

SUSITNA HYDROELECTRIC PROJECT

PROGRESS REPORT

DECEMBER 1982

Prepared by:



ALASKA POWER AUTHORITY

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Period: December 1982

This report covers activities on the Susitna Hydroelectric Project for the month of December 1982.

Principal activities included the receipt of FERC comments on the draft license application.

Summary of Task Activities

Task 72 - Surveys and Site Facilities

(a) Field Camps

The Watana camp commenced preparation for the winter Becker Drilling Program. A team from Denali Drilling Company were mobilized to the site to start construction of ice bridges on the Susitna River. Additional drilling staff were scheduled to mobilize in January.

(b) Access Roads

Additional work was performed by Acres and R & M in assessing the high level crossing at Devil Canyon.

Task 73 - Hydrology

Field monitoring programs continued under the R&M subcontract. Ice observations were continued at Talkeetna and Gold Creek. A detailed description of hydrology work during the months of March 1982 through November 1982 is contained in a supplement at the rear of this report.

Task 75 - Geotechnical Exploration

(a) Geotechnical Supplemental Report

The 1982 Supplement to the 1980-81 Geotechnical Report was printed and issued to the Power Authority during the month.

(b) Winter Drilling Program

A number of meetings were held between Harza-Ebasco staff and Acres Anchorage staff to scope the winter drilling program. Several orders for drilling and well installation equipment were placed with Denali Drilling during the month. Preparation of the Becker rig continued throughout the month. Mobilization of the rig to Alaska was planned for early January 1983.

(c) Transfer to New Engineer

Coordination continued between Harza-Ebasco and Acres in exchanging geotechnical data.

Task 76 - Design Development

(a) FERC License

Additions and modifications to the design drawings continued in December. Areas requiring modifications and/or changes included access roads and transmission line routing. Additional drawings were prepared to show construction haul roads for both the Watana and the Devil Canyon sites. Similarly, modifications were made to the high-level crossing routing at Devil Canyon.

(b) Feasibility Report Supplement

Work continued through December in the preparation of the supplement to the Feasibility Report. Work was delayed on this report pending completion of the FERC license applications. This delay was the result of: (1) the principal authors were fully committed to the FERC license, and (2) data to be input into the supplemental report would be extracted from the FERC license.

Task 77 - Environmental Studies

Work continued on revising and updating material in Exhibit E of the FERC license. Due to the extensive effort involved in preparation of Exhibit E, a more detailed review of task activities is deferred.

Task 78 - Transmission

The new routing of the transmission lines were completed in December and all drawings were changed to reflect the new alignment.

Task 79 - Cost Estimates and Schedules

Cost comparison information was provided for transmission route studies.

The development of final costs for environmental mitigation works for the FERC license application was started.

Task 80 - Licensing

The focus of efforts during December was on improving the draft licence application for filing in February 1983. A major meeting was held with FERC on December 14 to receive and discuss the draft comments on the license application. The comments were distributed to study team members with assignments for responding to them.

Also during December major efforts were expended in editing the draft application in accordance with directions given in Power Authority letters of December 7 and 10. This editing concentrated on consistency throughout all exhibits in terms of style, figures, mapping, and tone. Specific assignments were given for coverage of impact assessment of transmission lines and access roads.

Initial contacts were made with several printing firms in Buffalo and Columbia to solicit competitive bids for printing of the 10-volume set.

Adjustments were made in the mapping of Exhibit G to reflect changes in the corridor of the transmission line. Acreages were calculated by R&M for all federal properties included in the project boundary.

Task 81 - Marketing and Finance

Activities continued in this task to include review and reconsideration of estimates for operating and maintenance work for Watana and Devil Canyon development stage in support of FERC license application. Preparation work was continued to meet the Power Authority's need for further financial analysis of the Susitna Project with various schemes of financial support from the State of Alaska.

Task 83 - Administration

Work continued in monitoring costs and subcontracts under Amendment 4. Work commenced on the preparation of Amendment 5 to cover ongoing field program through February 15, 1983.

SUPPLEMENT TO DECEMBER 1982
PROGRESS REPORT - TASK 53/73
MARCH 1982 - NOVEMBER 1982

Work in Task 53/73 continued since the issuance of the Susitna Hydroelectric Project Feasibility Report on March 15, 1982. Work was primarily directed toward energy simulations, reservoir water temperature modeling, downstream temperature modeling, ice modeling, ground water analysis in sloughs, reservoir sedimentation, reservoir turbidity, tributary stability analyses, reservoir trophic status, nitrogen supersaturation and nutrient status. In addition, field data acquisition was continued and support was provided to the ADF&G field program as required. A draft of the Water Quality and Use section of Exhibit E of the License document was prepared and submitted to the Federal Energy Regulatory Commission on November 15, 1982. From November 29 to December 3, 1982, a workshop was held with resource agency personnel to facilitate review of the draft license application and to solicit agency response prior to the 60-day review period.

1 - Energy Simulations

Monthly energy simulations were run to determine the optimum drawdown of the Watana reservoir to effect a more representative planning period for drawdown selection, the rare drought year (1969) was adjusted to reflect a 1 in 32-year drought event. Drawdowns of 80, 100, 120, 140, 160, and 180 feet were used in the analysis. A drawdown of 120 feet was selected based on the results of the loss in generation revenue as determined by OGP and on the incremental intake costs. The mid-range demand forecast was used in the analysis.

Various downstream flow release scenarios were investigated. The flow releases considered differed primarily during the salmon spawning period of August through mid-September. Gold Creek target flows during the spawning varied from a low of 6,000 cfs to a maximum of 19,000 cfs. A flow of 12,000 cfs was selected for inclusion in the Exhibit E license document as it represents a compromise between project economics and downstream fishery concerns.

Various sensitivity runs were also undertaken. These included the low demand forecast and the effects of small hydro.

A weekly energy simulation program was written and tested with monthly flow data subdivided into weekly data. A problem of compatibility of USGS weekly flow tapes and Acres computer system precluded running the weekly simulation program with actual weekly data as of November 30.

2 - Reservoir Temperature Modeling

Based on the desire for a more sophisticated reservoir temperature model, a search was conducted to find a state of the art computer model which could be applied to the Watana and Devil Canyon Reservoirs. The model DYRESM which is a process-oriented model and requires little calibration, was selected as being as good as any other thermal model. One of its principal authors, Dr. John Patterson, was retained as a consultant.

To date, only the open water period using 1981 data has been run. The principal reason for this is that due to the complexity of the model, considerable input data is required. To verify the validity of the model on a glacially fed system, field measurements were conducted at Eklutna Lake. Discharge, water temperature, and climate data have been reduced and a computer simulation of Eklutna Lake is expected soon.

Although results with the 1981 data indicate that temperature control at the Watana outlet is possible, it is recommended that the field data collected in 1982 be reduced and simulated and additional sensitivity analyses be undertaken.

3 - Downstream Temperature Modeling

Using output from the reservoir temperature model, downstream water temperatures have been predicted for the open water period for both reservoir filling and project operation. Since reservoir winter conditions have not yet been simulated, outlet water temperatures during the winter period were bracketed between a maximum of 4°C and a minimum of 1°C and various runs were made to determine the upper and lower river mile locations when water temperature reached 0°C.

4 - Ice Modeling

The location of 0.1°C water from the downstream temperature modeling served as input to the ice modeling and the upstream progression of the ice front along with the ice thickness and water level was predicted for the cases considered.

5 - Ground Water Analysis in Sloughs

In mid-April a field program was initiated near sloughs 8A and 9 to determine the source of ground water and the impact of the mainstream Susitna River on the slough upwelling rates and the upwelling water temperature.

A series of shallow ground water wells were installed in slough 8A and 9 and monitored for temperature and water level. It became apparent as more observations were made that deep water wells were necessary to better understand the ground water movement and temperature patterns. In late October and November deep wells were drilled in the vicinity of slough 9. To date no measurements have been made in the wells.

A finite element analysis was undertaken to model the ground water flow. Preliminary analysis to date indicates that ground water movement into the sloughs is in a downriver direction with most flow coming from the mainstream Susitna. Ground water temperatures appear to be a function of the long term average temperature of the Susitna.

6 - Reservoir Sedimentation and Turbidity

A contract was let to Peratrovich, Nottingham, and Drage to investigate the Watana reservoir sedimentation characteristics and anticipated outflow turbidity. The analysis was based on theoretical concepts. A report has been produced and is available.

7 - Nitrogen Supersaturation

A memorandum on the proposed avoidance of gas supersaturation conditions downstream of the dams was prepared. The memorandum discussed the engineering analysis, the anticipated performance of the proposed fixed-cone valves, and the anticipated occurrence of spillage.

8 - Reservoir Nutrient Status

A report on reservoir nutrient status was prepared by L. O. Peterson and Associates. The basic finding was that no nutrient problems are foreseen.

9 - Field Data Acquisition

R&M Consultants collected the following field data: Meteorological data at the established Susitna climate stations and at Eklutna Lake; water temperature profiles, discharge measurements, suspended sediment and turbidity measurements at Eklutna Lake; ground water temperature and water level measurements at sloughs 8A and 9; discharge and stage measurements at Indian river and Portage Creek; water temperature, suspended sediment and turbidity measurements in the mainstream Susitna; mainstream Susitna cross sections for the ice simulation program; stage and discharge measurements in sloughs 8A, 9, 11, and 21.

10 - Aquatic Studies Coordination and Agency Consultation

Numerous meetings were held with members of the aquatic studies team to coordinate the various tasks and keep the study team informed as to the work progress within each task.

Discussions were held with Al Carson of the Susitna Steering committee and a meeting of the steering committee was planned to discuss the aquatic studies program approach, methodology, and progress including the instream flow study plan. However, the decision to prepare a draft Exhibit E by November 15, 1982 necessitated cancellation of this meeting.