

LETTER OF TRANSMITTAL

| | | | |
|-------------------------------|--------------------------------------|--------------------|--------------|
| DATE | May 12, 2010 | PROJECT NO. | 15317 05-001 |
| FROM: Elizabeth Benson | TO: Bob Piorkowski, ADF&G SPF | | |

Dear Mr. Piorkowski:

ASRC Energy Services (AES) is under contract to the Alaska Department of Natural Resources for environmental and permitting support for the Stand Alone Gas Pipeline Project. We are currently in the process of preparing our 2010 field studies program. AES field crews are scheduled to conduct stream surveys south of Livengood to Point Mackenzie, July 6, 2010 through July 31, 2010.

It is our understanding that, your office is requesting all work plans describing our activities. Enclosed you will find:

- ADF&G Fish Resource Permit Application
- Figure 1.0 Stand Alone Pipeline taken from the, Alaska Stand Alone Pipeline EIS
- Stream Survey Work Plan – *Note: At this time work plan maps are not available, and work plan pages are not sequential according to table of contents. Maps and stream crossing locations will be supplied in final report. Please refer to Figure 1.0 for project area map.*

Please call if you have any questions rearding our Work Plans. You can reach me at (907) 339-5477 or email me at elizabeth.benson@asrcenergy.com or Stewart Seaberg by phone (907) 339-7639 or email at stewart.seaberg@asrcenergy.com.

Sincerely,

Elizabeth Benson
 ASRC Energy Services
 Stand Alone Gas Pipeline Project, PM

INFORMATION TRANSMITTED

| | |
|---------------------------------|---|
| <input type="checkbox"/> LETTER | <input type="checkbox"/> MAPS |
| <input type="checkbox"/> REPORT | <input checked="" type="checkbox"/> OTHER |

RECEIVED BY: _____
(signature)

PRINT NAME: _____

DATE: _____

TIME: _____



STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
Fish Resource Permit Application
— Email Form —

A **FISH RESOURCE PERMIT** is required to take, possess, hold alive, or tag FISH AND THEIR EGGS (except goldfish and decorative tropical fish) FOR SCIENTIFIC OR EDUCATIONAL PURPOSES.

(in order to use this form over again as a "blank form" first re-name and save this as a new document)

| | | |
|--|----------------------------|--------------------------------|
| Stewart Seaberg | ASRC Energy Services (AES) | |
| (Name of Applicant) | (Organization or School) | |
| 2700 Gambell Street, Suite 200 Anchorage, Alaska 99503 | | |
| (type in complete mailing address including City, State, and Zip Code) | | |
| (907) 339-7639 | (907) 339-5475 | stewart.seaberg@asrcenergy.com |
| (your Telephone Number) | (Fax Number) | (Email Address) |
| Alaska Department of Natural Resources 550 W 7 th Ave Ste. 800 Anchorage, AK 99501-3560 | | |
| (type in the name and address of the organization with which you are under contract) | | |

I am making application to capture fish of the following species and number for the specified disposition (example: identify and release, measure and release, genetic sample and release, tag and release, sacrifice, transport, hold alive, etc.):

| <u>Species</u> <u>Common Name</u> | <u>Species</u> <u>Scientific Name</u> | <u>Life Stage</u> | <u>Number</u> | <u>Disposition*</u> |
|--------------------------------------|--|-------------------|---------------|----------------------------|
| sockeye salmon | Oncorhynchus nerka | jv, adult | uknwn | identify, measure, release |
| chinook salmon | Oncorhynchus tshawytscha | jv, adult | uknwn | identify, measure, release |
| coho salmon | Oncorhynchus kisutch | jv, adult | uknwn | identify, measure, release |
| pink salmon | Oncorhynchus gorbuscha | jv, adult | uknwn | identify, measure, release |
| chum salmon | Oncorhynchus keta | jv, adult | uknwn | identify, measure, release |
| Dolly Varden | Salvelinus malma | jv, adult | uknwn | identify, measure, release |
| Arctic char | Salvelinus alpinus | jv, adult | uknwn | identify, measure, release |
| rainbow trout | Oncorhynchus mykiss | jv, adult | uknwn | identify, measure, release |
| Broad whitefish | Coregonus nasus | jv, adult | uknwn | identify, measure, release |
| least cisco | Coregonus sardinella | jv, adult | uknwn | identify, measure, release |
| Bering Cisco | Coregonus laurettae | jv, adult | uknwn | identify, measure, release |
| humpback whitefish | Coregonus pidschian | jv, adult | uknwn | identify, measure, release |
| round whitefish | Prosopium cylindraceum | jv, adult | uknwn | identify, measure, release |
| Pacific lamprey | Lampetra tridentata | jv, adult | uknwn | identify, measure, release |
| Arctic lamprey | Lampetra camtschatica | jv, adult | uknwn | identify, measure, release |
| eulachon | Thaleichthys pacificus | jv, adult | uknwn | identify, measure, release |
| three spn stickleback | Gasterosteus aculeatus | jv, adult | uknwn | identify, measure, release |
| slimy sculpin | Cottus cognatus | jv, adult | uknwn | identify, measure, release |
| Northern pike | Esox lucius | jv, adult | uknwn | identify, measure, release |
| Sheefish | stenodus leucichthys | jv, adult | uknwn | identify, measure, release |
| burbot | Lota lota | jv, adult | uknwn | identify, measure, release |
| Arctic grayling | Thymallus arcticus | jv, adult | uknwn | identify, measure, release |
| longnose sucker | Castostomus catostmus | jv, adult | uknwn | identify, measure, release |
| Alaska blackfish | Dallia pectoralis | jv, adult | uknwn | identify, measure, release |

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

*For multiple sample locations give detail of species and number and disposition in your study plan

I understand permits are only valid for dates within a calendar year; I am requesting this permit for the following period: (a new application is required each year)

| | | |
|------|--------|-----------|
| 2010 | July 1 | October 1 |
|------|--------|-----------|

Year: (20__)
From: (month and day)
To: (month and day)

This is likely a **one year** **multi-year** **research project (circle one). I intend to submit a comprehensive project completion report by:**

| | |
|----------|------|
| November | 2010 |
|----------|------|

Month (xxx) Year (20xx)

I wish to obtain the above fish [finfish, shellfish, amphibians] by means of:

| |
|--|
| Fyke net, electrofishing, minnow trap, seining, angling |
|--|

(Specify gear type(s): minnow traps, hoop traps, fyke nets, gillnets, dip nets, spat collectors, etc.)

from the following location(s):

| |
|--|
| Streams along the proposed Stand Alone Gas Pipeline Project South of Livengood to Point Mackenzie |
|--|

(Specify location(s), i.e., X River at latitude/longitude, or ESE of Pt. Barrow, or on Kodiak Island, etc.)

The purpose of the activities for which a permit is being requested: (a brief purpose statement)

Baseline studies for the development of NEPA documentation and project permitting.

(this area and other boxes will expand as you type)

NOTE: A STUDY PLAN or RESEARCH PROPOSAL explaining the purpose and need, the objectives, and the procedures you will use must be included in/with this permit application:

See enclosed: Stand Alone Gas Pipeline Project 2010 Work Plan Stream Surveys, Livengood to Point Mackenzie, Alaska.

(Study Plan)

Final disposition of collected specimens* not to be released live at the site of capture will be:

All fish will be released live to the location where they were captured.

*(specimens may not be consumed, sold, traded, or bartered, or used in any commercial manner)

The following people will participate in field collections under terms of this requested permit:

| | | |
|------------------|--------------------|---|
| Stewart Seaberg | Jaime Stewart | Wendell Brower |
| David Waltemyer | Michelle Turner | Kim Hermann |
| Simon Wigren | Michelle Russell | (Others may be added as we hire summer technicians) |
| Kathryn Johnson | Meghan Larson | |
| Marianne Profita | Stacey Aughe | |
| Mac Salway | Mike Weidmer | |
| Darrin Lawless | Dennis Gnath | |
| Josh Buckmaster | Konrad Middlestadt | |

(completed application must be submitted to):

Email Address:

Freshwater and estuarine environment collections (Division of Sport Fish):\n Robert.Piorkowski@alaska.gov

Marine environment collections (Division of Commercial Fisheries):\n frpermits@alaska.gov

or

Mailing Address:

Freshwater & estuarine environment collections:

**Alaska Department of Fish and Game
Attn: Bob Piorkowski
Division of Sport Fish
P.O. Box 115526
Juneau, AK 99811-5526**

Marine environment collections and permits involving propagation. :

**Alaska Department of Fish and Game
Division of Commercial Fisheries-Permits
P.O. Box 115526
Juneau, AK 99811-5526**

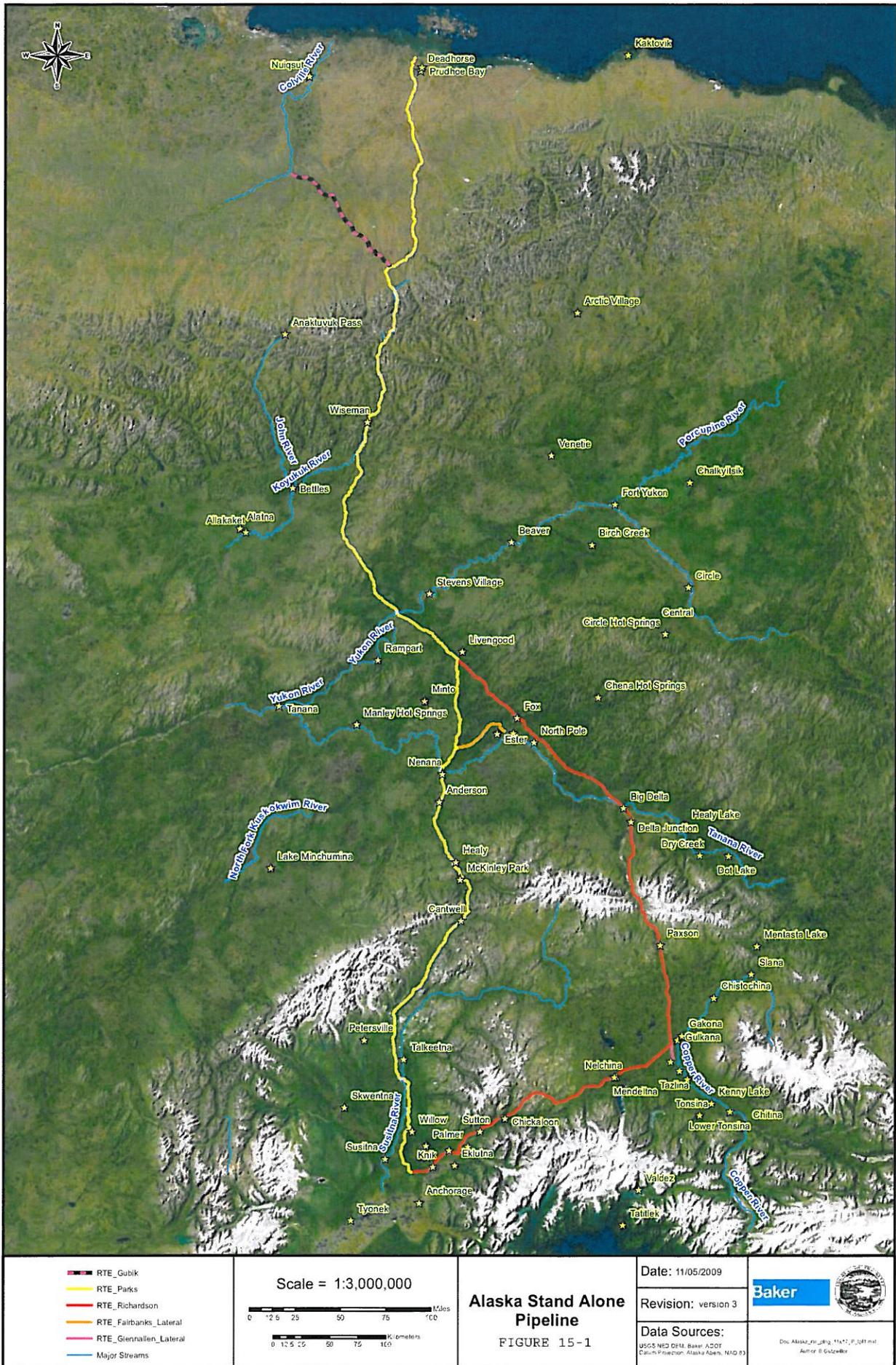


Figure 1.0; Reference: <http://www.asapeis.com/ProjectMap.aspx>

Alaska In-State Gas Pipeline Project 2010 Stream Crossings Work Plan Livengood to Point MacKenzie, Alaska

April 2010

Prepared for

State of Alaska
In-State Gas Pipeline Project
411 W. 4th Avenue
Anchorage, Alaska 99501

Authorized Agent

Robert F. Swenson
State of Alaska
In-State Gas Pipeline Project

Prepared by



2700 Gambell Street, Suite 200
Anchorage, Alaska 99503

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ACRONYMS and ABBREVIATIONS

| | |
|------------------|-------------------------------------|
| ADF&G | Alaska Department of Fish and Game |
| AES | ASRC Energy Services Alaska, Inc. |
| Ah | Ampere Hour |
| AS | Alaska Statute |
| Cm | Centimeter |
| CPR | Cardiopulmonary Resuscitation |
| EFH | Essential Fish Habitat |
| FL | Fork Length |
| Ft | foot, feet |
| GPS | Global Positioning System |
| HSE | Health, Safety, and Environment |
| kg | kilogram(s) |
| km | kilometer |
| lbs | pound(s) |
| m | meter |
| MB | Megabyte |
| mi | mile/miles |
| mm | millimeter |
| MP | Mile Post |
| NEPA | National Environmental Policy Act |
| pH | Instantaneous Hydrogen Ion Activity |
| Ppm | Parts Per Million |
| UBC | Universal Battery Charger |
| VHF | Very High Frequency |
| YSI | Yellow Springs Instruments |
| $\mu\text{S/cm}$ | microsiemens/centimeter |

1.0 INTRODUCTION

The State of Alaska supports the expeditious development of an Alaska In-State Gas Pipeline to deliver a long-term, cost effective supply of natural gas to Alaska communities. ASRC Energy Services Alaska, Inc. (AES) has been retained by the State of Alaska to conduct a stream crossing investigative study necessary for the development of the National Environmental Policy Act (NEPA) document and project permitting.

The preferred alignment begins in Prudhoe Bay and terminates in the Susitna Flats area (Figure 1). The alignment follows a southern direction entering the Brooks Range near Galbraith Lake. The alignment then crosses the continental divide at Atigun Pass and follows the valleys of the Upper Chandalar, Dietrich, and Middle Fork Koyukuk Rivers. The route continues south to the Yukon River and angles southeast to Livengood, where it passes through Minto Flats, generally following the Dunbar RS2477 Trail to Nenana. The route then parallels the Parks Highway to Willow. From Willow, the route departs from the Parks Highway to the west and follows the Susitna River and Little Susitna River Valleys to its termination near Point MacKenzie.

Stream surveys will focus on portions of the proposed Alaska In-State Gas Pipeline corridor from Livengood, south along the eastern edge of the Minto Flats State Game Refuge to Nenana, then follow the Parks Highway from Nenana to Point MacKenzie. This work plan discusses the objectives, scope, methods, logistics, schedules, and reports required for the proposed study.

2.0 OBJECTIVES

The objectives of this study are to document 1) both resident and anadromous fish assemblages and 2) stream and fish habitat characteristics at stream crossing locations along the proposed Alaska In-state Gas Pipeline alignment from Livengood to Susitna Flats.

3.0 SCOPE OF WORK

AES will conduct detailed investigations of all streams south of Livengood to Point MacKenzie along the Alaska In-State Gas Pipeline alignment corridor that have no documentation of fish or have not been surveyed for fish species. Survey efforts will use standard sampling techniques, including minnow trapping, seining, and electrofishing, to identify fish assemblages.

The Alaska In-State Gas Pipeline alignment crosses 161 mapped streams at 174 stream crossing locations (some streams are crossed more than once) between Livengood and Point MacKenzie (Table 3.0-1 and Figures 2–5). A total of 174 stream crossing locations are identified and are targeted for survey during the 2010 field season. In addition, any unmapped streams encountered along the alignment route will be surveyed.

The ADF&G’s Anadromous Waters Catalog specifies 42 anadromous fish stream designations along the alignment south of Livengood. For each of these stream crossings, fish sampling will be minimal. A survey, however, will be conducted at each crossing location to collect stream and fish habitat characteristics and stream flow measurements. Survey crews will focus fish sampling efforts on undocumented fish streams to comply with ADF&G Fish Habitat (Title 16) Permit requirements.

TABLE 3.0-1
 Mapped Streams South of Livengood to be Surveyed During Study

| Stream Information | Main Alignment MP 401 to MP 737 |
|---|---------------------------------|
| Number of Streams | 161 |
| Number of Stream Crossings ¹ | 174 |
| Specified Anadromous Fish Stream Crossings ² | 42 |

Reference: ¹Michael Baker Jr. (2008). ²Johnson, J. and K. Klein (2009)

Prior to conducting fieldwork AES will meet with ADF&G staff in Fairbanks and Palmer to review and discuss the stream crossing survey program and request information regarding fish and stream data within the pipeline route.

4.0 METHODS

AES will provide two field teams each consisting of a crew leader and two or three experienced field biologists. Field teams will typically access stream crossing sites from highway vehicles if the location is in close proximity to access roads. A helicopter will be required to access fish streams in Minto Flats, the Susitna Flats, and other selected locations where the alignment diverges from the existing road system and vehicular access is not practical.

A Global Positioning System (GPS) will be used to locate each stream crossing site and to document sampling locations. Data entry protocol will commit to one standard format (i.e. decimal degrees) to ensure the consistency and completeness of data collection at each stream crossing location.

Each field team will typically spend 45-90 minutes at each location, sampling extant fish populations and recording habitat characteristics as close to the proposed pipeline crossing as possible. An initial assessment of the stream reach will be conducted to determine the best method to adequately conduct fish sampling. Initial assessment will include attempts to directly observe adult and juvenile fish with the aid of polarized glasses. Photographs will be taken of each stream crossing location, as well as both upstream and downstream of the proposed pipeline crossing location.

After the initial assessment of the proposed stream crossing location is completed, including the area immediately upstream and downstream of the site, a sampling strategy will be developed. The sampling strategy will consider water depth, water velocity, substrate composition, and other factors to ensure fish sampling is conducted safely and efficiently. The sampling effort expended at each stream crossing will be determined by the crew leader.

The goal of the fish sampling strategy is to ensure adequate effort is made, and appropriate techniques are used to capture fish species inhabiting the area. The following fish sampling techniques will be used to accomplish this goal.

4.1 Electrofishing

Electrofishing will likely be the preferred method of field sampling to ensure fish sampling is conducted in the most efficient and cost effective manner. Electrofishing will target juvenile fish and will not be conducted in areas where adult fish are observed or rainbow trout are expected. Electrofishing will be conducted along a stream reach 20 times the mean channel width, or roughly one meander length (Fitzpatrick et al. 1998). To ensure sampling efficiency, crews will sample a maximum of 300 meters (m) (990 feet [ft]). Crews will attempt to include at least two examples each of two different habitat types (riffles, pools, and runs) in the sample reach.

Electrofishing will be stopped immediately if:

- Rainbow trout are observed or captured;
- Adult salmon are observed or captured;
- Large numbers (greater than 40) of juvenile fish have been captured;
- Stunned fish fail to recover quickly in the holding bucket.

Electrofishing crews will collect fish using a battery-powered Smith-Root LR-24 Backpack Electrofisher, a dip net, and bucket. In wadeable streams, electrofishing will begin downstream and work upstream from bank to bank to ensure all channel and habitat types are sampled. Crews will avoid herding fish by shocking intermittently. After a continuous 5-10 second shock pulse, crews will advance upstream before continuing to electrofish. Total electrofishing time at each stream crossing will not exceed 300 seconds (button time) per reach. All captured fish will be removed from the water as soon as possible and placed

into a bucket to minimize exposure to the electrical field. All collected fish will be identified to species, tallied, and examined for external abnormalities. Lengths for most fish will be recorded. In non-wadeable streams, other sampling methods identified below will be used.

4.2 Minnow Trapping

AES field crews will use minnow traps for sampling fish in a variety of habitats. A common and effective sampling method for juvenile and smaller species, minnow traps will provide a representation of fish species found in stream meanders, woody debris, and cut banks not easily accessible by other sampling methods. The traps will be baited, in accordance with ADF&G requirements, with cured salmon roe or salmon roe treated with a Betadine solution. Minnow traps will be placed from the streambank and generally remain in the water during the time of the survey and then checked for presence of fish. Minnow traps may be left overnight to increase the sampling efficiency.

Each deployed minnow trap will be secured to a fixed object, such as a branch or shrub, to insure the minnow trap is not lost. All minnow traps will be labeled in accordance with ADF&G requirements, checked on a regular basis, and removed upon completion of sampling at the stream crossing location.

4.3 Seining

Seining is another method used for sampling fish communities in streams. Seines are collection devices that trap fish by enclosing or encircling them. The captured fish are then dip netted and transferred to a collection bucket for subsequent species identification, length measurement, and released back into the water. Seining can be an effective technique for collecting smaller-sized individuals.

Beach seining is expected to be conducted infrequently and only in pool habitats of streams. A seine net 4.6 m long by 1.2 m wide (15 ft by 4 ft) with 0.6 cm (¼ in) mesh will be used to seine suitable pool habitats. The level of seining effort will be limited to survey locations where other sampling protocols are relatively inefficient and would increase the sampling efficiency to accessible habitats with slow water velocities.

4.4 Angling

Angling (rod and reel sampling) may be conducted on larger streams where other techniques are not practical and will be limited to survey locations where other sampling protocol do not apply. This sampling method could be used in rainbow trout streams where electrofishing is not permitted, water depth or currents would make it hazardous to seine, or streambanks are too steep for placement of minnow traps.

4.5 Data Collection and Recording

All fish captured will be positively identified to species and measured to the nearest millimeter (mm) fork length (FL). All fish will be released alive near the point of capture. Juvenile, anadromous fish such as salmon will be identified using a variety of fish keys, as needed, including “*Field Identification of Coastal Juvenile Salmonids*” (Pollard et al. 1997) and “*A Guide to the Collection and Identification of Presmolt Pacific Salmon in Alaska with an Illustrated Key*” (Trautman 1973).

In addition to fish sampling, baseline water-quality data and stream flow will be collected at each stream crossing site. Baseline water quality data will be collected to assess habitat conditions. Recorded aquatic habitat characteristics will include water temperature, hydrogen ion activity (pH), dissolved oxygen, conductivity (µS/cm). Water quality measurements will be collected in the field with Yellow Spring Instruments (YSI) water quality meters.

At each stream crossing location a cursory fish habitat and stream sensitivity evaluation will be made. To the extent possible, the presence and quality of salmon spawning and rearing habitat will be noted. Specific mitigation recommendations for the pipeline crossing may be developed as a result of the habitat and sensitivity evaluation. Stream Crossing Data Forms will include all notable features (Appendix A).

4.6 Literature Review and Desktop Study

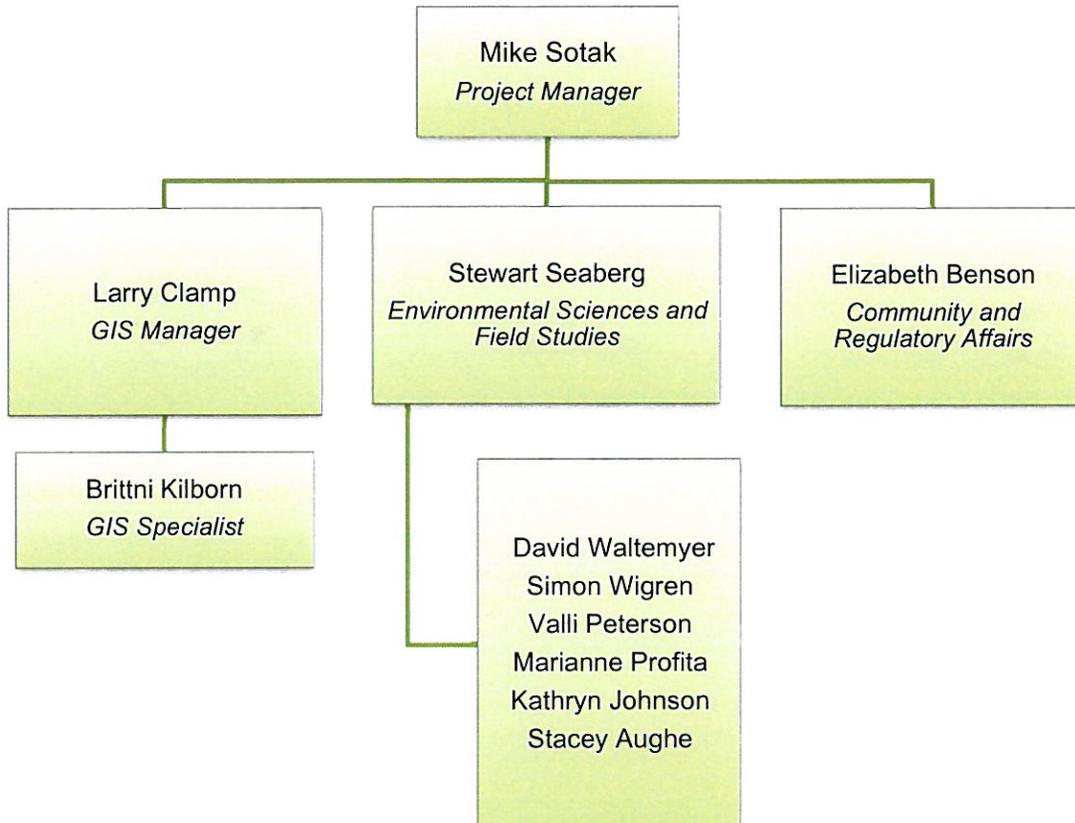
A literature review and desktop study will be conducted prior to field deployment. AES staff will collect data from previous fish surveys on rivers and streams crossing the alignment. Consultation with the ADF&G area management biologists will help determine what data can be obtained from previous studies and offer suggestions of what streams should be surveyed.

Literature review and agency consultation will include:

- 1) Reviewing published and unpublished reports and other documentation of previous Interior and Southcentral streams and rivers;
- 2) Consulting, if necessary, with other scientists who have conducted or collaborated on stream surveys;
- 3) Soliciting study plan input from ADF&G area biologists that have knowledge of fish near or along for the pipeline corridor.

5.0 PROJECT ORGANIZATION

AES managers and staff overseeing the stream crossing surveys program to meet project assumptions and expectations are as follows:



6.0 LOGISTICS AND SCHEDULE

This survey of stream crossings along the pipeline alignment covers approximately 337 pipeline miles (mi) and will focus on the area from Livengood to Susitna Flats. There are 174 mapped stream crossing locations, of which 100 are accessible by the Parks Highway and secondary roads and 74 are accessible by helicopter. Areas requiring helicopter access include the Minto Flats area (pipeline MP401–MP467) between Livengood and Nenana, near McKinley Park (pipeline MP541–MP555), and through Susitna Flats (pipeline MP708–MP737). Survey work supported by commercial helicopters must be capable of carrying three to four crewmembers, 100 kilograms (kg) (220 pounds (lbs) of gear, and a full fuel load.

To avoid costs associated with establishing remote field camps, all crews will be based out of commercial lodgings in communities that provide adequate support facilities and effective access to identified survey locations.

A field work schedule running between July 6 and July 31, 2010 is required for travel and sampling the total 174 stream crossings. Survey work will start at the Susitna Flats area and work north to Livengood.

For each crew, one person will be the designated crew leader, based on experience with similar surveys and knowledge of the goals and objectives of this project. The crew leader will be responsible for all aspects of team field operations, including determining the daily sequence of target segment visits, the selection of sample reaches, all data entry, and the measurement and observation of aquatic and riparian habitat parameters.

Each crew will be equipped with appropriate fish sampling gear and the field equipment necessary to collect all stream crossing data as noted in Appendix B. Safety gear and emergency supplies will be on-site.

6.1 Mitigation

AES is committed to completing fieldwork in a timely and environmentally responsible manner. The following mitigation measures will be implemented during the 2010 stream crossings work plan to minimize potential environmental impacts for the stream surveys.

- No field camps will be established within the stream crossing study area.
- Field crews will be housed in commercial lodging.
- Field crews will access stream crossing locations by highway, road, or helicopter transportation.
- Fuel storage or fueling will not occur in the stream crossing study area.
- Waste, hazardous or otherwise, will not be generated within the stream crossing study area as the result of study activities.
- No food scraps or garbage that may attract wildlife will be left in the field.
- Helicopter landings will not occur within 900 m (2,953 ft) of caribou herds numbering 10 or greater.
- Electrofishing will not be conducted in areas of actively spawning salmon.
- Visible salmon redds or eggs will not be disturbed, crossed or disrupted.
- Electrofishing will not be conducted in areas where rainbow trout are likely to be found.
- AES will adhere to all permit stipulations.

6.2 Permitting

In order to conduct the stream surveys identified in this study, two authorizations will be required from the ADF&G. A Fish Resource Permit, also referred to as a "Fish Collection Permit" is required for fish sampling activities in accordance with Alaska Statute (AS) 16.05.931. The Fish Resource Permit restricts some types of sampling techniques and requires a report of all fish collection activities be submitted to ADF&G after sampling activities have concluded for the field season.

A Special Area Permit will also be required from the ADF&G for helicopter access to the Susitna Flats State Game Refuge and the Minto Flats State Game Refuge. Helicopter access to both of these state game refuges is generally prohibited during moose and waterfowl hunting seasons. The ADF&G requires a summary report of the collection activities that were conducted on refuge lands.

7.0 SAFETY PROGRAM

Prior to field deployment, AES will develop a Health, Safety, and Environment (HSE) Plan to meet the HSE requirements and ensure field crews take all necessary safety and environmental precautions during

the field studies. All field personnel are required to read the HSE Plan and a copy of the Plan will be provided to each of the field teams. All personnel who work in remote locations (or in vehicles) will travel and work in teams with a minimum of two people, each of which will have completed all required safety training as listed in Table 7.0-1. Each person will have the necessary personal gear for the expected weather conditions. Each team will have survival gear (packs) and first aid kits, a satellite telephone, a Very High Frequency (VHF) radio, as well as a firearm and pepper spray for bear protection. Crewmembers will work together when in the field for safety and utilize radios, cellular, ground, or satellite phones (depending on the area) to maintain regular communication with the survey coordinator.

TABLE 7.0-1
Safety Training

| Training Course | Course Frequency |
|-------------------------------------|-------------------------|
| Cardiopulmonary Resuscitation (CPR) | Annually |
| Firearms Range Qualification | Once |
| Basic First Aid | Biennially |
| Bear Awareness and Defense | Once |

In addition, all parties involved in field studies are required to participate in a safety briefing each day prior to travelling into the field. The daily safety briefing will discuss the specific components of the HSE Plan and potential hazards expected for each day of field operations.

8.0 REPORTING

Results of the 2010 stream crossing surveys will be included in a study report after the field season has been completed. Both anadromous and resident fish found at all stream crossings will be identified. Digital photographs (of approximately 1 MB each) will be taken with a Minolta Dimage 5 camera or comparable unit. Photographs will be available and incorporated into the report as appropriate for each stream crossing site. Findings of the report will be used as the basis for Title 16 Fish Habitat Permit applications.

9.0 REFERENCES

Johnson, J. and K. Klein. 2009 Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes – Effective June 1, 2009. Alaska Department of Fish and Game, Special Publication No. 09-01, Anchorage.

Fitzpatrick, F.A., I. R. Waite, P. J. D’Arconte, M. R. Meador, M. A. Maupin, and M.E. Gurtz. 1998. Revised Methods for Characterizing Stream Habitat in the National Water-Quality Assessment Program. United States Department of the Interior, Geological Survey. Water-Resources Investigations Report 98-4052, Raleigh, North Carolina.

Michael Baker, Jr. 2008. Stand Alone Gas Pipeline Project Description. October 2, 2009.

Pollard, W. R., G. F. Hartman, C. Groot, and P. Edgell. 1997. Field Identification of Coastal Juvenile Salmonids. Harbour Publishing, Madeira Park, B.C.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, publ. Pagosa Springs, Colorado.

Trautman M.B. 1973. A Guide to the Collection and Identification of Presmolt Pacific Salmon in Alaska with an Illustrated Key. U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries. Seattle, WA.

Appendix B

Stream Crossing Surveys Field Equipment

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Sampling Gear

2 - Beach Seines
2 - YSI Water Quality Meters
2 - GPS
2 - Digital Cameras
1 Fyke Net
36 Minnow Traps
Zip Ties
2 - Fish Measuring Board

Data Entry Items

Data Forms
Write-in-the-Rain Field Notebooks
Pencils
Toolkits
1- Laptop Computer

Repair items

Mending/Repair Kit

Communication

2 - VHF Radio
2 - Iridium Satellite Phones

Safety

2 - 12-Gauge Shotguns and Ammunition
Tent
Wilderness First Aid Kit
Sam Splint
Water Pump
Iodine Tablets
Nylon Rope
Headlamp
Matches/Lighter
Knife
Space Blanket
Signal Mirror
Duct Tape
Aqua seal
2 - Personal Locator Beacon

Personal Gear

Rain Jacket
Rubber Rain Boots
Water
Breathable Chest Waders
Life Jacket
Sleeping Bag
Bug Spray
Sunblock
Food
Mosquito Head Net

Electrofishing Equipment

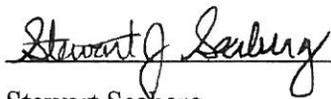
2 - LR-24 Electrofisher
2 - Adjustable Shoulder Harness
2 - 6-ft Two-Piece Electrode Pole
2 - 11-inch Aluminum Electrode Ring
2 - Rat-tail Cathode
4 - Two 24V 7Ah Batteries
2 - UBC-24 Battery Charger
2 - Wheeled Travel and Storage Case
2 - Dip nets

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Distribution

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QUALITY CONTROL REVIEWER



Stewart Seaberg
Environmental Sciences Department Manager
Regulatory and Technical Services


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