

ALASKA POWER AUTHORITY  
SUSITNA HYDROELECTRIC PROJECT  
POSITION PAPER  
FISHERIES ISSUE F-9

EXECUTIVE SUMMARY

Issue

Significance of water quality and stream morphology effects of borrow and spoil areas on fish habitat.

Position

The Alaska Power Authority proposes the mitigation measures presented in this paper. It is our position that implementation of these measures will be sufficient to avoid long-term impacts and to minimize short-term impacts of borrow and spoil areas on fish habitat.

Present Knowledge

Construction of the two Susitna Hydroelectric Project dams will require a substantial volume of borrow material and the deposition of spoil material. The removal and placement of these materials may accelerate erosion and cause a slight increase in stream sediment levels. The use of heavy equipment may lead to the introduction of small volumes of petroleum products into water bodies. Removal of material from Borrow Site E will convert riparian and upland habitat to standing water. Borrow activities near fish streams could disrupt fish behavior for the duration of the activity.

Mitigation Measures Endorsed by the Alaska Power Authority

1. Application of all appropriate prevention and rehabilitation guidelines discussed in the Best Management Practices Manuals entitled

"Erosion and Sedimentation Control" and "Oil Spill Contingency Planning" (APA 1985a, b).

2. Washwater from gravel processing operations will be discharged into settling ponds. All waste water from these operations will be discharged into receiving waters in accordance with the Alaska Department of Environmental Conservation and Environmental Protection Agency permit requirements (APA 1983a, p. E-2-183).
3. All upland spoil disposal areas will be rehabilitated using stockpiled organic layers and erosion prevention procedures (APA 1983a p. E-2-183).
4. Borrow Site E will be rehabilitated to create productive aquatic habitat. The site will be shaped and contoured to enhance fish habitat and all man-made items will be removed. Exposed slopes will be graded; areas capable of supporting vegetation will be seeded (APA 1983b p. E-3-156).
5. Rehabilitated areas will be monitored to ensure that mitigation measures are effective (APA 1983 p. E-3-156).
6. Use of explosives will be in accordance with the Alaska Department of Fish and Game guidelines (APA 1983b p. E-3-158).
7. Acquisition of all required state and federal permits and compliance with their terms and conditions (APA 1983a p. E-2-182).
8. Continuation of input from the aquatic studies program into preconstruction planning, design, and scheduling, as well as postconstruction monitoring to identify areas needing rehabilitation and maintenance (APA 1983b p. E-3-151).

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INTRODUCTION

Issue

Significance of water quality and stream morphology effects of borrow and spoil areas on fish habitat.

Position

The Alaska Power Authority proposes the mitigation measures presented in this paper. It is our position that implementation of these measures will be sufficient to avoid long-term impacts and to minimize short-term impacts of borrow and spoil areas on fish habitat.

DISCUSSION

Project Description.

Construction of the two dams for the Susitna Hydroelectric Project will require a substantial volume of borrow material, including rock from quarries, and granular and soil materials from alluvial deposits (Figures 1 and 2). Of the ten potential sites initially identified as having potential sources for material for the Watana Dam, (Figure 1), three (B, J, and L) have been eliminated from further consideration, two (C and H) are considered extremely unlikely to be used, and two (F and I) are designated as backup sites. The three remaining sites (A, D, and E) are the primary quarry and borrow areas; they have the following characteristics:

- o Site A. Rock quarry; located immediately south of the Watana dam site outside the reservoir area; 823 acres.
- o Site D. Borrow Area for impervious materials; located on the north bank of Deadman Creek, one to three miles from the dam site; nearly all outside the reservoir area; 709 acres.
- o Site E. Borrow Area for granular materials; located on the north bank of the Susitna, two to four miles downstream of the dam site; outside the inundation zones of both reservoirs; 445 acres.

The Devil Canyon Saddle Dam will require similar material, but being substantially smaller in volume than the Watana Dam, will require less fill. Materials needed for the Devil Canyon Dam will be obtained from the following borrow and quarry sites:

- o Site D. Borrow Area for impervious materials; located on the north bank of Deadman Creek, one to three miles from the Watana dam site; nearly all outside the reservoir area; 709 acres.
- o Site G. Borrow area for aggregate; located on the south bank of the Susitna, one-half to one and one-half miles upstream of the dam site; within the reservoir area; 55 acres.
- o Site K. Quarry; located west of Cheechako Creek, about 1.5 mi. from the Susitna River, at an elevation of 1,900-2,100 ft.; outside the reservoir area; about 60 acres.
- o Site K Backup. Quarry; located southwest of and uphill of Site K (separated by a slight saddle), at elevation 2,100-2,400 ft.; about two miles from the dam site; about 300 acres.

Removal of this material will require clearing of vegetation, the movement of heavy equipment, and occasionally, the use of explosives. The deposition

of spoil material, such as excavation waste and unsuitable construction material, will require the use of heavy equipment. Spoil material will be used to prevent seepage through the Watana relict channel, as road construction material, and in reclamation projects. Any unusable spoil material will be placed in upland areas and covered with reclaimed overburden, which will then be seeded.

A great deal of ground disturbance will occur and the potential for increased erosion is high. The detrimental effects of increased erosion on fish habitat is well-documented (Iwamoto et al. 1978). Studies have also shown that erosion is preventable if adequate protection measures are utilized (Larse 1971; Haupt and Kidd 1965).

The use of heavy equipment for borrow and spoil activities could result in the introduction of petroleum products into water bodies. Development and implementation of an oil spill prevention and reaction plan will help avoid impacts that could result from petroleum spills.

The removal of borrow material and the deposition of spoil material could cause stream channels to shift. Changes in stream depth, water velocity, or streambed composition could occur, with a resultant loss or reduction of traditional spawning or rearing areas. These changes, however, could also result in the creation of new spawning and rearing habitat.

#### Anticipated Impacts.

The use of mitigation measures will greatly reduce the rate of erosion in borrow and spoil areas. The use of measures to reduce the transport of sediments to streams will help minimize increases in stream sediment levels. A slight, temporary increase is expected in smaller, clearwater streams; increases in the Susitna River sediment load will be insignificant compared to the high levels that occur naturally. Small volumes of petroleum products could enter water bodies from leaking equipment but are not expected to have a measurable impact on stream productivity. Larger spills

could occur from vehicular accidents, but long-term impacts are not anticipated due to the implementation of containment and clean-up efforts detailed in the oil spill prevention and reaction plans required of each contractor. No instream blasting is planned (APA 1983b), and the use of explosives will be in accordance with ADF&G guidelines. It is possible that sound or shock waves from blasting could travel long distances and cause some disturbance of normal fish behavior, such as the emigration of fish to quieter areas. These disturbances would be short-term, and are not expected to have a detrimental effect on the survival of the affected populations.

A long-term impact will occur at Borrow Site E, located at the confluence of the Susitna River and Tsusena Creek (Figure 1). The large volume of material removed from this site will result in a large pit that will fill with water, converting riparian and upland habitat to lake habitat. This will result in an increase in the amount of available fish habitat. Mitigation plans to maintain this newly formed lake as suitable fish habitat are currently being developed.

#### Mitigation Measures Endorsed by the Alaska Power Authority

The Power Authority will avoid, minimize, or rectify impacts in order to provide habitat of sufficient quality and quantity to maintain natural reproducing populations. Where this goal is not compatible with project objectives, other mitigation techniques will be utilized. Impacts associated with borrow and spoils activities will be mitigated in the following manner:

- I. Application of the appropriate guidelines in the APA's Best Management Practices Manuals (BMPM). The Power Authority intends that applicable guidelines and state-of-the-art techniques contained in the manuals will be incorporated into the contractual documents for projects constructed, maintained, or operated by or under the direction of the Power Authority.

A. The BMPM entitled "Erosion and Sedimentation Control" (APA 1985a) details the specific techniques to be implemented during the following activities:

1. EARTHWORK

- a. Clearing and Grubbing
- b. Surface Preparation
- c. Borrow and Disposal Practices
  - i. Operations Plans
  - ii. All Borrow Sources
  - iii. Upland Sites
  - iv. Floodplain Sites

2. DRAINAGE STRUCTURES

- a. Culverts
  - i. Non-Fish Streams
  - ii. Fish Streams
- b. Low-Water Crossings
- c. Grading and Cross Drains
- d. Vegetated Channels
- e. Ditch Checks, Check Dams
- f. Mechanical Channel Liners
- g. Outlet Protection
- h. Inlet Protection

3. SEDIMENT RETENTION

- a. Settling Ponds
- b. Buffer Strips, Barriers
- c. Trap and Filters for Inlets
- d. Silt Curtains

4. SLOPE STABILIZATION

- a. General Techniques for Non-Permafrost Areas
- b. Temporary Downdrains

- c. Permanent Downdrains
- d. Diversions and Benches
- e. Level Spreaders and Interception Dikes

5. THERMAL EROSION CONTROL

- a. Prevention/Treatment of Disturbed Surfaces
- b. Cut Slope Stabilization

6. REVEGETATION

- a. Soil Constraints
- b. Site Preparation
- c. Seeding
  - i. Timing
  - ii. Application Methods
  - iii. Recommended Seeds and Mixtures
- d. Fertilization
- e. Mulches
- f. Woody Plants

7. RECLAMATION

8. INSPECTION AND MONITORING

- B. The BMP entitled "Oil Spill Contingency Planning" (APA 1985b) details the specific actions and techniques to be implemented during a petroleum spill. It includes the following:

1. POLICY GUIDELINES

2. ELEMENTS OF A CONTINGENCY PLAN

- a. Project Description
- b. Spill Assessment
- c. Training Program
- d. Response Organization



- e. Emergency Notification and Coordination
- f. Reporting Procedures
- g. Safety Guidelines
- h. Control Actions
  - i. Emergency Containment Sites
  - ii. Containment Methods & Implementation Guidelines
- i. Cleanup Actions
  - i. Techniques
  - ii. Implementation Guidelines
- j. Disposal
  - i. Oil and Water Separation
  - ii. Temporary Waste Storage
  - iii. Final Disposal
- k. Reclamation

II. Washwater from gravel processing operations will be discharged into settling ponds. All waste water from these operations will be discharged into receiving waters in accordance with the Alaska Department of Environmental Conservation permit requirements (APA 1983a p. E-2-183).

III. All upland spoil disposal areas will be rehabilitated using stockpiled organic layers and erosion prevention procedures (APA 1983a p. E-2-183).

IV. Borrow Site E will be rehabilitated to create productive aquatic habitat. The site will be shaped and contoured to enhance fish habitat, and all man-made items will be removed. Exposed slopes will be graded; areas capable of supporting vegetation will be seeded (APA 1983b p. E-3-156).

V. Rehabilitated areas will be monitored to ensure that mitigation measures are effective (APA 1983b p. E-3-156).

- VI. Use of explosives will be in accordance with the Alaska Department of Fish and Game guidelines (APA 1983b p. E-3-158).
- VII. Acquisition of all required state and federal permits and compliance with their terms and conditions (APA 1983a p. E-2-182).
- VIII. Continuation of input from the aquatic studies program into preconstruction planning, design, and scheduling, as well as postconstruction monitoring to identify areas needing rehabilitation and maintenance (APA 1983b p. E-3-151).

## REFERENCES

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**Figure 1**  
**SUSITNA HYDROELECTRIC PROJECT**  
**POTENTIAL WATANA BORROW SITES**

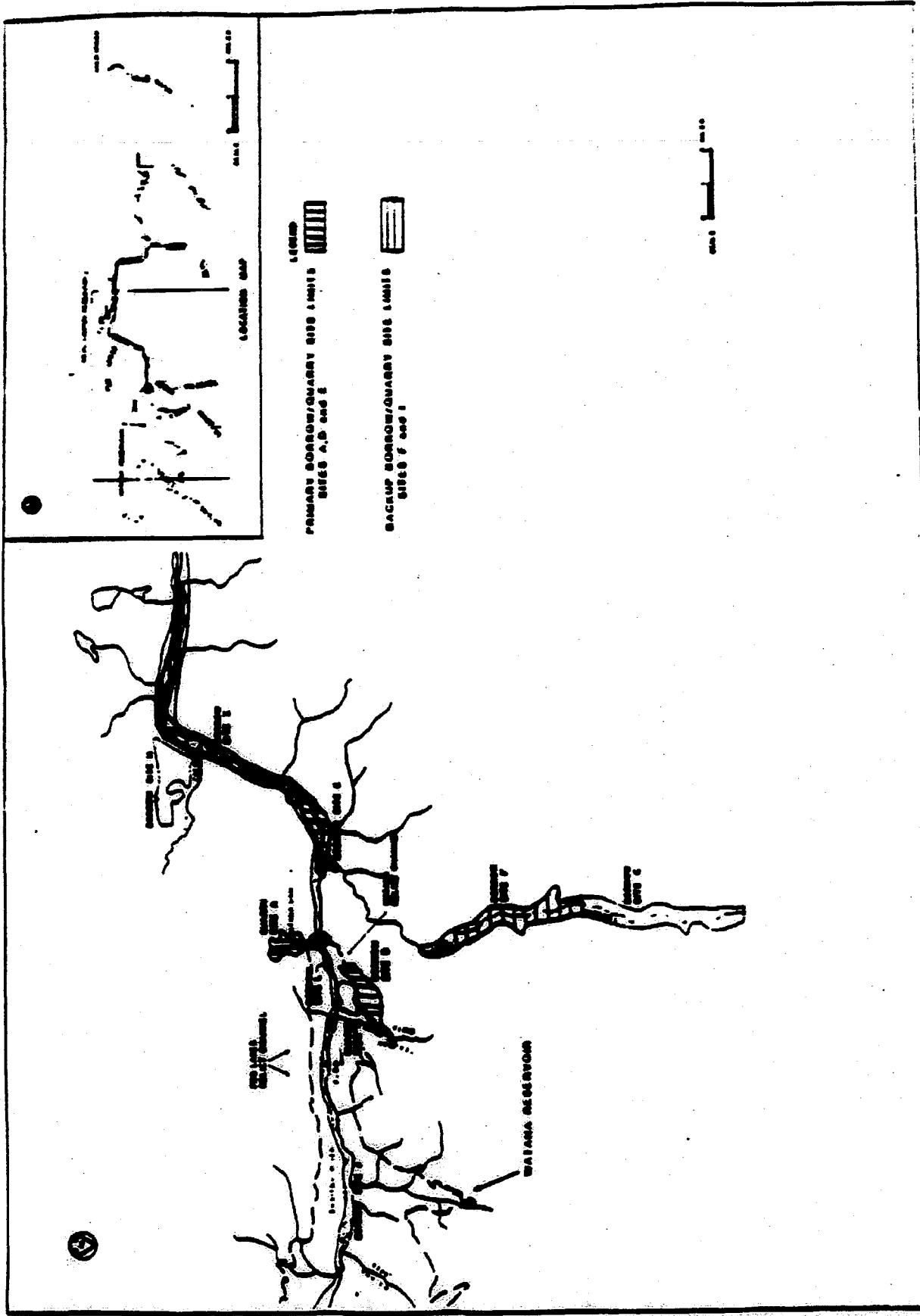


Figure 2  
 SUSITNA HYDROELECTRIC PROJECT  
 DEVIL CANYON BORROW SITE MAP

