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ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

POSITION PAPER

FISHERIES ISSUE F-7

EXECUTIVE SUMMARY

Issue

Significance of the physical effects of transmission line corridors 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 on fish habitat from the transmission line corridor will not be significant.

Present Knowledge

The Susitna Hydroelectric Project will require the construction of a transmission system to deliver power from the Watana and Devil Canyon generating plants to the major load centers in Anchorage and Fairbanks. The transmission system will follow three major alignments: westward from Watana to Devil Canyon, and then to Gold Creek; north from Gold Creek to Fairbanks; and south from Gold Creek to Anchorage.

The three corridors traverse a variety of terrain types and cross streams varying in size from small tributaries to major rivers. These streams contain both resident and anadromous fish species. Numerous small ponds are present in the corridors. Some of these contain resident fish species.

Construction and maintenance of the transmission system may cause periodic, short-term increases in stream sediment levels. All construction and maintenance will be performed in accordance with state and federal permit stipulations and the techniques detailed in the Best Management Practices Manuals (BMPM) (APA 1985a,b,c,d). These activities will be coordinated with the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Natural Resources (ADNR), and the U.S. Army Corps of Engineers (COE) and are not expected to cause significant changes in fish habitat quality.

Leakage of small volumes of petroleum products from vehicles may occur but would not result in measurable changes in water quality. Spills from vehicular accidents may occur and introduce measurable amounts of petroleum products into streams. The techniques detailed in the BMPM entitled "Oil Spill Contingency Planning" (APA 1985c) are applicable to a variety of spill sizes and locations. Where appropriate, contractors will be required to prepare and implement a Spill Prevention, Containment, and Countermeasure Plan and an Oil Spill Contingency Plan. Spills from vehicular accidents are not expected to have long-term impacts on fish habitat quality because of the rapid initiation of cleanup efforts.

Some minor disturbances of natural fish behavior patterns may occur during construction and maintenance activities, but these are not expected to have detrimental effects on the viability of the affected fish populations.

<u>Mitigation Measures Proposed by the Alaska Power Authority</u>

1. Acquisition of all required state and federal permits and compliance with their terms and conditions (APA 1983a, p.E-2-182).

2. Adherence to ADF&G's proposed Habitat Protection Regulations.

3. Use of impact prevention techniques detailed in the BMPM entitled "Erosion and Sedimentation Control," "Fuel and Hazardous Wastes," and "Oil Spill Contingency Planning" (APA 1985a-1985c).

4. Application of the appropriate guidelines in the report "Drainage Structure and Waterway Guidelines" (APA 1985d).

5. 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).

6. Use of winter construction to prevent ground disturbance and subsequent erosion.

7. Use of snow and ice bridges during winter construction to cross streams (APA 1983b p.E-3-153).

8. Alignment of transmission towers so structures are out of streams and floodplains to the greatest extent possible (APA 1983b p.E-3-153).

9. Proper disposal of waste concrete and concrete waste water (APA 1983a p.E-2-1984).

10. Adherence to ADF&G blasting guidelines (APA 1983b p.E-3-158).

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

POSITION PAPER

FISHERIES ISSUE F-7

INTRODUCTION

Issue

Significance of the physical effects of transmission line corridors 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 on fish habitat from the transmission line corridors will not be significant.

DISCUSSION

Present Knowledge

The Susitna Hydroelectric Project will require the construction of a transmission system to deliver power from the Watana and Devil Canyon generating plants to the major load centers in Anchorage and Fairbanks (APA 1983a,b). The transmission system will follow three major alignments: westward from Watana to Devil Canyon, and then to Gold Creek; north from Gold Creek to Fairbanks; and south from Gold Creek to Anchorage (Figure 1).

The system will consist of overhead, 345-kilovolt transmission lines and support towers; underwater cables across Knik Arm; switchyards at Watana, Devil Canyon, and Gold Creek; substations at the Knik Arm crossing, in Fairbanks, Willow, and Anchorage; and a load dispatch center at Willow.

Ground access will be used for construction and maintenance of the system. Trails from points along existing roads will access the transmission right-of-way (ROW). A 25-foot-wide access trail will be cleared within the ROW. At major streams ice bridges will be used for construction access. Maintenance access will be accomplished from trails on either side of major streams. All access trails will be constructed to the minimum standards suitable for four-wheel drive vehicles.

The width of the transmission ROW will depend on the number of lines present: 300 feet will be required for sections with two lines; 400 feet are necessary for three lines; and 510 feet are needed where four lines are constructed. This strip will be cleared of trees and shrubs tall enough to present a hazard to the system. In addition, the 25-foot-wide access trail within the ROW will be cleared of sufficient vegetation to allow the passage of four-wheel drive vehicles.

The types of foundations used for the support towers will vary according to the type of tower and the stability of the soil into which they are set. The use of concrete will be minimized through the use of driven steel pilings and steel grillage foundations, but some large diameter, cast-in-place concrete piles will be necessary.

Development of the complete transmission system will be phased over a number of years. Construction of the Watana-Gold Creek lines will occur as the Watana dam is constructed. Additional lines will parallel the Willow-Healy Intertie (a separate project presently under construction) and new lines will be constructed from Willow to Anchorage and Healy to Fairbanks. With the construction of the Devil Canyon Dam, additional lines will be added to the system between Gold Creek and Knik Arm. Present projections for the transmission system include the completion of the Watana phase by 1993 and the Devil Canyon phase by 2002.

The proposed Watana to Gold Creek ROW traverses flat to moderately steep terrain covered with tundra and discontinuous stands of dense forest vegetation. The majority of streams crossed are small, high-gradient tributaries of the Susitna River; these streams drain the Tsusena, Swimming Bear, Jack Long, and Devil Creek watersheds. The portions of these streams within the corridor contain slimy sculpin and Dolly Varden [1/]. The lower reaches of Jack Long Creek, downstream of the ROW boundary, contain chinook, coho, chum, and pink salmon. Many small, shallow, oligotrophic (nutrient-poor) ponds are present within the corridor. Some of these contain slimy sculpin and Dolly Varden. Rainbow trout are present in High Lake. Arctic grayling are present in some of the streams and ponds in this corridor (ADF&G 1984).

The proposed Gold Creek to Anchorage ROW traverses primarily flat wetlands with some lowland spruce-hardwood forest. Areas of tundra and shrubland are found near Gold Creek. The streams crossed by this alignment range from small, unnamed creeks and sloughs to large creeks and rivers, such as Montana, Sheep, Fish, and Little Willow Creeks and the Susitna, Talkeetna, Kashwitna, and Little Susitna Rivers. These streams vary from small, clear, snow-fed tributaries to large, turbid glacial systems and contain pink, chum, coho, chinook, and sockeye salmon, rainbow trout, arctic grayling, burbot, round and humpback whitefish, Dolly Varden pike, and eulachon (Morrow 1980). Numerous small, clear water bogs and beaver ponds are present within this ROW. Some of these contain rainbow and lake trout, grayling, Dolly Varden, burbot, whitefish and slimy sculpin (ADF&G 1984).

[1/] Common names of fish follow Morrow (1980). Scientific names are as follows: Slimy sculpin (Cottus cognatus), Dolly Varden (Salvelinus malma), chinook salmon (Oncorhynchus tshawytscha), coho salmon (Oncorhynchus kisutch), chum salmon (Oncorhynchus keta), pink salmon (Oncorhynchus gorbuscha), rainbow trout (Salmo gairdneri), arctic grayling (Thymallus arcticus), sockeye salmon (Oncorhynchus nerka), burbot (Lota lota), round whitefish (Prosopium cylindraceum), humpback white (Coregonus pidschian), pike (Esox lucius), eulachon (Thaleichthys pacificus), inconnu (or sheefish, Stenodus leucichthys), longnose sucker (Catostomus catostomus).

The proposed Gold Creek to Fairbanks ROW traverses terrain that ranges from flat tundra to steep mountain passes. Much of the terrain is covered by shrubland and upland spruce-hardwood forest, with occasional areas of wet tundra. The numerous streams crossed by this alignment range from small, clear water tributaries to large, turbid rivers. They include Honolulu, East, Cantwell, Panguingue, Little Panguingue, Healy, Little Goldstream, Rock, Bear and Fish Creeks, and the Susitna, Indian, Jack, Nenana and Tanana Rivers. These streams contain chinook, chum, and coho salmon, grayling, Dolly Varden char, burbot, inconnu (or sheefish), round and humpback whitefish, pike, longnose sucker, and slimy sculpin. Most of the ponds within this corridor are fed by run-off and groundwater. They contain grayling, lake trout, Dolly Varden, burbot, whitefish, and slimy sculpin (APA 1982).

Pertinent Studies. Vegetation clearing, access trail construction, and transmission line installations could cause an increase in the erosion of soils within the transmission alignment, if these activities were conducted without regard for environmental concerns. A large body of information pertaining to the detrimental effects of increased erosion and stream sedimentation on fish habitat exists in the literature (Iwamoto et al. 1978). Studies have also shown that most soil erosion from access roads is preventable, if adequate control measures are utilized (Larse 1971). Burns (1972) found access road construction and logging to be compatible, if adequate protection is given to streams.

Access trail construction could hinder or eliminate fish migrations if bridges, culverts, or other stream crossing devices were placed without regard for fish passage (John Graham Company 1976). Several guides for the maintenance of fish passages at road crossings are available (Lauman 1976, USDA 1979, Evans and Johnston 1980, Yee and Roelofs 1980). Their use during the planning, design, and construction phases of access trail development can ensure the continuation of fish passage at crossings.

Construction of the transmission facilities (trail and lines) could lead to the introduction of materials toxic to fish, such as petroleum products or concrete, into waterbodies. Development of an oil spill prevention and reaction plan, and the use of environmentally acceptable construction techniques can avoid these impacts.

Construction activities in or near streams can disrupt normal fish behavior. The movement of equipment across streams can cause fish to avoid using traditional spawning or rearing areas. Eggs, alevins, and fry could be crushed by heavy equipment working in streams, if timing of construction activities coincide with the incubation period. Shockwaves from explosives can cause significant mortalities of incubating fish eggs, if blasting occurs near spawning areas. Adherence to strict blasting guidelines and state regulations can avoid these impacts.

Anticipated Effects. Activities such as vegetation clearing, slope and grade cutting, excavating, the placing of fill material, and the instream movement of equipment may produce erodable material that could enter streams directly or through run-off. A number of techniques will be employed to control erosion and prevent chronic sedimentation of streams (APA 1985a). Minor, short-term increases in stream sediment levels may occur despite the use of these measures. Performance of these activities will be in accordance with all permit stipulations and in coordination with ADF&G, ADNR, and COE. No significant changes in fish habitat quality are expected.

Infrequent, low-volume introductions of petroleum products into water bodies from vehicles with leaks could occur, but would not result in measurable changes in water quality. Spills from vehicular accidents could result in the introduction of measurable amounts of petroleum products into water bodies. The techniques detailed in the BMPM entitled "Oil Spill Contingency Planning" (APA 1985c) are applicable to a variety of spill sizes and locations. Where appropriate, contractors will be required to prepare and implement a Spill Prevention, Containment, and Countermeasure Plan and an

Oil Spill Contingency Plan. Spills from vehicular accidents are not expected to have long-term impacts on fish habitat quality, due to the rapid initiation of cleanup efforts. Fish may avoid the area until cleanup operations and natural processes dilute and remove the material. Some concrete or concrete wash water could enter water bodies during construction, but the small volumes expected would not be sufficient to cause measurable changes in stream pH levels.

Some disturbances of natural fish behavior patterns may occur during instream work. These disturbances are not expected to have detrimental effects on the viability of the affected fish populations. Temporary emigrations of fish from areas of high turbidity and activity will be infrequent and short-term. The effect of these emigrations will be negligible.

MITIGATION

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 propagation techniques will be utilized. Impacts associated with transmission corridors will be mitigated in the following manner:

I. Acquisition of all required state and federal permits and compliance with their terms and conditions. (APA 1983a p. E-2-182).

II. Adherence to ADF&G's proposed Habitat Protection Regulations.

III. Application of the appropriate guidelines in the Power Authority'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 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
   c. Channel Maintenance

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

9. RECLAMATION

10. INSPECTION AND MONITORING

B. The BMPM entitled "Fuel and Hazardous Material" (APA 1985b) details techniques that can be employed during the following activities:

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

C. The BPMP entitled "Oil Spill Contingency Planning" (APA 1985c) identifies the major elements of an oil spill contingency plan and describes 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

IV. Application of the appropriate guidelines in the report "Drainage Structure and Waterway Design Guidelines" (APA 1985d). This report details the proper procedures for designing water passage structures, such as culverts and bridges. It includes the following:

A. FLOW DETERMINATION

B. HYDRAULIC DESIGN

1. WATERWAYS
   a. Permissible Non-erodible Velocity Method
   b. Tractive Force Method
2. CULVERTS
   a. Fish Passing Requirements
   b. Scope of Guidelines
   c. Culvert Hydraulics
   d. Culverts Flowing with Inlet Control
   e. Culverts Flowing with Outlet Control
   f. Computing Depth of Tailwater
   g. Velocity of Culvert Flow
   h. Inlets and Culvert Capacity
   i. Procedure for Selection of Culvert Size
   j. Inlet Control Nomographs
   k. Outlet Control Nomographs
   l. Performance Curves
3. BRIDGES
   a. General
   b. Hydraulics of Constrictions in Watercourses
   c. Procedure for Design of Bridge Waterway

V. 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 (AOA 1983b p. E-3-151).

VI. Use of winter construction to avoid surface disturbance and subsequent erosion.

VII. Use of snow and ice bridges during winter construction to cross streams (APA 1983b p. E-3-153).

VIII. Alignment of transmission towers so structures are out of streams and floodplains to the greatest extent possible (APA 1983b p. E-3-153).

IX. Proper disposal of waste concrete and concrete waste water (APA 1983a p. E-2-1984).

X. Adherence to ADF&G blasting guidelines (APA 1983b p. E-3-158).

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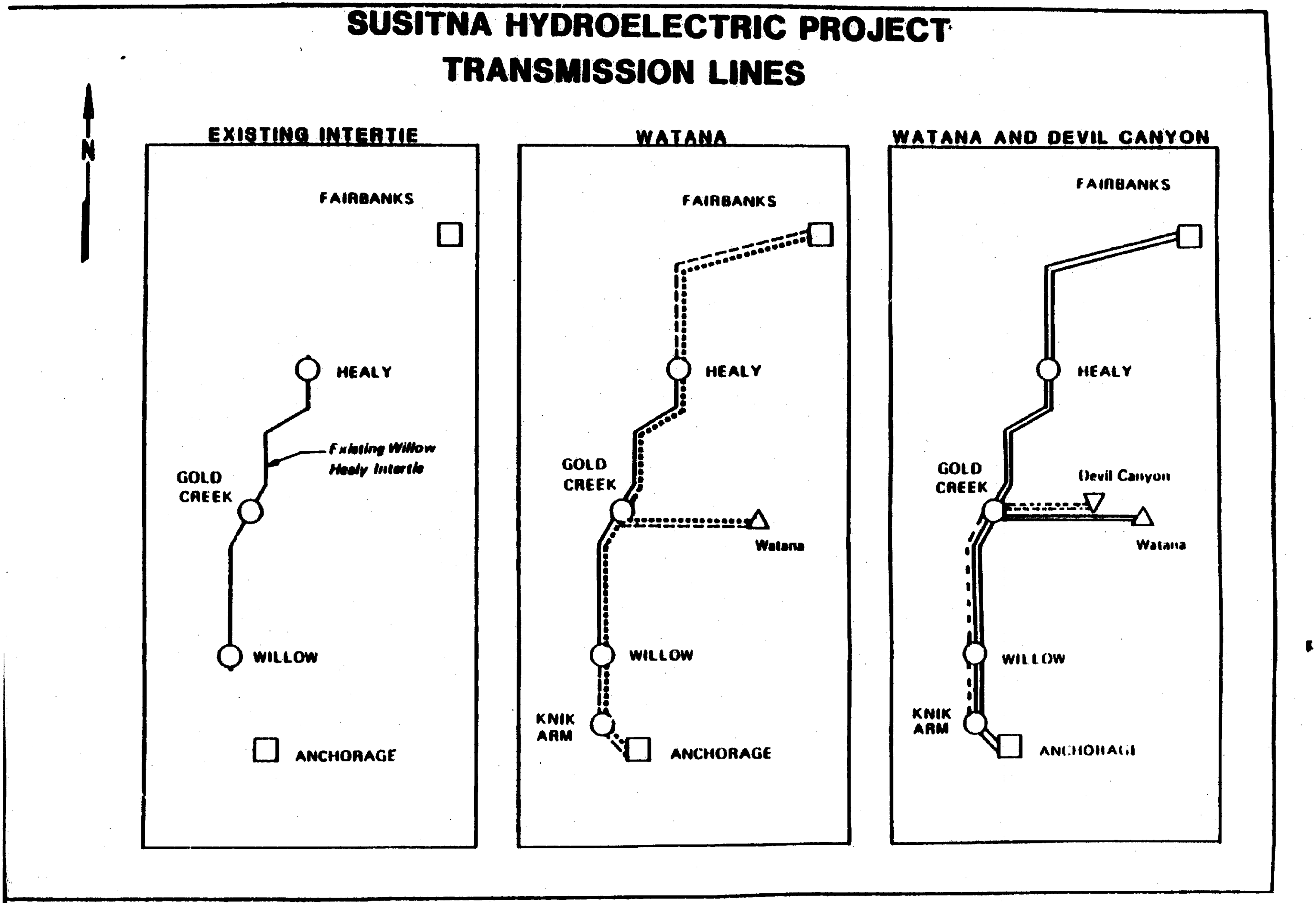
Figure 1


SUSITNA HYDROELECTRIC PROJECT
TRANSMISSION LINES
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EXISTING INTERTIE
FAIRBANKS
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