ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

POSITION PAPER

FISHERIES ISSUE F-8

EXECUTIVE SUMMARY

Issue

Significance of water quality and quantity effects of construction camps and permanent village on fish habitat.

Position

The Alaska Power Authority proposes the mitigation measures presented in the paper. It is our position that their use will ensure that the impacts of the construction camps and permanent village on fish habitat will not be significant.

Present Knowledge

The Susitna Hydroelectric Project will require the construction of temporary camps near both the Watana and Devil Canyon dam sites. A portion of the Watana camp will be retained to house personnel for operation and maintenance of both dams.

Local streams will provide water for camp use and will also receive wastewater discharges following secondary treatment. Sanitary landfills at each camp will accommodate solid wastes.

Streams and lakes near both camps are generally small and clear. They contain resident fish species such as Dolly Varden, arctic grayling, and slimy sculpin.

Minor, short-term increases in stream sediment levels may occur, but are not expected to have a significant effect on fish habitat quality.

Minor spills of petroleum products may occur in the camps despite the preventive measures adopted by the Power Authority, but are not expected to impact local water quality.

Water withdrawals from local streams for camp use are not anticipated to have a measurable effect on the amount of available fish habitat.

Discharge of treated wastewater into Deadman Creek and the Susitna River is not expected to have any effect on the water quality of these systems.

Mitigation Measures Endorsed by the Alaska Power Authority

1. Application of the appropriate guidelines in the following Best Management Practices Manuals:

   a. "Erosion and Sedimentation Control" (APA 1985a)

   b. "Water Withdrawal and Storage" (APA 1985b)

   c. "Fuel and Hazardous Materials" (APA 1985c)

   d. "Oil Spill Contingency Planning" (APA 1985d)

   e. "Liquid and Solid Waste" (APA 1985e)

2. Compliance with all required permits, including the Alaska Department of Fish and Game criteria for fisheries protection, an Alaska Department of Natural Resources water appropriation permit, Alaska Department of Environmental Conservation wastewater and waste disposal permits, a Federal Water Quality Certification,

and a National Pollutant Discharge and Elimination System Permit (APA 1983a p. E-2-184).

3. Continuation of input from the aquatic studies program into preconstruction planning, design, and scheduling, as well as post-construction monitoring to identify areas needing rehabilitation and maintenance (APA 1983b p. E-3-151).

4. Application of Alaska Department of Fish and Game blasting guidelines (APA 1983b p. E-3-158).

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
POSITION PAPER
FISHERIES ISSUE F-8

INTRODUCTION

Issue

Significance of water quality and quantity effects of construction camps and permanent village on fish habitat.

Position

The Alaska Power Authority proposes the mitigation measures presented in this paper. It is our position that their use will ensure that the impacts of the construction camps and the permanent village on fish habitat will not be significant.

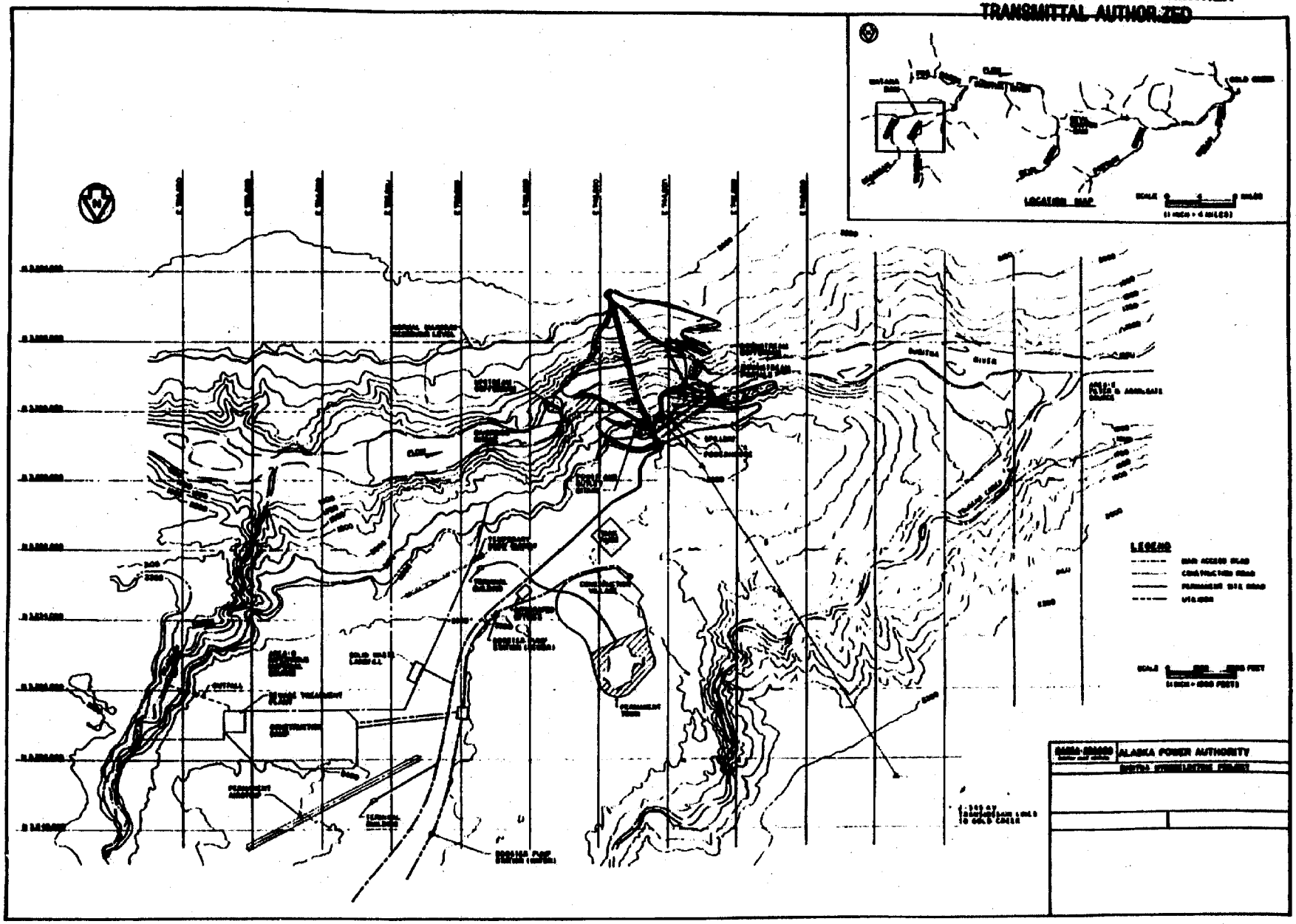
DISCUSSION

Project Description

The Susitna Hydroelectric Project will require the construction of two temporary camps (one at each dam site) and a permanent village at the Watana site. The Watana camp will be large enough to provide housing for a peak population estimated at 4,720 people (APA 1983b). It will be located at two sites north of the Susitna River between Tsusena and Deadman Creeks (Figure 1). The sites will be cleared and graded, fabric will be laid down, and gravel will be deposited for building foundations. A temporary airstrip (2,500 feet) will be constructed to facilitate camp construction. It will be upgraded later to a permanent airstrip (6,000 feet). Water for the Watana camp will be drawn from Tsusena Creek. An estimated 1.5 cubic feet

Figure 1

SUSITNA HYDROELECTRIC PROJECT
WATANA SITE FACILITIES
GENERAL LAYOUT



Source: APA 1983a, Revised plate F34 to Appendix F

per second (cfs) will be needed for camp use during periods of peak demand (mid-April through October). A series of groundwater wells will serve as a backup system. Wastewater will be discharged into Deadman Creek after receiving secondary treatment. Solid wastes will be placed in a sanitary landfill. Most of the camp will be dismantled upon completion of the dam and the site will be restored. A portion of the camp will be modified as necessary to house personnel who will operate and maintain the Watana Dam.

Streams near the Watana facilities are generally small, moderately steep, clearwater tributaries of Tsusena and Deadman Creeks. Some contain arctic grayling, Dolly Varden and slimy sculpin.[a/] Some of the small, nutrient-poor lakes in the area contain arctic grayling, Dolly Varden, slimy sculpin, and burbot (ADF&G 1984b).

The Devil Canyon camp will be large enough to house a peak population estimated at 1,900 people, and will be located on two sites south of the Susitna River, near the construction railhead (Figure 2). A portion of the camp will border the upper reaches of Jack Long Creek. Water will be drawn from the Susitna River for camp use. Effluent from a secondary treatment plant will be discharged into the Susitna River, downstream of the water intake. Solid wastes will be placed in a sanitary landfill. The camp will be dismantled upon completion of the dam and the sites will be restored. Operation and maintenance personnel for the Devil Canyon dam will be housed at the Watana permanent village.

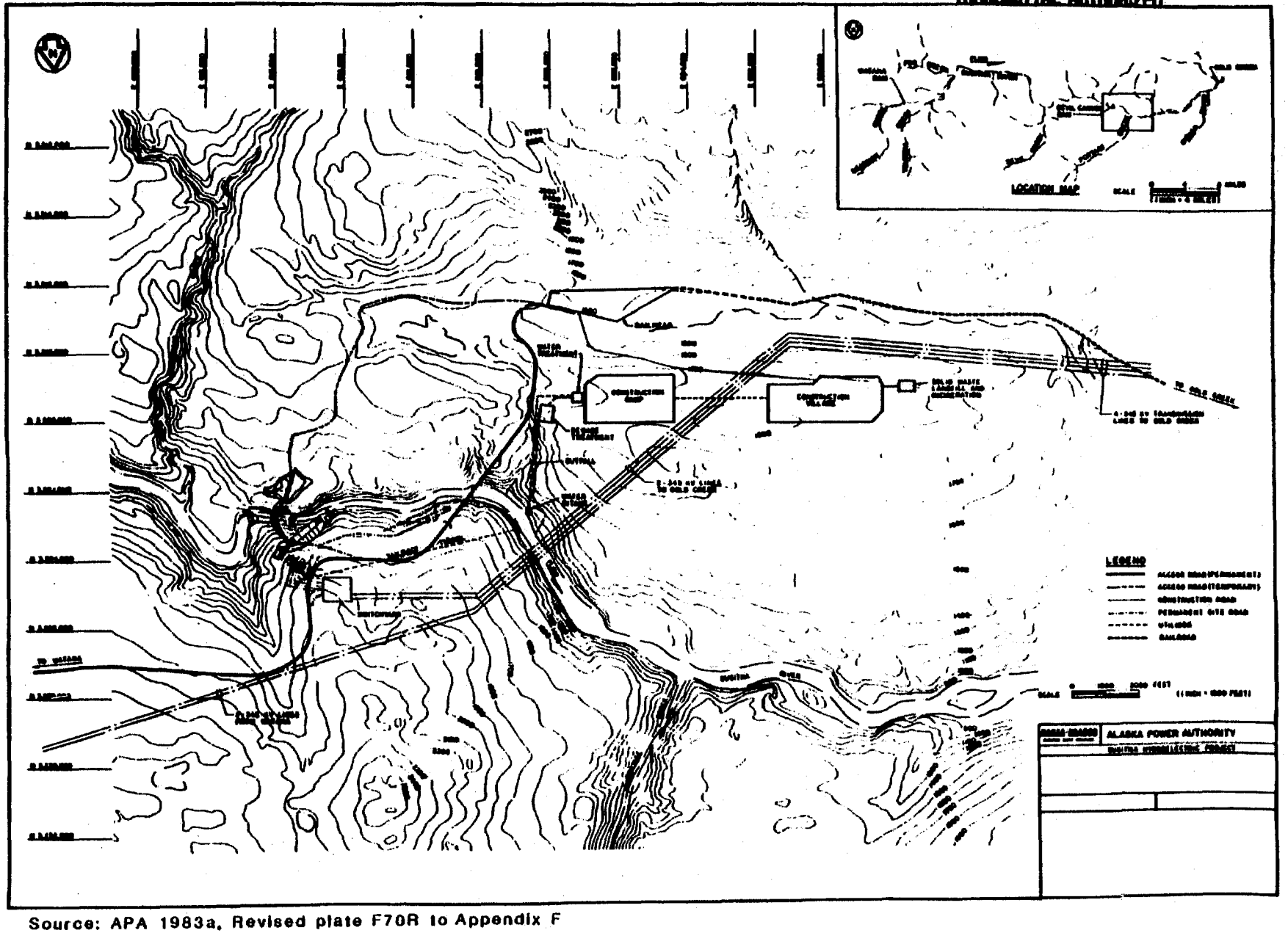
Streams near the Devil Canyon camp are clearwater tributaries of the Susitna River and contain Dolly Varden and slimy sculpin. The lower reaches of Jack Long Creek contain chinook, coho, pink and chum salmon, rainbow trout, arctic grayling, Dolly Varden char, and sculpin. Some of the small,

---

a/ Names of fish follow Morrow (1980). Scientific names of species mentioned in the text are as follows: rainbow trout (Salmo gairdneri), Dolly Varden (Salvelinus malma), pink salmon (Oncorhynchus gorbuscha), chinook salmon (O. tshawytscha), chum salmon (O. keta), coho salmon (O. kisutch), arctic grayling (Thymallus arcticus), burbot (Lota lota), and slimy sculpin (Cottus cognatus).

Figure 2

SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON SITE FACILITIES
GENERAL LAYOUT



Source: APA 1983a, Revised plate F70R to Appendix F

nitrient-poor ponds near the facilities contain Dolly Varden char, grayling and sculpin (ADF&G 1984b).

Pertinent Studies

Construction and use of remote camps can lead to soil erosion and stream sedimentation (Schmiege 1980). The detrimental effects of increased erosion on fish habitat and fish production has been thoroughly reviewed by Iwamoto et al. (1978).

Substances toxic to aquatic organisms enter the water bodies directly or in wastewater (John Graham Company 1976). Kavanagh and Townsend (1977) reported on the frequency of petroleum spills during construction of the Trans-Alaska Oil Pipeline, and found vehicular accidents, camp spills and leaks, and poor storage practices for waste petroleum to be major problems. The failure of Alyeska Pipeline Service Company and its contractors to adhere to the developed oil spill contingency plan was also reported.

Anticipated Impacts

Minor, short-term increases in suspended sediment levels may occur if construction activities such as vegetation removal, grading, or fill placement occur near water bodies. These activities will be performed in compliance with all required permits and in coordination with the Alaska Department of Fish and Game. Increases from these activities may cause a slight increase in turbidity, but they are not expected to have a significant effect on fish habitat, due to their short duration. No measurable changes in streambed sediment levels are expected.

Low-volume spills of petroleum products may occur in the camps despite the Power Authority's preventive measures, but no significant impacts on the water quality of local water bodies are expected due to the relatively small

volume of spills and the rapid initiation of clean-up efforts. All spills, regardless of size, will be reported to the Alaska Department of Environmental Conservation (ADEC) as required by state law. A Spill Prevention, Containment, and Countermeasure Plan (SPCC) will be developed, as required by the Environmental Protection Agency (EPA). A DEC Oil Spill Contingency Plan will also be developed. Failures of major petroleum storage areas are not expected, because the diking requirements set forth in the Best Management Practice Manual (BMPM) entitled "Oil Spill Contingency Planning" (APA 1985d) contain a considerable margin of safety. In the unlikely event of a major storage vessel failure, contamination of waterways will be prevented by a full-capacity containment dike.

Withdrawal of water from Tsusena Creek is not expected to measurably reduce the amount of available fish habitat, since the volume of water taken for the Watana camp during peak construction periods represents such a small percentage of the flow in Tsusena Creek (less than one percent of the average, open-water season flow). Water demand will be reduced during the winter months, but lower flows in Tsusena Creek would result in the withdrawal reaching approximately eight percent of the total flow.

It is believed that many grayling overwinter in the Susitna River (ADF&G 1984a). Some grayling, Dolly Varden, and slimy sculpin may overwinter in deep pools in lower Tsusena Creek, downstream of the camp's water intake. An eight percent reduction in streamflow would not affect the depth of these pools, but would reduce slightly the rate of water exchange. This reduction in inflow would not affect the survival of these fish since cold water temperatures make them relatively inactive and their metabolic demands are greatly reduced. The cold, turbulent water is expected to remain close to oxygen saturation, more than meeting the respiratory requirements of the relatively inactive fish.

Withdrawal of water from the Susitna River for the Devil Canyon camp will not affect the amount of available fish habitat because of the relatively small volume needed for camp use in comparison to the large volume of flow in the Susitna River.

Secondary treatment of the sewage discharged into Deadman Creek and the Susitna River will avoid changes in dissolved oxygen levels, since oxidation of the wastes will occur prior to discharge. The estimated biological oxygen demand (BOD) and the concentration of total suspended solid (TSS) of the effluent are both 30 mg/l, levels acceptable to the ADEC and the EPA. Heavy metals present in the wastewater will become bound to the organic material in the lagoons, avoiding increases in their concentrations in the receiving waters. Increased levels of nitrogen and phosphorus are expected in the effluent from both camps. The maximum effluent volume from the Watana camp is 1.5 cfs; the 1 in 20 year, 30-day low flow for Deadman Creek was estimated at 27 cfs (APA 1983b). Under a minimum dilution scenario, the effluent would be diluted by a factor of 17, reducing both the BOD and TSS to approximately 2 mg/l. Since the outfall would be located in the steep, turbulent, lower portion of Deadman Creek, thorough mixing would occur rapidly. The effluent will meet all applicable discharge and water quality standards and is not expected to cause any degradation of water quality in Deadman Creek. The low volume of effluent from the Devil Canyon camp (less than 1 cfs) is not expected to affect the water quality of the Susitna River, since the effluent will be rapidly diluted.

MITIGATION

Mitigation Measures Endorsed by the Alaska Power Authority

It is the goal of the Power Authority to avoid, minimize, or rectify impacts in order to provide aquatic habitat of sufficient quality and quantity to maintain natural reproducing fish populations. Impacts associated with construction camps and the permanent village will be mitigated in the following manner:

I. Application of the appropriate guidelines in the Power Authority's Best Management Practices Manuals (BMPM). The Power Authority intends that applicable guidelines and techniques contained in the manuals will be

incorporated, where appropriate, 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 a variety of techniques that can be employed 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. ICING CONTROL
   - a. Stacked Culverts and Subsurface Drains
   - b. Culvert Thawing

4. STREAM PROTECTION
   - a. Protection During Crossing and Construction

b. Bank Stabilization - Revetments

c. Bank Stabilization - Deflectors and Jetties

d. Bank Stabilization - Vegetative

5. SEDIMENT RETENTION

a. Settling Ponds

b. Buffer Strips, Barriers

c. Trap and Filters for Inlets

d. Silt Curtains

6. 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

7. THERMAL EROSION CONTROL

a. Prevention/Treatment of Disturbed Surfaces

b. Cut Slope Stabilization

8. 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

9. RECLAMATION

10. INSPECTION AND MONITORING

B. The BMPM entitled "Water Withdrawal and Storage" (APA 1985b) details guidelines and regulatory criteria that should be employed during the following activities:

1. DETERMINATION OF WATER AVAILABILITY, DEMAND AND QUALITY

2. IDENTIFICATION OF WATER SOURCES
   a. Surface Water
   b. Groundwater

3. WATER WITHDRAWAL AND STORAGE
   a. Wells
   b. Surface Water Intake Structures
   c. Pumping Stations
   d. Storage Tanks
   e. Earth Reservoir

C. The BMPM entitled "Fuel and Hazardous Material" (APA 1985c) details guidelines and techniques that can be employed during the handling and storage of hazardous materials, and includes the following:

1. ACCOUNTABILITY AND SAFETY
   a. Fuel and Hazardous Materials
   b. Tracking and Information System
      i. Procurement and Receipt
      ii. Storage
      iii. Disposal
   c. Personnel Training and Safety Program

2. STORAGE OF HAZARDOUS MATERIALS

a. General Storage Guidelines
   i. Above/Underground Bulk Fuel Storage
   ii. Explosives
   iii. Indoor Storage of Flammable/Combustible Liquids
   iv. Corrosives
   v. Reactive Chemicals
   vi. Compressed Gases

b. Petroleum, Oil and Lubricants
   i. Storage Containers
   ii. Storage Area Design

c. Explosives
   i. Storage of Explosives and Blasting Agents
   ii. Magazine Construction Guidelines
   iii. Mixing Facilities and Equipment for Blasting Agents and Water Gels

3. HAZARDOUS WASTES

D. The BMPM entitled "Oil Spill Contingency Planning" (APA 1985d) identifies the major elements of an oil spill contingency plan and describes specific actions and techniques that can be employed 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 and 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

E. The BMPM entitled "Liquid and Solid Waste" (APA 1985e) details specific techniques that can be employed during the following activities:

1. LIQUID WASTE MANAGEMENT
a. Project Parameters
b. Liquid Waste Stream Constituents
i. Classification
ii. Wastewater Sources and Strengths
c. Conceptual Camp Layout, Collection and Treatment System
i. Water Supply Requirements
ii. Wastewater Collection and Treatment Facilities
d. Design of Collection Systems
i. Characteristics by Type of Camp
ii. Collection Systems
e. Design of Treatment System
i. Exploratory and Fly Camps
ii. Small and Intermediate Camps
iii. Intermediate and Large Camps

2. SOLID WASTE MANAGEMENT
a. Types of Wastes
b. Treatment Alternatives

i. Incineration
ii. Landfill
iii. Reclamation for Reuse
iv. Salvage
v. Special Treatment

c. At-Source Handling
d. Transport of Solid Wastes
e. Occupational Safety and Health

II. Compliance with all required permits, including the Alaska Department of Fish and Game criteria for fisheries protection, an Alaska Department of Natural Resources water appropriation permit, Alaska Department of Environmental Conservation wastewater and waste disposal permits, a Federal Water Quality Certification, and a National Pollutant Discharge and Elimination System Permit. (APA 1983a p. E-2-184).

III. 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).

IV. Application of Alaska Department of Fish and Game blasting guidelines (APA 1983b p. E-3-158).

REFERENCES

Alaska Department of Fish and Game. 1984a. Susitna Hydro Aquatic Studies. Report No. 2. Resident and Juvenile Anadromous Fish Investigations (May-October 1983). Prepared for the Alaska Power Authority. 379 pp.

Alaska Department of Fish and Game. 1984b. Susitna Hydro Aquatic Studies. Report No. 4. Access and Transmission Corridor Aquatic Investigations. Prepared for the Alaska Power Authority. 89 pp.

Alaska Power Authority. 1983a. FERC License Application Project No. 7114-000. Susitna Hydroelectric Project. Volume 1, Exhibit A. 89 pp.

Alaska Power Authority. 1983b. FERC License Application Project No. 7114-000. Susitna Hydroelectric Project. Volume 5A, Exhibit E. Chapters 1 and 2. 195 pp.

Alaska Power Authority. 1983c. FERC License Application Project No. 7114-000. Susitna Hydroelectric Project. Volume 6A, Exhibit E, Chapter 3. 190 pp.

Alaska Power Authority. 1985a. Best Management Practices Manual. Erosion and Sedimentation Control. 103 pp.

Alaska Power Authority. 1985b. Best Management Practices Manual. Water Withdrawal and Storage. 22 pp.

Alaska Power Authority. 1985c. Best Management Practices Manual. Fuel and Hazardous Materials. 44 pp.

Alaska Power Authority. 1985d. Best Management Practices Manual. Oil Spill Contingency Planning. 56 pp.

Alaska Power Authority. 1985e. Best Management Practices Manual. Liquid and Solid Waste. 117 pp.

Iwamoto, R.N., E.O. Salo, M.A. Madej, and R.L. McComas. 1978. Sediment and Water Quality - A Reveiw of the Literature Including a Suggested Approach for Waste Quality Criteria. U.S. Environmental Protection Agency, Seattle, Washington.

John Graham Company. 1976. The Environment of Alaska; Analysis of the Impacts of Potential Development. Prepared for the Joint Federal-State Land Use Planning Commission for Alaska. 293 pp.

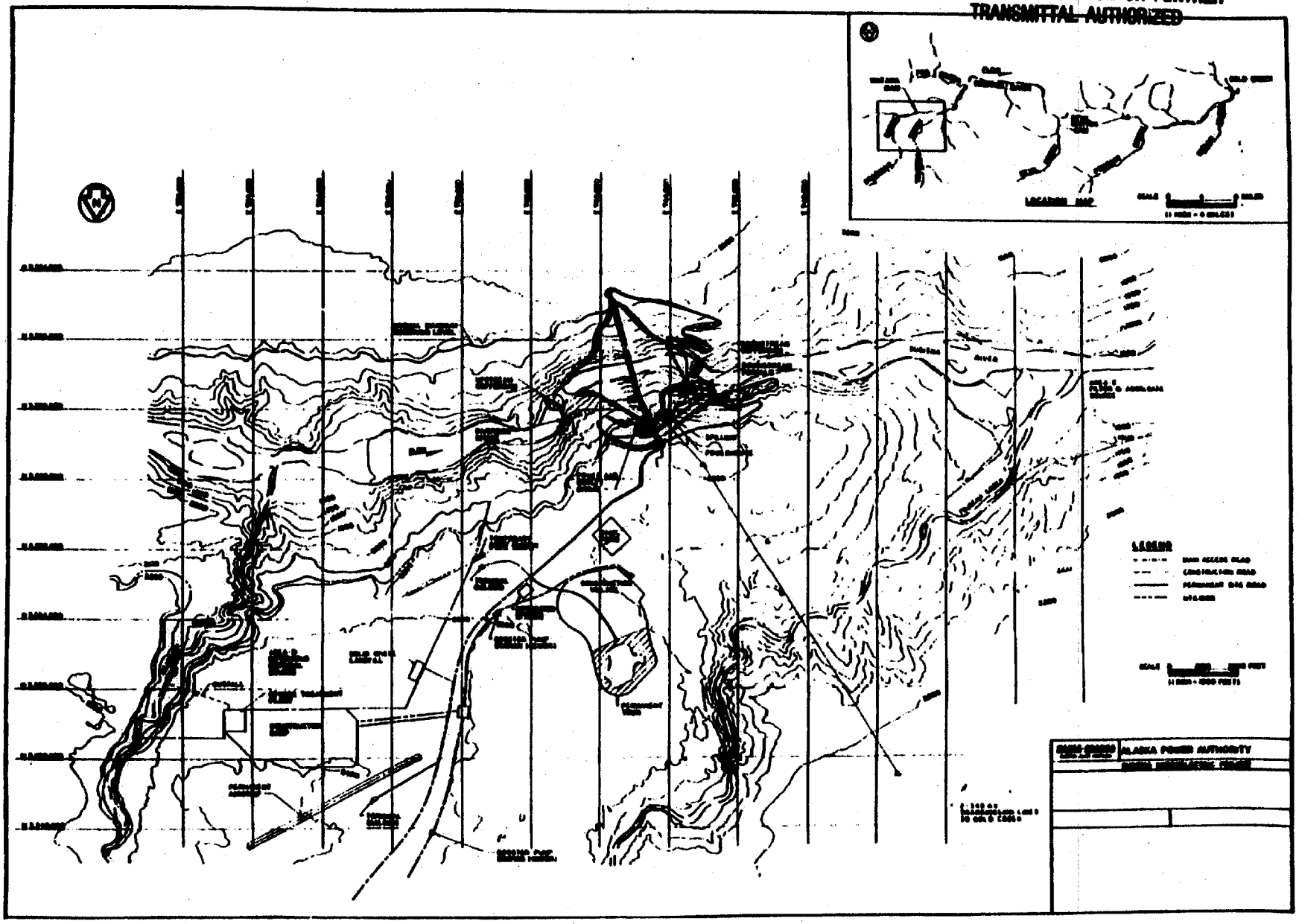
Morrow, J.E. 1980. The Freshwater Fishes of Alaska. Anchorage, 248 pp.

Kavanagh, N. and A. Townsend. 1977. Construction-related oil spills along the Trans-Alaska pipeline. Joint State/Federal Fish and Wildlife Advisory Tream. Special Report No. 15.

Schmiege, D.C. 1980. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America. 11. Processing mills and camps. USDA Forest Service Gen. Tech. Rep. PNW-113. 17 pp.

Figure 1

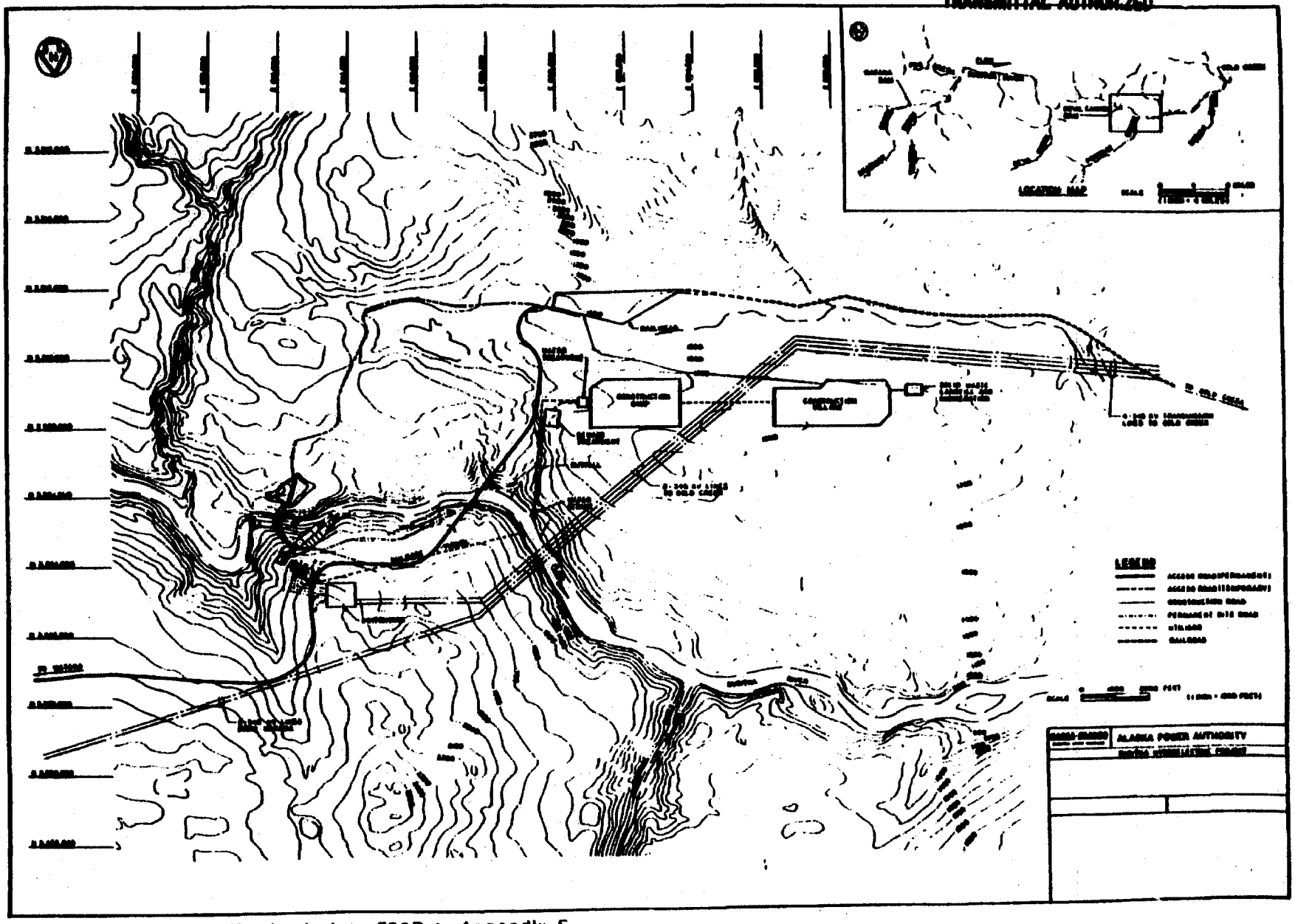
SUSITNA HYDROELECTRIC PROJECT
WATANA SITE FACILITIES
GENERAL LAYOUT



Source: APA 1983a, Revised plate F34 to Appendix F

Figure 2

SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON SITE FACILITIES
GENERAL LAYOUT



Source: APA 1983a, Revised plate F70R to Appendix F