | 39 |

## NATIONAL WASTE TREATMENT RESEARCH PROGRAM

### FOOD WASTES RESEARCH - PPB 1206

#### Status of Projects and Significant Accomplishments

##### Work Plan ZAQ: Technical Consultation and Data Dissemination

The Third National Symposium on Food Processing Wastes was held March 28 to 30, 1972, in New Orleans, Louisiana. Twenty-three technical papers were presented to over 200 registrants. Harold W. Thompson presented "Tertiary Treatment of Combined Domestic and Industrial Wastes," Dennis W. Taylor presented "Full-Scale Anaerobic Trickling Filter Treatment of Wheat-Starch Processing Wastes," and Max W. Cochrane presented "RBC Treatment of Simulated Potato Processing Wastes."

D. W. Taylor also presented a paper on the anaerobic filter to the 71st National AIChE meeting in Dallas, Texas. J. R. Boydston presented a talk at the Intermountain Section of the Institute of Food Technologists meeting in January on recent advances in food waste treatment technology.

##### Work Plan FGF: Grant Monitoring

The following grant sites were visited during the quarter:

12060 FRW Tabor City Foods, Tabor City, NC

12060 HPC Wine Advisory Board, Davis, California

12060 HRR Amber Laboratories, Juneau, Wisconsin

12060 EUZ Widmers Wine Cellars, Naples, New York

At the request of Region IX, K. A. Dostal met with personnel from several raw cane sugar processing companies in Hawaii and assisted one firm in the revision of a grant application.

The following grant proposals and preproposals were received during the quarter.

1. Pollution prevention of the nation's streams, rivers, and waterways by the whey effluent from cheese.
2. Pilot plant studies on joint treatment for the city of Tracy, California.
3. Rum distillery waste treatment by anaerobic digestion.
4. Utilization of paunch manure as feed for channel catfish and its effect on water quality.
5. Continuous hot-air blanching of vegetables.
6. Development of insulation material from potato skins.
7. Shrimp canning waste treatment study.
8. Seafoods processing wastewater characterization.
9. Recycling of water in poultry processing plants.
10. Sludge disposal at main plant -- Marhoefer Packing Co.
11. Evaluation of new blanching process (IQB) for waste water abatement in canning vegetables.
12. Ecostatic cane processing system-pilot phase.
13. Reuse of transport water in the fish meal and oil industry.

Work Plan GJJ: New and Improved Treatment Processes for Food

Processing Wastes

Anaerobic Filter

An inhouse report covering the operation and analysis of the anaerobic filters at Centennial Mills in Spokane, Washington, is in progress. Monitoring of the system has been completed with favorable results. A 65 percent reduction of the high strength waste (9,000 mg/l-COD) was achieved. Bench-scale tests indicate an increase to approximately 75 percent with final clarification.

A summary of this project was presented at the New Orleans Symposium.

Work Plan GKI: Secondary Treatment Processes for Highly Seasonal

Wastes

RBC pilot plant treatment of simulated potato processing plant wastes at the NERC, Corvallis lab was terminated. A final report was written, and a summary of the results was presented at the New Orleans Symposium.

Results were obtained from three runs of different organic and hydraulic loading rates. The average waste strength ranged from 670 to 3100 mg/l COD and removal efficiencies of 91-95 percent COD removal resulted.

Grant and Contract Research

The current status of monitored grants is described below:

1. 12060 EUZ: Winery Wastewater - Characterization and Treatment. Post construction studies continued during the quarter.

2. 12060 EKQ: Kent Cheese Company - Waste Treatment Facility. The final report preparation is still underway, expected completion end of next quarter.
3. 12060 FLL: Activated Sludge: Bio-Disc Treatment of Distilling Wastes. Full-scale evaluation about 50 percent completed.
4. 12060 EHS: Cannery Waste Treatment by Lagoons and Oxidation Ditch. Final report has been submitted and is being retyped before submittal for reproduction.
5. 12060 EHV: Aerobic Secondary Treatment of Potato Processing Wastes with Mechanical Aeration. Final audit has not been conducted.
6. 12060 DSI: State-of-the-art, Sugarbeet Processing Waste Treatment. The final report has been reproduced and initial distribution completed.
7. 12060 ECF: Water Pollution Abatement in the United States Seafood Industry -- State-of-the-art. Still awaiting final audit.
8. 11060 EZR: Complete Aerobic Treatment of Combined Domestic and Industrial Wastes with Mechanical Aeration. Grant has been audited but not closed out.
9. 12060 EIG: Full-scale Demonstration and Evaluation of Potato Dry and Wet Caustic Peeling Processes. First draft of final report completed.
10. WP-01486-01: Status and Research Needs for Potato Waste Waters. First draft of final report just completed.

11. 12060 FAD: Aerobic Treatment of Fruit Processing Wastes.  
First draft of final report completed.
12. WPD 93-04-68: Anaerobic-Aerobic Sugar Beet Waste Treatment.  
First draft of final report completed.
13. 12060 DXL: Reduction of Salt Content of Food Processing  
Liquid Waste Effluent. First draft of final report completed.
14. 12060 EDK: Production and Disposal Practices for Liquid  
Wastes from Canning and Freezing Fruits and Vegetables. Final report  
has been submitted but has not been reproduced.
15. 12060 EHT: Use of Fungi Imperfecti in Waste Control.  
Appendix of data has been received and final voucher processed.
16. 12060 EDZ: Pilot Plant Installation for Use of Fungi  
Imperfecti on Vegetable Wastes. Final report reproduced and distributed;  
waiting for final audit.
17. 12060 FAK: Concentration of Sugar Beet Wastes for Economic  
Treatment with Biological Systems. Final report reproduced and  
distributed, waiting for final audit.
18. 12060 FQE: Dry Caustic Peeling of Tree Fruit to Reduce Liquid  
Waste Volume and Strength. Final report reproduced and distributed.  
Final audit requested.
19. 11060 FJQ: Pollution Abatement and By-Product Recovery in  
Shellfish and Fisheries Processing - Phase I. Final report reproduced  
and distributed. Final audit requested.
20. 12060 EGU: State-of-the-art of Dairy Plant Wastes and Waste  
Treatment Systems. Final report submitted for reproduction.

21. 12060 FDR: Disposal of Rum Distillery Wastes. Second draft of final report under review.

22. 12060 ESY: Improvement of Treatment of Food Industry Waste. Second draft of final report under review.

23. 12060 EZP: Cannery Waste Treatment by the Kehr Activated Sludge Process. Second draft of final report under review.

24. WPRD 151-01-68: Integrated Treatment of Liquid Wastes from Food Canning Operations. Final audit has been requested.

25. 12060 EHU: Reconditioning and Reuse of Food Processing Brines. Final audit has been requested.

26. 12060 DQV: Removal and Recovery of Fatty Materials from Edible Fat and Oil Refinery Effluents. Final audit has been requested.

27. 12060 DEQ: Elimination of Pollution by and Utilization of Protein Concentrates (Dried Whey) from Milk Residues of Cheese Making. Final report is being prepared.

28. 12060 DPE: Treatment of Wastes from the Wet Milling Industry. Final report is being prepared.

29. 12060 DSB: Demonstration of a Full-Scale Waste Treatment System for a Cannery. Final report is being prepared.

30. 12060 EAE: Evaluation of Controlled Temperature and Forced Aeration in Trickling Filter Treatment of Food Canning Waste Waters. Final report is being prepared.

31. 12060 DXF: Development and Demonstration of an Ultrafiltration Plant for the Abatement of Pollution from Cottage Cheese Whey. Final

report on Phase I just completed and full-scale construction under Phase II just finished.

32. 12060 FJK: Acid Emulsion Breaking - Activated Sludge for Bakery Waste. Post-construction studies underway.

33. 12060 ESC: Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids. Data evaluation on silt separation and dewatering has been completed. Disposal studies are underway.

34. 12060 FUR: Membrane Separation of Soybean Whey for Product Recovery and Waste Treatment. Data collection completed. Evaluation and final report preparation initiated.

35. 12060 FTC: State-of-the-art Study of Water Pollution Control from the Beverage Industry. The final report still under revision.

36. 11060 DLF: Tertiary Treatment of Combined Domestic-Industrial Wastes. The final report still under revision.

37. 11060 DJB: Controlled Treatment of Combined Potato Processing - Municipal Wastes by Anaerobic Fermentation, Aerobic Stabilization Process. Post-construction studies underway.

38. 11060 DUJ: Dynamic Process Development for Biological Treatment of Whey Bearing Wastes. Final report submitted for reproduction.

39. 11060 ENF: Vermont Cheese Industry Pollution Abatement. Final report submitted for reproduction.

40. 12060 PAV: Low Water Volume Enzyme Deactivation of Vegetables Before Preservation. Hot-gas blanching runs completed on asparagus. Quality ratings as well as vitamin and mineral analyses conducted on the following: asparagus, green beans, kernel corn, beets, pumpkin, and spinach.

41. 12060 HFY: Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale. Final report draft under revision.

42. 12060 FRW: Water and Waste Management in Sweet Potato Processing. Base-line data collection completed and planned modification for the next season have been approved.

43. 12060 HCW: Submerged Combustion Evaporation System for Concentration of Brewery Spent Grain Liquors. Data collection still underway.

44. 12060 HPC: Pilot Scale Treatment of Wine Stillage. Additional anaerobic units as well as the aerobic pilot plants were placed onstream.

Two grants were awarded during the quarter:

12060 HUQ (801007) "Seafoods Processing Wastewater Characterization," Oregon State University, Corvallis, Oregon. The ten-month study will determine unit wastes loads generated by the processing of tuna, bottom fish, crab, salmon, shrimp, and by-products.

12060 HRR (800747) "Acid Whey Fermentation Demonstration Pilot Plant," Amber Laboratories, Juneau, Wisconsin. Evaluate the technical and economic feasibility of producing a high-protein feed product by fermentation of whey using yeast.

#### Plans for Fourth Quarter, FY 1972

1. Continue grant monitoring.
2. Continue work on industrial effluent limitations.

PAPER AND FORST INDUSTRIES RESEARCH - 1204, 1210, 1301

Status of Projects and Significant Accomplishments

Work Plan GJG: Technical Consultation and Data Dissemination

The section continued involvement with Section 13 permit activities. Information requests from the Denver Western Field Laboratory, and Chicago and San Francisco Regional Offices were handled. Meetings on Guidelines were attended at Mr. Stein's invitation in Washington. Mr. Quarles met with the industry group at the first meeting and cited eventual enforcement needs and permit conditions. Aid was also provided the New England Interstate Water Pollution Control Commission concerning a paper mill sludge disposal problem in Lake Champlain. A meeting was attended at the Atlanta Regional Office to evaluate the proposal by ITT-Rayonier to implement treatment requirements for the Fernando Beach Florida mill. A meeting was attended in Washington concerning Koppers Co. wood preserving waste treatment project at Carbondale, Illinois; decisions were reached concerning the state-of-art study for wood preservation. The section presented basic information to the Permits Section, Region X, on pulp and paper manufacture, waste sources and treatment thereof. A visit made to the Baxter Wood Preserving Plant at Eugene was preliminary to a meeting with A. X. Baxter at San Mateo concerning a possible no-discharge agreement for the west coast industry. Dr. Willard presented a paper on Color and Solids Removal from Aerated Lagoon Effluent at the February 21, 1972, Dallas AIChE meeting. The

section hosted a meeting on present progress in identifying importance of Klebsiella in pulp and paper wastes at the Laboratory on February 17. About 30 Federal, State, and industry people attended. Mr. Boydston and Mr. Scott met with Research Triangle people at Raleigh to determine how the program in pulp and paper might expand into the air control aspects and to determine any similar activity at RTP. Information was provided Autotrol Corp. on results obtained from hardboard wastes being processed on their pilot plant; to M. Clark, Water Resources, B.C. on color removal projects; to C. Woelke, Washington State Fisheries, on chemical analysis of samples for fish toxicity studies; and to P. Hynninen, Finland, on toxicity and steam stripping of condensates. Dr. Willard completed teaching a course in biological waste treatment at the University of Washington during the quarter.

#### Work Plan FCK: Paper Mill Influence on Bacterial Quality

As a result of the February 17 meeting on importance of Klebsiella in pulp and paper wastes, samples of vegetation from the forest were plated for K. pneumoniae with negative results, contrary to NCASI contention that they are a ubiquitous bacteria. Further research work has been directed toward a temperature (44.50 on vs 45°C) separation of E. coli and K. pneumoniae. Deoxyribonucleic acid (DNA) has been extracted from a number of field isolates of K. pneumoniae. This will be subject to physical tests to determine similarity with like materials isolated from clinical K. pneumoniae infections.

#### Work Plan GJH: Suspended Solids Removal by Mechanical Means

The program continued at Crown Zellerbach's Lebanon, Oregon, pulp mill to collect data on the microscreening of unbleached sulfite suspended solids during the quarter. Some equipment problems occurred due to corrosion and breakdown. The program employed the 10, 42, and 100 micron screens for raw wastes and biological floc from the aeration basin. Suspended solids, dissolved solids, and BOD are being determined. The next phase, to begin soon, will test microstraining of unsettled biologically treated wastes to provide fiber for floc formation and hopefully improved filtration and dewatering. Some delays have occurred because of main mill pump malfunction and lack of feed to the aeration system.

#### Work Plan ZEB: Biological Systems for High Efficiency Treatment of Hardboard Waste Water

The Bio-Disc treatment of raw hardboard wastes at the Evans Products Co. in Corvallis, Oregon, continued during the quarter with good treatment results. Three loading rates have been employed. A BOD removal of 90+ percent was obtained at a loading of 1 gallon per square foot surface per day while flows at 7 gal/sfd removed only 20 percent of the BOD<sub>5</sub> in the short 25-minute detention period.

#### Work Plan FCD: Grant and Contract Monitoring

Grant applications and research proposals reviewed during the quarter related to the following:

1. Effluent Control from a Kraft mill
2. Oxygen Bleaching and molecular Oxygen (UNOX) Waste Treatment
3. Pyrolysis of Industrial Wastes
4. Role of Nitrogen Fertilizers in Forest Soils
5. Closeup of a Neutral Sulfite Mill.

Project reports receiving final review and forwarded for publication were as follows:

1. 12040 FUB: Green Bay Packaging, Green Bay, WI - Pilot Reverse Osmosis for Control of Neutral Sulfite Effluents.
2. 12040 EEL: Reverse Osmosis Concentration of Dilute Pulp and Paper Effluents. Institute of Paper Chemistry, Appleton, WI
3. 12100 EBG: OSU, Influence of Log Rafting on Water Quality
4. 13010 EGA: OSU, Studies on Effects of Watershed Practices on Streams, Final Report printed.
5. State-of-Art Studies, Pulp and Paper, WAPORA

#### Grant and Contract Research

Of active grants, the following showed change of status or progress during the quarter:

1. 12130 GER: Optimization of Combined Industrial-Municipal Waste Treatment - revised specifications and drawings.
2. 12040 ESV: Crown Zellerbach, Camas, WA, Yearly progress report issued on soil assimilation of pulp and paper sludge versus crop yield studies.

3. 12040 EJU: St. Regis Paper, Pensacola, FL, Pilot operations started during quarter.

4. 12040 GQD: Crown Zellerbach, Lebanon, OR, The grant on coliform control has demonstrated that 10 ppm chlorine appears sufficient to control effluent quality. Possible toxicity effects are being investigated.

5. 12040 ENC: Interstate Paper, Riceboro, GA, Color Removal from Kraft & Pulping Effluents. Final report distributed.

6. 12130 EDX: Green Bay Metro Sewage District. Joint Treatment of Municipal Sewage and Pulp Mill Effluents. Final report distributed.

7. 12040 EMY: Mead Corporation, Multi-system treatment of Kraft and Mill Wastes. Final report distributed.

#### Plans for Fourth Quarter, FY 1972

1. Continue R&D grant and contract monitoring and review.

2. Provide, on request, consulting services to Headquarters, regional offices, and states. This includes activities associated with effluent guidelines for pulp and paper mills as well as wood preserving wastes.

3. Continue with in-house project work:

a. Continued work on hardboard wastewater treatment using a Bio-Disc.

b. Further investigation of screen size effect on suspended solids removal.

c. Determination of potential health hazard that Klebsiella pneumoniae may present.

## NATIONAL THERMAL POLLUTION RESEARCH PROGRAM

### Status of Projects and Significant Accomplishments

Research activities during this quarter have been minimal. A large percentage of staff effort has been devoted to review of Environmental Impact Statements on nuclear power plants, preparation of technical testimony of the Houston Lighting and Power suit, and consultation to headquarters and regional offices on discharge permit applications from fossil-fuel plants.

#### Work Plan ZBA: Improvement in Evaporative Cooling Methods

Dr. Garton presented a paper entitled, "Biological Effects of Cooling Tower Blowdown" to the 71st Annual Meeting of American Institute of Chemical Engineers in Dallas, Texas. This paper will be published in the Institute's publication, Water 1972. A limited number of pre-prints are available in NTPRP at this time.

#### Work Plan ZFD: Heat Transport and Behavior in Large Hydrologic Systems

Plans for cooperative research on the energy budget using the experimental channels to be constructed at Northern States Power Company's Monticello Nuclear Power Plant are still pending.

#### Work Plan ZFC: Heat Transport and Behavior in the Mixing Zone

A draft of Part I of the Workbook on Mixing Zone Problems will go out for review in about two weeks. Work on Part II has not been

initiated. It is anticipated that the major part of this work will be done this coming summer and continued for about one year from that time.

#### Work Plan ZFJ: Beneficial Uses of Waste Heat

See section on this work plan under grants and contracts -- Eugene Water and Electric Board, Grant No. 16130 EIK.

#### Miscellaneous:

Alden Christianson attended the Geothermal Resources First National Conference held in El Centro, California, on February 16-18, 1972. He subsequently surveyed additional literature and prepared an overall assessment of the pollutional aspects of geothermal resource development. This staff report is included in the Report and Papers section of this report.

The conclusion of this study is that numerous forms of pollution are potentially associated with geothermal development. Concerns include heat, entrained chemical pollutants (salts, gases, etc.), land subsidence, land use, visual and noise pollution. Most of the adverse environmental effects can and will be minimized through careful planning, development, and management. However, EPA should monitor this growing activity as development proceeds.

#### Grant and Contract Research

#### Work Plan ZFD: Heat Transport and Behavior in Large Hydrologic Systems

1. Environmental Systems Laboratory, Inc., Grant No. 16130 GSD,

"Study for the Stochastic Calculation in Water Equilibrium Temperature" is continuing.

2. Oregon State University, 16130 FOK, "Controlling Thermal Pollution in Small Streams," is continuing.

3. Cornell University, 16130 DIP, "Heat and Water Vapor Exchange between Water Surface and Atmosphere," is continuing.

Work Plan ZFC: Heat Transport and Behavior in the Mixing Zone

Oregon State University, 16130 DGM, "Thermal Plume Dispersion," is continuing.

Vanderbilt University, 16130 FDX, "Project for Concentrated Research and Training in the Hydrologic and Hydraulic Aspects of Water Pollution Control," was submitted to GAD for continuation for final year.

University of Minnesota, 16130 FSU, "Mixing and Dispersion at a Warm Water Outlet," was submitted to GAD for award for final year.

Work Plan ZFJ: Beneficial Uses of Waste Heat

Work plan for FY 73 activities is being formalized for grant with Eugene Water and Electric Board, "Thermal Water Demonstration Project."

Work Plan ZFF: Engineering and Cost Aspects of Heat Dissipation

Grant was awarded to Environmental Systems Corporation for supplement to their grant 16130 GNK, "Quantitative Measurement and Continuous On-Line Monitoring of Drift from Salt or Brackish Water Cooling Towers."

Washington State University, 16130 FLM, "Analysis of Engineering Alternatives for Environmental Protection from Thermal Discharges," has been continued. This is the final year on this grant.

Contract was awarded to Hittman Associates, 16130 HKK, "Thermal Pollution Control Nomographs."

Purdue University, "Turbulent Bed Cooling Tower," 16130 EMQ, has been submitted to GAD for continuation for the final year.

### Consulting Services

#### Work Plan ZFL: Consultation and Advisory Services

##### The following Environmental Impact Statements were reviewed:

1. Midland, Units 1 and 2, Consumers Power Company
2. Calvert Cliffs, United 1 & 2, Baltimore Gas & Electric
3. Turkey Point, Units 3 & 4, Florida Power and Light
4. Point Beach, Unit 2, Wisconsin-Michigan Power Company
5. Pilgrim, Boston Edison
6. Palisades, Consumers Power
7. Enrico Fermi, Unit 2, Detroit Edison
8. Quad Cities, Units 1 & 2, Commonwealth Edison & Iowa-Illinois gas and Electric
9. Surry, Units 1 & 2, Virginia Electric and Power

##### Further Consultation to Headquarters included:

1. Communications and meetings on thermal policy
2. Industrial Waste Surveys (steam power production)
3. Enforcement office -- Turkey Point
4. Review of AEC Guide to the Preparation of Cost-Benefit Analyses
5. Various proposals received and reviewed

6. In response to requests from Research Triangle Park we sent to several persons in headquarters and EPA laboratories requests for input on "Impact of Air Pollution Control Systems on Water Quality." Responses were compiled and information sent to Technical Analysis & Evaluation Section, NERC, RTP, with our recommendations.

Consultation was provided the Regions on the following:

Region I:

1. Technical assistance on Brayton Point, Massachusetts power plant.
2. Comments on proposal "Use of Sewage Treatment Plant Effluents as Cooling Water Makeup."
3. Technical assistance on Maine Yankee power plant.
4. Comments on proposal, Dr. Grune, "Ideas on Multiple Effect Humidity Process."

Region IV:

1. Technical assistance on Oconee Nuclear Station.
2. Technical assistance on Ocean Outfall Criteria, Dade County.

Region VI:

Houston Lighting and Power case.

Region IX:

Review of proposal on "Chemical Heat Pump," by Leonard Greiner.

Region X:

Review of proposal concerning cooling scheme for power plants, by John P. Harmon.

### Other Consultation Provided

Comments were provided National Water Quality Laboratory on "Use of Mechanical Devices for Antifouling in Sea Water Power Plant Cooling."

Comments were provided M. Yarosh, Oak Ridge National Laboratory on oxygenation in cooling towers. Mr. Rainwater also reviewed a report by Mr. Yarosh "Productive Use of Waste Heat from Steam Generating Electric Power Plants" prepared for AEC.

John P. DeKany, Research Triangle Park, visited NTPRP and suggestions were provided on "Chemical Engineering Research in Electric Power Generation."

### Reports, Papers and Presentations

Mr. Rainwater spoke at the January 1972, Annual Meeting of the Cooling Tower Institute, New Orleans. —

Dr. Garton presented a paper to the 71st Annual Meeting of the American Institute of Chemical Engineers in Dallas, Texas, in February.

Alden Christianson prepared a staff report, "Pollutional Aspects of Geothermal Resources Development," March 1972. Copies are available on request. —

Dr. Tichenor presented a paper at the Annual Meeting of the National Association of Corrosion Engineers in St. Louis on March 21, 1972. —

A paper by Dr. Shirazi, "Dry Cooling Towers for Steam Electric Power Plants in Arid Regions," has been accepted for publication in the Journal of International Association on Water Pollution Research.

### Plans for Fourth Quarter, FY 72

1. Although activities slowed this past quarter in the area of Industrial Waste Studies efforts (waiting for action on legislation) meetings are planned to coordinate efforts for acquiring additional data needed for establishing effluent levels.

2. Implement the fluid dynamic studies.

3. Schedule a workshop on submerged discharges.

4. Complete testimony for Houston Lighting and Power suit.

5. Continue with Environmental Impact Statement reviews.

## NATIONAL COASTAL POLLUTION RESEARCH PROGRAM

PPB 1607

### Status of Projects and Significant Accomplishments

#### Work Plan DBH: Estuarine and Ocean Outfalls

An Interagency Agreement between NCPRP and the Environmental Prediction Research, U.S. Navy, Monterey, California, has been requested. The agreement concerns development and testing of a numerical model of pollutant dispersion in the New York Bight area.

Chief, Physical Oceanography Branch is serving as a co-coordinator with the Departments of Oceanography and Civil Engineering, Oregon State University on a short course to be held in June. The course is on digital computer techniques for tidal modeling of well-mixed estuaries and shallow bays.

Equipment purchases for the offshore oceanographic experiment discussed in the last quarterly report were initiated. The experiment will be conducted off the Oregon coast this summer in cooperation with the Oregon State University and several other academic and governmental institutions.

A grant was made to Dr. D. Harleman, MIT, for an investigation of partially mixed estuaries and the incorporation of biogeochemical terms in the mass transport equations.

#### Work Plan ZAH: PCB, Biocides, and Other Persistent Organic Compound

##### Distributions and Fates in Coastal Waters

Work continued on evaluation of sample clean-up procedures with primary emphasis on coastal water and sediment samples. Sample clean-up

procedures for sewage treatment plant water and sludge effluent samples were also examined. A certain degree of difficulty was experienced and overcome when sludge samples were analyzed.

Efforts to identify input sources and rates of input of PCBs, DDT and other persistent organics into Puget Sound were initiated. Preliminary experiments have not been completed.

#### Work Plan XAA: Barge Dump Disposal of Wastes in Ocean and Disposal Waters

Proposals have been technically reviewed (from California Institute of Technology and from Rudjer Boskovic Institute, Yugoslavia) and cooperative experiments have been outlined for San Francisco Bay with the Corps of Engineers. Taken together these three projects plus one having input from NCPRP to the Cal Tech project, constitute a large program of particulate research for coastal waters. The purchase of radiation equipment planned for long range work needs has been partially accomplished. A large Ge(Li) crystal has been ordered for 120-day delivery. Such large crystals are distinctly special order items and 120-day delivery is probably the best that can be anticipated. In addition, a direct high speed connection from our present equipment to the OSU computer has been installed and auxiliary electronics for its control have been completed but not yet attached and tested.

#### Work Plan ZAI: Mercury, Cadmium, Arsenic, and Other Heavy Metal

##### Distributions and Fates in Coastal Waters

Walter Rittall attended a meeting in Washington, DC, on March 21-22, 1972. Six contractors presented preliminary findings relative to ways

of treating mercury laden sediments in fresh water streams and lakes. Panel members discussed merits of proposed schemes and recommended continued funding of two proposals leading to a demonstration project.

Using our environmental simulator, two runs have now been made (in addition to a prior practice run) on uptake of mercury (inorganic and organic) at very low levels under a variety of circumstances by several biota of Northwest coastal regions as well as by Yaquina Bay waters and sediments. Among the variables considered preliminarily, were form of the mercury compound, concentration, chelators, and other materials that might occur in effluents and in natural waters and which might be anticipated as bearing on the uptake. The data which are apparently clear and coherent, are quite numerous, upwards of 1000 samples were taken, dissected, counted, and weighed and approximately 100 curves will have to be drawn after statistical analysis. The required ADP work has been delayed by program planning efforts (EROS, ROAP).

The purchase of data handling equipment for the radiochemistry laboratory has been in part completed and a very useful thin crystal is now being interpreted with our counting equipment. This equipment will simplify and make more precise the handling of voluminous radioactivity data which has heretofore been a physically deficient problem.

#### Work Plan: Remote Sensing and Monitoring

Considerable effort was expended on coordination of NASA underflights for the ERTS-A project. Field procedures and plans were finalized with Bendix and the University of Michigan - joint participants with EPA. Tentative arrangements were made with New York, San Francisco, and

Atlanta Regional Offices for assistance in field collection of sea truth data. We were advised by a headquarters representative of OR&M that we were relieved of responsibility on these projects as of April, and that future EPA participation would be handled by Headquarters. No written confirmation has been received.

Operational check out and modification of in-house equipment listed below:

1. Underwater television equipment
2. Benthic respirometer.

### Consulting Services

#### Work Plan ZAR: Technical Consultation on Coastal Pollution Problems

At the request of David A. Bucy, Associate Professor, program personnel presented a lecture to senior General Engineering students at Oregon State University on March 8, 1972.

Assisted in preparation of testimony for California State water quality standards.

Assisted in preparation of RFP Review and many principal investigators with their proposals for technical contract work on oil pollution. This work has led to a new program: 21 AIV.

Attended planning meetings and prepared experimental plans for NTA in coastal waters.

Some consultation time was spent with personnel of the Northeast Regional Office on modeling of embayments in Massachusetts and Rhode Island.

## Grant and Contract Research

### Work Plan XAA: Barge Dump Disposal of Wastes in Ocean and Coastal Waters

Grant monitoring.

#### Other:

Lake Superior: Finalized \$25,000 contract for current meter film processing including travel to Waltham, Massachusetts, to participate in film reading process.

Conferred with Mike Gross of Enforcement Section relative to preparation of final report for 1971 field study and complete a review of file material on Lake Superior study.

One week temporary duty in Washington, DC, assisting PEM, Transport Branch, in bringing research proposal files up to date.

Completed cooperative project with EPA-Pesticides Branch, NERC-Corvallis. NCPRP's role was the design and installation of a hinged ramp at OSU's Marine Pier at Newport, Oregon.

Chief, Physical Oceanography Branch, served as a panel member on modeling at the Marine Technology Society Meeting in Washington, DC.

### Plans for Fourth Quarter, FY 1972

Develop sampling schedules, assemble and design equipment for plant and field survey of Reserve Mining Company discharge to Lake Superior. Survey to begin as soon as weather conditions permit.

Equipment will be assembled and tested for deployment in the field during the offshore oceanographic experiment.

It is expected that the Interagency Agreement with U.S. Navy will be initiated requiring some final negotiations on technical aspects of the Agreement.

A grant with the University of Washington on final circulation has been developed. It is anticipated that their grant will also be let in this fiscal year.

Work will continue on the analytical models of drift flow report.

## NATIONAL EUTROPHICATION RESEARCH PROGRAM

PPB 1601

### Status of Projects and Significant Accomplishments

During this quarter NERP personnel spent a large percentage of time organizing and getting the National Eutrophication Survey Program (NESP) (328206) underway. A list of all identifiable sewage treatment plants (approximately 25,000) was provided to each EPA Regional Office and they were requested to identify all those treatment plants in their Regions which discharged directly to lakes or impoundments or to rivers and streams which were impounded within 25 miles. Subsequently a questionnaire was sent to persons in Region I, New York, Minnesota, Michigan and Wisconsin, asking for additional information and data on the lakes in their respective states. All the data will be arranged in a filing system set up by Region, States within each Region, and lakes and impoundments within each state. As information and data are received on each lake, it is filed appropriately.

NERP staff devised a Staffing Chart for the NESP and prepared Position Descriptions and Requests for Personnel Action (SF-52) for the 22 new positions to be located at NERC, Corvallis. NERP assisted the Western Environmental Research Laboratory at Las Vegas, which will conduct a sampling program on the identified lakes, in recruiting personnel and advising them on techniques for chemical and biological analysis. NERP also identified the tributaries on all the lakes (approximately 300) to be sampled the first year.

NERP personnel provided specific biological, chemical, and physical data on 20 lakes in the United States that were considered to be prime candidates for immediate restorative procedures. This information was requested by the Office of Water Programs, EPA Headquarters.

Work Plan ZCB: Assay Procedures for Determining Productivity Responses

Preliminary interpretation of algal assays on fall and winter water samples from Burntside, Fall, and Shagawa Lakes indicates the following nutrient(s) limiting for algal growth. Burntside filtered and autoclaved/filtered (A/F) water was primarily phosphorus limited for algal growth at the surface, middle, and bottom sampling depths. Burntside (A/F) lake water supported an average of 0.22 mg dry wt/l of Selenastrum capricornutum in the fall and winter surface and mid-depth samples. The winter bottom depth sample supported 1.09 mg dry wt/l of the test alga. Preliminary chemical analysis indicate a slight increase of phosphorus with depth in the Burntside winter lake samples. The addition of 1.0 mg N/l failed to stimulate algal growth. However, the addition of .05 mg P/l increased algal productivity nineteen and tenfold respectively, in the fall and winter Burntside lake water samples. While the singular addition of nitrogen failed to stimulate growth, its addition with .05 mg P/l supported an average growth of 25.1 mg dry wt/l of the test alga. Shagawa Lake surface (A/F) water samples are primarily phosphorus limited for algal growth. Unlike Burntside Lake, the addition of nitrogen to Shagawa Lake mid-depth and bottom samples stimulated algal growth. Assay results also indicate nutrient stratification in Shagawa Lake with an average productivity response of 0.75, 8.4 and 14.1 mg dry wt/l

of the test alga, respectively, with the increase in lake depth. Fall Lake water samples were phosphorus limited for algal growth. Unlike Shagawa Lake, Fall Lake algal productivity response was similar at the surface and mid-depth sampling points. An average algal productivity of 0.06 mg dry wt/l in the fall and 0.12 mg dry wt/l in the winter, surface and mid-depth Fall Lake water samples was observed.

The first series of five Lake Michigan samples collected on a transect from Milwaukee, Wisconsin to Luddington, Michigan have been assayed for their algal growth potential. Singular phosphorus spikes ranging from 0.005 to 0.020 mg P/l, with and without the addition of 1.0 mg N/l, AAP medium, iron and trace elements were added to the lake water samples. Preliminary results indicate that the singular addition of .02 mg P/l stimulated algal growth in four of the five Lake Michigan samples. An initial study indicated that as the amount of phosphorus was increased from 0.005 to 0.020 mg P/l, and the other nutrients (N, trace elements and Fe) were kept constant, there was a corresponding increase in algal productivity ranging from 0.10 to 8.0 mg dry wt/l. These results tend to indicate that Lake Michigan is limited for algal growth by several nutrients including phosphorus.

Two algal assay research studies were initiated this quarter:

- (1) The development of a marine algal assay bottle test capable of determining algal productivity in an estuarine environment, and
- (2) the evaluation of trace metals (Cu, Hg, Zn, Pb, Co, Cd, Mn) required for algal growth.

Four test organisms are being evaluated as potential marine algal assay test species; two diatoms (Cyclotella menenghiana, Thalassiosira pseudonana) and two green flagellates (Dunaliella tertiolecta, Nannochloris atomus). Initial studies indicate that all four of the test organisms will grow in Burkholder's artificial sea water containing AAP medium concentrations of N, P, Fe, and trace elements, when incubated at either 18 or 24°C under 750 or 400 ft-c of continuous "cool white" fluorescent light.

Investigation is underway to design and implement a procedure which will enable a rapid measurement of daily biomass changes during the growth cycle of Anabaena flos-aquae. The study includes the use of such equipment as an electronic particle counter, hemacytometer and fluorometer. At present, selected cultures of Anabaena are being grown in AAP and Gorham's medium under the conditions outlined in the "Algal Assay Procedures: Bottle Test," August 1971. An attempt at using natural waters as the growth medium was also tried. Tentative results indicate that a constant factor to enumerate cell number does not apply to the entire growth cycle. Distinct factor differences were noticed using the algal assay procedure medium between the log and lag phase of growth. Growth response in natural water (Cline's Pond) was so erratic that conclusive data were not obtained. It was encouraging to note that replicate cell counts using an electronic particle counter for a given sample are within 10 percent of each other.

Work Plan ZCA: Determination of the Environmental and Nutritional  
Requirements and Physiological Processes of Freshwater  
and Estuarine Algae and Plants

Determination of the trace metal requirements of three species of freshwater algae were initiated. The algal species being used in this study are Selenastrum capricornutum, Microcystis aeruginosa, and Anabaena flos-aquae. Analysis of the trace metals content of algal cells grown in the algal assay procedure medium or Gorham's culture medium was not obtainable because of the limitations of analytical equipment in our laboratory. Dense aliquots of S. capricornutum and M. aeruginosa that had been cultured in Gorham's medium were distributed to the following laboratories for trace metal analysis:

1. Oregon State University Radiation Laboratory, Corvallis, Oregon, Neutron activation analysis.
2. Southeast Water Laboratory, Athens, Georgia, spark source mass spectrophotometer analysis.
3. Instrumentation Laboratory Incorporated, Lexington, Massachusetts, atomic absorption emission, spectroradiometer with a flameless sample attachment (IL Model 355).
4. EPA Region X Laboratory, Seattle, Washington, Perkin-Elmer graphite furnace.

Results from the four laboratories have not been received at this time.

Preliminary studies of algal cultures spiked with copper and mercury are underway.

#### Work Plan ZBP: Lake Restoration

Tertiary treatment plant construction at Ely, Minnesota, has thus far held essentially to schedule and is 35 percent completed as of the end of March.

Sampling was carried out as scheduled at Shagawa Lake, Ely, Minnesota, with a few exceptions due to extremely cold weather (to  $-49^{\circ}\text{F}$ ) during January and February. Special water samples were taken for algal assay PAAP evaluation and sediment samples for sediment-water interchange tests for NERP at the Corvallis Laboratory.

Chlorophyll concentrations have remained essentially nil. The lake stabilized to a condition characterized by slowly changing parametric gradients. Lake remained ice-covered with a substantial layer of snow.

A dye tracing study was conducted to determine the flow of municipal waste water in Shagawa Lake. Tentative conclusion is that the flow (under ice conditions) was into the lake running northwest from the waste water outfall to the first small island, then west in a relatively confined volume between seven and fifteen foot depths. After three and a half days the waste water had progressed to within about three hundred yards of Brisson's Point Sampling Station. After the same period of time there was no evidence of an easterly or northerly flow.

Work is progressing to resolve the question of sludge disposal from the existing and new treatment plants. This could be a critical problem since State, County, local, private, and Forest Service approvals are necessary. All parties have been contacted: no solution is yet in sight. Aid of AWTRL has been requested.

Work Plan ZCH: New Methods for the Removal and/or Inactivation of  
Nutrients in Lakes

The Cline's Pond sodium aluminate experiment was monitored monthly. Ortho-P remained constant at about 0.003 mg/l; total-P increased slightly as the quarter progressed to 0.04-0.07 mg/l. Nitrate-N increased dramatically to >1.0 mg N/l in January, and has since decreased to >0.5 mg/l. Chlorophyll a in surface waters varied between 13 and 26 mg/m<sup>3</sup>.

The Lake Sallie nutrient budget has been recalculated in order to reconcile two independently derived sets of data, eliminate questionable data, and update some areas where new information has recently been received. A summary report is in preparation.

Work Plan ZCE: Sediment-Water Plant Nutrient and Toxic Element  
Interchange Processes and Control

Sediment samples were obtained from Shagawa Lake in January, taken through the ice at four different locations. Leaching experiments were initiated as described in the last quarterly report, utilizing aerobic, anaerobic, mixed, and static conditions. Leaching of phosphorus has occurred most strongly in anaerobic unmixed systems containing sediments taken at the deeper locations.

Work Plan ZCJ: A Comparative Study of Eutrophication in Two Mountain  
Lakes

Diamond Lake was sampled at the center (deep) station on February 2. The lake was covered with 2-2.5 ft of ice and 1 ft of snow. As expected,

the lake was inversely stratified, with temperature and DO of 0.4°C and 10.8 mg/l at the surface, and 2.8°C and 0.5 mg/l at the bottom (14 m). The pH was about 6.7 throughout the water column.

Phytoplankton clump counts averaged 70/ml, consisting of Asterionella and an unidentified flagellate.

Most other parameters behaved normally for winter conditions. However, hypolimnetic ortho-P levels were only 5-20 percent of those found under similar reducing conditions in the lake last summer.

#### Other Activities

In March Mr. Maloney visited the Dow Chemical Company, Freeport, Texas, to review the progress of a research contract relating to the development and testing of selective algicides. He also attended a Headquarters meeting to discuss and evaluate future research needs concerning the environmental effects of nitrilotriacetic acid (NTA).

C. F. Powers, Spencer Peterson and William Sanville met with personnel of the U. S. Forest Service and Beak Consultants at Portland to discuss problem at Lake of the Woods, Oregon.

Kenneth Malueg attended a presentation at Stevens Point, Wisconsin, on lake restoration activities in Wisconsin; participated in review board at Madison, Wisconsin on inland lake demonstration projects regarding lake renewal and management activities; and visited Ely, Minnesota to discuss research activities of Shagawa Lake Project.

Robert Brice visited South Lake Tahoe to obtain useful information on tertiary plant operation.

Ron Morris and Robert Brice participated in a meeting at Cincinnati, among AWTRL, TKDA, Graver, and Komline-Sanderson to resolve questions on operation of the tertiary plant. A cooperative laboratory program in the near future will evaluate various operating procedures for the tertiary plant.

Visitors included: (1) Dr. Jose Ortiz-Casas, an engineer for the government of Spain who was in the U. S. to learn more about the eutrophication process and its control; (2) Dr. Eschenroder (General Research Corporation) who discussed his corporation's role in development of mathematical models and how they could help in the modeling of Shagawa Lake.

#### Grant and Contract Research

The following research grant and contract proposals were reviewed:

1. "Lake Restoration Through a High Capacity Siphon System."
2. "Restoration of Inland Waterways."
3. "Population versus Eutrophication."
4. "Perspectives on Biological Effects of Artificial Destratification."
5. "Biology and Biochemistry of Cyanophages."
6. "Nitrogen Metabolism in Bloom Blue-Green Algae."
7. "Remote Sensing for Eutrophication Measurement."
8. "Phosphorus Removal in an Operating Wastewater Treatment Plant and the Consequent Effect on Algal Growth in Ponds and Additional Phosphorus Sedimentation in Streams."

9. "Removal of Algae from Eutrophic Lakes and Oxidation Ponds by Polymer-Aided Centrifugation." (Relevancy Review)
10. "Salton Sea Eutrophication Control Using Local Brines for Phosphate Removal." (Relevancy Review)
11. "Limnology and Eutrophic Processes of Lake Tahoe."
12. "New Approaches to Biological Control of Harmful Blue-Green Algae With Special Emphasis on Anabaena and Microcystis."
13. "Algal Assay Prediction of Potential Productivity of Fresh and Estuarine Waters."
14. "Biological Control of Aquatic Vegetation."
15. "Nitrate Removal from Water at the Water-Mud Interface in Swamps, Marshes, and Flooded Soils."
16. "Eutrophication Processes in Southeastern Virginia Ponds."  
(Proposed)

#### Reports, Papers, and Presentations

Maloney, T. E., W. E. Miller, and T. Shiroyama. Algal Responses to Nutrient Additions in Natural Waters, I. Laboratory Assays. Proceedings of Symposium on Nutrients and Eutrophication. American Society of Limnology and Oceanography. 1972.

Powers, C. F., D. W. Schults, K. W. Malueg, R. M. Brice, and M. D. Schuldt. Algal Responses to Nutrient Additions in Natural Waters, II. Field Experiments. Proceedings of Symposium on Nutrients and Eutrophication. American Society of Limnology and Oceanography. 1972.

Malueg, K. W., C. F. Powers, and D. Krawczyk. Effects of Aerial Forest Fertilization with Urea Pellets on Nitrogen Levels in a Mountain Stream. Northwest Science, Vol. 46, No. 1. 1972.

Ely staff presented a program on environmental pollution at the Eveleth (Minnesota) High School.

#### Plans for Fourth Quarter, FY 72

##### Physiological Control

1. Complete the statistical analysis and evaluation of the algal assay data to determine the effect of trace metals on algal growth.
2. Continue the evaluation of new test species for algal assays.
3. Continue the investigations of the Shagawa Lake Project water samples and the Lake Michigan water samples.
4. Continue development of an algal assay procedure for marine and estuarine waters.

##### Lake Restoration

1. Review all 1971 data and incorporation of necessary parameters into the preliminary mathematical model of Shagawa Lake.
2. Get authorization and hire needed personnel for Shagawa Lake Project.
3. Continue limnological investigation of Shagawa Lake.
4. Begin laboratory program at Ely to evaluate various operating procedures for the tertiary plant.

### Technology Development

1. The Diamond Lake study will be resumed at ice-out, probably about June 1.
2. Site selection for studies of nutrient flux from septic tanks to lakes will be made and sampling wells installed in those sites which are accessible.
3. A single monitoring station will be established on Suttle Lake and other potential study lakes will be sought.
4. It is anticipated that the A and E study for experimental ponds will be contracted.
5. The Cline's Pond project will continue to be monitored.
6. The Cline's Pond manuscript should be completed and submitted for publication.
7. A study of ATP instrumentation and the use of ATP techniques in limnological studies will be made.

## CONSOLIDATED LABORATORY SERVICES PROGRAM

### Status of Projects and Significant Accomplishments

#### General

The  $N_2/O_2/CO_2$  gas chromatograph was field tested at Seattle; at the Western Fish Toxicology site, at the Fairplay Laboratory, Oregon State University, and the Santiam River at Interstate 5. The chromatograph operated perfectly under field conditions.

The SHAVES program is being programmed for the Boeing Computer (EPA's contract computer). The error and duplication sections are now in the Boeing System. The data 100 terminal is also now producing data sheets, thus the morning visits to OSU computer is no longer necessary.

The backlog is being reduced, thus analysts are moved into areas where backlog exists to arrive at a zero backlog. The management information turnaround and backlog produced by the SHAVES assists in moving analysts to appropriate locations.

#### Automated Analytical Systems

The interface connecting Technicon II to a teletypewriter has been received and installed. What now remains is to connect program Technicon which was developed by Ken Byram with the help of Fred Roberts, to the Technicon II system. Once the interface is made data can be dumped directly into the computer. A program will then

determine whether individual samples are valid within appropriate quality control and store the validated data for printouts. Work is continuing on removal of arsenic interference in the phosphorus analysis. Initial experiments indicated that 10 micrograms of arsenic with the present Technicon flow system would be seen as 1 microgram of phosphorus. Systems are being explored to completely remove the arsenic interference so that we need not conduct an arsenic analysis but simply run a phosphorus analysis and obtain a valid result.

#### Atomic Absorption Spectrophotometry

Response in metal analysis now is a function of production. In analyzing samples for metals, freeze-dried samples were compared to normal air dried samples. In freeze-drying samples for mercury analysis the levels of mercury were three-fold higher than in similar wet digested samples. The spikes were also three times higher. The use of a mercury manometer appears to add this higher level of mercury into the sample. More work will be done to prove this theory. Tissue from the crab sample, after mercury analysis, is combined with a chelate extracting primarily cadmium. The chelate is extracted in an organic solvent and analysis is performed for cadmium. Systems are being evaluated to achieve the analysis of metals in algae. Samples have been sent to IL Development Laboratory, to Southeast Laboratory Athens, to EPA Regional Laboratory Seattle for comparative analysis of metals in algae. The analytical technique which is being evaluated is the tantalum ribbon combustion sampling system being marketed by the IL

Laboratories. This system is very similar to the Perkin Elmer graphite furnace combustion system.

### Specialized Analysis

Work is continuing on freeze drying samples before analysis. Observations continue to impress us on the difference between a freeze-dried sample and an air-dried sample. It appears that freeze drying produces a more uniform material from which a representative sample can be taken.

During this particular period, CLS conducted a study on preservation of samples. The results of this study indicated that at high organic levels it is essential to poison a sample with 400 mg/l of mercury rather than 40. The 400 mg/l level seems to inhibit microbiological activity observed at the 40 mg/l level. The use of sulphuric acid at a rate of 2 ml/l did not inhibit bacterial growth.

Assistance was given to NFIC-Denver on chemistry, specifically the automated analytical system.

Methods write-up for the determination of dissolved gases in water and assistance to the National Eutrophication Survey Program also required a considerable amount of time by the specialized group.

### Analysis of Carbon

A back-up system for the analysis of inorganic carbon in water has been set up using the portable  $N_2/O_2/CO_2$  system and a second system as backup is being assembled for use in the laboratory. Preliminary information on the response of the  $CO_2$  using the gas chromatographic

system indicates that levels of 0.3 mg/l can be observed at a precision of  $\pm 0.1$  mg/l. Continuous checks are made between analysis using the Beckman System for total carbon and total organic carbon and the OIC System.

#### Computer Services

The computer services group has been concerned with programming of the SHAVES system onto the Boeing Computer using the Data 100 terminal. Programs run through the OSU Computer can now be fed directly from the terminal with use of the OSU Computer, the Boeing Computer, or interfacing through the Mead System. A considerable amount of time has been devoted to the National Eutrophication Survey Program. The Chief has devoted considerable amount of time working with EPA-ADP systems as part of a task force looking into the problem of compatability. Recommendations by the task force will produce one ADP system with appropriate interfaces.

#### Biology

Discussions between the Chief of Biology Section and the National Waste Treatment Program on a biological study are now in progress. The discussions will delineate resources and time frames in studying toxicity of industrial wastes on the larval stage of an insect form.

#### Microbiology

The Microbiological Section is still handling samples originating in the Regional Programs. These are the only samples being handled from the Regional Programs at the present time.

### Areas of Concern

The cyclic nature of sample input is still causing concern. The concern with ROAP's and National Eutrophication Survey Program had an effect on low input of samples into CLS. Mechanisms must be worked out to develop a steady inflow of samples.

### Plans for Fourth Quarter, FY 1972

The National Eutrophication Survey Program has top priority, and appropriate systems are being checked out and will be checked out so that the program functions smoothly.

The final method write-ups for the analysis of gases dissolved in water will be distributed. Efforts will continue to put all phases of the SHAVES Program onto the Boeing Computer.