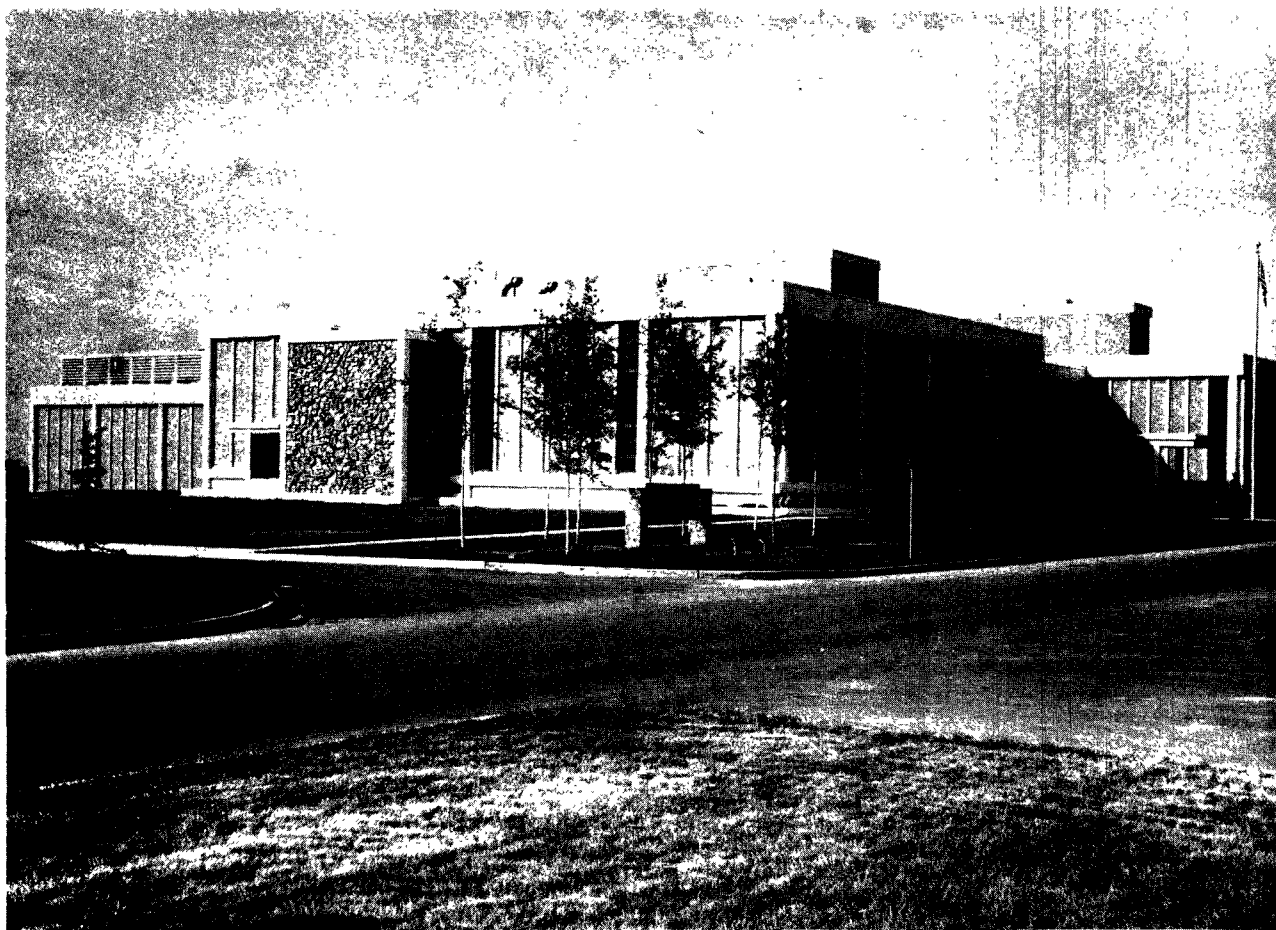


UNITED STATES DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
ALASKA WATER LABORATORY



QUARTERLY RESEARCH REPORT

April 1 — June 30, 1971

ALASKA WATER LABORATORY
College, Alaska 99701

ALASKA VILLAGE DEMONSTRATION PROJECT(S)

PROJECT: 16100 GGR

Objectives:

To plan and construct in one or more Alaskan villages, projects to provide a central safe water supply and waste disposal facility in conjunction with community laundry and bathing facilities and a community health education program to help assure continued beneficial use of the projects.

Work Accomplished Fourth Quarter FY 1971:

In April a contract for initial demonstration project at Emmonak was signed with International Research and Technology being the contractor. Design work on the contract has begun and the contractor has developed a preliminary plan for the building to house facilities.

Technical proposals for a second project were discussed with three bidders for the project to be constructed at Wainwright. Bureau of Indian Affairs (BIA) and Public Health Service (PHS) programs will be coordinated with this project and will provide financial support.

A contract has been negotiated with Wasteco, Inc. for phase I (design) of a project for the arctic village of Wainwright. The contractor has already performed some significant design steps and is making good progress. On June 24 the Project Advisor accompanied representatives of Wasteco on a visit to Wainwright to obtain specific project site information and water samples for examination. Other matters concerning the minor details of the facility were discussed with village residents at that time.

Project personnel have worked with the Regional Training Officer to develop a training course for the native operators of AVDP facilities. Training staff, housing, curriculum and equipment are being prepared for this course which will be held in mid-August. Laundry equipment and a tracked vehicle which will become a part of the Emmonak installation have been ordered for use in the training course and tool kits for the trainees are being assembled. Process equipment similar to that which will be used in the village installations has been located in the Fairbanks area and arrangements are being made for trainees to obtain operating experience with this equipment. The City Councils of Emmonak and Wainwright have appointed two men from each site for training in the operation and management of the demonstration facilities.

At the request of the Alaska Department of Health and Welfare, project personnel have explored arrangements under which AVDP would provide services in implementing the Alaska State Village Safe Water Act.

The villages of Arctic Village and Allakaket have been surveyed to determine their possible suitability as future project locations. Additional projects will only be undertaken when agreement is reached with the State of Alaska on the mechanism and conduct of a jointly directed state-funded program.

In-house work is about on schedule. However, due to new requirements for negotiating contracts the Wainwright project was late getting underway. Also, at the end of the quarter, the contractor for the Emmonak project had failed to deliver preliminary plans and specifications falling within the monetary limitations for the project. It will be necessary to delay construction of the Emmonak project because the contractor has continued to propose project costs beyond the available funds.

Work Plan First Quarter FY 1972:

1. Complete agreement between EPA and State of Alaska.
2. Participate in phase I design of both projects.
3. Carry out first phase, project operator training.
4. Conduct additional village surveys for projects to be done under state agreement.

COLD CLIMATE RESEARCH

PROJECT: 16100 GKG - LOW TEMPERATURE DISINFECTION

Objectives:

1. Determine effectiveness of chemical disinfection of low temperature waste water treatment plants.
2. Develop disinfection design criteria for low temperature system.
3. Demonstrate application of low temperature design criteria.

Work Completed Fourth Quarter FY 1971:

None. The chlorination system is in operation at the Eielson Pilot Plant facility, but no cold weather data can be obtained until next winter.

Work Plan First Quarter FY 1972:

None.

PROJECT: 16100 GGS - APPLICATION OF ADVANCED WASTE TREATMENT IN ALASKA

Objectives:

1. Establish water use patterns for remote location operations and determine the feasibility of reducing water requirements.
2. Determine the effectiveness of small scale tertiary package plants and demonstrate their capabilities under remote site operating conditions.

Work Completed Fourth Quarter FY 1971:

Failure of the activated carbon filters is believed to be due to excessive overloading by organic rich pin floc in the clarifier overflow. Water use patterns (quality and quantity) for remote camps were reported in the paper "Alaska Industry Experience in Arctic Sewage Treatment" presented at the 26th Purdue Industrial Waste Conference.

Work Plan First Quarter FY 1972:

Due to lack of activity in the North Slope camps with advanced waste treatment units no work is planned for the next quarter. The Alaska Air Command has let two contracts for advanced waste treatment units at King Salmon Air Force Site. The units will be installed this summer or next spring. The Alaska Water Lab will assist in monitoring these units.

PROJECT: 16100 FHC - COLD REGIONS EXTENDED AERATION DESIGN CRITERIA

Objectives:

Development of adequate design criteria for application of extended aeration in Alaska.

Work Completed Fourth Quarter FY 1971:

The bulking problem at the Eielson A.F.B. units was corrected by reducing the sludge age (i.e., sludge wasting).

Minor modifications for better winter performance at the Eielson A.F.B. pilot site were designed and are underway. Compressor, storage and chlorination sheds were built. A contract for construction of a dry pit pump shed to house the main feed pumps was let and completed. A design for modification of the center basin to provide a sludge handling facility was completed, and ordering of the materials begun.

A review draft of the status of extended aeration in Alaska report was completed.

PROJECT: 16100 FHD - DESIGN CRITERIA FOR ALASKA SEWAGE LAGOONS

Objectives:

1. To establish design criteria for the aerated lagoon waste treatment process in Alaska, and to evaluate parameters and contribution to effluent quality, power and maintenance costs, and reliability.

2. To demonstrate the feasibility of waste stabilization lagoon application in Alaska, particularly utilizing winter storage and summer treatment capabilities.

Work Completed Fourth Quarter FY 1971

Collection of data from the Eielson A.F.B. pilot lagoon and the Northway lagoon continued through the quarter; evaluation of data collected to date is essentially completed.

Proposed lagoon modifications for the Ft. Greely lagoon project were designed, coordinated with USARAL and the Corps of Engineers, and approved by EPA headquarters. Materials have been ordered and labor contracted for the project.

Work Plan First Quarter FY 1972:

A. Aerated lagoons:

1. Complete modifications to the Ft. Greely aerated lagoon and complete preparations for the sampling program.

2. Continue data collection from the Eielson A.F.B. pilot lagoon and the Northway lagoon.

B. Facultative lagoons:

1. The center basin will be converted to a waste sludge handling unit and will not be used as a facultative lagoon during the coming season.

2. Collection of data from the Ft. Yukon lagoon will continue as available manpower and funds permit.

PROJECT: 16100 GGT - FATE AND EFFECT OF OIL SPILLS ON ARCTIC RIVERS

Objectives:

Develop an understanding of the rate of movement and ultimate fate of petroleum spilled on and under the ice of ice covered rivers.

Establish the toxicity of spilled hydrocarbons to the aquatic communities of ice covered streams.

Work Completed Fourth Quarter FY 1971:

Plans were formulated for participating in a cooperative study with U.S. Army Cold Regions Research and Engineering Laboratory dealing with effects of oil spilled on permafrost terrain.

Work Plan First Quarter FY 1972:

Develop detailed work plan for the study mentioned above.

PROJECT: 16100 FHB - BACTERIA CONTAMINATION OF ALASKA WATERS

Objectives:

The objectives of this study of the Tanana River, from its confluence with the Chena River to its confluence with the Yukon River, are as follows:

1. To determine the rate of reduction in numbers of fecal indicator bacteria.

2. To determine changes in the chemical parameters which are associated with domestic wastes.

3. To establish the time required for a water mass to travel from the mouth of the Chena River to the mouth of the Tanana River.

Work Completed Fourth Quarter FY 1971:

None.

Work Plan First Quarter FY 1972:

Complete preparation of final draft for publication.

PROJECT: 16100 FHE - DISSOLVED OXYGEN DEPLETION AND ALASKA WATER RESOURCES

Objectives:

A. The role of microorganisms in D.O. depletion at low water temperatures.

1. To determine the metabolic activity of the natural population of microorganisms in subarctic river water in a system which simulates river conditions as nearly as possible.

2. Assess the role of nutrients in metabolic activity of microorganisms at low temperatures.

B. D.O. sampling technique for arctic operation

1. To determine the method of collecting and transporting D.O. samples in BOD bottles which will minimize ice problems and provide the most valid sample.

2. To validate the sampling methods described in section 1. Using laboratory techniques, examine the significance of the error resulting from different sampling techniques.

C. Winter baseline D.O. conditions

1. Establish baseline conditions for waters of the major drainages.

2. Determine the D.O. levels of ground water to establish the oxygen content of the water that rivers receive under ice cover.

Work Completed Fourth Quarter FY 1971:

A. Studies on the effect of velocity on the rate of D.O. depletion with unpolluted river water continued. These studies seem to verify that the speed of current in the river does not measurably effect the rate of D.O. depletion. Because of the surface runoff during breakup, this work was not completed and will be continued in FY 72.

Pure cultures for nutritional studies have been obtained from various samples and final selection of cultures for study is in progress. The project plan for FY 72 has been completed and the literature review in support of this effort has started.

B. 1. This section was virtually inactive due to limited field work and the end of winter field conditions.

2. Tests were run comparing the results of four different sampling techniques. Utilizing first tap water then upper Chena River water, tests were run on samples taken from super-saturated water to water with drastically suppressed D.O. levels less than 10% saturation. A first draft of a paper describing the validation study was initiated.

C. Limited field work was attempted this quarter because of the end of winter conditions. Substantial effort was placed on data analysis and correlation prior to the trip to the National Water Quality Laboratory at Duluth. Visited the NWQL and discussed D.O. trends in arctic and subarctic waters and winter dissolved oxygen sampling techniques. Some progress was made on the initial draft of the field work and results.

Work Plan First Quarter FY 1972:

A. Study of the effect of velocity on the rate of D.O. depletion with unpolluted river water will continue and the portion of the study using laboratory substrates will be completed. Survey of the nutritional requirements of selected pure cultures will be started. Literature survey and monitoring of the indigenous bacterial flora at 0°, 20° and 35°C will continue.

B. 1. Begin the first draft describing the sampling and transporting procedures.

2. Finish paper on lab study and have it reviewed by lab committee.

C. Field trips will be taken to examine the D.O. in ground water sources during the summer. Writing the first draft of the manuscript will continue.

PROJECT: 16100 GHG - BASELINE CONDITIONS OF ARCTIC NORTH SLOPE

Objectives:

To provide baseline water quality information on the Sagavanirktok River system and the immediate industrial region of the developing oil field, examining physical-chemical water chemistry, microbiology, and aquatic biology (piscine and benthic organisms) parameters.

Work Completed Fourth Quarter FY 1971:

Little work was accomplished on the manuscript early in this quarter due to the higher local priority placed on another project. Manuscript preparation was reinitiated in June.

Work Plan First Quarter FY 1972:

Continuation of the preparation of the initial manuscript. It is probable that the rough draft will be completed in July with subsequent completion this quarter.

PROJECT: 16100 GOI - GRAVEL REMOVAL PRACTICES ON ARCTIC NORTH SLOPE AND
WATER QUALITY CHANGES FROM ROAD BUILDING

Objectives:

1. Ascertain the nature and degree of damage that activities associated with gravel removal and road construction have on the aquatic ecosystem in subarctic and arctic Alaska.
2. Develop guidelines to be used by operators and resource managers to permit orderly removal of gravel and permit road construction without damage to aquatic life and water quality.

Work Completed Fourth Quarter FY 1971:

The Road Guide was revised and is now being reviewed by the lab review committee.

Work Plan First Quarter FY 1972:

Obtain regional and Washington approval of Road Guide and have it printed.

GRANTS AND CONTRACTS

PROJECT 16100 EOM - "Baseline Water Quality Study of the Alaskan Arctic Estuarine Development," Institute of Marine Science, University of Alaska, Dr. Patrick J. Kinney.

The majority of effort for this quarter was expended in continued analysis of the samples that were collected in the physical and chemical studies, the sedimentation studies, and the limnological and marine biological studies. Data and results from each of these disciplines were tabulated in the eight-month report. Preliminary and tentative interpretations were presented with more correlations to be described with the collection and analysis of more data.

PROJECT 16100 FWQ - "Investigations of Possible Effects of Crude Oil on Aquatic Organisms," Department of Biological Sciences, University of Alaska, Dr. James E. Morrow.

The first annual report was completed and copies are available. The application for grant renewal has been received and Dr. Morrow has submitted it for consideration and funding.

PROJECT 16100 PAK - "Lime Disinfection of Sewage Bacteria at Low Temperature," Department of Microbiology, Colorado State University, Dr. S. M. Morrison.

The grant was funded as of May 1, 1971 for an 18 month period, to determine the effectiveness of lime in low temperature disinfection of sewage effluents.

The following Research Grant Proposals were given technical review by Laboratory personnel:

PROJECT 16100 GWX - "Protection of the Environment through Energy Utilization Planning of Alaskan Oil Reserves"

PROJECT 18080 HFP - "The Sediment Environment of Port Valdez and Galena Bay, Alaska and the Effect of Oil on this Ecosystem"

"A Demonstration of the Effects of Oil Spillage on a Watershed in Interior Alaska"

PROJECT 16100 GLI - "Effects of Oil Introduction into High Latitude Fresh-water Systems"

"High Latitude Oil Spill Persistence"

PROJECT 16100 HEX - "Employment of Freezing for Enhancement of Sewage Treatment in Frigid Areas"

"Development, Demonstration and Evaluation of a Physical-Chemical Wastewater Treatment System for the Alaskan North Slope"

CONSOLIDATED LABORATORY SERVICES

Two sets of samples received from the Kuskokwim River basin in support of the mercury pollution investigation by Operations were analyzed. Standard reference samples distributed by the Analytical Quality Control Laboratory, Cincinnati, Ohio were also analyzed. Our recovery of inorganic mercury is good (95+ %), however the recovery of organic mercury is poor; additional work will be done to improve the recovery of organic mercury.

Approximately two hundred samples of sludges, effluents and receiving waters were analyzed for the Alaska Operations office in support of their study to determine the effect of fisheries processing wastes on the aquatic environment in Kodiak Harbor.

Analyses were completed in May on the Winter 1971 Sampling Survey for the Trans-Alaska Pipeline route study. All data will undergo final edit in early July, with publication of the Joint AWL/AOO paper to be in early October.

A number of samples were received from the spring sampling of the Petersburg reforestation project. The project sampling will continue until October 1971, when review and evaluation of the data collected to date will aid in future planning.

A small number of samples were analyzed in support of the Alaska Village Demonstration Project to evaluate water supplies for their project systems.

Analysis of weekly samples from the Eielson pilot facility was conducted throughout the quarter. Planning sessions were held with the Research staff to determine the needs for FY 1972 for this and other planned waste treatment projects.

A series of approximately 75 samples were analyzed for nitrate in support of the Alaska State Division of Environmental Health request for analysis of well waters in the Fairbanks area. Several samples were found to exceed USPHS drinking water standards for this constituent.

A new double distillation system was received and is undergoing testing. The product water is of adequate quality for our use, however, an adequate storage facility has not been secured.

Because of limited manpower and great amount of work required per sample, sorting and identification of bottom fauna collected by both CCR and AOO is backlogged, in some cases as much as one year. In FY 1972 we hope to acquire additional manpower to ease this burden.

PUBLICATIONS AND PRESENTATIONS

The following paper was published, for limited distribution, under the Working Paper Series:

"Depth and Time of Freezing of a Silty Soil under Deciduous Forest Near Fairbanks, Alaska," Working Paper No. 12.

Frederick B. Lotspeich and Ernst W. Mueller participated in a Symposium entitled "Fire in the Northern Environment" in April. Their presentation, "Effects of Fire in the Taiga on the Aquatic Environment," will be published in the Symposium proceedings.

Mr. Mueller spoke as a panel member before the League of Women Voters concerning pollution problems on the Chena River.

Richard W. Latimer presented a slide illustrated lecture on Resource Development at an Executive Seminar series entitled "Management of America's Resources."

PUBLIC RELATIONS

The following Alaska Water Laboratory reports were requested and mailed out this quarter:

"The Chena River--A Study of a Subarctic Stream" - 30
"Biological Waste Treatment in the Far North" - 20
"Effects of Forest Fires on Water Quality in Interior Alaska" - 20

The Laboratory distributed approximately 450 miscellaneous public information pamphlets which were requested.

The Laboratory mailed out over 130 of their Working Papers.

The Alaska Water Laboratory Display was placed at Alaskaland during this quarter.

VISITORS

Visitors to the Laboratory during this period included:

Dr. O. E. Dickason, Director, Alaska Operations Office in Anchorage.

Mrs. Barbara Schmidling, Regional Personnel Officer, from Portland.

Messrs. Richard Berg, Thaddeus Johnson, James Malcolm, and Edward Lobaez, from the U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.

TRAVEL

Dr. Ronald Gordon, Dr. Fred Lotspeich, and Eldor Schallock visited the National Water Quality Laboratory in Duluth, Minnesota to confer on dissolved oxygen work. While in Minnesota, Dr. Gordon also attended the American Society for Microbiology meeting, held in Minneapolis.

Mr. Richard Latimer traveled to Washington, D.C., to attend an EPA Symposium held there. Mr. Latimer also went to Berkeley, California, to attend an Executive Seminar.

Mr. Merritt Mitchell traveled to Washington, D.C., to confer with Headquarters personnel regarding the Alaska Village Demonstration Project.

TRAINING

Mr. Richard Latimer attended a two-week Executive Seminar, presented by the U.S. Civil Service Commission, in Berkeley, California.

Dr. Frederick Lotspeich and Messrs. Eldor Schallock, Barry Reid, and Bertold Puchtler attended a three-day course entitled "The Web of Communication."

Mrs. Fernanda Jacobs completed the course "Principles and Methods of Taxonomy," given by the University of Alaska during the spring semester.

Mrs. Candace George completed the course "Introductory Quantitative Analysis," given by the University of Alaska during the spring semester.

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