GOVERNMENTAL PERMIT/PLAN REVIEW DOCUMENTATION

SUSITNA HYDROELECTRIC FEASIBILITY STUDY

FIELD STUDY PROGRAM

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March 28, 1980

INTRODUCTION

PURPOSE

The purpose of this documentation is to satisfy all federal, state, and borough permit and plan review requirements which may be necessary to carry out the field study program for the Susitna Hydroelectric Feasibility Study. Performance of the field study activities associated with the overall Feasibility Study is an extremely important phase of the Susitna project. The information derived from the field study program will provide many of the answers needed to decide whether or not the state of Alaska should proceed with the proposed Susitna Hydroelectric Project.

Within the past year, Alaska Power Authority (APA) has made a conscientious effort to identify the plan review and permit requirements for the field study program. After considerable review of governmental statutes and regulations, and discussions with various federal, state, and borough officials, it is believed that the permit and plan review requirements have been clearly determined. Specifically, the field study program will require, at least, the following permit and review approvals.

Permit/Plan Review Requirement	Regulatory Agency
Temporary Use Permit	Bureau of Land Management
Scientific Collecting Permit	U.S. Fish and Wildlife Service
Federal Antiquities Permit	Heritage Conservation and Recreation Service
Anadromous Fish Permit	State Department of Fish and Game
Scientific Fish and Game Collection	State Department of Fish and Game
Field Archaeology Permit	State Department of Natural Resources

All permit documentation for the field study program is presented in one document in order that all reviewing agencies may have similar information and a more complete description of the field study program. To accomplish this convenience, it was necessary to present the information required in a format which would embrace all the concerns of various governmental agencies. This approach may require a more careful review of the data provided. However, it is hopeful that this approach will enhance the quality of review and expedite the length of agency review periods, especially those which require interagency comments and discussions.

SCOPE OF DOCUMENTATION

The field study program includes four major types of field activities:

- Aerial and land surveying
- Hydrological studies
- Environmental studies
- Geotechnical and seismological investigations

No aspects of the field study program are expected to generate any significant environmental consequences to the resources of the Susitna River Basin; in fact, only geotechnical and seismological investigations will require a temporary disturbance to selected land and water areas within the upper River basin. Consequently, geotechnical and seismological investigations are described in somewhat greater detail to allow proper agency assessment of these field activities. Otherwise, each major type of field activity is generally described in terms of field study objectives, the scope of field investigations and techniques, the location of field activities, and the field activity schedule. These descriptions are also supplemented with completed permit application forms which have already been determined as necessary to submit, and copies of already approved permits and stipulations for specific aspects of the field study program (See Appendices A, B, and C).

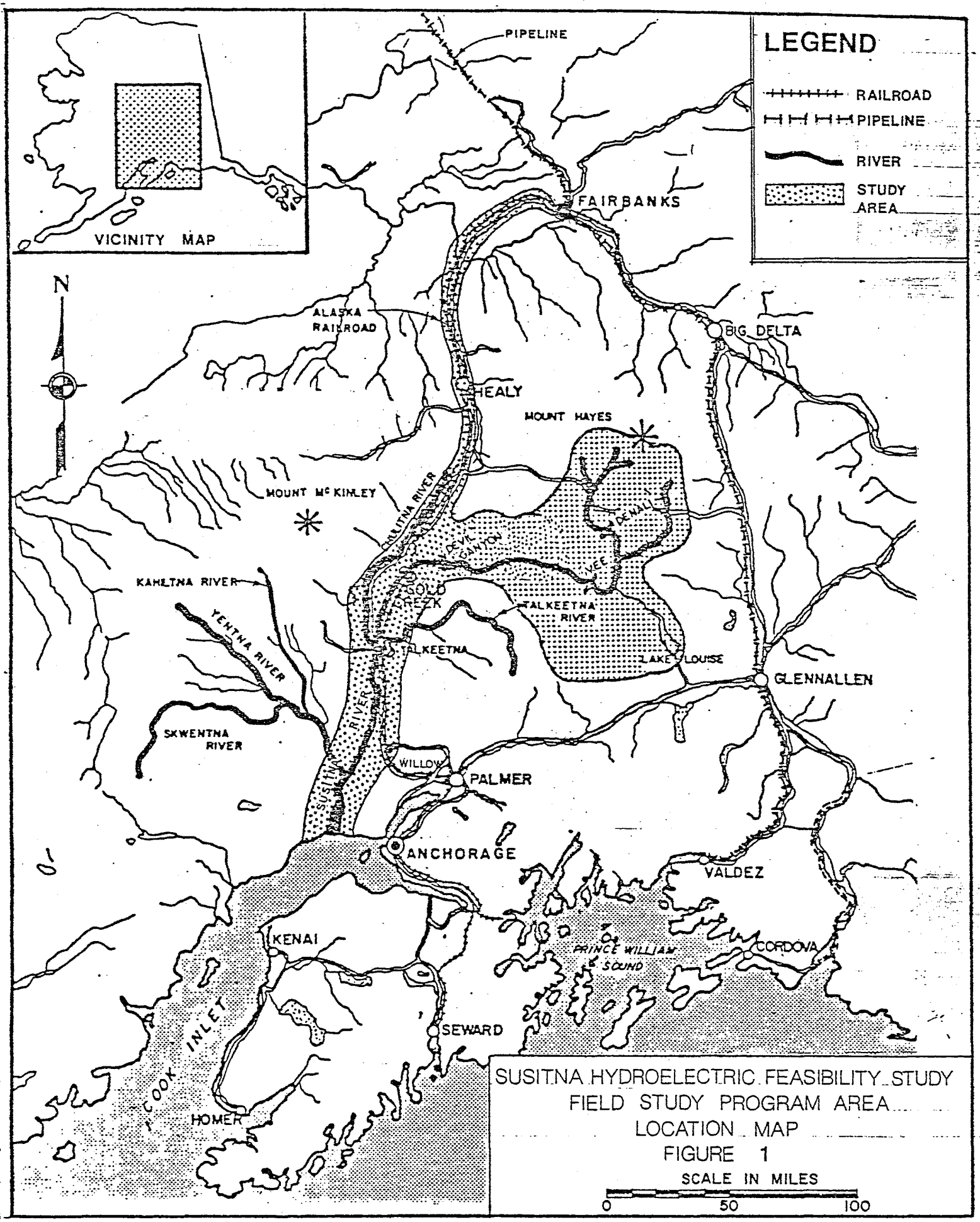
DESCRIPTION OF THE FIELD STUDY PROGRAM

GENERAL

In December, 1979, the Alaska Power Authority (APA) contracted Acres American, Inc., its various subcontractors, and selected governmental agencies in Alaska to perform the Susitna Hydroelectric Feasibility Study. The field study program described in this document refers to those field investigations which APA considers necessary to carry out the Susitna Hydroelectric Feasibility Study. The field investigations required for the study include four major types of field activity which will be accomplished by the following agencies:

Type of Field Activity	Primary Field Investigators
Aerial and Land Surveying	R&M Consultants, Inc.
Hydrological Studies	R&M Consultants, Inc. U.S. Geological Survey U.S. Soil Conservation Service
Environmental Studies	Terrestrial Environmental Specialists, Inc. University of Alaska, Fairbanks State Department of Fish and Game
Geotechnical and Seismological Investigations	R&M Consultants, Inc. Woodward Clyde Consultants

The field study program will generally be performed in selected areas throughout the Susitna River Basin and along the railbelt between Anchorage and Fairbanks (Figure 1). Field activities are scheduled to begin in April, 1980, and be completed by late summer of 1982. In the following sections of this report, a more definitive description of field study locations, field schedule, and other aspects of each major type of field activity are presented.


LEGEND
RAILROAD
PIPELINE
RIVER
STUDY AREA
VICINITY MAP
N
PIPELINE
FAIRBANKS
ALASKA RAILROAD
BIG DELTA
HEALY
MOUNT HAYES
MOUNT McKINLEY
CHULITNA RIVER
DEVIL CANYON
DEVIL MTN.
KAHILTNA RIVER
GOLD CREEK
TALKEETNA RIVER
YENTNA RIVER
TALKEETNA
LAKE LOUISE
GLENNALLEN
SUSITNA RIVER
SKWENTNA RIVER
WILLOW
PALMER
ANCHORAGE
VALDEZ
KENAI
PRINCE WILLIAM SOUND
CORDOVA
COOK INLET
SEWARD
HOMER
SUSITNA HYDROELECTRIC FEASIBILITY STUDY
FIELD STUDY PROGRAM AREA
LOCATION MAP
FIGURE 1
SCALE IN MILES
0
50
100

AERIAL AND LAND SURVEYING

Introduction

Surveying activities to be accomplished in the field study program include site specific surveys, aerial photography and photogrammetric mapping, control network surveys, access road surveys, field reconnaissance of the proposed reservoir area, and hydrographic surveys. Each of these subtasks is generally described in the following paragraphs in terms of field study objectives, the scope of field investigations and techniques, the location of field activities, and the field activity schedule.

Site Specific Surveys

Objective

Provide "on the ground" surveys of specific areas which require a higher level of accuracy than can otherwise be obtained through photogrammetric mapping.

Scope of Field Investigations and Techniques

A minimum amount of low brush clearing will be done to facilitate ground surveys. This task will involve collecting data for two cross-sections at each dam site, topographic mapping of the switchyard area at each dam site, and site mapping of Watana Base Camp facilities and the proposed runway area.

Clearing will be confined to that necessary to improve visibility during field surveys. No trees of significant size will be removed. This clearing will be accomplished by the use of chain saws, machetes, sandviks, and axes.

Access to sites will be by helicopter. All ground travel will be by foot. Each site survey will involve the use of one four-man field survey crew.

Location of Field Activities

Field activities will be performed in areas throughout the upper Susitna River Basin (Figures 2, 3, and 4).

Field Activity Schedule

Field activity will occur from May 1 through October 31, 1980.

Aerial Photography and Photogrammetric Mapping

Objective

Provide contour mapping of both Devil Canyon and Watana Dam and Reservoir sites, photography and contour mapping of access corridors, photography of

the transmission corridor, photography to be used by geologists in terrain unit mapping, photography to be used in the environmental studies of the project area, and photography of the Susitna River downstream to Talkeetna for use by hydrologists.

Scope of Field Investigations and Techniques

A minimum amount of clearing will be done to provide aerially visible horizontal and vertical control panels (targets) for photogrammetric mapping. Panels will be placed at intervals of approximately two miles. Panels will be crosses on the ground of 20-foot lengths constructed of plastic fabric.

Clearing will be confined to that necessary to improve visibility of panels from above. This clearing will be accomplished by the use of chain saws, machetes, sandviks, and axes.

Access to sites will be by helicopter, foot travel, or snowmachine. Setting of the panels will involve the use of one or two men.

Location of Field Activities

Areas to be paneled include the length of the Susitna River from the confluence of the Susitna, Chulitna, and Talkeetna Rivers upstream to an area between the Oshetna and Tyone Rivers, the Watana Base Camp, and one of the three proposed access road routes (Figures 2, 3, and 4).

Field Activity Schedule

Field activity will occur from April 15 through August 15, 1980.

Control Network Surveys

Objective

Provide a more frequent interval of horizontal and vertical survey control than currently exists in the project area.

Scope of Field Investigations and Techniques

Utilizing "one second" theodolites, medium to long-range electronic distance measuring devices, and helicopter supported ground crews, a chain of high accuracy control monuments will be established on each side of the river basin from the upper reaches of Watana Reservoir site to the lower end of Devil Canyon. This network will serve as the "spine" of all subsequent survey activity and mapping effort.

A precise level circuit will be run extending from the existing U.S. Coast and Geodetic Survey circuit up to the Parks Highway railroad, upriver through both the Devil's Canyon dam site and the Watana dam site, and tying to the existing U.S. Coast and Geodetic Survey circuit along the Denali Highway.

Eight-foot high target sights constructed of wood and fabric will be erected on control stations situated at intervals of approximately 15 miles. Clearing will be confined to that necessary to improve visibility during horizontal and vertical control surveys. No trees of significant size will be removed. Clearing will be done around horizontal control stations and along level lines. Brush cutting will primarily be limited to limbing and low brush trimming. This brushing will be accomplished by the use of chain saws, machetes, sandviks, and axes.

Access will be by foot, snowmachine, or helicopter. Field surveys will be performed by up to six four-man crews.

Location of Field Activities

Horizontal control surveys will include all of the Susitna River Basin from Devil's Canyon upstream to an area between the Oshetna and Tyone Rivers (Figures 2, 3, and 4). Vertical control surveys will include all of the Susitna River Basin from Gold Creek upstream to the Denali Highway (Figures 2, 3, and 4).

Field Activity Schedule

Field activity will occur from February 15 through October 31, 1980.

Access Road Surveys

Objective

Provide contour mapping and elevations for the proposed access corridor to proposed dam sites, quarries, and borrow pits.

Scope of Field Investigation and Techniques

A preliminary study phase preceding this aspect of surveying field activity will entail reviewing photos and existing maps of possible access routes, as well as a comprehensive review of work already completed by the U.S. Army Corps of Engineers. Once this work is completed, it is anticipated that three possible access routes will be evaluated more fully in terms of technical feasibility, environmental impact, and preliminary cost estimates. The results from these investigations will result in an initial route selection. Subsequently, horizontal and vertical control will be established along the selected access corridor for photogrammetric mapping.

A minimum amount of clearing will be done to improve visibility during horizontal and vertical control surveys. Clearing will be confined to that necessary to improve visibility during field surveys. No trees of significant size will be removed. Clearing will be done around horizontal control stations and along level lines. Brush cutting will primarily be limited to limbing and low brush trimming. This brushing will be accomplished by the use of chain saws, machetes, sandviks, and axes.

Eight-foot high target sights constructed of wood and fabric will be erected on control stations. These stations occur at intervals of approximately every two to three miles.

Access will be by foot and helicopter. Field surveys will be performed by two three-man crews.

Location of Field Activities

To be determined prior to September, 1980.

Field Activity Schedule

Field activity will occur from September 1 through October 31, 1980.

Field Reconnaissance of Reservoir Area

Objective

Make on-the-ground checks to verify adequacy of information obtained during an earlier map and photo search; more precisely delineate dimensions of those portions of the reservoir area which are likely to require special attention during the ultimate construction of the project.

Scope of Field Investigations and Techniques

A field reconnaissance team of two persons will be furnished with marked-up maps produced during an earlier map and photo inventory. By making on-the-ground inspections, the team will be able to ascertain the extent of clearing required, as well as estimate the size, nature, and density of various trees to be removed. In addition, some initial estimates will be made of soil types, particularly as they would affect slope stability. To the extent that surficial inspection will reveal it, the field team will seek potential borrow sites which are situated in proposed reservoir areas in order to minimize eventual environmental impact to adjacent land areas.

Field reconnaissance will involve limited foot travel of certain areas within the Susitna River Basin from Devil's Canyon upstream to an area between the Oshetna and Tyone Rivers. However, reconnaissance will primarily be done by airborne investigation.

Location of Field Activity

Field reconnaissance activity will occur in those areas depicted in Figure 2.

Field Activity Schedule

Field activity will occur from August 1 through October 31, 1980.

Hydrographic Surveys

Objective

Provide field and aerial survey data relating to the Susitna River gradient and cross sectional configuration of the active flood plain.

Scope of Field Investigations and Techniques

Through the use of deferential level circuits, 60 miles of river will be profiled from the lower portion of Devil Canyon, downstream, to the confluence of the Susitna, Talkeetna, and Chulitna Rivers near the town of Talkeetna.

Pre-set picture panels for aerial photogrammetry will be tied to the profile level circuit for later use in river cross sections. Panels will be placed at intervals of approximately one mile. Panels will be crosses on the ground, constructed of 20-foot lengths of plastic fabric.

Cross sections of the river's active flood plain will be measured at selected intervals and based on elevations established during river profiling.

A minimum amount of brush clearing will be done to improve visibility during vertical control surveying, profiling, cross-sectioning, and tying-in vertical control panels along the Susitna River from the confluence of the Susitna, Chulitna, and Talkeetna Rivers upstream to Devil's Canyon. Clearing will be accomplished by the use of chain saws, machetes, sanviks, and axes. It will be confined to the extent necessary to improve visibility of panels from above, and to improve visibility during field surveys.

Access will be by foot, railroad "speeder," or helicopter. Field activity will involve the use of two four-man crews.

Location of Field Activities

Field activities will be performed along the Susitna River from the confluence of the Susitna, Chulitna, and Talkeetna Rivers upstream to Devil's Canyon (Figures 2 and 3).

Field Activity Schedule

Field activity will occur April 1 through December 1, 1980.

HYDROLOGICAL STUDIES

Introduction

Hydrological activities to be done in conjunction with the field study program include stream flow, ice thickness and water quality monitoring, climatological monitoring, snow course measurements, and climatological transmission corridor investigation. Each of these subtasks is generally described in the following paragraphs in terms of field study objectives, the scope of field investigations and techniques, the location of field activities, and field activity schedule.

Streamflow, Ice Thickness and Water Quality Monitoring

Objective

Supplement available streamflow and water quality data for the Susitna River Basin.

Scope of Field Investigations and Techniques

Existing and proposed stream gauge stations and gauge sites will be utilized as continuous monitoring and sampling locations for the measurement of water levels, water discharge, sediment discharge, ice thickness, and various water quality parameters.

The only structures on site will consist of standard USGS stream or crest gauge stations. All equipment used for measuring flow, water quality, ice thickness, and sediment will be carried to and from the site on each trip.

Stream gauge and crest gauge sites will generally be monitored by a two-person team which will gain access to the sites by helicopter in the summer, and by helicopter or fixed-wing aircraft on skis in the winter. Those stations accessible by road will be reached by automobile. The length of visit by the field team will vary from one to four days at each site.

Location of Field Activities

Field activity will occur at selected sites throughout the Susitna River Basin (Figures 2 through 7).

Field Activity Schedule

Field activity will occur from May 1, 1980, through June 30, 1982.

Climatological Monitoring

Objective

Supplement available climatological data for the Susitna River Basin.

Scope of Field Investigations and Techniques

Continuous monitoring of various climatological parameters will be at selected stations throughout the Susitna River Basin. At each climate station, two 4 x 4-foot pads will be placed on the ground approximately 20 feet apart. One pad will contain a 5-foot high tower and a 5-foot high instrument shelter. Sensors to record wind speed and direction will be located on the tower. A recorder servicing all of the sensors will be located in the instrument shelter. A 6-foot tower and a tipping bucket rain gauge will be located on the second pad. A solar radiation sensor, temperature sensor, and relative humidity sensor will be located on the tower.

Climatic stations will be maintained by a visiting field team of two persons which will make biweekly site visits to the climatic stations via helicopter in the summer, and by helicopter or fixed-wing aircraft on skis in the winter. Site visits at each site will normally be completed in less than one day.

Location of Field Activities

Field activity will occur at selected sites throughout the Susitna River Basin (Figures 2 through 7).

Field Activity Schedule

Field activity will occur from May 1, 1980, through June 30, 1982.

Snow Course Measurements

Objective

Supplement available snow course data for the Susitna River Basin.

Scope of Field Investigations and Techniques

During the winter season, a two-person field crew will monthly visit several snow course sites to measure snow depth and density. The length of each visit will generally be less than one day per site. Access to the snow course stations will be by helicopter or fixed-wing aircraft on skis.

Structures remaining at each station will consist of snow course location markers and a snow depth gauge.

Location of Field Activities

Snow course stations will be situated within the upper Susitna River Basin (Figures 2, 4, and 6).

Field Activity Schedule

Field activity will occur from February 1 to May 30, 1980, and February 1 to May 30, 1982.

Climatologic Transmission Corridor Investigation

Objective

Supplement available climatological data for the proposed transmission line corridor with measurements of in-cloud icing, snow creep, freezing rain, and general climatological information.

Scope of Field Investigations and Techniques

Upon determination of the proposed transmission line corridor in mid-1980, three climatologic stations will be established along the proposed corridor at three sites. Winter measurements will be made of general climatology parameters, in-cloud icing, freezing rain, and snow creep.

Similar to the other climate stations proposed for the Susitna River Basin, two 4 x 4-foot pads, approximately 20 feet apart, will be placed on the ground at each station. One pad will contain a 5-foot high tower and a 5-foot high instrument shelter. Sensors to record wind speed and direction will be located on the tower. A recorder servicing all of the sensors will be located in the instrument shelter. A 6-foot tower and a tipping bucket rain gauge will be located on the second pad. A solar radiation sensor, temperature sensor, and relative humidity sensor will be located on the tower.

In order to determine the potential build-up of ice on future transmission lines, two tripods, spaced approximately 20 feet apart, will be installed to support a 10-foot high simulated transmission line. The transmission line will be connected to tensionemeters which will measure line tension as icing builds up on the line. Visual observations will be required to define ice characteristics and dimensions.

One of three climatic stations will also contain a small installation for the measurement of ice build-up during a precipitation event. This installation will consist of a one-half inch thick, 2 x 2-foot steel plate which is supported three feet above ground. During freezing rain events, the ice will accumulate on the plat surface, and depth of ice will be measured manually. Consequently, the freezing rain installation will have to be situated within walking distance of a permanent residence.

Snow creep stations will be established in the vicinity of each general climatological station. At each station, six staff gauges will be installed in a series normal to the fall of the mountain slope. Each rod will be founded such that it begins in a vertical position. As the snowpack creeps downhill, the staff will deflect accordingly. The staff gauges will be referenced to a bench mark such that the deflection can be measured using surveying transits and chains. Prior to each winter, the staff gauges will be repositioned and referenced for the upcoming winter measurements.

Each of the three transmission corridor stations will be serviced throughout the year by a two-person field crew. However, measurements of in-cloud icing, freezing rain, and snow creep will only be made during the winter months. Access to each station will be by helicopter, fixed-wing aircraft, or automobile. Visits by the field crew will normally be completed within one day for each station.

Location of Field Activities

Field activity will be performed at selected sites along the Anchorage-Fairbanks railbelt.

Field Activity Schedule

Field activity will occur from January 1, 1981, to June 30, 192.

ENVIRONMENTAL STUDIES

Introduction

Environmental activities to be accomplished in the field study program include studies and investigations relating to cultural resources, fish ecology, wildlife ecology, plant ecology, land use analysis, and recreational planning assessment. Each of these subtasks is generally described in terms of field study objectives, the scope of field investigations and techniques, the location of field activities, and field activity schedule.

Cultural Resources Investigations

Objective

Identify archeological, historical, and paleontological resources within the upper Susitna River Basin and proposed transmission corridor, and to recommend mitigation measures to reduce adverse impact of ground-disturbing activites on these resources.

Scope of Field Investigations and Techniques

Two survey crews, consisting of three or four persons, will conduct systematic foot traverses and visual reconnaissances of geotechnical and seismic field activity areas, the proposed runway area at Watana Base Camp, the proposed dam sites, and other potential ground-disturbance areas which may eventually be affected in conjunction with the development of the proposed Susitna Hydroelectric Power Project. Upon completion of reconnaissance-level archaeological surveys and subsequent analyses, the two survey crews will return to selected sites identified during initial reconnaissance-level survey to determine the horizontal and vertical dimensions of specific sites, and to estimate the kinds of materials contained within them. Site testing will be accomplished through the examination of hand-excavated test pits which will be approximately 1 x 1 x 1-foot in size. Test pits will be backfilled immediately following excavation activity.

Access to the reconnaissance-level survey and test pit areas will be by either helicopter or foot.

NOTE: At the time of this documentation, an approved Federal Antiquities Permit (No. 80-AK-023) has already been granted to the University of Alaska, Division of Life Sciences, Fairbanks for these field activities (Appendix B).

Location of Field Activities

Archaeological reconnaissance and excavation work will be performed throughout the upper Susitna River Basin and the proposed transmission corridor.

Field Activity Schedule

Field activity will occur from May 15 through September 15, 1980, and from May 15 through September 15, 1981.

Fish Ecology Studies

Objective

Determine the relative abundance and distribution of adult anadromous fish populations within the Susitna River drainage.

Determine the distribution and abundance of selected resident and juvenile anadromous fish populations.

Determine the spatial and seasonal habitat requirements of anadromous and resident fish species during each stage of their life histories.

Scope of Field Investigations and Techniques

COOK INLET/SUSITNA RIVER CONFLUENCE TO THE YETNA RIVER CONFLUENCE

(Stock Assessment of the Adult Salmon Populations)

Commercial Fisheries Division of the Alaska Department of Fish and Game currently operates an escapement project in the vicinity of Susitna Station as a part of their ongoing sockeye salmon research program. Expansion of this program will provide the necessary escapement data required for the Susitna Hydroelectric Feasibility Study. Sonar counters and fishwheels will be operated from May through mid-October to determine escapement by species.

SUSITNA-YETNA RIVER CONFLUENCE TO TALKEETNA

(Stock Assessment of the Adult Salmon Popluations)

One side-scan sonar project will be established within this area of the river. Seasonal apportioned counts by species will be compared to the lower Susitna and Yetna River sonar projects to determine importance of this area to the entire drainage. Fishwheels and possibly other sampling gear will be used to apportion sonar counts.

The sonar project will be located between the Yetna River confluence in the vicinity of Sunshine. This program will provide information on (1) the importance of this area of the river for spawning; (2) the extent to which this area is used for migration to spawning areas upstream of Talkeetna; and (3) the contribution of these salmon stocks to the total Susitna River drainage. A total of two side-scan sonar counters and four fishwheels will be required.

All salmon captured in the fishwheels at the "Sunshine site" will be marked with a color- and number-coded Peterson disc tag. Market fish will be recaptured upstream to provide an assessment of stocks utilizing this area.

Migrational timing will be determined by fishwheel catches at the sonar projects and survey crews.

Recreational utilization of these salmon stocks will be determined partially by ongoing Alaska Department of Fish and Game (ADFG) creel census programs. Expansion of these programs will be required to monitor all species adequately. The creel-census programs will also provide data on migrational timing and tag recoveries.

Movement of salmon through this geographic area will be monitored by remote sensing devices for radio-tagged fish. Sonar counters may also provide horizontal distribution data for the area.

COOK INLET/SUSITNA RIVER CONFLUENCE TO THE TALKEETNA-SUSITNA RIVER CONFLUENCE

(Stock Assessment of the Resident and Juvenile Anadromous Fish Populations)

A crew of three biologists, utilizing a riverboat as their primary means of transportation, will operate in the Susitna mainstem and tributary systems during the ice-free months (May through October, 1981). Their activities will include:

. Sampling using established techniques and their adaptations including gill nets, minnow traps, adult traps, angling, seines, and electrofishing.

. Developing suitable techniques for sampling the Susitna mainstem. Particular emphasis will be placed on the design of an effective stationary fish trap.

. Classifying in terms of depth, velocity, turbidity, and substrate types in conjunction with the sampling of resident populations.

. Tagging adult resident fish and note species, size, date, and location of capture.

A crew of four biologists will carry out fisheries research during the winter months. This facet of the field operations will be based on road access until such time as the mainstem Susitna ice condition has stabilized sufficiently to provide safe transportation via snowmachine. This crew will perform the following operations:

. Survey in the proximity of areas surveyed during the previous summer using established sampling techniques such as gill nets and minnow traps. As ice conditions improve and data is analyzed, this effort will be expanded to include as much of the study area as possible.

. Design an effective resident species adult trap for use in this study area as established sampling techniques meet with limited success when applied under a cover of ice in the river environment.

. Classify habitat in terms of ice cover, depth, velocity, turbidity, and substrate in conjunction with sampling of resident populations.

Following the first season's determination of resident and juvenile anadromous fish occurrence, areas of greatest availability, and suitable methods of capture, the 1982 program will be directed largely to the same areas and intensified with respect to relative abundance and preferred habitat utilization. The 1982 study plan will again consist of two segments: summer field operations and winter field operations.

A crew of three biologists utilizing a riverboat as their primary means of transportation will operate in the Susitna mainstem and tributary systems during the ice-free months to:

. Confirm previous season's data base with regard to occurrence and species composition.

. Determine relative abundance of resident stocks in predetermined locations by seasonal period, and further establish patterns of intrasystem migration.

. Further define preferred habitat parameters.

. Continue to tag adult resident fish, and record any recaptures from previous year.

A crew of four biologists will carry on the 1981 study from January through April. This four-man crew will begin the second field season in December of 1982. Following the first season's determinations, the program will be expanded to include additional areas, will be intensified at one or two predetermined locations, and will continue to determine habitat requirements.

(Spatial and Seasonal Habitat Requirements of Fish Populations)

Three field operations will be accomplished in 1981. These are mainstem seasonal instream flow measurements, tributary seasonal instream flow measurements, and collection of other physiochemical and biological habitat data.

A crew of biologists utilizing a customized riverboat as their primary means of transportation will operate in the mainstem and selected tributary systems during the ice-free months of May through October to:

. Establish and refine large river instream flow measurement techniques.

. Collect instream flow data in terms of depth, velocity, wetter perimeter, and substrate.

. Collect water quality data as related to discharge.

TALKEETNA-SUSITNA RIVER CONFLUENCE TO PROPOSED DEVIL'S CANYON DAM SITE

(Stock Assessment of the Adult Salmon Populations)

Salmon escapement estimates will be determined by a tag and recovery program in this area. Fish marked at the "Sunshine site" will be recovered by ground survey crews upstream from the Chulitna River confluence.

Surveys of major spawning areas between Talkeetna and Devil's Canyon dam site will be conducted in conjunction with juvenile studies to determine distribution.

Migrational timing of salmon stocks utilizing this area will be determined by stream surveys.

Recreational use within this area will be determined by a creel-census program.

(Stock Assessment of the Resident and Juvenile Anadromous Fish Populations; Spatial and Seasonal Habitat Requirements of Fish Populations)

Due to limited access to much of the Susitna River upstream of Talkeetna, and related high cost of transportation, work for 1981 will be limited to the Indian River - Portage Creek - Gold Creek area. This area is accessible by railroad, and will be investigated by a single field crew located in the Gold Creek area. These investigations will be extended downstream into other areas in the second and third years of study.

A four-man crew will be located in the Gold Creek or Indian River area, housed in a local cabin or tent camp, and provided with a river boat and Zodiac-type raft to conduct the following activities:

. Establish the occurrence and species composition of resident and anadromous fish stocks utilizing the mainstem Susitna River during the period May through October of 1981. This work will entail intensive netting, electro-shocking, trapping, or use of set lines or other suitable collection methods within the mainstem reach from Fourth-of-July Creek upstream to Portage Creek. Some of these collection devices are expected to require modification or development as the season progresses.

. Perform similar sampling by net, electro-shock, trap, or angling within the Indian River, Portage Creek, Gold Creek, and Fourth-of-July Creek tributaries. A program of fish tagging will be implemented to define intrasystem movement.

. Creel census anglers utilizing these four streams to determine harvest of resident fish by (a) species, (b) age class, (c) size, (d) seasonal period, and (3) area of availability. The creel census will also held with recovery of tagged fish.

. Conduct the adult anadromous studies in this area in cooperation with the anadromous program.

Following the first season's determinations of resident and anadromous fish occurrence, areas of greatest availability, and suitable methods of capture, the 1982 program will be directed to the same areas, and intensified to include population estimations and preferred habitat utilization.

A similar two-man crew will be located in the Indian River or Gold Creek area, depending upon which seems more appropriate as a result of the first year study. The same equipment will be utilized.

DEVIL'S CANYON DAM SITE TO THE TYONE RIVER CONFLUENCE

(Stock Assessment of Adult Salmon Populations)

Surveys and escapement sampling will be conducted in the proposed impoundment areas between the Denali Highway and Devil's Canyon during periods of peak adult salmon abundance. Initial observations will be conducted by aerial surveys to document the presence or absence of adult salmon. Surveys will be done in conjunction with resident fish investigations.

(Stock Assessment of the Resident and Juvenile Anadromous Fish Populations; Spatial and Seasonal Habitat Requirements of Fish Populations)

A three-man crew will work in the proposed impoundment area during the ice-free months, utilizing a helicopter and light aircraft for transportation throughout the study area. The study crew will be housed in a temporary/portable field camp. Investigations will be directed to:

. Conduct extensive on-the-ground surveys of Goose, Jay, Kosina, Watana, Deadman, Tsusena, and Fog Creek, and the Oshetna River. These investigations will include hydrological surveys, and will determine the types of aquatic habitat currently available to resident species.

. Determine the types, magnitude, and location of aquatic habitats which will be lost upon inundation by these respective streams. Geographical features blocking upstream migration will be noted. Conversely, stream areas which will benefit in terms of improved access to fish stocks, upon impoundment, will be recorded.

. Conduct extensive netting, trapping, and fish collection to determine the specific occurrence and composition of resident species occupying these eight tributarial waters. As possible, efforts will be directed to determine the extent of seasonal intraseasonal migrations.

. Tag all adult fish captured for determination of intrasystem movement and migrations.

Upon completion of the 1981 assessment of aquatic habitats and biological distribution of fish species within the impoundment area tributaries, investigations will be directed to the upland lake areas and the mainstem Susitna proper.

In 1982, a two-man field crew will again operate with a transportable field camp, utilizing helicopter and light aircraft for transportation. Investigations will begin as soon as "ice-out" occurs in the spring, and continue until freeze-up in the fall.

Studies in 1982 will be directed to:

. Survey fish, utilizing selected tributarial stream mouths throughout the season to determine intrasystem movements of resident fish and their reliance upon the mainstem river during the critical winter months.

Tentative stream selections are Kosina, Jay, and Watana Creeks. A semipermanent camp will be located in the vicinity of these stream mouths, and the individual streams will be sampled for fish occurrence on an established sampling schedule throughout the season.

. Survey upland lakes associated with mainstem Susitna River tributary streams for fish population and related biological data. Habitat information will also be collected from inlet and outlet streams, and be used later in determining the impacts to seasonal migrations and biological requirements of resident fish as a result of impoundment, road construction, and transmission corridor placement.

. Determine resident fish occurrence and distribution with the mainstem Susitna River throughout the spring - summer - fall periods. This work will be accomplished by the same field crew utilizing a chartered boat for transportation on a predetermined sampling schedule. Nets, trot lines, traps, etc., will be used to determine fish presence.

. Continue collection of complete hydrological data.

Determination of mainstem fish occurrence and distribution will be accomplished by two or three scheduled week-long trips through the impoundment area. The upland lake surveys will be accomplished during "nonsample" periods at the tributary mouths.

Location of Field Activities

All field activities will be accomplished along the Susitna River and adjacent drainage areas from the Cook Inlet/Susitna River confluence upstream to the Susitna and Tyone river confluence (Figures 8, 9, 10, and 11).

Field Activity Schedule

Field activity will occur from January 1, 1981, through December 31, 1983.

Wildlife Ecology Studies

Objective

Determine the distribution and relative abundance of big game, furbearers, birds, and nongame mammals.

Gather sufficient data to develop an understanding of the relationship between key wildlife species, and the distribution, quality, and seasonal utilization of habitat components.

Determine the predator-prey relationships that exist in the terrestrial system.

Scope of Field Investigations and Techniques

BIG GAME

Field activities concerning big game include aerial surveys, radio tracking, trapping, and on-the-ground work relating to the study of moose, caribou, bear, wolf, wolverine, and Dall sheep.

A caribou census will be conducted through the use of aerial photography. Motor-driven 35 mm cameras will be mounted inside a single-engine fixed-wing aircraft or helicopter. Subsequently, composition counts involving very low level aircraft flights will be made. On occasion, the aircraft may land to allow observers to use spotting scopes from the ground.

The remaining big game field investigations, as well as selected caribou studies, will utilize radio telemetry which involves placing radio collars on animals, and periodically relocating them from the air. Animals are captured by drugging them with darts shot from a helicopter. When the animal is immobilized, the helicopter lands, and two biologists place collars and ear tags on the animal, and take a variety of measurements and biological samples.

The collared animals are relocated from a Super Cub or Cessna 180 equipped with special antennas. The aircraft is usually flown at 1,000 to 2,000 feet to pick up the signal. When an animal is located, the aircraft will drop down for more detailed observations.

There is a possibility that some bears and wolverines will be captured by live trapping instead of helicopter darting. This technique involves placing a baited trap on the ground. The traps are similar to Havahart live traps in design, but are larger. The bear traps are made from two oil drums welded together. This technique will be used only if helicopter darting fails to obtain the desired composition of animals. Traps will be placed by helicopter, and removed when trapping is finished.

Both of these field activities will be supplemented by short on-the-ground visits to locations of dead study animals, wolf and bear dens, and selected areas for collecting fecal material, etc. Access to these areas will be by helicopter, ski or float equipped aircraft, or possibly boat. The only activities will be recording of data and collection of fecal samples and animal remains.

FURBEARERS

Field activities associated with furbearers will include investigations of red fox, coyote, pine marten, mink, river otter, lynx, beaver, muskrat, and weasel.

Field parties of two to six persons will perform foot transects and scent station surveys to study furbearer tracks, trails, and densities. Marten, lynx, red fox, mink, and river otter surveys may be supplemented by radio telemetry studies which would require live trapping, chemical immobilizing, and animal handling and collaring.

Field survey activities will also include the use of small, single track snowmachines when snow depths exceed 18 inches. Rivercraft (flat bottom boats or rafts) with outboard motors will be used to conduct river surveys.

The field crew will establish temporary tent camps along sandbars and other suitable locations for periods not to exceed one week. No tree clearing will be performed. Firewood will be cut only from driftwood and existing fallen trees.

BIRDS AND NONGAME MAMMALS

A survey of the avifauna of the Upper Susitna River Basin will be conducted within an approximate 10-mile band on either side of the river, from Gold Creek to the upriver location above which the impoundment will not influence the current habitat. All habitats of the region will be visited on a regular basis throughout the migration and summer periods, and all birds seen or heard will be recorded.

Several aerial surveys will be made each year to search for evidence of large nesting raptors such as the osprey, bald and golden eagles, peregrine falcon, and gyrfalcon. Aerial surveys of waterfowl will also be conducted over wetland areas periodically throughout the migration and summer seasons.

Breeding bird census plots will be established during 1980 in each of the major terrestrial habitats in the vicinity of the proposed dam sites. Wherever possible, these plots will be square 10-ha plots on sites of uniform habitat. Censusing will be done with a modification of the territory mapping method. During the breeding season (1981), seven to nine censuses will be conducted on each plot; one or two censuses will be conducted during the winter months of 1980 and 1981. The habitat for each bird census plot will be sampled in detail during 1980, using the point-centered method, with modifications to include sampling of ground cover and shrub vegetation. Access to and from census plots will be by helicopter.

During 1980, nongame mammal trapline transects will be established in each of the major terrestrial habitats in the vicintiy of the proposed dam sites and several wetland habitats. Censusing of shrews, voles, and mice will be conducted using the North American Census of Small Mammals snap-trapping technique. Two parallel transects will be established, each a straight line 289 mm long, consisting of 20 trap stations. At each station, a maximum of three snap-traps and one pitfall trap will be set for three consecutive nights. One late-spring/early-summer, one fall, and possibly one winter census will be conducted on each of the habitat plots. Some random trapping will also be conducted in order to permit the detection of species in the area that may not occur on the intensive plots. Access to and from trapline transect area will be by helicopter.

More general methods will be used to quantify the presence of such species as the little brown bat, collared pika, snowshoe hare, hoary marmot, arctic ground squirrel, red squirrel, and flying squirrel. Within the study plots, the relative amount of sightings and sign (burrow entrances, cone "middens," scat, etc.) will be tabulated, and attempts will be made to located and map and concentrations of hoary marmot and arctic ground squirrel.

The performance of bird census and nongame mammal trapline transects will necessitate the establishment of temporary tent camps for a survey team of two to five persons. The camps will be situated within or adjacent to census and transect areas, and will be utilized for periods not to exceed one week. No tree clearing will be performed. Firewood will be cut only from driftwood or existing fallen trees.

Location of Field Activities

Wildlife ecology field studies will be accomplished throughout the Susitna River Basin (Figures 8, 9, 10, 11, and 12).

Field Activity Schedule

Big game field work will begin on April 1, 1980, and be completed by December 31, 1981. Furbearer field investigations will commence on April 1, 1980, and be completed by December 31, 1981. Bird and nongame mammal studies will occur from May 1, 1980, to December 31, 1981.

Plant Ecology Studies

Objective

To map and characterize the vegetation cover/habitat types occurring in the areas to be affected by the proposed Susitna Hydroelectric Project.

Scope of Field Investigations and Techniques

Upon completion of preliminary mapping of available vegetation cover/habitation map data, field verification surveys will be made at selected areas in the River Basin to confirm to location and presence of major plant communities and habitat types. These field assessments will involve a team of one to four persons performing walk-through surveys of each vegetative type in the field with observational information obtained on plant characteristics such as dominant species composition, species abundance, estimated heights, and estimated percent cover.

Location of Field Activities

Field verification surveys will be conducted at selected areas throughout the Susitna river Basin.

Field Activity Schedule

Field activity will occur from June 1 to September 30, 1980, and July 1 to September 30, 1981.

Land Use Analysis

Objective

Determine the historical patterns and present land use trends of the upper Susitna River Basin.

Scope of Field Investigations and Techniques

Supplementing information derived from the cultural resources investigations, a field crew of one to four persons will interview selected landowners, users, and managers located in Anchorage, Fairbanks, and the Susitna River Basin regarding present and future use trends in the upper Susitna River Basin and the proposed transmission corridor. Access to landowners and managers located in remote areas of the River Basin will be made by helicopter.

Subsequent field reconnaissances by a field crew of one to four persons will be made to verify the location and presence of identified historical and present land uses, as well as potential scenic/natural attractions. Access within the River Basin will be made by automobile when possible. Otherwise, remote locations will be reached by helicopter.

Location of Field Activities

Field activities will be performed at selected areas throughout the upper Susitna River Basin.

Field Activity Schedule

Land use interviews and field verification surveys will occur from June 1 to October 1, 1980, and June 1 to October 1, 1981.

Recreation Planning Assessment

Objective

Assess the potential for reservoir-oriented recreation.

Scope of Field Investigations and Techniques

Field investigations will include on-the-ground reconnaissance of the proposed impoundment areas within the upper Susitna River Basin. Access to this area for a field crew of two persons will be by helicopter.

No tent camps will be established for this activity.

Location of Field Activities

Field activities will be accomplished within the upper Susitna River Basin in the vicinity of the proposed impoundment areas.

Field Activity Schedule

Field activity will occur from July 1 to July 31, 1980

GEOTECHNICAL AND SEISMOLOGICAL INVESTIGATIONS

Introduction

Geotechnical and seismological investigations to be carried out in conjunction with the field study program include Watana and Devil's Canyon dam site investigations, construction materials investigations, reservoir investigations, access road investigations, and seismic studies. Each of these subtasks is generally described in terms of field study objectives, the scope of field investigations and techniques, the location of field activities, and field activity schedule.

Watana and Devil's Canyon Dam Site Investigations

Objective

Perform investigations of the surface and subsurface geology and foundation conditions at the Watana and Devil's Canyon dam sites sufficient to ensure safety of design of major structures and foundations, and reliable project construction cost estimates.

Scope of Field Investigations and Techniques

Exploratory field investigations at the dam sites will comprise geologic mapping, diamond drilling, geophysical in-hole seismic testing, borehole camera studies, and test trenches (See Tables 1 and 2).

Surface geological mapping will be conducted, and outcrops will be located by survey, and mapped in detail. Adverse geological features will be further investigated on the surface. Exploratory drilling will be performed at both sites in the various structure areas on both abutments, and in the riverbed to determine foundation conditions. Diamond drills of the Longyear 34 type, or equivalent, will be used. Split-spoon and Shelby tube sampling, as well as standard penetration tests will be performed in the overburden. NX-size core will be drilled. Riverbed drilling at each site will be undertaken during the winter months to take advantage of the ice cover.

Permafrost conditions will be studied with the assistance of thermal probes installed in boreholes. Test trenches will be used to assist in the geological mapping process, but will not be utilized on steeply sloping areas to avoid future erosion. Test trenches excavated in the summer will use a small backhoe.

Site preparation for core drills will be by hand, and drill rigs will be placed on site by helicopters. Site clearing for helicopter landing areas, where required, will consist of a maximum of 150-foot circles cleared by hand tools only.

Land-based drilling operations in the summer months will scatter drill cuttings in the vicinity of each drill site to a depth of approximately two inches. All cased holes will be suitably capped to protect the public safety and the integrity of the test hole. No casing shall be left extending more than two feet above ground surface. Uncased holes will be backfilled.

GEOTECHNICAL AND SEISMIC FIELD ACTIVITIES - 1980

Area	Type of Exploration	Proposed Project Structures/Facilities: Devil's Canyon Dam and Reservoir	Proposed Project Structures/Facilities: Watana Dam and Reservoir
Dam Site	Geologic Mapping	Yes	Yes
	Geophysical (seismic and resistivity)	3 - 900 ft. lines at buried channel site 3 - Oblique 450 ft. lines across river channel 2 - 1,000 ft. lines on right abutment	1 - 5,000 ft. line at proposed spillway site 2 - Oblique 1,500 ft. lines across river within upstream portion of dams
	Diamond Drilling	1,000 ft.	600 ft.
	Airborne Radar Imagery	± 3,500 ft. at right and left abutment and saddle dam site	± 4,000 ft. at right and left abutments
Dam Construction Materials		One established and two new borrow areas	Four established and two new borrow areas
	Geologic Mapping	Yes	Yes
	Portable Auger Drilling	20 - 10 ft. deep holes in the two proposed borrow areas	20 - 10 ft. deep holes in the two proposed borrow areas
	Geophysical (seismic and resistivity)	2 - 1,000 ft. lines in the two proposed borrow areas	2 - 1,000 ft. lines in the two proposed borrow areas
	Test Trenches	30 trenches in the three borrow areas	30 trenches in the three borrow areas
	Airborne Radar Imagery	6 - 1,000 ft. lines in the three borrow areas	8 - 1,000 ft. lines in four of the borrow areas
Reservoir Basin	Geologic Mapping	Yes	Yes
	Portable Auger Drilling	10 - 10 ft. deep holes	10 - 10 ft. deep holes
	Geophysical (seismic)	2,000 ft.	6,000 ft. at site of right bank relict channel
	Diamong Drilling	100 ft.	100 ft.
	Airborne Radar Imagery	10,000 ft.	20,000 ft.

GEOTECHNICAL AND SEISMIC FIELD ACTIVITIES - 1981

Area	Type of Exploration	Proposed Project Structures/Facilities: Devil's Canyon Dam and Reservoir	Proposed Project Structures/Facilities: Watana Dam and Reservoir	Other
Dam Site	Geologic Mapping	Yes	Yes	
	Diamond Drilling	4 holes in right abutment (powerhouse and dam) 4 holes in left abutment (saddle dam and diversion tunnel) 3 holes in riverbed*	2 holes in relict channel, right abutment 2 holes in right abutment spillway and dam) 2 holes in left abutment (powerhouse and dam)**	
	In-hole Seismic	1,500 ft.	1,000 ft.	
	Borehole Camera	1,500 ft.	1,200 ft.	
	Test Trenching	15 trenches	15 trenches	
Dam Construction Materials		Three borrow areas from 1980 program plus two new areas	Six borrow areas from 1980 program plus two new areas	
	Auger Drilling	10 - 30 ft. deep holes	12 - 30 ft. deep holes	
	Diamond Drilling	10 - 50 ft. deep holes in five borrow areas	12 - 50 ft. deep holes in six borrow areas	
	Test Trenching	30 trenches in two new areas	30 trenches in two new areas	
Reservoir Basin	Geologic Mapping	Yes	Yes	
	Portable Auger Drilling	10 - 10 ft. deep holes	10 - 10 ft. deep holes	
	Diamond Drilling	3 - 100 ft. deep holes, 1 - 200 ft.	3 - 100 ft. deep holes, 1 - 200 ft.	
	Geophysical/Seismic	1,000 ft.	1,000 ft.	
	Reservoir Slope) Monitoring)	1 - 200 ft. slope indicators	1 - 200 ft. slope indicator	
Access Road Route (Approx. 50 miles)				Access Road
	Geologic Mapping			Yes
	Airborne Radar Imagery			10 miles (20% of total lengt
	Portable Auger Drilling			25 - 10 ft. deep holes
	Hollow Stem Auger) Diamond Drilling)			15 - 50 ft. deep holes

Diamond drilling of the river ice will be accomplished during the winter months with drill cuttings being collected and removed entirely from the drill site. Measures to minimize sedimentation will include the casing of each drill hole from the riverbed to the ice surface. Consequently, all return flows will come to the surface without polluting the river. In addition, a sump will be placed around each casing.

Pumping (permeability) tests will be conducted so as to reduce surface disturbance and water quality impacts to a minimum. No ground water will be pumped directly into live streams.

Fault line trenching, which will be accomplished in the winter, will require the equivalent of a D7 Cat Dozer for excavation. All trenches will be backfilled, and the ground surface restored to original contours.

Location of Field Activities

Field activities will be performed in the vicinity of the proposed Watana and Devil's Canyon dam sites (Figures 13 and 14).

Field Activity Schedule

Field activity will occur from May 15, 1980, to October 1, 1981.

Construction Materials Investigations

Objective

Establish detailed geological conditions and geotechnical properties of potential construction material sources to ensure the adequate availability of embankment fill.

Scope of Field Investigations and Techniques

Field exploratory investigations (Tables 1 and 2) will essentially comprise diamond drilling and test trenching. Some geologic mapping and geophysical studies will also be undertaken. Drilling will be carried out in borrow areas and potential rock quarries. Splitspoon and Shelby tube sampling and standard penetration tests will be performed. Core drilling will be performed in rock.

Site preparation for core drills will be by hand, and drill rigs will be placed on site by helicopters. Site clearing for helicopter landing areas, where required, will consist of a maximum of 150-foot circles cleared by hand tools only.

Land-based drilling operations in the summer months will scatter drill cuttings in the vicinity of each drill site to a depth of approximately two inches. All cased holes will be suitably capped to protect the public safety and the integrity of the test hole. No casing shall be left extending more than two feet above ground surface.

Test trenches excavated in the summer will use a small backhoe. All trenches will be backfilled, and the ground surface restored to original contours.

Location of Field Activities

Field activities will take place in the vicinity of the proposed Watana and Devil's Canyon dam sites (Figures 13 and 14).

Field Activity Schedule

Field activity will occur from April 15, 1980, to October 1, 1981.

Reservoir Investigations

Objective

Undertake a detailed evaluation of the geological features and geotechnical conditions in the Watana and Devil's Canyon reservoir areas to ensure the safety and integrity of the impoundments (Tables 1 and 2).

Scope of Field Investigations and Techniques

The investigations to be carried out in 1980 and 1981 (Tables 1 and 2) comprise geologic reconnaissance, auger and diamond drilling, seismic refraction surveys, and reservoir slope monitoring.

Site preparation for drills will be by hand, and drill rigs will be placed on site by helicopters. Site clearing for helicopter landing areas, where required, will consist of a maximum of 150-foot circles cleared by hand tools only.

Land-based drilling operations in the summer months will scatter drill cuttings in the vicinity of each drill site to a depth of approximately two inches. All cased holes will be suitably capped to protect the public safety and the integrity of the test hole. No casing shall be left extending more than two feet above ground surface.

Location of Field Activities

Field activities will take place in the vicinity of the proposed Watana and Devil's Canyon dam sites (Figures 13 and 14).

Field Activity Schedule

Field activity will occur from April 15, 1980, to October 1, 1981.

Access Road and Transmission Line Investigations

Objective

Determine the surface and near surface geology and foundation conditions along the selected access road and transmission line routes to ensure technical and economic feasibility.

Scope of Field Investigations and Techniques

The exploratory investigations along access road and transmission line routes will comprise geologic mapping; airborne radar imagery studies; as well as portable auger, hollow-stem auger, and diamond drilling (Table 2). Auger and diamond drilling will be accomplished at locations situated approximately every mile along the proposed access route. Along the transmission corridor, approximately one hole will be drilled along every 5-mile segment.

Site preparation for all drills will be by hand, and drill rigs will be placed on site by helicopters. Site clearing for helicopter landing areas, where required, will consist of a maximum of 150-foot circles cleared by hand tools only.

Land-based drilling operations in the summer months will scatter drill cuttings in the vicinity of each drill site to a depth of approximately two inches. All cased holes will be suitably capped to protect the public safety and the integrity of the test hole. No casing shall be left extending more than two feet above ground surface. Auger drill cuttings will be backfilled into the drillholes. Uncased diamond drill holes will be backfilled.

Location of Field Activities

Field activities will take place in the vicinity of the proposed Watana and Devil's Canyon dam sites (Figure 15), and along the Anchorage-Fairbanks railbelt.

Field Activity Schedule

Field activity will occur from January 1 to November 1, 1981.

Seismic Studies

Objective

Determine earthquake ground motions which will provide the seismic design criteria for major structures associated with the proposed Susitna Hydroelectric Project.

Scope of Field Investigations

A short-term seismic monitoring network, consisting of the installation and servicing of small ground-mounted recording instruments and a 20-foot antenna, will be established at selected locations within the upper Susitna River Basin. Using a helicopter for access, a two-person field crew will install the instrumentation and subsequently service the field units approximately four times per year. Otherwise, the continuous recording units will automatically send signals to a base recording unit which will be located at the Watana Base Camp.

In order to ascertain the location and seismic characteristics of potential fault areas, seismic test trenching will be conducted at selected locations in the winter of 1981. Test trenches will be excavated with a CAT D7 Dozer or equivalent, and will be backfilled to original contours after trenching. The actual trenching sites will be determined during the 1980 program, and will be identified several months prior to the 1981 program.

Location of Field Activities

Field activities for the seismicity studies will be 30 miles either side of the Susitna River within the project area.

Field Activity Schedule

Field activity will occur from April 15, 1980, to October, 1981.

APPENDIX A

BLM TEMPORARY USE APPLICATION

Form 2920-1
(November 1977)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 42-R0996

Serial Number

INSTRUCTIONS ON REVERSE

TEMPORARY USE APPLICATION AND PERMIT

Title I, Sec. 28(e) of the Mineral Leasing Act of 1920, 30 U.S.C. 185, as amended; Secs. 302(b) and 504(a) of P.L. 94-579, October 21, 1976, 43 U.S.C. 1732, 1764.

APPLICATION

1. Name *(first, middle initial, and last)*
Alaska Power Authority

Address *(include zip code)*
333 West Fourth Avenue, Suite 31
Anchorage, Alaska 99501

2. Give legal description of public lands for which you are applying

TOWNSHIP	RANGE	SECTION	SUBDIVISION

See Attachment A - Legal Description

Meridian	State	County	Acres *(number)*
Seward and Fairbanks	Alaska	N/A	10,344,960

3. Proposed date(s) of use: From April 15, 1980 to December 31, 1983

4a. Are you 21 years of age or over? [X] Yes [ ] No

b. Are you a citizen of the United States or have you declared your intention? [X] Yes [ ] No

c. As applicant, are you a [ ] Partnership [ ] Association [ ] Corporation; [ ] Individual(s); or an agency of [ ] Federal Government [X] State Government [ ] Political subdivision of any state?

d. Are the statements required by Instruction Number 2 attached? [ ] Yes [ ] No [X] Not applicable

5. Are you making this application for your own use and benefit? [ ] Yes [X] No *(If "no," explain)*
The activities described in the attached narrative will be accomplished by various subcontractors of the Alaska Power Authority.

6. Are the lands now improved, occupied, or used? [X] Yes [ ] No *(If "yes," describe improvements and purposes, identify users and occupants)*
Residential and commercial uses exist within the Anchorage-Fairbanks railbelt area. Within the Susitna River Basin, some recreational and residential structures are present; otherwise, the River Basin is generally undeveloped.

7a. What do you propose to use the lands for?
Perform the field study program activities required for the Susitna Hydroelectric Feasibility Study.

b. What improvements, including sanitation facilities, do you intend to make? *(Describe improvements and attach drawings, if convenient)*

N/A -- See attached narrative.

c. What is the estimated cost of proposed improvement? $ N/A

d. What is the proposed source of water for domestic or other uses?
N/A

8. Have you enclosed filing fee of $10? [ ] Yes [X] No *(See Instruction Number 3)*

I CERTIFY That the information given by me in this application is true, complete, and correct to the best of my knowledge and belief and is given in good faith.

(Date)

Eric Yould, Executive Director
(Signature of Applicant)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

PERMIT

Permission is hereby granted to

of

to use the following-described lands:

TOWNSHIP	RANGE	SECTION	SUBDIVISION

Meridian	State	County	Acres *(number)*

for the purpose of

and subject to the following conditions:

1. This permit is issued for the period specified below. It is revocable at the discretion of the authorized officer of the Bureau of Land Management, at any time upon notice. This permit is subject to valid adverse claims heretofore or hereafter acquired.

2. Permittee shall pay annually, in advance, to the authorized officer the sum of dollars as rental or such other sum as may be required if a rental adjustment is made.

3. Permittee shall observe all Federal, State, and local laws and regulations applicable to the premises and to erection or maintenance of signs or advertising displays including the regulations for the protection of game birds and game animals, and shall keep the premises in a neat, orderly, and sanitary condition.

4. Use or occupancy of land under this permit shall commence within months from date hereof and shall be exercised at least days each year.

5. Permittee shall take all reasonable precautions to prevent and suppress forest, brush, and grass fire and prevent pollution of waters on or in the vicinity of the lands.

6. Authorized representatives of the Department of the Interior, other Federal agencies, and game wardens shall at all times have the right to enter the premises on official business.

7. Permittee shall not enclose roads or trails commonly in public use.

8. Permittee shall pay the United States for any damage to its property resulting from this use.

9. Permittee shall notify the authorized officer of address change immediately.

10. This permit is subject to all applicable provisions of the regulations (43 CFR 2920) which are made a part hereof.

11. Permittee agrees to have the serial number of this permit marked or painted on each advertising display erected or maintained under the authority of such permit.

12. Permittee shall not cut any timber on the lands without prior permission from the authorized officer.

13. This permit is subject to the provisions of Executive Order No. 11246 of September 24, 1965, as amended, which sets forth the Equal Opportunity clauses. A copy of this order may be obtained from the signing officer.

14. This permit may not be assigned without prior approval of the authorized officer of the Bureau of Land Management.

15. Special Conditions:

Permit issued for period

From _____

To _____

_____
(Authorized Officer)

_____
(Title) (Date)

INSTRUCTIONS

1. Submit, in *duplicate*, to any local office of the Bureau of Land Management having jurisdiction of the lands.

2. An application by a partnership or association must be accompanied by a statement by each member that he is a citizen of the United States or has filed a declaration to become a citizen. An application by a corporation must be accompanied by a statement showing that the corporation is authorized to hold land in the State in which the land is located and that the person making the application is authorized to act for the corporation.

3. If applicant is other than a Federal, State, or local governmental agency, this application must be accompanied by a nonreturnable filing fee of $10 made payable to the Bureau of Land Management.

4. If this application is for permission to erect an advertising display or sign, the applicant must: (a) attach an accurate and fully descriptive diagram, sketch, or photograph (at least 3" × 5") of the sign or display to be erected showing the dimensions, type of construction, estimated cost, the advertising material to be included thereon, the plan of illumination, if any, and the manner of attachment to the land; and, (b) a photograph (at least 3" × 5") showing the site on which the sign or display is to be erected.

ATTACHMENT A

GENERAL LEGAL DESCRIPTION

FIELD STUDY PROGRAM AREA

TOWNSHIP	RANGE	SECTION	SUBDIVISION
T. 13 N.	RS. 4-9W, 4-6E	All	Seward Meridian
T. 14 N.	RS. 4-9W	All	Seward Meridian
T. 15 N.	RS. 4-9W	All	Seward Meridian
T. 16 N.	RS. 4-9W	All	Seward Meridian
T. 17 N.	RS. 4-9W	All	Seward Meridian
T. 18 N.	RS. 4-9W	All	Seward Meridian
T. 19 N.	RS. 4-9W	All	Seward Meridian
T. 20 N.	RS. 4-9W	All	Seward Meridian
T. 21 N.	RS. 4-9W	All	Seward Meridian
T. 22 N.	RS. 4-9W	All	Seward Meridian
T. 23 N.	RS. 3-7W, 13-15 W.	All	Seward Meridian
T. 24 N.	RS. 3-7W, 13-15 W.	All	Seward Meridian
T. 25 N.	RS. 3-7W, 13-15 W.	All	Seward Meridian
T. 26 N.	RS. 4-7W, 13-15W, 1-12 E.	All	Seward Meridian
T. 27. N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 28 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 29 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 30 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 31 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 32 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian
T. 33 N.	RS. 1-15W, 1-12 E.	All	Seward Meridian

ATTACHMENT A

TOWNSHIP	RANGE	SECTION	SUBDIVISION
T. 1 N.	R. 2W	All	Fairbanks Meridian
T. 1 S.	RS. 1-4W	All	Fairbanks Meridian
T. 2 S.	RS. 4-7W	All	Fairbanks Meridian
T. 3 S.	RS. 5-8W	All	Fairbanks Meridian
T. 4 S.	RS. 7-8W	All	Fairbanks Meridian
T. 5 S.	RS. 7-8W	All	Fairbanks Meridian
T. 6 S.	RS. 7-8W	All	Fairbanks Meridian
T. 7 S.	Rs. 7-8W	All	Fairbanks Meridian
T. 8 S.	RS. 8-9W	All	Fairbanks Meridian
T. 9 S.	RS. 6-9W	All	Fairbanks Meridian
T. 10 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 16 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 17 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 18 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 19 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 20 S.	RS. 1-4W, 1-4E	All	Fairbanks Meridian
T. 21 S.	RS. 1-4W, 1-4E.	All	Fairbanks Meridian
T. 22 S.	RS. 1-12 W. 1-4E	All	Fairbanks Meridian

ATTACHMENT A

TOWNSHIP	RANGE	SECTION	SUBDIVISION
T. 3 N.	RS. 5-9W.	All	Copper River Meridian
T. 4 N.	RS. 5-9W.	All	Copper River Meridian
T. 5 N.	RS. 5-9W.	All	Copper River Meridian
T. 6 N.	RS. 5-9W.	All	Copper River Meridian
T. 7 N.	RS. 5-9W.	All	Copper River Meridian
T. 8 N.	RS. 5-9W	All	Copper River Meridian
T. 9 N.	RS. 5-9W.	All	Copper River Meridian
T. 10 N.	RS. 5-9W.	All	Copper River Meridian
T. 11 N.	RS. 5-9W.	All	Copper River Meridian
T. 12 N.	RS. 5-9W.	All	Copper River Meridian
T. 13 N.	RS. 5-9W.	All	Copper River Meridian
T. 14 N.	R. 9 E.	All	Copper River Meridian
T. 13 N.	R. 9 E.	All	Copper River Meridian
T. 6 N.	RS. 7-8E.	All	Copper River Meridian

APPENDIX B

FEDERAL ANTIQUITIES PERMIT NO. 80-AK-023

UNITED STATES DEPARTMENT OF THE INTERIOR

Please use this number when referring to this permit.
NO. 80-AK-023

FEDERAL ANTIQUITIES PERMIT

ARCHEOLOGICAL RESOURCES PROTECTION ACT OF 1979

October 31, 1979 (93 Stat. 721, 16 U.S.C. 470)

1. PERMIT ISSUED TO:

University of Alaska-Division of Life Sciences

DATE: FEB 6 1980

2. NAME, ADDRESS AND OFFICIAL STATUS OF PERSON:

a. In general charge: Dr. John Bligh, Director, Division of Life Sciences, University of Alaska, Fairbanks, Alaska 99701

b. In actual direct charge: (see attached sheet)

3. UNDER APPLICATION DATED:

February 20, 1979 (received March 15, 1979)

4. AUTHORIZES:

Archeological Investigations (Consultation Services/Limited Testing)

5. ON LANDS DESCRIBED AS FOLLOWS:

Public lands owned and controlled by the Department of the Interior and administered by the Bureau of Land Management in the State of Alaska.

Control #: 114-AK/79-002

6. FOR PERIOD:

February 7, 1980 through February 6, 1981

7. MATERIALS COLLECTED UNDER THIS PERMIT WILL BE DEPOSITED FOR PERMANENT PRESERVATION IN THE

University Museum
University of Alaska
Fairbnaks, Alaska 99701

OR IN OTHER ACCREDITED INSTITUTIONS UNDER SUITABLE LOAN AGREEMENTS.

8. Special Conditions

This permit is subject to the provisions of the Archaeological Resources Protectio Act approved October 31, 1979, as well as the special conditions on the reverse of this form and special appended stipulations.

9. PRELIMINARY REPORT

Within approximately 6 weeks of the conclusion of field work, a preliminary report of work performed under this permit, illustrated with representative photographs and listing new and significant collected materials should furnished the Secretary, Smithsonian Institution, and 5 copy(s) thereof should be forwarded to this Department. (see special stipulations)

n 2b - In Actual Direct Charge:

Dr. Anne Shinkwin, Associate Professor
Dr. Jean Aigner, Associate Professor
Dr. W. Roger Powers, Associate Professor, all of the Division of Life Sciences, University of Alaska, Fairbanks;
Dr. James Dixon, University Museum, University of Alaska, Fairbanks.
David Plaskett, University Museum, University of Alaska, Fairbanks.
G. Smith and C.E. West, Research Associates, University Museum, University of Alaska, Fairbanks.

1. Work under this permit is limited to consultation services. (general survey investigations, limited surface collections and testing for site evaluative purposes only) when requested by the Bureau of Land Management (BLM). Extensive testing, emergency excavation, and/or salvage may not be undertaken under this permit except with the written approval of the appropriate BLM District Manager.

2. Academic research projects may not be conducted under the authority of this permit. Such projects will require separate research permits.

3. The permittee shall contact the appropriate BLM District Manager prior to the beginning of each of his field operations to inform the BLM of specific work to be conducted. At this time, the BLM District Manager may impose additional stipulations as deemed necessary to provide for the protection and management of the resources of the area.

4. Collections of cultural artifacts and other related material acquired under the provisions of this permit remain the property of the United States Government and may be recalled at any time for the use of the BLM or other agencies of the Federal Government.

5. The following individuals are authorized to be in direct charge of field work conducted under this permit:

Dr. Anne Shinkwin	Dr. James Dixon
Dr. Jean Aigner	David Plaskett
Dr. W. Roger Powers	G. Smith
C. E. West	

6. The person in direct charge of field work, or a qualified designee, shall be on site at all times when work is in progress. Failure to comply with permit stipulations will result in removal of subject's name from the approved list of persons-in-direct charge.

7. During the course of the work conducted under this permit, the BLM District Manager or his representative shall have access to the study area of this permit, and during or after completion of this work, shall have the right to inspect all artifacts or other material removed from these sites.

8. The following information shall be submitted to the District Manager as a part of the preliminary report or as a part of a separate report within 30 days of the end of each completed project:

a. identification of the specific Federal Antiquities permit under which work was performed;

b. identification of the project and the BLM Serial case file (if any) for which the report is being written;

c. the names of individuals utilized in activities under this permit, the commencement and termination dates of investigations, and the disposition of original notes and records;

d. a description of survey methods and the intensity of the survey;

e. a definition of "site" and "site types" as used in this study;

f. a statement of the work done under the permit;

g. the significance of identified cultural resources and their potential for contributing data concerning archeological problems of the project area, including descriptions and maps exhibiting their relationship to the proposed project. Sites which may merit nomination to the National Register of Historic Places will be so identified;

h. a completed Site Inventory Form for each site found (BLM #8110-1 thru-5 or toehr approved form) with appropriate maps indicating the location of each site;

i. a catalog and evaluation of all objects collected; and

j. a recommended program of study to realistically mitigate direct and indirect adverse effects on cultural resources which will result from the project, including possible research designs. It is recommended in the event that archeological resources are to be affected by the originally planned project that every attempt be made to alter the areas of surface disturbance to avoid these resources. When mitigating actions must include excavation, the request for clearance will report in detail the reasons why avoidance cannot be accomplished.

10. A copy of all published journal articles (reprints) and other published or unpublished reports and manuscripts resulting from the work conducted under this permit shall be filed with the District Manager.

11. Upon request, all field notes, records, photographs, and other data related to this permit shall be made accessible to the BLM and/or the Departmental Consulting Archeologist for review.

12. If any evidence of human remains is encountered during the course of test excavations, all work shall cease and the responsible BLM Officer shall immediately be notified. Work shall not recommence until permission to do so is obtained from the responsible BLM Officer.

13. No lithic replicative experimentation shall be conducted at any archeological site or aboriginal quarry source covered by this permit.

14. Stakes and/or flagging used to identify sites, shall be removed upon completion of the project.

15. Vehicular activity shall be restricted to existing roads and trails unless otherwise authorized by the District Manager. Care should be exercised to avoid directly or indirectly increasing access or potential vandalism to cultural resource sites.

16. Disturbed areas shall be kept to a minimum size consistent with the purpose of the study.

17. Permittee shall take adequate precautions to prevent livestock from injury in any pit or trench.

18. All test pits shall be backfilled.

19. Living trees shall not be cut or otherwise damaged.

20. Camp sites shall be at least 300 yards from water.

21. Proper precaution shall be taken at all times to prevent and suppress fires. The permittee shall be held responsible for suppression costs for any fores on public lands caused through negligence of the permittee or his authorized representatives. No debris burning shall be allowed without specific permission from the District Manager.

22. Improvements ushc as fencing or reservoirs or other improvements within the permit area shall not be disturbed or where disturbance is necessary, prior approval must be obtained from the District Manager. Any improvement disturbance shall be left in the original or better condition as is determined by the District Manager.

23. The permittee shall be responsible for cleaning up all camp and work sites before leaving the area. Caution shall be taken to adequately prevent littering and pollution on the public lands under permit or the adjoining properties. Refuse shall be carried out and deposited un approved disposal areas.

24. The BLM reserves the right to request the Departmental Consulting Archeologist to terminate this permit at any time.

25. The resumes of all crew chiefs must be submitted to the State Office, BLM, and to the office of the Departmental Consulting Archeologist, if any changes in personnel are anticipated.

26. The permittee shall contact the appropriate BLM District Manager prior to beginning each of his filed operations (with follow-up written notification) to inform the BLM of specific work to be conducted. Such notification should take place at the earliest stage of a project requiring a consulting services survey. At the time of notifcation, the permittee shall also bring with him written concurrence from the appropriate Native Corporation, when the project will involve land selected under the ANCSA.

27. All artifactual material collected or excavated under this permit from lands selected under the provision of ANCSA shall remain the property of the United States Government until such times as interim conveyance of the particular parcel of land is completed. Upon conveyance, ownership of artifactual material collected or excavated, from land conveyed under ANCSA, between the time of "withdrawl for selection" and "conveyance" corporation. Ownership of artifactual material can be transferred at an earlier date if proper facilities for housing and storing the collection by the Native group are available. Requests for transfer of ownership of artifacts should be made to the Bureau of Land Management, Alaska State Director.

APPENDIX C

U.S. FISH AND WILDLIFE SCIENTIFIC COLLECTION PERMIT

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(2/76)

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

Brina Kessel
University Museum
Univeristy of Alaska
Fairbanks, Alaska 99701

2. AUTHORITY-STATUTES
16 USC 704
REGULATIONS (Attached)
50 CFR 21.23

3. NUMBER
PRT 2-11 AK

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
02/04/80	12/31/80

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business)

9. TYPE OF PERMIT
Scientific Collecting

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
State of Alaska

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE, Daniel Gibson, Stephen O. Mc Donald, and any person who is under the direct control of, or who is employed by the permittee. Written notice of sub-delegation authority shall be forwarded to the issuing officer prior to accomplishing the purpose authorized herein.

D. Authorized to take migratory birds, eggs, and nests as necessary for the programs of the Museum and the College of Biological Sciences and Renewable Resources, University of Alaska, transport and possess dead specimens for scientific and educational purposes, during the tenure of this permit. The use of unattended mist nets is not authorized.

E. Carry a copy of this permit whenever exercising its authority, and display permit number on all unaccompanied shipments.

F. Dispose of specimens as specified in 50 CFR 21.23(c)(1).

G. Maintain records as required in 50 CFR 13.46.

H. Does NOT authorize trespass on private property, nor areas selected for claim by Native corporations and villages.

I. Does not authorize the taking of eagles or endangered species.

J. Permittee must have written authority from the Alaska Department of Fish and Game, Juneau, Alaska, before exercising any of the authorities granted by this permi

☐ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS An annual report must be provided the Division of Law Enforcement, U. S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503, by January 10, 1981. The report must be submitted on a form 3-430a supplied by the U. S. Fish and Wildlife Service.

ISSUED BY [signature] TITLE [illegible] DATE

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

3-201
(2/76)

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 704
REGULATIONS (Attached)
50 CFR 21.23

1. PERMITTEE

Brina Kessel
University Museum
Univeristy of Alaska
Fairbanks, Alaska 99701

3. NUMBER
PRT 2-11 AK

4. RENEWABLE ☒ YES ☐ NO

5. MAY COPY ☒ YES ☐ NO

6. EFFECTIVE 02/04/80

7. EXPIRES 12/31/80

8. NAME AND TITLE OF PRINCIPAL OFFICER (*If #1 is a business*)

9. TYPE OF PERMIT
Scientific Collecting

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
State of Alaska

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE , Daniel Gibson, Stephen O. Mc Donald, and any person who is under the direct control of, or who is employed by the permittee. Written notice of sub-delegation authority shall be forwarded to the issuing officer prior to accomplishing the purpose authorized herein.

D. Authorized to take migratory birds, eggs, and nests as necessary for the programs of the Museum and the College of Biological Sciences and Renewable Resources, University of Alaska, transport and possess dead specimens for scientific and educational purposes, during the tenure of this permit. The use of unattended mist nets is not authorized.

E. Carry a copy of this permit whenever exercising its authority, and display permit number on all unaccompanied shipments.

F. Dispose of specimens as specified in 50 CFR 21.23(c)(1).

G. Maintain records as required in 50 CFR 13.46.

H. Does NOT authorize trespass on private property, nor areas selected for claim by Native corporations and villages.

I. Does not authorize the taking of eagles or endangered species.

J. Permittee must have written authority from the Alaska Department of Fish and Game, Juneau, Alaska, before exercising any of the authorities granted by this perm

☐ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS An annual report must be provided the Division of Law Enforcement, U. S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503, by January 10, 1981. The report must be submitted on a form 3-430a supplied by the U. S. Fish and Wildlife Service.

ISSUED BY [signature] TITLE [illegible] DATE

STATE OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

PERMIT

to

- [X] TAKE
- [X] POSSESS
- [X] HOLD ALIVE
- [X] BAND OR TAG
- [X] IMPORT INTO ALASKA
- [X] EXPORT FROM ALASKA

- [X] BIRDS OR THEIR EGGS
- [X] MAMMALS
- [ ] ~~NESTS OR THEIR EGGS~~

FOR SCIENTIFIC, EDUCATIONAL, OR PROPAGATIVE PURPOSES, as described below.

ssued March 9, 1979 Expires December 31, 1979

rmit No. 79-131 Authorizing Dr. Brina Kessel & Subpermittees*

University Museum, University of Alaska Fairbanks, Alaska 99701

presenting Same

conduct the following described activities, SUBJECT TO THE CONDITIONS, EXCEPTIONS,) RESTRICTIONS EXPRESSED HEREON AND ON THE REVERSE SIDE HEREOF, in accordance with e "Fish and Game Code of Alaska" (Chapter 94, SLA 1959):

Authority is granted to take migratory birds, eggs and nests as necessary for the programs of the Museum and the College of Biological Sciences and Renewable Resources, University of Alaska, transport and possess dead specimens for scientific and educational purposes during the tenure of this permit. The use of unattended mist nets is not authorized. Federal permit PRT 2-11 AK must be in possession.

-CONT.-

HIS PERMIT DOES NOT ALLOW PEREGRINE FALCON, ALEUTIAN CANADA GOOSE, EAGLES OR THEIR EGGS.

IS PERMIT MUST BE CARRIED BY THE PERMITTEE WHEN OPERATING THEREUNDER and be exhibited) any person authorized to enforce state or federal laws who requests to see it. This rmit is nontransferable, and will be revoked, or renewal denied by the Commissioner Fish and Game if the permittee violates any of its conditions, exceptions or restric- ons. No redelegation of authority may be allowed under this permit.

DETAILED REPORT, including numbers, species, dates, and disposition of each specimen; re dates and places collected, their sex, age and breeding condition, lengths and ights of fish, and weights of birds and mammals SHALL BE SUBMITTED WITH RETURN OF THIS RMIT WITHIN 10 DAYS AFTER ITS EXPIRATION DATE. Permits will not be renewed until such port has been received by the Commissioner.

ALASKA DEPARTMENT OF FISH AND GAME

Donald G. McKnight
ivision Director

for Ronald O. Skoog
Commissioner or Authorized Representative

Authority is also granted to take and possess mammal specimens as necessary in Dr. Kessel's capacity as curator of the University Museum.

* Subpermittees are Daniel Gibson, Stephen O. McDonald and any other person who is under the direct control of or is employed by Dr. Kessel. Written notice of sub-delegation authority shall be in writing with a copy to Division of Game, Department of Fish & Game, Subport Building, Juneau, Alaska 99801.