ALASKA GASLINE DEVELOPMENT CORP.
GAS FOR ALASKANS

ALASKA STAND ALONE GAS PIPELINE/*ASAP*

Plan of Development Revision 1

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
AAAQS	Alaska Ambient Air Quality Standards
AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Plan
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
AGDC	Alaska Gasline Development Corporation
AGIA	Alaska Gasline Inducement Act
AHPA	Alaska Historic Preservation Act
AHRS	Alaska Heritage Resource Survey
Alyeska	Alyeska Pipeline Service Company
ANILCA	Alaska National Interest Lands Conservation Act
ANSI	American National Standards Institute
API	American Petroleum Institute
APP	Alaska Pipeline Project
ARPA	Archaeological Resources Protection Act
ARRC	Alaska Rail Road Corporation
AS	Alaska Statute
ASAP	Alaska Stand Alone Gas Pipeline
ASRC	Arctic Slope Regional Corporation
ASME	American Society of Mechanical Engineers
BACT	best available control technology
BLM	Bureau of Land Management
BMP	Best Management Practices
Bscfd	Billion standard cubic feet per day
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CIRI	Cook Inlet Regional Corporation
CNG	compressed natural gas
CO	carbon monoxide
CO_2	carbon dioxide
CSU	Conservation System Unit
CWA	Clean Water Act
DB	Denali Borough
DCOM	ADNR Division of Coastal and Ocean Management
DMLW	ADNR Division of Mining Land and Water
DNP&P	Denali National Park and Preserve
DOI	Department of Interior

DSAW	double submerged arc welded
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERW	electric resistance weld
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FBE	fusion-bonded epoxy
FERC	Federal Energy Regulatory Commission
FNSB	Fairbanks North Star Borough
GCF	Gas Conditioning Facility
GIS	Geographic Information System
H_2S	hydrogen sulfide
HABS/HAER	Historic American Building/Historic American Engineering Record
HAP	hazardous air pollutant
HB	House Bill
HDD	horizontal directional drilling
ICAS	Iñupiat Community of the Arctic Slope
ID	Identification
lb/ft	pounds per foot
LNG	liquefied natural gas
LOA	Letter of Authorization
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
MLV	mainline valve
MMscfd	million standard cubic feet per day
MMPA	Marine Mammal Protection Act
MMU	minimum mapping unit
MOA	Municipality of Anchorage
MP	milepost
MSB	Matanuska-Susitna Borough
MSDS	Material Safety Data Sheets
mya	million years ago
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NGL(s)	natural gas liquids
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NIPs	non-native invasive plants
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NSB	North Slope Borough

NWI	National Wetland Inventory
O&M	Operation and Maintenance
ODPCP	Oil Discharge Prevention and Contingency Plan
OHA	Office of History and Archaeology
OPS	Office of Pipeline Safety
OSHA	Occupational Safety and Health Act
PAL	plantwide applicability limit
PELS	permissible exposure limits
PHMSA/OPS	U.S. Department of Transportation – Pipeline Hazardous Materials Safety Administration/Office of Pipeline Safety
PJD	Preliminary Jurisdictional Determination
PM_{10}	particulate matter of 10 microns in diameter or smaller
$PM_{2.5}$	particulate matter of 2.5 microns in diameter or smaller
POD	Plan of Development
ppm	parts per million
PRPA	Paleontological Resources Preservation Act
PS	Pump Station
PSD	prevention of significant deterioration
psi	pounds per square inch
RCA	Regulatory Commission of Alaska
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
ROW	right-of-way
SARA	Superfund Amendments and Reauthorization Act
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasure Plan
SPCP	Spill Prevention Control Plan
SPCO	State Pipeline Coordinator Office
SWPPP	Storm Water Pollution Prevention Plan
TAPS	Trans Alaska Pipeline System
TES	Threatened and Endangered Species
TSCA	Toxic Substances Control Act
TUP	Temporary Use Permit
TUS	Transportation and Utility Systems
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds
VRM	visual resource management
VSM	vertical support members

INTRODUCTION

This Plan of Development (POD) has been prepared by the Alaska Gasline Development Corporation (AGDC) to support the planning and development of the Alaska Stand Alone Gas Pipeline/***ASAP*** (ASAP). The POD provides the following detailed information to support regulatory processes, permit applications, and preparation of required National Environmental Policy Act (NEPA) documents. The POD includes information on the following:

- Purpose and Need
- Project Description
- Right-of-Way (ROW) Location
- Facility Design Factors
- Government Agency Involvement
- Project Construction
- Resource Values and Environmental Concerns
- Stabilization and Rehabilitation Methods
- Operation and Maintenance (O&M)
- Termination and Restoration

1.0 PURPOSE AND NEED

1.1 Purpose

The Proposed Action is the construction and operation of ASAP from the North Slope to the Cook Inlet Area in Southcentral Alaska. The purpose of the project is to provide a long-term, stable supply of up to 500 million standard cubic feet per day (MMscfd) of natural gas and natural gas liquids (NGLs) from North Slope gas fields to markets in the Fairbanks and Cook Inlet areas by 2016.

1.2 Need

ASAP would fulfill the following needs:

- A shortfall of natural gas supply in the Cook Inlet area, which is the primary fuel source for heating and electrical power generation, is projected in the near future (2013-2015).
- Fairbanks currently is in air pollution non-attainment area status due to particulate matter. Use of oil and wood for heating are major contributors to this problem in winter. Converting from existing heating sources to natural gas would reduce harmful air emissions and assist in achieving attainment status.
- A stable and reliable supply of natural gas is needed to spur economic development of commercial and industrial enterprises in Fairbanks and the Cook Inlet Area.
- A stable and reliable supply of natural gas and NGLs is needed to meet current and future demand of 500MMscfd as follows:
  - 200 MMscfd – Cook Inlet Area current demand
  - 50 MMscfd – Cook Inlet Area future demand (2030)
  - 60 MMscfd – Fairbanks future demand

  - 60 MMscfd – NGL extracted at MP 39
  - 130 MMscfd – Future Commercial and Industrial Use
- A secondary need is to use proven gas supplies that are readily available on the North Slope to provide economic benefit to the State through royalties and taxes.

1.3 Background Information

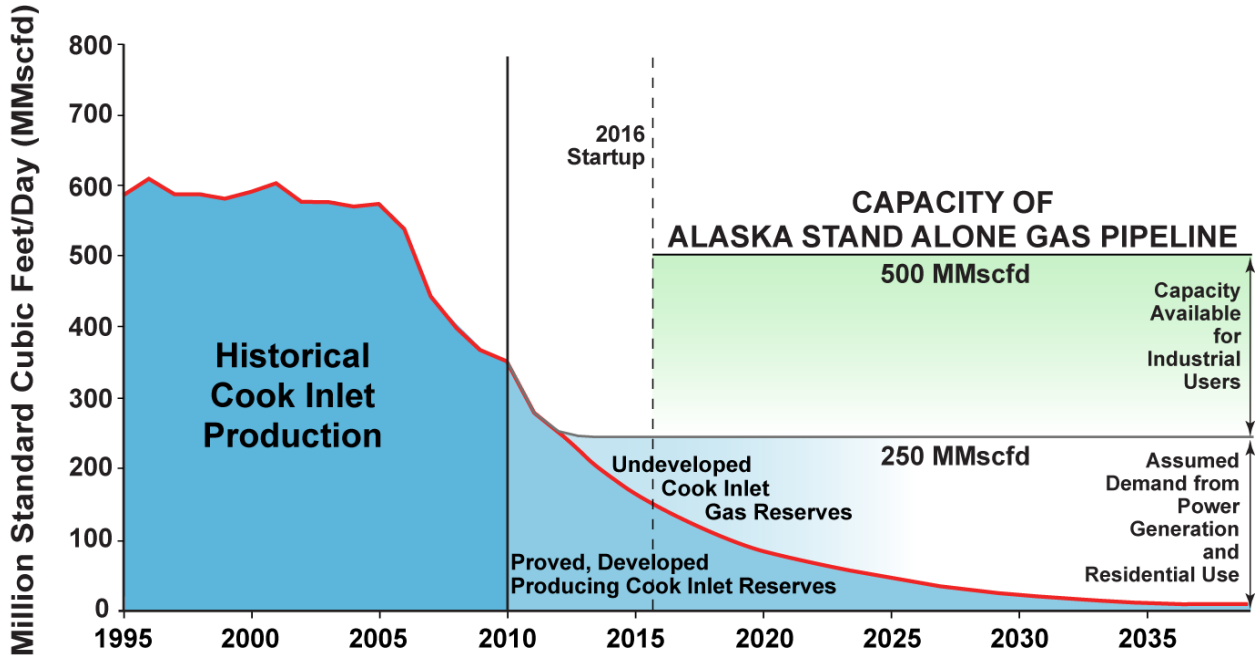
For decades, various sponsors have studied projects to export natural gas from Alaska's North Slope to North America, Asia, or both. To date, none of these projects have advanced past the feasibility study stage. In 2010, House Bill (HB) 369 was passed by the Alaska Legislature. Section 38.34.040 (d) of HB 369 provides the following stipulations for establishing a natural gas pipeline system:

- The route selected is economically feasible.
- Natural gas is made available to residents at the lowest possible cost.
- The project allows for connecting lines along the entire route to serve industrial, residential, and utility customers.
- The project can supply other regions of the state at commercially feasible rates.
- The project uses state land and existing state highway and Alaska Railroad Corporation (ARRC) rights-of-way to the maximum extent feasible.
- The project uses existing highway and ARRC railroad bridges, gravel sources, equipment yards, maintenance facilities, and other existing facilities and resources to the maximum extent feasible.

ASAP is an intrastate project independent of other proposed interstate natural gas pipeline projects. The Alaska Pipeline Project (APP), the project sponsored by the Alaska Gasline Inducement Act (AGIA), and Denali–The Alaska Gas Pipeline project are studying the feasibility of exporting Alaska's North Slope natural gas via a large-diameter pipeline. As these export plans and studies continue, the near-term needs (2013) for additional natural gas supplies to supplement Cook Inlet reserves and to serve developed and developing markets within Alaska remain.

The Cook Inlet gas fields have served the residential and commercial needs of Southcentral Alaska for decades supplying natural gas for heating and electrical power generation (93 percent of generated electricity uses natural gas). These fields also supply large industrial operations like the liquid natural gas (LNG) export plant and the formerly operational Agrium fertilizer facility in Kenai. However, these fields cannot sustain the area's needs without some form of supply expansion. Figure 1.3-1 illustrates this projected drop in production.

Figure 1.3-1 Cook Inlet Historic and Projected Natural Gas Production



Source: Alaska Gasline Development Corporation, 2010

The routing of ASAP will minimize total pipeline length; reduce the amount of challenging terrain and geologic special design areas; avoid and/or minimize impacts to ROWs; and avoid parks, preserves, refuges, and wilderness areas, thereby reducing construction impacts. To the extent feasible, existing state infrastructure and ROWs, including state/borough highways and road systems and the ARRC railroad, will be used for pipeline installation to minimize project impacts.

The Proposed Action will serve developed and developing markets within Alaska, including Fairbanks and the Railbelt. Much of Alaska has no long-term source of fuel other than oil. Currently, LNG is trucked in limited supplies to Fairbanks from Cook Inlet suppliers for a small local distribution system. A long-term, affordable energy source is needed for Fairbanks, the Railbelt, and western Alaska communities. Community, commercial, and industrial development in Interior Alaska could be facilitated with a reliable supply of natural gas. ASAP will provide construction and operational jobs and new business opportunities for Alaska citizens. New jobs and tax revenues will be created. Struggling or marginal businesses will be stimulated and expanded or new industrial activities, including mining, will have access to cost-effective energy.

1.4 Expected Public Benefits

The expected public benefit of ASAP is the potential for delivery of a long-term, reasonably priced supply of natural gas to the Cook Inlet area and to Fairbanks and other communities along the pipeline corridor. Specifically, this supply could be used for:

- Heating homes, public safety facilities, military bases, and businesses
- Generating electrical energy used throughout the region
- Continuing economic stability and growth by supporting industrial users

- Accommodating future population growth and increased commercial usage served by the existing ENSTAR Beluga local distribution system, and for the Fairbanks–North Pole area and other Railbelt communities
- Promoting compressed natural gas (CNG) as a substitute for gasoline and diesel fuel used by cars and trucks in Fairbanks; for use by communities along the Parks Highway, including tour buses in Denali National Park and Preserve (DNP&P); and for use by Anchorage and communities on the Kenai Peninsula
- Potentially providing CNG for distribution to rural Alaska communities via the Yukon and Tanana Rivers and marine barges from Cook Inlet
- Providing infrastructure to allow more economic development of mining and oil/gas projects

2.0 PROJECT DESCRIPTION

The proposed project is a 24-inch-diameter natural gas pipeline with a natural gas flow rate of 500 MMscfd at peak capacity. The proposed pipeline will be buried except from milepost (MP) 0 to 6, and at elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations. The pipeline system will be designed to transport a highly-conditioned natural gas highly-enriched in non-methane hydrocarbons.

The routing of ASAP is from Prudhoe Bay following the Trans Alaska Pipeline System (TAPS) and Dalton Highway corridors, generally paralleling the highway corridor from the North Slope to near Livengood, northwest of Fairbanks. At Livengood, the pipeline route heads south, joining the Parks Highway corridor west of Fairbanks near Nenana. From there it continues south and terminates at milepost (MP) 737. It will connect at MP 39 of the Beluga Pipeline (ENSTAR's distribution system) near Wasilla. Figure 2.0-1 shows the ASAP route. A lateral pipeline to Fairbanks (Fairbanks Lateral) will take off from the main pipeline just a few miles north of Nenana at Dunbar. The Fairbanks Lateral will travel northeast to Fairbanks, a distance of approximately 35 miles. Figure 2.0-2 shows the Fairbanks Lateral route.

The structures, facilities, and related project components are listed below. More details are provided in Section 7.0, Project Construction.

Pipeline

- The 24-inch-diameter mainline is 737 miles in length.
- The 12-inch-diameter Fairbanks Lateral pipeline is 35 miles in length and will tie-in with the main pipeline at MP 458 of the ASAP.

Gas Conditioning Facility

- A 70-acre gas conditioning facility (GCF) will be located on the North Slope at Prudhoe Bay to provide conditioning necessary to remove carbon dioxide (CO_2), hydrogen sulfide (H_2S) and other impurities from the source gas stream.
- Natural gas will be obtained from the existing Central Gas Facility located approximately 1,000 feet north of the planned GCF.

Compressor Stations

- A maximum of two compressor stations will be required. Design optimization may allow construction using a single compressor station.
- Gas turbine-driven centrifugal compressors are proposed.
- Propane-cycle gas-chiller plants will be installed at compressor stations located north of Minto Flats.
- There will be two gas-turbine-driven electric-power generators per station.
- Each compressor station site will be on a gravel pad.
- Compressor station sites will be fenced.

Straddle and Off-Take Facility

- The Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In at MP 458 near Dunbar.
- The Straddle and Off-Take Facility will separate natural gas liquids (NGL[s]) from the gas stream to Fairbanks, providing 60 MMscfd of utility-grade gas to Fairbanks. NGLs extracted from the gas stream to Fairbanks will be re-injected into the main pipeline.
- A custody transfer gas metering station will be collocated with the Straddle and Off-Take Facility.

Cook Inlet NGL Extraction Facility and Terminus

- The Cook Inlet NGL Extraction Facility and Terminus will be located at MP 737. It will connect at MP 39 of the ENSTAR Beluga Pipeline.
- The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade gas into the ENSTAR Beluga pipeline. NGLs extracted from the gas stream will be sold separately.
- A custody transfer gas metering station will be collocated with the Cook Inlet NGL Extraction Facility and Terminus.

Other Permanent Facilities

- Mainline block valves will be set at a maximum of every 20 miles. It is expected that 30 mainline block valves and two valves along the Fairbanks Lateral will be required.
- A pig launcher will be located at the GCF. Pig launcher/receiver assemblies will be located at the compressor stations. A pig receiver will be located at the pipeline terminus. A pig launcher will be located at the tie-in for the Fairbanks Lateral and receiver at the end of the alignment.
- O&M facilities will be located in Prudhoe Bay, Fairbanks, and Wasilla.

Material and Water Sources

- Material Sites (gravel pits) will be distributed along the route minimize hauling distances. Existing material sites will be used whenever possible.
- Water Sources used for construction needs will be collected from surface water sources such as lakes and streams.

Construction Support Facilities

The facilities will include the following:

- Project Offices
- Logistics Support Sites
- Personnel Housing and Support
- Port Facilities
- Access Roads
- Construction Workpads (gravel, ice or snow, and grade)
- Laydown Yards and Storage Facilities
- Airports and Airstrips

2.1 Commodity to be Transported and for What Purpose

The proposed pipeline will deliver natural gas, along with NGLs. The proposed pipeline project does not include gas producer facilities to transport, condition, compress, or cool the gas to pipeline gas specifications prior to delivery at the pipeline inlet.

The pipeline will be designed to transport natural gas with compositions ranging from hydrocarbon lean utility-grade gas to natural gas enriched with non-methane hydrocarbons as shown in Table 2.1-1. A minimum pipeline operating pressure will have to be maintained when transporting an enriched natural gas to prevent condensation of liquid hydrocarbons and generation of slug flow. The minimum operating pressure necessary to prevent drop out of liquids condensate varies with gas composition.

TABLE 2.1-1 ASSUMED COMPOSITION OF GAS TO BE TRANSPORTED

Gas composition (mole percent)	Central Gas Facility Residue	Pipeline Gas after Conditioning	Utility-Grade Gas after NGL Extraction
Carbon dioxide	11.55	1.50	1.53
Nitrogen	0.62	0.69	0.71
Methane	80.74	89.92	91.97
Ethane	5.14	5.72	5.74
Propane	1.56	1.74	0.05
I-butane	0.12	0.13	0.00
N-butane	0.19	0.21	0.00
Pentanes	0.08	0.09	0.00
Total	100.00	100.00	100.00

Notes:
NGL = Natural Gas Liquids

The quantity of natural gas that can be transported through the proposed 24-inch-diameter mainline is 500 MMscfd with a maximum allowable operating pressure (MAOP) of 2,500 psi. The quantity of natural gas that can be transported through the proposed 12-inch-diameter Fairbanks Lateral is 60 MMscfd with an MAOP of 1,400 psi.

2.2 Timeline of Project

The project timeline is presented in Figure 2.2-1.

Figure 2.2-1 Alaska Stand Alone Gas Pipeline Timeline

Major Tasks and Milestones	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Engineering/Environmental/Permitting									
Project Sanction			(6/2012)						
Pre-Construction Preparation									
Construction									
Startup							(10/2016)		
Operations Turnover/Warranty Period, Restoration									
Recurring Operation and Maintenance									

2.2.1 Duration and Timing of Construction

Construction is planned for a two-and-a-half year period. Construction will be completed in separate sections, referred to as spreads. The pipeline is divided into five spreads, with each spread further divided into sections to accommodate varying terrain or seasonal challenges to support an orderly construction sequence, as shown in Table 2.2-1. Pre-construction activities such as ROW development and construction of access roads, laydown yards, and camps will begin in the summer prior to the first season of pipeline construction. Pipeline construction is planned to begin in late 2014 and be completed in late September 2016.

TABLE 2.2-1 CONSTRUCTION SPREAD BY SEASON AND LOCATION

Spread	Section	Location	Start (MP)	End (MP)	Length (Miles)	Construction Season
1	1A	GCF to PS-1	0	6	6	Winter 1
1	1B-1	PS-1 to Happy Valley	6	88	82	Winter 1
1	1B-2	Happy Valley to Atigun River Valley	88	163	75	Winter 2
1	1C-1	Atigun River Valley to North Atigun Pass	163	173	10	Summer 1
1	1C-2	North Atigun Pass to Chandalar Shelf	173	183	10	Summer 2
		Spread 1 Total:			**183**	
2	2A-1	Chandalar Shelf to Coldfoot	183	248	65	Winter 1
2	2A-2	Coldfoot to Prospect River	248	286	38	Winter 2
2	2B	Prospect River to Ray River	286	348	62	Summer 1
2	2C	Ray River to Yukon River	348	360	12	Winter 2
		Spread 2 Total:			**177**	
3	3A	Yukon River to Livengood	360	405	45	Summer 1
3	3B-1	Livengood to Little Goldstream	405	468	63	Winter 1
3	3B-2	Little Goldstream to Healy	468	529	61	Winter 2
		Spread 3 Total:			**169**	
4	4A-1	Healy to Nenana River	529	535	6	Summer 1
4	4A-2	Nenana River to Lynx Creek	535	541	6	Fall 1/Winter 2
4	4B	Lynx Creek to Honolulu Creek	541	602	61	Summer 1
4	4C-1	Honolulu Creek to Susitna River	602	673	71	Winter 1
4	4C-2	Susitna River to Beluga South Terminus	673	737	64	Winter 2
		Spread 4 Total:			**208**	
		Mainline Total:			**737**	
Fairbanks Lateral		Mainline (MP 459) to Fairbanks	0	35	35	Summer 2

Notes:
GCF = Gas Conditioning Facility
MP = milepost
PS = Trans Alaska Pipeline System Pump Station

2.2.2 Duration of Operations

The ASAP is expected to be in operation for the productive life of the natural gas field(s) that supply it. The estimated useful life of the pipeline is the economic life (which is the controlling factor) and is estimated to extend past the maximum duration of the Lease, which is 30 years. With appropriate maintenance, repair, and refurbishment, the physical life of ASAP is indefinite. The design life is a technique used to rationalize cost/benefit of the initial construction cost against future maintenance cost. The project pipeline useful life is a combination of function of economic life, physical life, and design life.

The duration of operations has financial and operational components. The financial term will depend on the pipeline contractor who purchases the project and a payback period, which usually ranges between 15 and 25 years depending on financial agreements. This timing must take into account debt-to-equity ratio, debt outstanding, approved equity or earnings allowed, inflation factors, and additional factors. The operational term is the life of the project. The applicant, AGDC, requests the maximum term available because a modern pipeline is expected to be operational as long as gas is available from the source and that period could exceed 50 years.

2.3 Cost of Proposal (Construction, Operation, and Maintenance)

The July 2010 Cost of Service estimate for the ASAP is described in Table 2.3-1 below.

TABLE 2.3-1 COST OF PROPOSAL

Cost Item	Cost
Pipeline Construction	$4.4 billion
Gas Conditioning Facility	$4.0 billion
Total Construction	$8.4 billion
Operations and Maintenance	$70 million per year

Michael Baker Jr., Inc. July 2010

2.4 Gathering System, Trunk Line, or Distribution Line

The proposed pipeline will connect to a field gathering system at the valve flange at the Prudhoe Bay Central Gas Facility, to the Fairbanks distribution system, and to the ENSTAR distribution system at MP 39 of the Beluga Pipeline near Wasilla.

2.5 Surface and Subsurface Features

The proposed pipeline will be buried except from MP 0 to 6, and at elevated bridge stream crossings, compressor stations, possible fault crossings, pigging facilities, and off-take valve locations.

Burial modes are generally trenches or berms. South of ASAP MP 6 the pipeline will exit the ground only at bridged river crossings, compressor stations, and possible out-take valve locations.

Pipelines are classed based on proximity to inhabited areas and existing infrastructure. Location class was assigned according to American Society of Mechanical Engineers (ASME) B31.8. Using the project Geographic Information System (GIS), buildings fit for human occupancy were identified within a buffer defined as one-quarter-mile either side of the proposed alignment and within a 1-mile segment longitudinally along the alignment.

Depth of cover requirements for Class 1 through 4 pipeline locations are provided in Table 2.5-1. This table also includes depth of cover for parallel encroachment of pipelines on roads, highways, or public streets with hard surfaces, and railroads. Additional project criteria are provided for uncased crossings of roads, highways, and railroads. Site-specific cover criteria may be required for pipeline uplift (frost heave) resistance or by local agencies or property owners. In Attachment 1, typical drawings that include surface and subsurface features illustrate various ditch modes.

TABLE 2.5-1 DEPTH OF COVER REQUIREMENTS FOR CLASS 1 TO 4 PIPELINE LOCATIONS

Location	Minimum Normal Soil (Inches)	Design Depth Normal Soil (Inches)	Consolidated Rock Specifications (Inches)
Class 1 locations	30	36	18
Class 2, 3, and 4 locations	36	42	24
Parallel encroachment of pipelines on roads, highways, or public streets with hard surfaces, and railroads	48	52	36
Uncased crossings of roads, highways, and railroads	48	52	36

Michael Baker Jr., Inc. July 2010

Per the Code of Federal Regulations (CFR), 49 CFR 192.325, the pipeline will be installed with at least 12 inches of clearance from any other underground structure not associated with the pipeline. If this clearance cannot be attained, the pipeline must be protected from damage that might result adjacent infrastructure.

2.6 Length and Width of the Right-of-Way, Area Needed for Related Activities

The construction ROW width for construction activities will generally be 100 feet. Specific construction activities such as horizontal directional drilling (HDD) pads at river and stream crossings, areas of side-hill construction, road and foreign pipeline crossings, and temporary facilities such as construction camps and temporary laydown areas, will require a larger ROW width. Details will be provided when engineering and specific requirements are finalized. Typical drawings are provided in Attachment 1 that depict construction modes and ditching ROW.

Permanent width for the main pipeline ROW will be 52 feet and for the proposed 12-inch lateral pipeline ROW to Fairbanks will be 51 feet through federal lands, and 30 feet through State of Alaska lands. ROW width through other lands is expected to be 30 feet. At certain crossings or other sensitive locations the permanent ROW width may be greater.

2.7 Ancillary to an Existing Right-of-Way

The ASAP route maximizes use of existing or officially designated transportation and utility corridors and minimizes new ground disturbances. The proposed pipeline route parallels the TAPS corridor and the Dalton Highway to Livengood and the Parks Highway from just north of Nenana to approximately MP 708 near Wasilla. The pipeline is not ancillary to any other natural gas pipelines until the pipeline reaches MP 39 of the Beluga Pipeline, where the natural gas will enter the existing ENSTAR system.

2.8 Alternative Routes or Locations

The Council on Environmental Quality (CEQ), per 40 CFR 1502.14, requires that a range of alternatives be considered for any major federal action. As noted in the March 16, 1981 *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* memorandum, this includes 1) identification of a reasonable a Range of Alternatives, 2) analysis of Alternatives Outside the Capability of the Applicant or Jurisdiction of Agency, and, 3) discussion of a No Action Alternative.

An alternatives analysis of other reasonable routes for ASAP was prepared in September 2009. The alternative routes considered in addition to the preferred ASAP route were the Richardson Highway Pipeline route (Section 2.8.1) and two spur routing options: the Parks Highway Spur and Richardson Highway Spur, as described in Sections 2.8.2 and 2.8.3.

2.8.1 Richardson Highway Pipeline Route Alternative

The alternative route considered, but not selected, was the Richardson Highway Pipeline route. This alternative shares a common routing with the preferred ASAP route as far as Livengood. At Livengood, the alternative route heads southeast along the TAPS and Richardson Highway corridors to Glennallen where it turns to the west along the Glenn Highway to connect with the existing gas distribution system at MP 39 of the Beluga Pipeline. The alternative route is 860 miles long. Also included is an approximately 9-mile-long spur connecting the main pipeline to the local distribution network in Glennallen.

2.8.2 Parks Highway Spur Route Alternative

This alternative route assumes construction of an Alaska–Canada Gasline and a takeoff point at Fairbanks and follows the Parks Highway to MP 39 of the Beluga Pipeline. With this spur line route, a Fairbanks Lateral line from Dunbar is not required.

2.8.3 Richardson Highway Spur Route Alternative

This alternative route assumes construction of an Alaska–Canada Gasline and a takeoff point at Delta Junction and follows the Richardson Highway to Glennallen heading west generally following the Glennallen Highway to MP 39 of the Beluga Pipeline. A lateral connecting the local distribution network in Glennallen would be required.

2.8.4 Why Alternatives Were Not Selected

HB 369 passed by the Alaska State Legislature requires a project plan be developed that includes an analysis of alternative routes and the selection of a route that is economically feasible and makes natural gas available to residents at the lowest possible costs. The alternatives and routing modes discussed in this section were considered but not carried forward as the proposed action because they did not optimize the number of users, minimize pipeline length, minimize engineering constraints and costs, and minimize opportunities that could adversely affect the environment.

3.0 RIGHT-OF-WAY LOCATION

3.1 Legal Description

The proposed ROW for ASAP will cross federal, state, borough, private, and Alaska Native lands. The proposed ROW will also cross several large rivers. `

The POD addresses a 200-foot-wide corridor (100 feet on either side of the alignment centerline). This area will be narrowed as the ASAP route is optimized and more information becomes available. Actual construction will occur within a 100-foot construction ROW.

Table 3.1-1 identifies landowners within a 200-foot-wide corridor by number of parcels. Attachment 2 identifies each parcel by landowner. Given that the construction corridor may vary in width, and the route may change slightly as it is refined, the actual number of parcels crossed may vary slightly. The number of parcels crossed would be determined by a land survey of the final pipeline alignment.

This land ownership information has been obtained from publicly available sources and has been partially title-verified. The number of parcels crossed will be determined by a land survey of the final pipeline alignment. The final alignment and construction right-of-way have not been determined.

A Web Service is available to agencies to provide maps showing the alignment and other features, including existing facilities, stream crossings, temporary land use areas, and material sites. This Web Service is meant to take the place of alignment sheets. A series of route maps are provided in Attachment 3.

TABLE 3.1-1 LAND OWNERSHIP OF PARCELS CROSSED BY THE PROPOSED RIGHT-OF-WAY (ESTIMATED)

Ownership	Total Length (Miles)	Total Land Parcels
Federal	239	310
State	407	629
Municipal/Borough	9	30
Native Allotments/Corporations	42	83
Private	17	195

Michael Baker, Jr., Inc. February 2011
Notes: Land ownership data is not included from the alignment located in the Alaska Department of Transportation Right-of-Way or within the Fairbanks Lateral.

3.2 Site-Specific Engineering Surveys for Critical Areas

Site-specific engineering surveys for critical areas will be completed during detailed engineering. Critical areas are defined as those areas requiring special design or mitigation, such as river crossings, fault crossings, and erosion-prone areas.

3.3 Maps and Drawings Showing River Crossings

A list of potential stream crossings is located in Attachment 4. Typical drawings of stream crossings are included in Attachment 1.

3.4 Right-of-Way Acreage Calculation

The area calculation for the 737-mile-long ASAP construction ROW and the 35-mile-long Fairbanks Lateral is approximately 9,400 acres. The acreage was calculated by assuming a consistent 100-foot construction ROW throughout the alignment. The estimated acreage does not include extra temporary workspaces that will be determined as design progresses.

4.0 FACILITY DESIGN FACTORS

4.1 Technical Summary

Table 4.1-1 identifies the pipeline location classes, wall thickness, and MAOP.

TABLE 4.1-1 PIPELINE PRESSURE STANDARDS

Location Class*	Wall Thickness (inches)	Maximum Allowable Operating Pressure (psi)
Location Class 1 (Div 2)	0.595	2,500
Location Class 2	0.714	2,500
Location Class 3	0.857	2,500
Location Class 4	1.071	2,500

Notes: *Location Class 1, Div. 1 not used.
Michael Baker Jr., Inc. July 2010

4.2 Toxicity of Pipeline Product

Toxicity is the degree to which a substance is able to damage an organism exposed to it. Toxicity can be measured by its effects on the target (organism, organ, tissue, or cell). Toxic and hazardous substances are regulated, generally based upon their use. The regulations relevant to the pipeline product include:

- The Occupational Safety and Health Administration (OSHA) regulates occupational exposures to chemical and physical agents.
- The Toxic Substances Control Act (TSCA) established requirements and authorities for indentifying and controlling toxic chemicals hazardous to human health and the environment. TSCA addresses gathering of information regarding the toxicity of particular chemicals, assessing if they pose an unreasonable risk, and instituting appropriate control actions.

As required under Section 8(b) of TSCA, the U.S. Environmental Protection Agency (EPA) maintains a list of chemicals that are in commercial use within the U.S. called the TSCA Inventory of Chemical Substances (commonly referred to as the TSCA Inventory). Currently there are approximately 84,000 chemicals on the TSCA Inventory.

The product carried by the ASAP is natural gas, composed of over 80 percent methane with minor amounts of light hydrocarbons such as ethane, propane, and butane, and NGLs. Natural gas is colorless and odorless.

Methane, the primary component of natural gas, is biologically inactive and not considered toxic. However, other components, such as isobutene, pentanes, and hexanes have permissible exposure limits (PELs) from OSHA (800 parts per million [ppm], 1,000 ppm, and 500 ppm, based on 8-hour-per-day, 5-day-per-week exposure limits). In addition, many components of natural gas and NGLs are included in the TSCA Inventory. Some natural gas sources also contain significant levels of H_2S. Hydrogen sulfide and the untreated gas are considered toxic. Hydrogen sulfide will be removed from the product during conditioning prior to transportation in ASAP.

Both natural gas and NGLs may be considered hazardous due to their low flash point and flammability. The EPA has applied Acute Health, Fire and Sudden Release of Pressure hazard categories to natural gas.

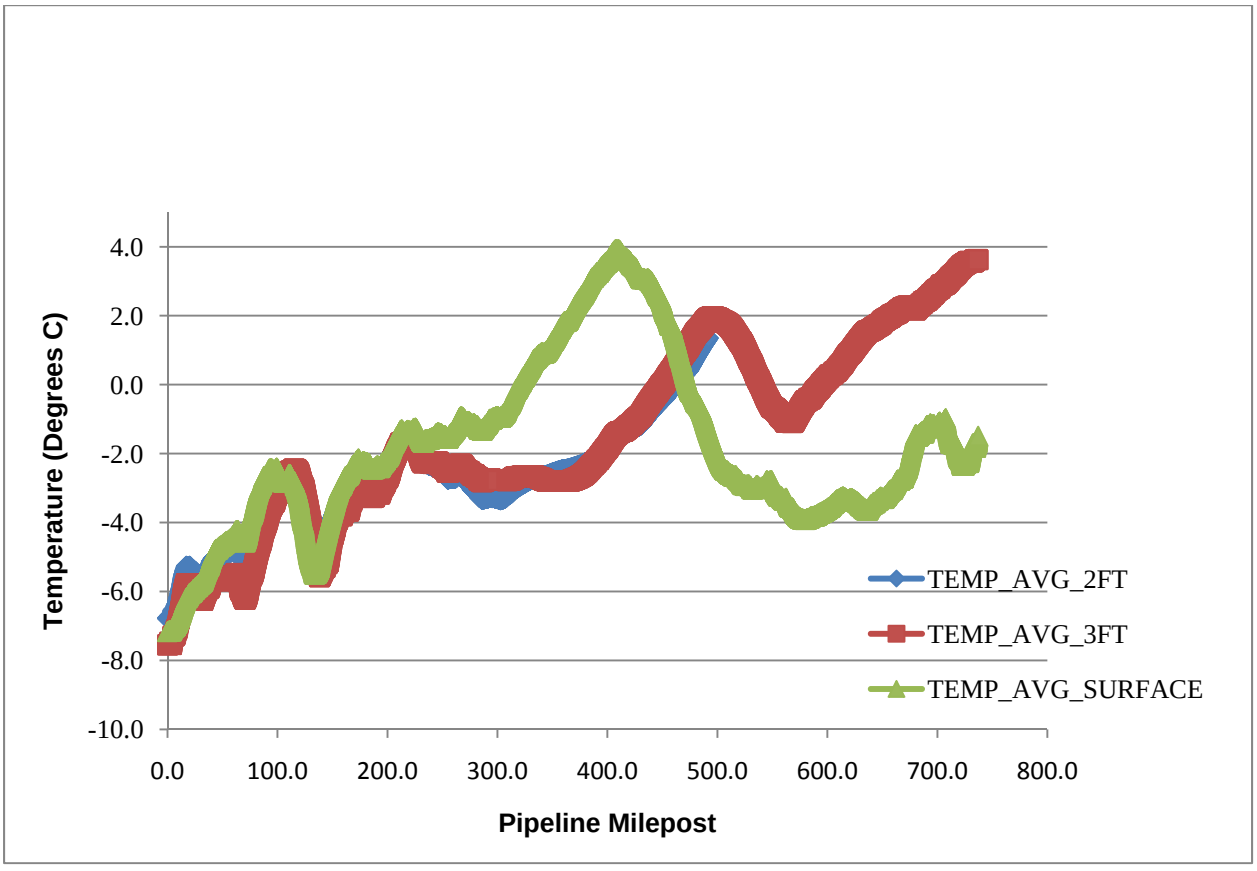
4.3 Anticipated Operating Temperatures

"Anticipated operating temperatures" refers to the pipeline operating temperature and changes along the route, seasonally, and as a function of throughput. The operating temperature of the buried pipeline could affect the frozen/thawed nature of the surrounding subsurface that, in turn, could affect the pipeline trench support conditions as well as potentially cause subsurface expression such as local subsidence or heave.

The pipeline operating temperature will be governed by the combined influence of Joule-Thompson cooling associated with gas pressure drop, pipe wall heat transfer between gas and surrounding soil, and heat input from gas compression. The goal is that the proposed pipeline and lateral pipeline will employ an ambient pipeline over all proposed operating modes. An "ambient pipeline" refers to a pipeline with operating temperatures closely approaching seasonal temperatures of the surrounding ground. Mitigation measures will include maintaining, to the maximum extent practicable, an existing temperature regime along the corridor.

A temperature profile showing preliminary ground and surface temperature profiles over the ASAP route is shown in Figure 4.3-1. It should be noted that data is sparse over the southern half of the alignment and this profile may not accurately reflect site conditions.

Figure 4.3-1 Ground and Surface Temperature Profiles Over the Proposed ASAP Route



The temperature of ASAP will follow seasonal ground temperature at low flow rates. At full capacity it is anticipated that the cooling associated with gas pressure drop is unlikely to result in non-ambient pipeline operation.

As designed, the pipeline will be operated at below freezing temperatures in predominately permafrost terrains to protect the thermal stability of the surrounding ground. Similarly, the pipeline will be operated at above freezing temperatures in predominately thawed settings so as to not create frost bulbs around the pipe that could lead to frost heave displacement of the pipeline or adverse hydraulic impacts on drainages crossed by the pipeline. Pipeline design will use engineering controls such as insulation and strategic use of non-frost-susceptible fill to control the thermal signature of the pipeline in discontinuous permafrost.

Once the gas to be transported leaves the Central Gas Facility, fan-type coolers will reduce the temperature to approximately 20 degrees Fahrenheit (°F) above ambient. Refrigeration units will then lower the temperature further to approximately 30°F at the pipeline inlet. The need to reduce compressor discharge gas temperature leaving a station will be determined via hydraulic analysis and subsequent evaluation of thermal interaction between the pipe and surrounding soil. It is anticipated that mechanical refrigeration will be used to cool compressed gas from approximately half of the stations located along the northern portion of the alignment. No compressor discharge gas cooling will be required along the southern half of the pipeline. No gas heating is planned for the proposed pipeline.

The need to heat or cool the gas stream depends on numerous operational constraints. When additional design is completed and with overall modeling of the system, including compressor station locations/size, elevation, and ambient temperature, the operational characteristics of the pipeline, including the temperature of the gas stream over the length of the alignment, will be determined. The temperature gradient will be compared to the measured ground temperatures and design measures to maintain the current ground temperature as required. Additional details regarding the operating temperatures and maintenance of the existing thermal regime will be developed as the project progresses and will be provided to agencies when available.

4.4 Permanent Width or Size

The permanent width or size of the main pipeline ROW will be 52 feet through federal lands and 30 feet through state lands. The Fairbanks Later will be 51 feet through federal lands and 30 feet through state lands. ROW width through other lands is expected to be 30 feet. At certain crossings or other sensitive locations the permanent ROW width may be greater.

4.5 Temporary Areas Needed

The typical construction ROW width needed for construction activities will be 100 feet. Specific construction requirements such as HDD pads at river and stream crossings, road and foreign pipeline crossings (Section 7.4.5), and temporary facilities, such as construction camps and temporary laydown areas (Section 7.2), will require additional real estate. Attachment 1 presents typical standard drawings for river and stream crossings.

5.0 ADDITIONAL COMPONENTS OF THE RIGHT-OF-WAY

5.1 Connection to an Existing Right-of-Way

See Attachment 3 for a series of pipeline routing maps.

5.1.1 Existing Components On or Off Public Land

The selected route maximizes the use of existing or officially designated transportation/utility corridors and minimizes new ground disturbances.

5.1.2 Possible Future Components

No additional facilities or components are planned to be added at this time. The addition of tie-ins to the pipeline by future gas sources is a possibility; however, these plans will be developed by the pipeline construction contractor and operator.

5.2 Location of Compressor Stations

Compressor station needs are currently being evaluated as the pipeline design is optimized. Based upon current design, a maximum of two compressor stations will be required. It is possible that a single compressor station will provide sufficient compressive ability for the gas throughput.

A total of 11 compressor station locations were identified early in the design process. Locations CS-4 and CS-8 are under evaluation for the two-compressor design option and location CS-5 is under evaluation for the one-compressor design option. Compressor station components will be modularized to minimize on-site construction and commissioning work in remote locations. Compressor stations are listed in Table 5.2-1. Compressor station locations may change slightly if necessary during design optimization. Compressor stations are discussed in more detail in Section 7.3.2.

TABLE 5.2-1 RANGE OF PIPELINE COMPRESSOR STATION LOCATIONS

Compressor Station ID	Station Location	Equipped with Discharge Chilling	Notes
CS-4	MP 225.0	Yes	Two compressor option
CS-5	MP 285.5	Yes	One compressor option
CS-8	MP 466.5	No	Two-compressor option; based upon pipeline hydraulics, chilling is not required for compressor stations located south of Minto Flats.

6.0 GOVERNMENT AGENCY INVOLVEMENT

6.1 Entities That Have Regulatory Authority or That Will Be Affected By Project

Specific federal, state, and local government agencies have regulatory authority over different aspects of ASAP. The scope of regulatory decision-making includes the authorities listed in Table 6.1-1.

TABLE 6.1-1 FEDERAL, STATE, AND LOCAL AGENCIES WITH REGULATORY AUTHORITY

Federal Agencies	U.S. Department of the Interior–Bureau of Land Management (BLM) U.S. Army Corps of Engineers (USACE) U.S. Coast Guard (USCG) U.S. Environmental Protection Agency (EPA) U.S. Department of Transportation (USDOT) –Pipeline and Hazardous Materials Safety Administration (PHMSA)–Office of Pipeline Safety (OPS) U.S. Fish and Wildlife Service (USFWS) National Marine Fisheries Service (NMFS) National Parks Service (NPS) Federal Aviation Administration (FAA)
State Agencies	Alaska Department of Natural Resources (ADNR) • State Pipeline Coordinator Office (SPCO) • Office of History and Archaeology (OHA) • Division of Coastal and Ocean Management (DCOM) • Division of Mining, Land and Water (DMLW) • Mental Health Trust Authority [landowner] Alaska Department of Environmental Conservation (ADEC) Alaska Department of Fish and Game (ADF&G) Alaska Department of Transportation and Public Facilities (ADOT&PF) Regulatory Commission of Alaska (RCA) Alaska Railroad Corporation (ARRC)
Local Agencies	North Slope Borough (NSB) Fairbanks North Star Borough (FNSB) Denali Borough (DB) Matanuska-Susitna Borough (MSB) Municipality of Anchorage (MOA) Nenana Wasilla Houston

There are also a number of federally-recognized tribes along the ASAP route with whom government-to-government consultation will be required during the NEPA process (Table 6.1-2). Entities that may be affected by the project are described in more detail in Section 8.2.14.

TABLE 6.1-2 FEDERALLY-RECOGNIZED TRIBES ALONG THE PIPELINE ROUTE BY REGION

Regional IRA	Region	Community	BIA Recognized Tribe
Inupiat Community of the Arctic Slope (ICAS)	North Slope	Barrow	Native Village of Barrow
		Kaktovik	Native Village of Kaktovik
		Nuiqsut	Native Village of Nuiqsut
		Anaktuvuk Pass	Naqsragmiut Tribal Council
Tanana Chiefs Conference	Interior - Yukon-Tanana Subregion	Alatna	Alatna Traditional Council
		Allakaket	Allakaket Traditional Council
		Evansville	Evansville Tribal Council
		Manley Hot Springs	Manley Hot Springs Traditional Council
		Minto	Minto Traditional Council
		Nenana	Nenana Traditional Council
		Rampart	Rampart Traditional Council
		Stevens Village	Stevens Village IRA Council
		Tanana	Tanana Tribal Council
	Interior - Yukon Flats Subregion	Beaver	Beaver Traditional Council
		Birch Creek	Birch Creek Tribal Council
	Interior - Upper Tanana Subregion	Dot Lake	Dot Lake Village Council
		Healy Lake	Healy Lake Traditional Council
		Tanacross	Tanacross IRA Council
	Interior	Cantwell	Native Village of Cantwell
	Cook Inlet	Chickaloon	Chickaloon Native Village
		Knik	Knik Tribe
		Eklutna	Eklutna Native Village
		Tyonek	Native Village of Tyonek

6.2 Permitting Organization

Permitting for ASAP will focus on two major efforts:

1) Three major permit applications listed in Table 6.2-1 were filed in November, 2009. These major permit applications will allow the U.S. Army Corps of Engineers (USACE), as lead agency, to prepare a NEPA document and complete the NEPA process, proceed to a Record of Decision (ROD), and facilitate a grant of ROW from the U.S. Department of the Interior, Bureau of Land Management (BLM), as well as to gain approvals to use federal and state lands for the project.

2) A subsequent effort is required to obtain all necessary permits prior to beginning construction activities. These permits are included in Table 6.2-2 and are organized by regulatory agency.

TABLE 6.2-1 CURRENTLY FILED REGULATORY APPROVALS

Permit Type	Permitting Agency	Activity
Federal Pipeline Grant of ROW	BLM	Installation of a new pipeline or to convert an existing lease term pipeline into a ROW pipeline. ROWs for pipelines through federal lands.
State Pipeline ROW Lease	ADNR SPCO	Common carrier pipeline
Draft Section 404/401 Approval	USACE ADEC	Placement of fill or dredged material into waters of the U.S. (wetlands)

6.2.1 Federal Agency Involvement

No Federal Energy Regulatory Commission (FERC) Section 7(c) application is required because the proposed action is intrastate and, therefore, outside of FERC's jurisdiction. Table 6.2-2 describes anticipated federal agency involvement.

6.3 List of Authorizations and Pending Applications for Similar Projects

Authorizations and permits for similar projects that may provide information to authorizing agencies relevant to ASAP are listed below.

- The APP application for a certificate of public convenience and necessity is to be filed October 2012 by TransCanada Alaska Company, LLC with the FERC. An application for state ROW lease was filed in 2005 with the ADNR.

- The APP application for a BLM ROW has been filed (TransCanada FF95685) and a certificate of public convenience and necessity is to be filed October 2012 by TransCanada Alaska Company, LLC with the FERC. An application for state ROW lease was filed in 2005 with the ADNR.

- Denali, the Alaska Gas Pipeline filed a SF299 ROW application with the BLM in 2008 (Denali FF95391).

- A ROW application for a smaller-diameter gas pipeline to Donlin Creek was filed with the BLM (Donlin Creek AA92403).

- Foothills West Transportation Access Project is currently under development by the Alaska Department of Transportation and Public Facilities. The purpose of the project is to construct a road from the Dalton Highway to Umiat to provide access to oil and gas resources and the National Petroleum Reserve-Alaska.

TABLE 6.2-2 PERMITTING PLAN TABLE/MATRIX

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
PERMIT APPLICATIONS SUBMITTED AS OF AUGUST 2010						
Land Use						
1.	Approval of Transportation and Utility Systems (TUS) In and Across a Conservation System Unit (CSU) in Alaska	Department of Interior (DOI)	43 Code of Federal Regulation (CFR) 36	Access within any CSU, national recreation area in Alaska managed by Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), or the National Park Service (NPS). Permit application is SF 299.	2 years	Proposed project may not cross a CSU such as Denali National Park and Preserve. U.S. Congressional approval required.
2.	Federal Pipeline Grant of Right-of-Way (ROW) and associated Temporary Use Permits (TUP)	BLM	43 CFR 2880, and the Mineral Leasing Act of 1920	Installation of a new pipeline or to convert an existing lease term pipeline into a ROW pipeline ROWs for pipelines through federal lands	2 years Environmental Impact Statement/ Record of Decision (EIS/ROD) expected to be issued December 2011)	Permit application submitted November 2009. Resubmitted under Alaska Gasline Development Corporation (AGDC) August 2010.
3.	State Pipeline ROW Lease	Alaska Department of Natural Resources (ADNR) State Pipeline Coordinator's Office (SPCO)	11 Alaska Administrative Code (AAC) 80.005	Pipeline ROW	! year	Permit application submitted November 2009. Resubmitted under AGDC August 2010.
Discharge Into Water						
4.	Preliminary Jurisdictional Determination (PJD)	U.S. Army Corps of Engineers (USACE)	33 CFR 331.2	To determine the presence of wetlands (waters of the U.S.)	90 days after submittal of all documents	PJD request was filed November 2009. Associated USACE permit applications are filed during the EIS process.
5.	Dredged or Fill Material	USACE	33 CFR 323 (Section 404 of Clean Water Act (CWA)	Placement of fill or dredged material into waters of the U.S. (wetlands)	2 years (EIS/ROD expected to be issued December 2011)	Permit application submitted November 2009. Resubmitted under AGDC August 2010.

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Discharge Into Water						
6.	Dredged or Fill Material	Alaska Department of Environmental Conservation (ADEC)	18 AAC 70 (Section 401 of CWA)	Placement of fill or dredged material into waters of the U.S. (wetlands)	2 years (EIS/ROD expected to be issued December 2012)	Section 401 will be obtained concurrent with the Section 404 permit.
PERMIT APPLICATIONS TO BE SUBMITTED DURING EIS PROCESS						
Navigable Waters and Water Use						
7.	Obstruction to Navigable Waters	USACE	33 CFR 322 (Section 10 of the Rivers and Harbors Act 1899)	Construction of any structure in or over any navigable water of the U.S., including excavation/dredging or deposition of material. Activities not requiring a permit include bridges or causeways, aqueducts, aerial tramways, conveyers, and overhead pipelines. It does not include power transmission lines, communication cables, submerged pipelines, or tunnels.	2 years (EIS/ROD expected to be issued December 2011)	Included in section 404 permit application filed November 2009.
8.	Construction of Dams/ Dikes or Bridges/ Causeways in Navigable Waters	U.S. Coast Guard (USCG)	33 CFR Subchapter J Section 9 of the Rivers and Harbors Act of 1899; General Bridge Act of 1946	Construction of any dam or dike in a navigable river or navigable water of the U.S. must be permitted by USACE. Construction of any bridge or causeway in a navigable river or navigable water of the U.S. must be permitted by USDOT.	2 years (EIS/ROD expected to be issued December 2011)	Included in section 404 permit application filed November 2009.
9.	Temporary Water Use	ADNR	11 AAC 93.220	Temporary water use, ice armoring, and pipe testing for period of less than 5 consecutive years.	90 days	
Hazardous Material and Waste						
10.	Oil Discharge Prevention and Contingency Plan (ODPCP)	ADEC	18 AAC 75.400	ODPCP must be approved by ADEC. Discharge of oil from non-transportation-related onshore facilities onto or on navigable waters of the U.S. requires an ODPCP. Includes interstate and intrastate onshore pipeline systems, including pumps and appurtenances as well as in-line or breakout storage tanks needed for continuous operation of a pipeline system.	120 days	This permit is not applicable for natural gas pipelines

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Wildlife						
11.	Fish Habitat Protection	Alaska Department of Fish and Game (ADF&G)	Alaska Statute (AS) 16.05.871 and AS 16.05.841	Permit is necessary for activities that use, divert, obstruct, pollute, or change natural flow of specified anadromous fish streams	90 days	
12.	Letter of Authorization (LOA)	USFWS	50 CFR 18 Marine Mammal Protection Act (MMPA)	Any activity that has the potential to "take" a marine mammal as defined within MMPA (USFWS trust species, e.g., polar bear and Pacific walrus)	90 days	Letter of Authorization (LOA) for incidental, unintentional take or intentional take of a polar bear
13.	Bald and Golden Eagles	USFWS	50 CFR 22 Bald and Golden Eagle Protection Act	Any activity that could "take" a bald or golden eagle, their eggs, feathers or nest as defined within the Eagle Protection Act	N/A	Not a permit – consultation required
14.	Migratory Bird	USFWS	50 CFR 21 Migratory Bird Treaty Act (MBTA)	"Take" includes any attempt to hunt, pursue, would, kill, possess, or transport any migratory bird, nest, egg, or any part of it	N/A	Not a permit – consultation required
15.	Wildlife Protection Measures	ADF&G	5 AAC 92 5 AAC 95.900	Design and construction of pipeline to avoid significant alteration of caribou and other large ungulate movement and migration patterns	N/A	Not a permit – consultation required under National Environmental Policy Act (NEPA)
16.	Endangered, Threatened, or Candidate Species	USFWS	50 CFR 402 Section 7 of Endangered Species Act (ESA)	If proposed activity affects species listed under ESA then obtain agreement with USFWS re: scope of studies to determine project's probable effect on Threatened and Endangered Species (TES)	N/A	Not a permit – consultation required under ESA
17.	Essential Fish Habitat (EFH)	National Marine Fisheries Service (NMFS)	50 CFR 600 Magnuson-Stevens Act provisions	Federal agencies are required to consult with NMFS on any action that may result in adverse affects to EFH	N/A	Not a permit – consultation required under NEPA
18.	Fish Resource	ADF&G	AS 16.05.340(b)	Required of anyone who wants to collect or hold alive any live fish, shellfish, or aquatic plants or their gametes (except gold fish and decorative tropical fish) for purposes of science, education, propagation, or exhibition	30 days	Typically required for field studies

Permit Type		Permitting Agency	Citation	Activity	Acquisition Time	Notes
Air Quality						
19.	Prevention of Significant Deterioration (PSD)	ADEC	18 AAC 50.306 40 CFR 52.21	Obtain PSD permit before beginning construction on a new major source, a major modification, or a plantwide applicability limit (PAL) major modification	1.5 to 3 years	Due to the complexity of air permitting for large-scale projects, required air permits will be clarified during the permitting process. All permits that may be required are included in this table.
20.	Nonattainment area new source review for construction	ADEC	18 AAC 50.311	A construction permit must be obtained before commencing construction of a major stationary source, major modification, or PAL major modification for a nonattainment pollutant in a nonattainment area		
21.	Pre-construction review for a major source of hazardous air pollutants	ADEC	18 AAC 50.316	Authorize plans for construction and assess emission standards and air contamination A construction permit must be obtained before beginning construction of a new major source of hazardous air pollutants or reconstructing a major source of hazardous air pollutants		
22.	Minor Air	ADEC	18 AAC 50.502	A minor permit is required for an air pollutant before construction, operation, or relocation of a minor source if the stationary source needs a Title V permit		
Archaeological						
23.	Alaska Cultural Resource	ADNR	AS 41.35.080	Permit is required for investigation, excavation, gathering, or removal of any historic, prehistoric, or archaeological resources of the state	30 days	Typically required for field studies only
24.	Section 106 Consultation	ADNR	36 CFR Part 800 National Historic Preservation Act (NHPA)	Any project funded, licensed, permitted, or assisted by the federal or state government	N/A	Not a permit – consultation required under NEPA
25.	Section 106 consultation with State Historic Preservation Office (SHPO)	Tribal entities	36 CFR Part 800 NHPA	Any project funded, licensed, permitted, or assisted by the federal government	N/A	Not a permit – consultation required under NEPA

Permit Type		Permitting Agency	Citation	Activity	Acquisition Time	Notes
Archaeological						
26.	Preservation of Historic, Prehistoric, and Archaeological Resources	ADNR	AS 41.35.070 Alaska Office of History and Archaeology (OHA), SHPO, Alaska Historic Preservation Act (AHPA)	Any project located on state lands	90 days	Concurrence required from OHA and SHPO
Land Use						
27.	Utility on State ROW	Alaska Department of Transportation and Public Facilities (ADOT&PF)	17 AAC 15.011	Permit authorizing the applicant to construct or install utility facilities within a department ROW	90 days	
28.	Special Area	ADF&G	5 AAC 95.420	Activities, except for lawful hunting, trapping, fishing, viewing, and photography occurring in state game refuges, state recreation areas, across designated wild and scenic rivers, or through state parks require a special area permit. Use of helicopter or motorized vehicle requires a permit.	90 days	
29.	Development	North Slope Borough (NSB)	NSB Code of Ordinances Title 19	Activities occurring within NSB and on NSB lands. Note—may also need zoning change depending on route.	60 days	
30.	Land Use, Zoning, and/or Floodplain	Fairbanks North Star Borough (FNSB)	FNSB Code of Ordinances Title 17 and 18	Activities occurring within FNSB and on FNSB lands	60 days	
31.	Land Use and/or Zoning	Denali Borough (DB)		Activities occurring within DB and on DB lands. Consultation with DB required.	60 days	
32.	Land Use and/or Zoning	Matanuska-Susitna Borough (MSB)	MSB Comprehensive Plans and Zoning	Activities occurring within MSB and on MSB lands	60 days	

	Permit Type	Permitting Agency	Citation	Activity	Acquisition Time	Notes
Coastal Zone						
33.	Coastal Consistency Determination	ADNR	11 AAC 110 Alaska Coastal Management Program	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	
34.	Local Consistency Determination	MSB	MSB Coastal Management Program	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	Determination of consistency with MSB coastal management plan and enforceable policies will be obtained concurrent with the state of Alaska Coastal Zone Consistency Determination
35.	Local Consistency Determination	NSB	N/A	Activities within designated coastal zones, including waterways, that may impact coastal waters	50 days	NSB does not have a Coastal Management Plan in effect. NSB does have opportunity to comment with regard to specially designated area (e.g., for subsistence use).
Miscellaneous - Consultations, Stipulations, and Requirements						
36.	Environmental Justice	All federal agencies	Executive Order (EO) 12898	Activities that may disproportionately affect minorities and low-income populations (e.g., subsistence)	N/A	Not a permit – consultation required under NEPA.
37.	Wetlands Protection Consideration	All federal agencies	EO 11990	Agencies must take action to minimize the destruction, loss, or degradation of wetlands	N/A	Not a permit – consultation required under NEPA.

	Permit Type	Permitting Agency	Citation	Activity	Notes
PRE-CONSTRUCTION, CONSTRUCTION, OPERATION PERMITS					
Water Use					
38.	Floodplain Management	All federal agencies	EO 11988	Agencies must take action to reduce the risk to flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the beneficial effects served by floodplains.	Not a permit – consultation required under NEPA.
39.	Appropriation of Water and Water Rights	ADNR	11 AAC 93.040–.140	Application for water rights. Normally a permit to appropriate water or temporary water use permit should be obtained before application for water rights.	
40.	Temporary Water Use	ADNR	11 AAC 93.22	Temporary water use, ice armoring, and pipe testing for period of less than 5 consecutive years.	
41.	Fish Habitat Protection	ADF&G	AS 16.05.871 or AS 16.05.841	Water withdrawal from fish bearing waterbodies	
42.	Alaska Pollutant Discharge Elimination System (APDES)	ADEC	18 AAC 70	Discharge of pollutant from a point source into waters of the U.S. Alaska is fully authorized to administer the EPA's NPDES program.	
43.	Non-Domestic Wastewater Disposal	ADEC	18 AAC 72.500–.900	Discharges to land, surface water, or groundwater in Alaska	
Solid Waste					
44.	Solid Waste Management	ADEC	18 AAC 60.210–.215	Permitting a solid waste landfill. Does not include land clearing, woody debris (slash), bricks or cement, asphalt, or waste rock from mining	
Hazardous Material and Waste					
45.	Approval from local landfill operators to deposit non-hazardous solid waste	NSB FNSB DB MSB	NSB, FNSB, DB, and MSB regulations	Handling of solid waste at local landfills	
46.	Generator Identification (ID) Number	EPA	40 CFR 262 Resource Conservation and Recovery Act (RCRA) (18 AAC) 62.210 by reference)	All companies which treat, store, dispose of, transport, or offer for transport regulated waste must obtain an EPA ID number	

	Permit Type	Permitting Agency	Citation	Activity	Notes
47.	Transportation and disposal of hazardous waste	EPA	40 CFR 262 RCRA (18 AAC 62.210 adopted by reference)	Follow requirements regarding transportation, treatment, and disposal of hazardous waste	
48.	Hazardous Chemical Inventories	EPA	40 CFR 302 Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (aka *Superfund*) Title III Superfund Amendments and Reauthorization Act (SARA)	Reporting, planning requirements for facilities that handle, store, and/or manufacture hazardous materials	
49.	Hazardous Chemical Inventories	State Dept of Military Affairs	AS 26.23.073 AS 26.23.077	Reporting, planning requirements for facilities that handle, store, and/or manufacture hazardous materials	
			Wildlife		
50.	Public Safety	ADF&G	5 AAC 92.033	Permit to take, relocate, haze, or destroy birds or their eggs or nests, mammals or reptiles for public safety purposes.	
			Air Quality		
51.	Air quality requirements for open burning (vegetation from ROW)	ADEC	18 AAC 50.065 (b)–(f)	General requirements for open burning Also ensure that 1) material is kept dry, 2) noncombustibles are separated, 3) draft is present, 4) combustibles are separated from grass and peat, and 5) combustibles are not allowed to smolder.	
52.	Air quality control permit to open burn (vegetation from ROW)	ADEC	18 AAC 50.065 (g)	Permit for controlled open burning of forest land, land-clearing operations greater than 40 acres, vegetative cover, fisheries, or wildlife habitat	

	Permit Type	Permitting Agency	Citation	Activity	Notes
Transportation					
53.	Oversized and overweight vehicles (pipe hauling)	ADOT&PF	17 AAC 25.300	Oversized and overweight vehicles permit (such as for construction materials including pipe) and associated attachments (e.g., for flag cars, etc.)	
54.	Transportation of hazardous materials	ADOT&PF	17 AAC 25.200	Transportation of hazardous materials, hazardous substances, or hazardous waste by vehicle	
55.	Airport Operation	Federal Aviation Administration (FAA)	14 CFR 139	An Airport Operating Certificate must be obtained to construct, align a new airport, or activate an airport	This permit may not be applicable for proposed activities.
Camp					
56.	Domestic Wastewater Discharge Permit and Plan Approval	ADEC	40 CFR 122 (APDES)	Permit and plan approval required before domestic wastewater system can be constructed, installed, operated	
57.	Domestic Wastewater Discharge Permit and Plan Approval	ADEC	18 AAC 72.010, 200, and 215	Permit and plan approval required before domestic wastewater system can be constructed, installed, operated	
58.	Drinking Water Plan Approval	ADEC	18 AAC 80.200	Camps—human consumption	
59.	Food Service (camps)	ADEC	18 AAC 31.020	Permit for food service facilities serving 10 or more people per day	
60.	Solid Waste Management	ADEC	18 AAC 60	Handling of solid waste at camp locations and final disposition	
Miscellaneous					
61.	Spill Prevention Control and Countermeasure Plan (SPCC)	EPA	40 CFR 112 Oil Pollution Prevention	SPCC must be available for review. Discharge of oil from non-transportation-related onshore facilities onto or upon navigable waters of the U.S. Includes interstate and intrastate onshore pipeline systems including pumps and appurtenances as well as in-line or breakout storage tanks needed for continuous operation of a pipeline system.	
62.	Natural Gas Pipeline Safety	Pipeline and Hazardous Materials Safety Administration (PHMSA)	49 CFR 190-192	Transportation of Natural Gas by Pipeline Safety and Reporting Requirements	

7.0 PROJECT CONSTRUCTION

7.1 Construction Planning Considerations

In arctic and subarctic Alaska, climatic, hydrologic, topographic, biologic, and geographic factors influence construction methods, schedule, safety, impacts, and cost. Construction plans will consider these factors and identify options to address the uncertainties with regards to logistics, procurement, construction methods, and environmental conditions when operating in remote areas of Alaska.

Construction plans will identify options available for various pipeline segments and construction activities to account for unexpected conditions such as lack of snow or insufficient frost depth during winter construction, or excess water during summer construction.

7.1.1 Construction Execution

To address the technical aspects presented by varying terrain, seasonal extremes, and the overall magnitude of the project, the ASAP has been divided into four spreads along the mainline and one along the Fairbanks Lateral. Each of these spreads has been segmented into smaller sections according to terrain, climate, or complexity of construction. The Fairbanks Lateral alignment is concise and traverses relatively supine terrain and will be contained in a single construction spread. Segmentation of the ASAP route has been carefully planned with the explicit intent of ensuring construction within a given section can be completed in a single construction season. The length, geographical limits, and planned seasons of construction for each spread and section are listed in Table 2.2-1

Construction will be assigned to execution contractors on a spread basis. Each execution contractor will have full control of their respective spread and will be responsible for its progress, costs, construction methods, manpower, and construction equipment. The execution contractors must meet numerous contract performance standards and will be closely monitored throughout construction. These standards include, but are not limited to, the following:

- Progress milestones
- Compliance with design and specifications
- Quality inspection and documentation standards
- Environmental safeguards established by federal and state agencies and included in permit stipulations
- Health, safety, and environmental requirements
- Applicable labor and employment standards

In order to ensure compliance with the standards, all contractors will be pre-qualified to verify that they have an Operations Integrity Management System (or equivalent) in place. In addition a Quality Control Plan will be developed to identify construction related issues and verify that all work is performed in a manner to maintain the quality of the pipeline and related facilities, and to make sure all work is performed in accordance with relevant permit stipulations.

7.1.2 Construction Seasons

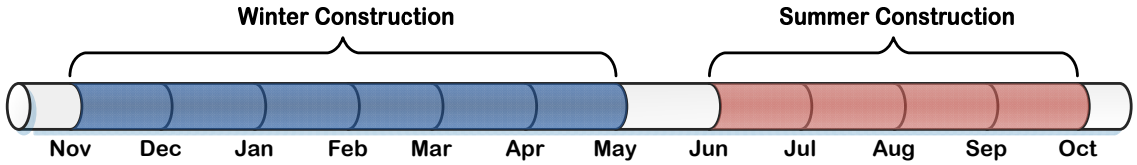
Several factors were considered when defining sections of the pipeline as winter or summer construction. In addition to anticipated regulatory requirements, the local terrain's ability to support construction

equipment during the summer months was considered. Winter construction offers the ability to reduce workpad thickness or to eliminate gravel workpads altogether. To contend with varying terrain, climate, and geologic conditions along the route, sections of the pipeline were planned for construction according to the season most conducive to construction of site-specific elements along the pipeline.

Major pipeline construction operations is planned to take place over a two-year period. Approximately three-quarters of the pipeline will be constructed over two winter construction seasons. However, access road construction, construction camp site development, bulk materials logistics, and other preconstruction activities will begin approximately six months in advance of pipeline construction and will continue through the shoulder seasons (spring and fall).

Figure 7.1-1 delineates approximate limits for summer and winter construction seasons. It should be noted that the specific start, finish, and duration of each season is subject to specific site conditions.

Figure 7.1-1 Construction Season Timeline



7.1.3 Construction Labor Requirements

The construction phase of the project will require contractors who are able to meet specific safety, quality, and technical standards, and schedule requirements.

Construction labor during Summer 0 will be dedicated to the development of the ROW, opening of material sites, gravel processing, camp development, and access road construction. The majority of pipeline construction and other infrastructure will occur during winter and summer.

Personnel remaining active during the fall will be limited to those associated with site restoration, hydrotesting, demobilization of equipment and infrastructure, and pipeline start-up activities.

Detailed estimates of pipeline construction labor requirements have yet to be conducted. Preliminary estimates for pipeline construction labor are based on current pipeline construction spreads and construction seasons and are presented in Figures 7.1-2 and 7.1-3. Pipeline construction labor will peak during the Summer 1 construction season at around 5,400 personnel.

An estimate of the labor necessary to construct gas facilities related to the project has not been conducted. Estimates of pipeline labor requirements are preliminary in nature and are expected to change as engineering and planning efforts progress.

Figure 7.1-2 Craft Labor by Season

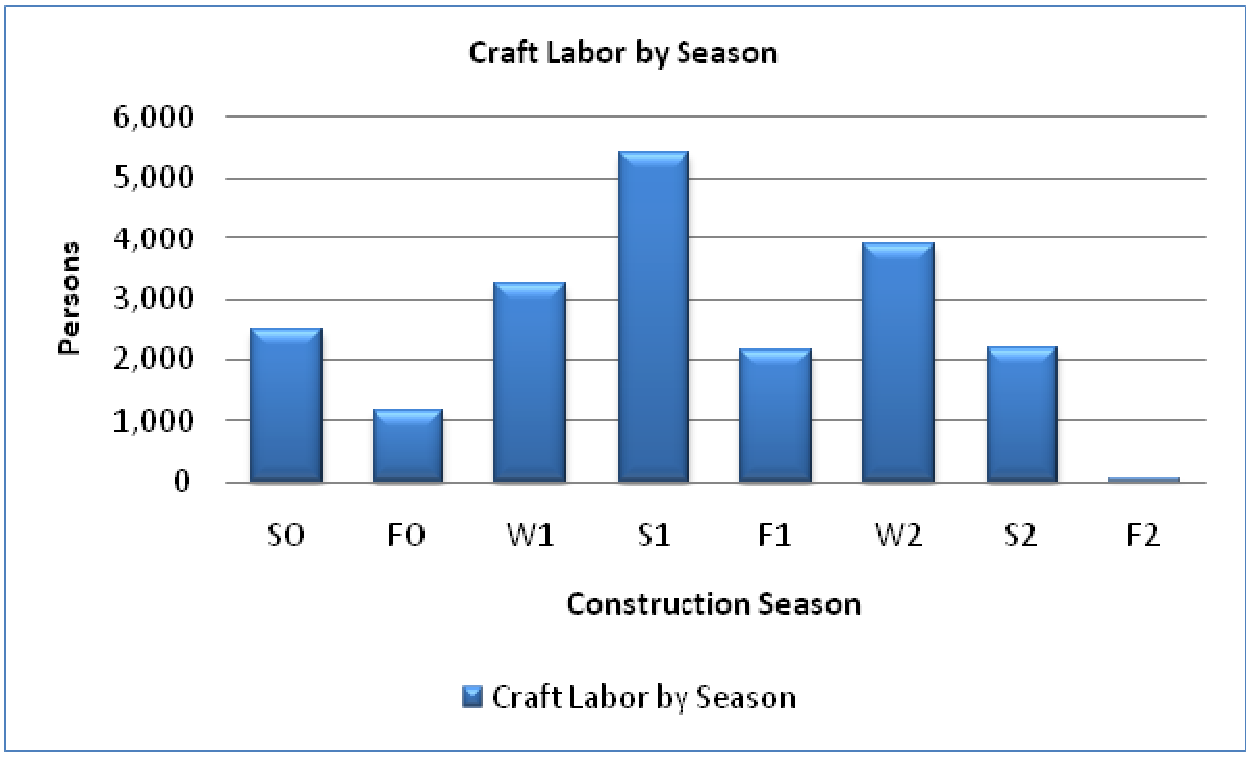
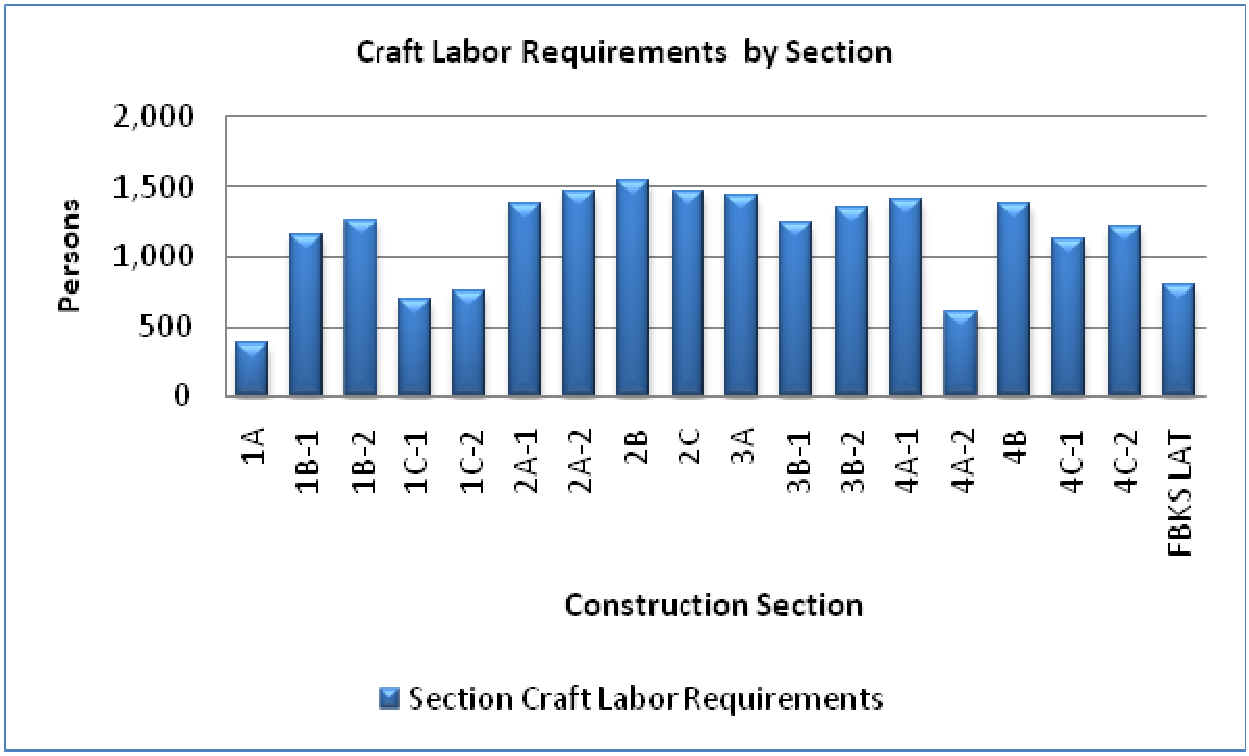


Figure 7.1-3 Craft Labor by Section



7.2 Construction Support Facilities

Significant support activities will be required to successfully construct ASAP given its expansive geographic limits, remoteness, and the challenging terrain over which it will be constructed.

Preliminary construction and logistics planning activities resulted in a conceptual layout of support facilities required to construct the pipeline. These support facilities include:

- Project offices and logistic support sites
- Transportation facilities and hubs, such as port facilities, rail facilities, and airports and airstrips
- Temporary land use areas such as camp locations, pipe laydown yards and storage facilities, remote airports and airstrips, and fuel storage sites

Construction support facilities and temporary land use areas are shown in Figure 7.2-1 and Table 7.2-1.

7.2.1 Project Offices

Project offices will support pre-construction, construction, ROW restoration, pipeline start-up, and the initial operations phase of the pipeline. Project offices include a centralized construction headquarters, logistics support sites, and construction support offices dedicated to individual construction spreads.

Project Headquarters

This plan assumes a project headquarters office will be located near a major airport (Fairbanks or Anchorage). This site serves as the central control center during all phases of project execution. The facility will be used by the owner, program/project management teams, and other project-related personnel, such as government and agency personnel. This site will be operational well in advance of construction startup.

7.2.2 Logistics Support Sites

The project requires two primary logistics support sites. These temporary facility sites will be located in Fairbanks and Seward and serve to:

- Manage the logistics of incoming pipe equipment and other materials
- Oversee the coating and double-jointing process (Fairbanks)
- Oversee the distribution of pipe from the coating/double-jointing facility to respective pipe storage yards (Fairbanks)

Seward Logistics Support Site

Seward is expected to be the port of entry for pipe and other materials, including the majority of large equipment. The Seward Logistics Support Site will be located on or near the AARC railroad's Seward Track Yard. The primary role of this site is to oversee the reception of pipe, valves, and other materials transported by sea as well as their subsequent distribution by rail to the pipe coating and double-jointing facility located in Fairbanks.

Fairbanks Logistics Support Site

The second major logistics support site will be the Fairbanks Logistics Support Site, located near the coating and double-jointing facility and ARRC rail line. This site will facilitate both logistics management personnel and owner quality assurance staff dedicated to ensuring the quality of pipe coatings and double-jointing procedures.

7.2.3 Personnel Housing and Support

Personnel housing and support services will be provided by mobile construction camps, stationary construction camps, and existing commercially available lodging. Fifteen construction camps are planned for the project. All the temporary construction camps planned for this project will be located on previously disturbed sites, most of which were developed during TAPS construction. The two proposed camps that will not be located on previously developed campsites are Chulitna Butte and Sunshine. However, both of these camps are planned for development on previously disturbed sites. Chulitna Butte is located on the existing ARRC Hurricane rail siding and the Sunshine is located at the site of the Talkeetna Bluegrass festival.

TABLE 7.2-1 TEMPORARY LAND USE OVERVIEW

Location	Milepost	Size of Laydown Yard (acres)	Camp Capacity (person) and Area (acres)	Fuel Storage Facilities	Equipment Storage	Other Facilities
Spread 1						
Prudhoe Bay	4	6	N/A	yes	yes	West Dock; Airport (SCC)
Franklin Bluffs	45	7	500 person (8.5 acres)	yes	yes	
Happy Valley	88	7	500 person (8.5 acres)	yes	yes	
Oksrukuyik	117	7	N/A	N/A	N/A	
Galbraith Lake	147	6	500 person (8.5 acres)	yes	yes	Airstrip (GBH)
Atigun	171	2	250 person (8.5 acres)	yes	yes	
Chandalar	180	4	500 person (8.5 acres)	yes	yes	Airstrip (5CD)
Spread 2						
MS 106-1	200	3	N/A	N/A	N/A	
MS 102-1	224	3	N/A	N/A	N/A	
Coldfoot	247	7	500 person (8.5 acres)	yes	yes	Airstrip (CXF)
Prospect	284	7	N/A	N/A	N/A	Airstrip (PPC)
Old Man	313	7	500 person (8.5 acres)	yes	yes	
Seven Mile	356	7	500 person (8.5 acres)	yes	yes	Airstrip (FVM) [Located two miles north of the camp]
Spread 3						
MS 74-2 HR	383	6	N/A	N/A	N/A	
Livengood	406	7	500 person (8.5 acres)	yes	yes	Airstrip (4AK)
Dunbar	459	7	N/A	N/A	N/A	[ARRC MP 431]
Nenana	476	8	500 person (10 acres)	yes	yes	[ARRC MP 412]; Airport (ENN)
Airstrip Z84	NA	N/A	N/A	N/A	N/A	

Location	Milepost	Size of Laydown Yard (acres)	Camp Capacity (person) and Area (acres)	Fuel Storage Facilities	Equipment Storage	Other Facilities
Spread 4						
Healy	531	8	500 person (10 acres)	yes	yes	[ARRC MP 359]; Airstrip (HRR)
Cantwell	570	8	500 person (10 acres)	yes	yes	[ARRC MP 320]; Airstrip (TTW)
Chulitna Butte	607	8	500 person (10 acres)	yes	yes	[ARRC MP 282]
Swan Lake	647	8	N/A	N/A	N/A	
Airstrip TKA	N/A	N/A	N/A	N/A	N/A	Airstrip (TKA)
Sunshine	678	7	500 person (10 acres)	yes	yes	[ARRC MP 215]
Willow	708	7	N/A	N/A	N/A	[ARRC MP 186]
ARRC MP 165	NA	N/A	N/A	N/A	N/A	[ARRC MP 165]
ARRC MP 160	NA	N/A	N/A	N/A	N/A	[ARRC MP 160]
South Terminus	737	1	N/A	N/A	N/A	
Seward Logistics Support Site	NA	15	N/A	N/A	N/A	[ARRC MP 0]; Port of Seward
Fairbanks Lateral						
ARRC MP 451	N/A	N/A	N/A	N/A	N/A	[ARRC MP451]
ARRC MP 459	N/A	N/A	N/A	N/A	N/A	[ARRC MP 459]
Fairbanks Logistics Support Site	N/A	15	N/A	N/A	N/A	[ARRC MP 470]; Airport (FAI)

Notes:
FAA codes for airports are provide in parentheses
ARRC siding locations are presented in brackets

Mobile Construction Camps

Mobile camps typically accommodate small ROW development crews over a short duration. These crews will primarily be involved in ROW preparation activities. Since these activities will occur prior to stationary camps becoming operational, mobile camps will be moved as ROW development progresses.

As pre-construction activities subside and stationary camps become operational, mobile camps will no longer be required. In most situations, these facilities will be absorbed into stationary camp complexes and remain until the construction camp is demobilized.

Stationary Construction Camps

Stationary camps will be established to accommodate pipeline and facility construction crews. Construction camps will house construction labor, management, agency, and support service personnel in numbers ranging from approximately 250 in the minor camps to 500 in the major camps. Camp site footprints will vary from 8.5 to 10 acres. Construction camp sites are subject to site-specific influences such as terrain and environmental conditions and subject to change. Reference Figure 7.2-1 and Table 7.2-1 for construction camp locations.

Existing Available Lodging

Lodging needs for construction of the Fairbanks Lateral and that portion of the mainline south of MP 708 will be satisfied by local lodging provided it meets health and safety requirements for personnel.

Health, Safety, and Emergency Response Facilities

Each camp will have a medical technician on-staff. Camp facilities will include a private examination room and a reception and service area. Equipment will include refrigeration facilities for storage of perishable medicines, sterilization equipment, and storage for medical supplies.

All sleeping quarters will contain fire alarms connected to a central alarm panel in the security offices. Mechanical rooms, kitchens, and furnaces will have automatic fire extinguishing systems. Fire protection stations will be located in central areas of each dormitory and contain both water hose racks and dry powder fire extinguishers. All-purpose, dry powder, and chemical extinguishers will be located in central locations throughout the camp.

Camps will be fenced with wire mesh and steel pole fences for security and animal control. Security guard houses will be located at each camp's major entrance. Site Security Plans will be developed, as required, to address the safety of personnel and security of equipment and materials.

If an emergency develops requiring response greater than that available at the camp, locally available emergency response will be used until regional emergency responders are on site. Table 7.2-2 provides the health, safety, and emergency response facilities located in communities near the project corridor.

TABLE 7.2-2 HEALTH, SAFETY, AND EMERGENCY RESPONSE FACILITIES NEAR RIGHT-OF-WAY

Community	Health Care	Police/State Troopers	Fire/Rescue Services
Prudhoe Bay	Oil company medical staff, Greater Prudhoe Bay Fire Department	North Slope Borough Police Department (NSB PD)	Greater Prudhoe Bay Fire Department. Emergency Medical Services (EMS) have limited highway, coastal, and airport access. Emergency service is provided by paid EMS Service.
Nuiqsut	Nuiqsut Clinic, Community Health Aid Program (CHAP)	NSB PD	Nuiqsut Volunteer Fire Department
Anaktuvuk Pass	Anaktuvuk Pass Clinic (CHAP).	NSB PD	Borough/Anaktuvuk Pass Volunteer Fire Department
Alatna	Alatna Clinic (Primary Health Care facility) (CHAP)	State Troopers in Bethel	No fire services. Use State VPSO in Allakaket.
Coldfoot	Fairbanks hospitals	State Troopers Post	No fire services. Volunteer Emergency Services have highway and air access.
Wiseman	Wiseman Health Clinic (CHAP), Fairbanks hospitals	State Troopers in Fairbanks	No fire services. Emergency services have limited highway, river, and air access. Within 30 minutes of a higher-level satellite health care facility.
Evansville	Evansville/Bettles Clinic (CHAP)	State Troopers in Fairbanks	Emergency Services have summer highway and helicopter access. Emergency service is provided by volunteers and a health aide.
Bettles	Frank Tobuk Sr. Health Clinic in Evansville, health aide and volunteers	State Troopers in Fairbanks	City/Bettles Volunteer Fire Department. Emergency Services include river and air access. Emergency service is provided by volunteers and a health aide.
Allakaket	Allakaket Health Clinic (Primary Health Care facility) (CHAP)	Village Public Safety Officer (VPSO)	VPSO. River and air access
Livengood	No health care facility	State Troopers in Fairbanks	Emergency Services have highway and air access.
Minto	Minto Clinic (CHAP)	VPSO/ State Troopers in Fairbanks	Emergency Services have highway and air access. Emergency service is provided by volunteers, health aide, volunteer Fire Department and Search and Rescue Truck.
Manley Hot Springs	Manley Hot Springs Clinic (CHAP), Manley Rescue Squad.	State Troopers in Fairbanks	Volunteer Fire Department. Emergency services are provided by Manley Rescue Squad, volunteers, and a health aide. Emergency Services have highway, river, and air access.
Fairbanks	Fairbanks Memorial Hospital, Interior Community Health Center, Fairbanks Regional PHN, Chief Andrew Isaac Health Center, and Bassett Army Community Hospital/Ft. Wainwright. Hospitals are qualified acute care facilities and provide state-certified Medevac services.	Fairbanks Police Department, State Troopers	City of Fairbanks Fire Department, Borough Fire Department/EMS Fairbanks Airport Fire Department, Chena-Goldstream Fire and Rescue, Fort Wainwright Fire/EMS, Steese Area Volunteer Fire Department, Fort Wainwright Fire/EMS, BLM Alaska Fire Service Guardian Flight, Inc, Warbelow's Air Ventures, Inc
Nenana	Nenana Clinic	State Troopers Post	Nenana Volunteer Fire/EMS Department. Emergency Services include highway, river, and airport access. Emergency service is provided by 911 Telephone Service, volunteers, and a health aide.
Tanana	Tanana Health Center (CHAP), Tanana Emergency Medical Services. The clinic is qualified Emergency Care Center. X-Ray and pharmacy available.	Tanana PD, VPSO, State Troopers in Fairbanks	Tanana Tribal EMS. Emergency Services have limited highway, river, and airport access. Emergency service is provided by 911 response, volunteers, and a health aide.

Community	Health Care	Police/State Troopers	Fire/Rescue Services
Anderson	Anderson Health Clinic, EMS and Ambulance	State Troopers in Fairbanks	Anderson Volunteer Fire Department, EMS, Ambulance, Clear Air Station Fire/Ambulance. Anderson is an isolated location and is part of the Interior EMS Region. Emergency Services have highway and air access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Healy	Tri-Valley Community Center (private owner). The clinic is a qualified Emergency Care Center.	State Troopers Post	Tri-Valley Volunteer Fire Department/EMS. Healy is an isolated town/Sub-Regional Center and part of the Interior EMS Region. Emergency Services have highway and air access. Emergency service is provided by 911 response and volunteers.
Cantwell	Cantwell Clinic (Primary Health Care facility)(CHAP)	State Troopers Post	Borough/Cantwell Volunteer Fire Department. Cantwell has highway air and helicopter access. Emergency service is provided by 911 response, volunteers, and a health aide.
Talkeetna	Sunshine Community Health Center (private owner). The clinic is a qualified Emergency Care Center. Mat-Su Regional Hospital (Acute Care Facility) is between Palmer and Wasilla on the Parks Highway.	State Troopers Post	Borough/Public Safety Station #111, Talkeetna Ambulance Service. Emergency Services have highway, air and helicopter access. Emergency service is provided by 911 response and volunteers.
Willow	Sunshine Community Health Center (private owner) in Talkeetna. The clinic is a qualified Emergency Care Center. Mat-Su Regional Hospital is between Palmer and Wasilla on the Parks Highway. Willow Ambulance Service	State Troopers in Talkeetna	Borough/Public Safety Station #121, Willow Fire building, Willow Fire Substation, Willow Ambulance Service. Emergency Services have highway and air access. Emergency service is provided by 911 response and volunteers.
Houston	Mat-Su Regional Medical Center in Palmer, Anchorage hospitals	State Troopers in Palmer. Houston PD	City/Houston Volunteer Fire Department. Emergency Services have highway and helicopter access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Big Lake	Mat-Su Regional Medical Center in Palmer, Anchorage hospitals	State Troopers Post	Borough/Big Lake Volunteer Fire Department. Emergency Services have highway and air access and are within 30 minutes of a higher-level satellite health care facility. Emergency service is provided by 911 response and volunteers.
Wasilla	Mat-Su Regional Medical Center in Palmer	Wasilla City PD	Borough/Central Mat-Su Fire Department, Wasilla Lake Fire/EMS
Palmer	Mat-Su Regional Medical Center in Palmer	Palmer City PD	Palmer Ambulance Service, Victory Volunteer Fire Department, Wolverine Volunteer Fire Department, Borough Ambulance
Anchorage	Alaska Regional Hospital, Providence Alaska Medical Center, Alaska Native Medical Center, Elmendorf AFB 3rd Medical Group, U.S. Army Medical Clinic/Fort Richardson	Anchorage PD, State Troopers Post	Municipality/Anchorage Fire Department, Elmendorf AFB Fire Department, Ted Stevens Anchorage International Airport Police and Fire, Fort Richardson Fire/EMS

State of Alaska Community Database, 2009. Department of Commerce, Community and Economic Development (certified/not certified). http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm. Accessed 11/23/2010

7.2.4 Port Facilities

Pipe, materials, and large construction equipment will be shipped to Alaska via marine transport. Alaska has five Southcentral ports that are suitable to receive materials and equipment: Anchorage, Seward, Valdez, Whittier, Port MacKenzie. The Port of Seward was selected as the planned port of entry for pipe and equipment due to available storage and connection to the ARRC railroad. Pipe will be shipped using Small Handy Class cargo ships which are capable of carrying up to 10,000 tons per shipment. Approximately 35 shipments are expected to be required to complete pipe delivery.

Materials and equipment needed for construction of the GCF will be shipped via marine transport to West Dock at Prudhoe Bay. The existing West Dock facilities are sufficient to receive materials without additional construction or dredging activities beyond the currently permitted maintenance. Approximately nine shipments are expected to be required to complete material delivery at West Dock.

7.2.5 Rail Facilities

The ARRC railroad provides rail service between Seward, Whittier, Anchorage, and Fairbanks and is the only rail service in Alaska. The ARRC will be the primary transport of pipeline materials between the Port of Seward and Fairbanks. Pipe offloaded from marine transport at Seward will be placed on rail cars and shipped to Fairbanks for double jointing and coating. Once pipe has been double-jointed and coated, it will be distributed to laydown yards by rail or truck depending upon the final destination.

7.2.6 Roads

Public roads will be used to transport equipment, materials, and personnel to the greatest extent possible where marine and rail transport are not available. The Dalton Highway will be used to transport materials and equipment north of Fairbanks and the Parks Highway will be used to transport materials and equipment between Fairbanks and the South Terminus. Other public access roads will be used to the greatest extent practicable to reduce the construction of temporary access roads.

Access Roads

Roads are necessary for equipment, materials, and personnel to access the pipeline ROW, compressor stations, block valves, camps, laydown yards, material sites, and water sources from existing roads. Access roads consist of both newly constructed gravel roads, improved existing roads, ice roads, and snow roads. Where necessary, snow roads will be armored with ice to reduce the chances for damage to surface vegetation.

Vehicles using the access roads during construction include semi-trailer trucks with lowboy flatbed trailers carrying tracked equipment, pipe trucks, dump trucks, crew buses, and heavy-duty passenger vehicles, such as pickups or sport-utility vehicles.

Typical standard drawings for gravel access roads and culverts can be found in Attachment 1, DB-ACC-01 and DB-ACC-02. A table of existing and new access roads, including ice roads, to be used during construction can be found in Attachment 5.

7.2.7 Construction Workpads

Construction workpads refer to the zone along the alignment from which work is performed, as shown in Attachment 1. Workpads will be installed to support equipment required for pipeline construction. Three main types of workpads are required, including ice/snow workpads, gravel workpads, and graded

workpads. Culverts and temporary bridges will be installed, as required, to permit cross drainage during summer months. No temporary bridges are anticipated to be required over USACE or U.S. Coast Guard (USCG) navigable waters. The ROW will be maintained during construction to allow safe passage of construction equipment and to prevent degradation of the ROW and adjacent areas. Additional culverts, riprap embankments, or drainage ditches will be installed during construction as required.

7.2.8 Pipe Laydown Yards and Storage Facilities

Laydown yards (as shown above in Figure 7.2-1 and Table 7.2-1) will store pipe and materials after delivery and before construction. Site dimensions depend on the site location and the type and quantity of materials to be stored. Laydown yards will be developed beginning the summer prior to pipeline construction. In general, laydown yards are collocated with construction camps, equipment storage, and fuel storage.

7.2.9 Airports and Airstrips

Major airport hubs to support project construction include Anchorage and Fairbanks. Existing asphalt and gravel airstrips owned by the Alaska Department of Transportation and Public Facilities (ADOT&PF) located along the pipeline route will provide support during mobilization and demobilization of personnel, emergency evacuations, and delivery of essential equipment to various job sites. Airports approved during the selection/planning process are of adequate size but may require upgrades to improve runways, runway lighting, communications, and navigational aids. Table 7.2-3 provides detailed information regarding airports and airstrips located in project areas.

TABLE 7.2-3 PROJECT AIRPORTS AND AIRSTRIPS

Airports/ Airstrips	FAA Code	Owner	Runway Identification	Length (Feet)	Width (Feet)	Surface Type/ Condition	Project Use
Anchorage	ANN	ADOT/PF	14/32	11,584	150	Asphalt/Good	Hub
Deadhorse	SCC	ADOT/PF	40,321	6,500	150	Asphalt/Good	Hub
Fairbanks	FAI	ADOT/PF	02L/20R	11,800	150	Asphalt/Good	Hub
Galbraith Lake	GBH	ADOT/PF	13/31	5,182	150	Gravel/Good	Primary
Healy River Strip	HRR	ADOT/PF	15/33	2,912	60	Asphalt/Good	Primary
Prospect Creek	PPC	ADOT/PF	40,197	4,968	150	Gravel/Good	Primary
Talkeetna	TKA	ADOT/PF	18/36	3,500	75	Asphalt/Good	Primary
Cantwell	TTW	Private	40,290	2,080	30	Gravel/Fair	Alternate
Clear	Z84	ADOT/PF	40,197	4,000	100	Asphalt/Good	Alternate
Chandalar Shelf	5CD	ADOT/PF	40,197	2,529	70	Gravel/Good	Alternate
Coldfoot	CXF	ADOT/PF	40,197	4,000	100	Gravel/Good	Alternate
Five Mile	FVM	BLM	40,511	2,700	75	Gravel/Good	Alternate
Livengood Camp	4AK	ADOT/PF	15/33	1,415	50	Gravel/Good	Alternate
Nenana Municipal	ENN	Nenana, AK	04L/22R	4,600	100	Asphalt/Good	Alternate

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7.2.10 Fuel Storage Sites

Each camp will have temporary storage facilities for oil, gasoline, diesel fuel, and lubricant to support camp and construction activities. Appropriate measures for handling, storage, and transportation protective of human health and the environment will be maintained at all times. Spill prevention and response is addressed in Section 7.11.

7.3 Pipeline Facilities Construction

This section identifies the pipeline facilities currently planned for construction. This information was developed as a result of preliminary planning and engineering analysis and will continue to evolve and change as the project progresses. The projected construction timelines are listed in Table 7.3-1.

TABLE 7.3-1 CONSTRUCTION TIMELINE FOR MAJOR FACILITIES

Activity	Start Date	Completion Date	Calendar Days
FACILITIES	7/1/2013	7/4/2016	1,099
Modular Sea-Lift	7/2/2015	9/30/2016	99
GAS CONDITIONING PLANT	7/1/2013	7/4/2016	1,099
Fabricate Modules	7/1/2013	6/30/2015	729
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Install & Testing	10/1/2015	7/4/2016	277
STRADDLE and OFF-TAKE FACILITY	7/1/2013	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456
COMPRESSOR STATIONS	7/1/2016	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456
COOK INLET NGL EXTRACTION FACILITY	7/1/2013	6/30/2016	1,095
Fabricate Skids	7/1/2013	4/1/2015	639
Pre-Construction Preparation	4/1/2014	3/31/2015	364
Construction and Testing	4/1/2015	6/30/2016	456

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Many facilities will be collocated to maximize efficiency and minimize negative effects on the environment. Table 7.3-2 identifies facilities that will be collocated.

TABLE 7.3-2 COLLOCATION OF ABOVE GROUND FACILITIES

Main Facility	Gas Compressor	Gas Refrigeration	NGL Extraction	Metering	Pig Launcher	Pig Receiver	Mainline Valve	Other
Gas Conditioning Facility	●	●		●	●		●	
CS-4	●	●			●	●	●	
CS-5	●	●			●	●	●	
Straddle/Off-Take Facility	●		●	●	●	●	●	Straddle/Off-Take Facility will be collocated with CS-8, if CS-8 is used
CS-8	●			●	●	●	●	
Cook Inlet NGL Extraction Facility	●		●	●		●	●	

7.3.1 Gas Conditioning Facility

The GCF will be located on the North Slope at Prudhoe Bay, south of the existing Central Gas Facility (Figure 7.3-1) and at MP 0 of ASAP. The GCF will be located in the Umiat Meridian, Township 11 N; Range 14 East; Sections 11 and 14 (U011N014E11 and U011N014E11). The centerpoint of the gravel pad will be located at 70.31293 latitude, -148.514503 longitude in the WGS84 coordinate system.

The GCF will receive gas from the Central Gas Facility, which receives gas from the Prudhoe Bay fields through gathering lines. Upon receipt of gas, the GCF will remove CO_2, H_2S, and other impurities. NGLs (propane, butane, and pentanes) will be injected to enrich the gas, then compressed and cooled to maintain the existing thermal regime in permafrost soils, and injected into the proposed ASAP.

Module sections of the GCF will be transported to the facility site via barge to West Dock, then transported on existing roads and assembled on site. A barge lift of nine barges is expected to be required. No modification to the existing West Dock infrastructure will be required. Additional details regarding the size and assembly/construction of the GCF will be developed as the project progresses.

The GCF will be located on a 70-acre gravel pad. The planned layout of the GCF is included in typical drawings located in Attachment 1. Access to the GCF will be via a permanent gravel road accessible from existing Prudhoe Bay roads.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel during work hours. A main generator and backup system will be located at the GCF. Off-site housing will be provided for GCF workers, likely at a commercial camp located within Deadhorse. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

GCF Processes

The gas from the production fields on the North Slope of Alaska contains CO_2 and H_2S at levels above the gas quality specifications for utility-grade gas. To remove these contaminants from the gas, a reversible chemical-reaction removal process will be used. The chemical amine is brought into contact with the raw gas in a special contacting tower. By mixing the raw gas and amine, the CO_2 and H_2S are absorbed into the amine such that the resulting gas in the mixing tower is within the specification requirements for utility-grade gas. The amine, rich with CO_2 and H_2S, goes through a heating process in which the CO_2 and H_2S will be vaporized. This vapor of CO_2 and H_2S (acid gas) is compressed and returned, through a pipe between the pipeline facilities, to the producers for re-injection into the reservoirs to sequester the acid gas. The amine, once the acid gas has been removed, will be returned to absorb more acid gas in the mixing tower.

The produced gas contains levels of water vapor that would freeze if left in the gas going through the pipeline. After the amine process, the gas will go through a glycol dehydration process to remove water from the produced gas. Glycol, a liquid desiccant that will absorb water from gas, is brought into contact with the produced gas in a special mixing tower. Upon leaving the mixing tower, the rich glycol (containing the absorbed water) will be regenerated by applying heat. In this process, the water is vaporized and the glycol, now lean (not containing water) will be returned to absorb more water from the gas. The water vapor is vented to the atmosphere.

NGLs are introduced into the dry produced gas. The gas enriched with NGLs will be cooled and compressed to pipeline operating pressures prior to entering the pipeline at MP 0. A preliminary list of major equipment anticipated to be used at the GCF is provided in Table 7.3-3.

TABLE 7.3-3 GAS CONDITIONING FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Waste Gas Pre-Compressors	2	129 hp	First step in the compression of waste gas (primarily CO_2 & H_2S)
Waste Gas Compressors	2	698 hp each	High pressure compression of the waste gas to pressures adequate for reinjection in the reservoirs for sequestration.
Primary Electrical Generator	1	18,781 KW	Primary source of electrical power generation
Backup Electrical Generator	1		Back-up source of electrical power generation.
Conditioned Gas Compressors	3	12,259 hp each2	Compression of conditioned gas to pipeline operating pressures
Refrigerant Compressors (for conditioned gas)	1	3,901 hp	Cooling of conditioned gas prior to injection into the pipeline.
Refrigerant Compressors (for DeEthanizer feed)	1	12,848 hp	Cooling of rich gas feed to DeEthanizer
Booster Compressors	1	2,465 hp	Boost rich gas to DeEthanizer operating pressure
DeEthanizer Reboiler	1	48.67 mmBTU/hr	Provide heat to remove methane and ethane from NGL stream.
Amine Regenerator Reboiler	2	95.7 mmBTU/hr each	Provide heat to remove the waste gas from the amine
Glycol Regenerator	2	8.6 mmBTU/hr each	Provide heat to remove water from the glycol
Mole Sieve Regenerators	2	6.8 mmBTU/hr each	Provide heat to remove water from the mole sieve absorbent

Michael Baker Jr., Inc, February 2011

7.3.2 Compressor Stations

Compressor stations will be required to compress the natural gas to maintain pressure in the pipeline. The MAOP in the mainline is 2,500 psi and the MAOP in the Fairbanks Lateral is 1,400 psi. The number of compressor stations required is currently being evaluated as the pipeline design is optimized. Based upon current design, a maximum of two compressor stations will be required. It is possible that a single compressor station will provide sufficient compressive ability for the gas throughput.

A total of 11 compressor station locations were identified early within the design process. Locations CS-4 and CS-8 are under evaluation for the two-compressor design option and location CS-5 is under evaluation for the one-compressor design option. Location CS-4 is near Wiseman just south of MP 225 (Fairbanks Meridian F031N010W19; 67.496419 latitude and -149.862978 longitude). CS-5 is located near TAPS Pump Station 5 near MP 285.5 (F023N014W030; 66.792341 latitude and -150.667517 longitude).

Location CS-8 is near Dunbar near MP 466.5 (F002S006W08; 64.75614 latitude and -148.794887 longitude). Compressor station locations may change slightly if necessary during design optimization. However, CS-4 will be located between MP 220 and MP 226.2; CS-5 will be located between MP 280 and MP 287, and CS-8 will be located between MP 461 and MP 466.5. The compressor stations locations are shown on Figure 2.0-2.

Each compressor station will be designed and constructed according to site-specific requirements. Compressor stations located north of Minto Flats (i.e., CS-4 and CS-5) will include refrigeration systems to cool the gas in order to maintain the thermal regime in permafrost soils. CS-8 will be collocated with the Straddle/Off-Take facility.

Each compressor station site will be constructed on a gravel pad designed according to site-specific requirements. Site components will be modularized to minimize construction, logistics, and commissioning activities. The dimensions require approximately 1.5 acres of land as shown in the typical compressor station layout (as noted in typical drawings in Attachment 1). However, a 20-acre area is expected to be requested as part of the ROW to allow for changes or variations from the typical layout. Design and optimization of facilities, including compressor stations is currently ongoing. This may affect required components, layout, and area needed.

A preliminary list of major equipment anticipated to be used at compressor stations is provided in Table 7.3-4.

TABLE 7.3-4 TYPICAL COMPRESSOR STATION EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	1	11,714 hp	Compression of conditioned gas to pipeline operating pressures
Primary Electrical Generator	1	663 KW	electrical power generation
Refrigerant Compressor	1	3,977 hp	Cooling of conditioned gas

Michael Baker Jr., Inc, February 2011

A permanent gravel road will be constructed to each compressor station from existing roads to allow easy access. The route of the access road(s) will be determined after the design is optimized and location(s) finalized.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel. Each compressor station will include a main generator and backup power system. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

Personnel requirements have not yet been determined. If compressor stations are manned, housing will be provided. If compressor stations are not manned on an ongoing basis, facilities appropriate for periodic or emergency residency by maintenance and operations personnel will be provided. Because of this, full camp facilities will be included in the site plans. Camp facilities will include sleeping quarters, kitchen, showering/toilet facilities, and recreational/relaxation areas.

7.3.3 Straddle and Off-Take Facility

A Straddle and Off-Take Facility will be located at the Fairbanks Lateral Tie-In between MP 461.0 and MP 466.5 near Dunbar. This facility will be collocated with CS-8 if this compressor station is constructed. A gas metering station will also be collocated with the Straddle and Off-Take Facility.

The Straddle and Off-Take Facility will remove NGLs from the gas, allow utility-grade gas to enter the Fairbanks Lateral, and re-inject the NGLs into the mainline, thus “straddling” the Fairbanks Lateral. This facility would include the separation and processing equipment to supply 60 MMscfd of utility-grade gas

to Fairbanks by taking a side-stream of conditioned residue gas from the pipeline for processing. A map of the planned Straddle and Off-Take Facility location is shown in Figure 7.3-2.

The facility will require less than five acres of land secured by a perimeter fence. The Straddle and Off-Take Facility will be located in the Fairbanks Meridian, F002S006W08. The gravel pad will be located at approximately 64.75614 latitude, -148.794887 longitude. A permanent gravel road will be constructed to the Straddle and Off-Take Facility from existing roads to allow easy access. The route will be determined after the design is optimized and location finalized.

Site support facilities include those necessary to house equipment, utilities, workspace, and personnel. A main generator and backup system will be located at the Straddle and Off-Take Facility. Major waste streams anticipated from the Straddle and Off-Take Facility include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.
Ongoing personnel requirements have not yet been determined. If the Straddle and Off-Take Facility is manned, housing will be provided. If compressor stations are not manned on an ongoing basis, facilities appropriate for periodic or emergency residency by maintenance and operations personnel will be provided. Because of this, full camp facilities will be included in the site plans. Camp facilities will include sleeping quarters, kitchen, showering/toilet facilities, and recreational/relaxation areas.

Straddle and Off-Take Facility Processes

The basic process of the Straddle and Off-Take Facility is extraction of NGLs from the gas stream in the Fairbanks Lateral, and reinjection of the NGLs into the main line. This NGL rich gas would be cooled to temperatures where some of the heaver hydrocarbons (NGLs) start forming a liquid phase. The gas/liquid hydrocarbon would be distilled, allowing utility-quality natural gas to be removed from the top of the column. Liquid NGLs would be removed from the bottom of the column and re-injected into the mainline. In the event of emergency upsets, gases would be removed via a gas flare.

A layout of the Straddle and Off-Take Facility is provided in the typical design drawings located in Attachment 1. A preliminary list of major equipment anticipated to be used at the Straddle and Off-Take Facility GCF is provided in Table 7.3-5.

TABLE 7.3-5 STRADDLE AND OFF-TAKE FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	2	4,266 hp each	Compression of gas feeding the Fairbanks lateral to pipeline operating pressures
Primary Electrical Generator	1	1,517 KW	electrical power generation
Refrigerant Compressor	1	6,308 hp	Cooling of conditioned gas
DeEthanizer Reboiler	1	10.1 mmBTU/hr	Provide heat to remove methane and ethane from NGL stream
Mole Sieve Regenerator	1	0.8 mmBTU/hr	Provide heat to remove water from the mole sieve absorbent

Michael Baker Jr., Inc, February 2011

7.3.4 Fairbanks Lateral Terminus

The Fairbanks Lateral will terminate at MP 37 of the Fairbanks Lateral. At this time, specific valve, venting, and blinding systems as well (as required equipment) has not been determined. Additional information will be provided as design and optimization progresses.

7.3.5 Cook Inlet NGL Extraction Facility and Pipeline Terminus

An NGL Extraction Facility will be located at the south terminus of the pipeline (ASAP MP 737) near Cook Inlet (Figure 7.3-3). This is near MP 39 of the existing ENSTAR Beluga Pipeline. The Cook Inlet NGL Extraction Facility will be located in the Seward Meridian, S016N005W36. The centerpoint of the gravel pad will be located at 61.427777 latitude, -150.083571 longitude in the WGS84 coordinate system. The Cook Inlet NGL Extraction Facility will separate NGLs from the gas stream and inject utility-grade natural gas into the existing ENSTAR pipeline for distribution. A gas metering station will be located at this site. NGL fractionation is not part of this project.

A layout of the Cook Inlet NGL Extraction Facility is provided in the typical drawings included in Attachment 1. A preliminary list of major equipment anticipated to be used at the Cook Inlet NGL Extraction Facility is provided in Table 7.3-6.

TABLE 7.3-6 COOK INLET NGL EXTRACTION FACILITY EQUIPMENT

Equipment Type	Quantity	Size/Power	Function
Gas Compressors	2	11,729 hp each	Compression of gas prior to injection on the Beluga Pipeline to pipeline operating pressures
Main Facility Generator	1	1,223 KW	Electrical power generation
Refrigerant Compressor	1	13,810 hp	Cooling of gas prior to entering DeEthanizer absorber towers
DeEthanizer Reboiler	1	49.11 mmBTU/hr	Provide heat to remove NGLs from the main gas stream prior to injection of natural gas into Beluga Pipeline
Mole Sieve Regenerator	2	27.3 mmBTU/hr each	Provide heat to remove water from the mole sieve absorbent

Michael Baker Jr., Inc, February 2011

Equipment and construction materials for the Cook Inlet NGL Extraction Facility will be transported to the site using marine transport to a Southcentral Alaska port, then via existing rail and public roads. A permanent gravel road will be constructed to the Cook Inlet NGL Extraction Facility from existing roads to allow easy access. The route of the access road will be determined after the design is optimized and location finalized.

Site support facilities include those necessary to house equipment, utilities, necessary workspace, and personnel. A main generator and backup system will be located at the Cook Inlet NGL Extraction Facility. Major waste streams anticipated from compressor stations include emissions from major equipment, wastes generated from O&M (lubricants, cleaners, fuels, etc.), and wastewater and municipal solid waste from personnel working at the facility. Waste disposal has not yet been determined, but will be performed in accordance with appropriate regulations and permits.

It is expected that personnel at the Cook Inlet NGL Extraction Facility will be responsible for providing their own housing in Wasilla or another nearby communities and would commute to work on a daily basis. Facilities appropriate for long-shift day workers will be provided. These may include kitchen, showering/toilet facilities, sleeping quarters, and recreational/relaxation areas.

7.4 Pre-construction Activities

Pre-construction activities will begin in Summer 0, the summer prior to the first season of pipeline construction (Winter 1). Pre-construction activities will include transportation of equipment and materials to laydown and storage yards, ROW survey and clearing, erosion control activities, material mine site development, gravel processing, and development of water sources.

7.4.1 Transportation of Equipment and Materials

Transport and delivery of construction equipment and materials to support pipeline execution throughout the project corridor will be organized to coordinate with construction spread locations and seasonal construction activities. The main modes of transportation for equipment and materials include:

- Ship and barge transport
- Rail transport
- Truck transport
- Air transport to designated project airstrips

In general, materials and equipment will be transported via ship or barge to an Alaskan port, and then transferred to rail as discussed in Section 7.2.4 and 7.2.5. Public roads and access roads will be used where marine and rail service is not available.

7.4.2 Right-of-Way

Before construction starts (Summer 0), pre-construction efforts will be conducted to prepare for the buildup of equipment, material, and construction personnel and to develop ROW infrastructure such as material sites and access roads.

Survey and Staking

During the pre-construction period, surveys will be completed to locate the alignment, ROW, and temporary construction easement and to complete real estate acquisition. The ROW will be surveyed and staked, clearing limits defined and temporary perimeter controls installed, and existing utility lines will be located and marked. Additional survey support for ROW development includes activities related to workpad, camp sites, laydown yards, and access road construction. Any sensitive areas that should be avoided (e.g., cultural sites) would be demarcated as part of surveying and staking.

Clearing

Clearing crews will remove all brush, timber, and stumps from the construction ROW. Machine clearing will be used in all areas except sensitive slopes. If there is a risk of spreading spruce bark beetles in the area, timber will be either mulched or burned to prevent it from being appropriate habitat for beetle larvae.

To reduce the amount of waste for disposal generated from downed brush and timber (other than marketable timber), the following clearing alternatives and disposal methods may be used. The preferred disposal methods of brush, timber, and stumps are the first two identified.

- Hydroaxing, chipping, or mulching brush and leaving on the ROW
- Stockpiling brush in designated areas to provide firewood for local communities
- Stockpiling brush on the ROW and burning it
- Hauling brush to designated disposal sites

Grading

Grading includes excavation of waste or embankment and may include the stripping of topsoil. In situations where topsoil removal is required, it will be segregated and saved when practical to enhance surface rehabilitation and aid in future revegetation of the area. Table 7.4-1 lists the location and extent of areas where AGDC proposes to implement specialized cut-and-fill (two-tone) grading techniques.

TABLE 7.4-1 APPROXIMATE LOCATIONS OF CUT-AND-FILL GRADING

From Milepost	To Milepost	Length (Miles)	Approximate Location
142	183	41	Atigun Pass Area
183	205	22	Dietrich River/Chandalar Shelf
252	255	3	Cathedral Mountain
263	265	2	N/A
426	429	3	Minto Flat Area
540	541	1	Denali National Park and Preserve
554	556	2	Panorama Peak
564.5	567.5	3	Reindeer Hills–Cantwell Area
	Total	**77**	

Notes: There are short sections within segments that will not require modeling.

Excavation

Excavation is classed as stripping, ditching or trenching of rock or borrow. Stripping excavation consists of the excavation, removal, and disposal of all surface organic material, silt, and unsuitable overburden necessary to expose suitable foundation conditions at the compressor station sites, access roads, and borrow areas.

7.4.3 Temporary Erosion Control

Prevention of erosion to the greatest extent possible is critical to maintain an on-schedule construction program and to reduce impacts to the environment. An Erosion Control Plan will be developed before the start of construction and will specifically define erosion control procedures for each area along the ROW. Also, a Storm Water Pollution Prevention Plan (SWPPP) will be developed as required by the NPDES permit. The SWPPP will address erosion control measures, best management practices, and mitigation measures to control erosion and storm water runoff. Continued ground surveillance and corrective erosion control and vegetation maintenance will be employed throughout the construction phase of the project. Normal drainage patterns will be maintained where practical.

7.4.4 Material Sites

Sand and gravel is required to support construction activities. As with any large pipeline project, there will be a need for substantial amounts of sand and gravel for pipeline bedding and padding, work pad construction, major facility construction (i.e., GCF, compressor stations, Straddle and Off-Take Facility, and NGL Extraction Facility), new temporary and permanent gravel access road construction, and for the

expansion and upgrade existing camp and laydown yards. Material will also be needed for meter stations, MLVs; to provide pipeline stability at fault crossings; and as well as other needs. Table 7.4-2 provides a preliminary estimate of the amount of material needed for construction.

TABLE 7.4-2 CUBIC YARDS MATERIAL REQUIRED FOR PROJECT CONSTRUCTION

Bed/Pad/Backfill	Work Pad/Side Fill	Compressor Stations	Access Roads Subbase/Surface	Camps & Yards
3,702,000	6,185,000	1,775,000	377,000	1,061,000
			Total	13,100,000

Michael Baker Jr., Inc. January 2011

Sand and gravel material sites located along the ASAP corridor will provide needed borrow material. Geotechnical data regarding material availability is in development; however a total of 546 existing material sites along the main alignment have been identified using existing ADOT&PF material site information sources. Based upon this preliminary data, it is expected that sufficient material is available along most of the alignment to provide material sufficient for the ASAP project. However, a few areas such as Minto Flats and south of Willow have no developed material sites.

Table 7.4-3 displays material availability along major sections of the route. Additional information on existing material sites, including location, size, and quantity of available material is included in Attachment 6. Additional details will be developed as the project progresses and will be provided to agencies when available.

TABLE 7.4-3 MATERIAL AVAILABILITY AND NEED BY CONSTRUCTION SPREAD

Spread	Location	Length (Miles)	Material Needs (CY)	Available Material (CY)	Number of Material Sites
1	GCF to Chandalar Shelf	183	2,501,000	31,400,000	49
2	Chandalar Shelf to Yukon River	177	5,375,000	42,350,000	76
3	Yukon River to Healy	177	3,410,000	39,923,000	164
4	Healy to South Terminus	208	1,793,000	80,450,000	257
	Mainline Total:	**737**	**13,079,000**	**194,123,000**	**546**
Fairbanks Lateral	MP 459 of mainline to Fairbanks	35	unknown	unknown	unknown
	Project Total:	772	13,079,000	194,123,000	546

Note: material site requirements and availability for the Fairbanks Lateral route have not been studied at this time.
Michael Baker Jr., Inc. January 2011

Sufficient material is expected to be available along most of the alignment to limit hauling distances to under ten miles. Additional stretches of alignment may require increased haul distances from neighboring sites. Table 7.4-4 shows the maximum haul distance for the mainline.

TABLE 7.4-4 MAXIMUM HAUL FOR MATERIAL

ASAP Milepost		Maximum Haul Distance (miles)
Northern	Southern	
0.0	171.1	5
171.1	180.0	7
207.3	223.9	10
270.0	281.0	6
341.9	348.0	6
389.8	399.2	5
405.8	466.9	52
534.0	548.2	8
571.5	586.7	8
607.3	612.6	5
707.6	737.1	20

Michael Baker Jr., Inc. January 2011

Prior to site development, during detailed construction and permitting efforts, Material Site Mining Plans and Reclamation Plans will be developed specific to each material site and submitted for agency approval. These plans will include such as habitat types, access locations, temporary stockpile areas, excavation limits and depths, archaeological and environmental information, and site restoration planning. Reclamation Plans specific to each material site will detail the actions necessary to return the site to a stable condition will be developed and submitted for agency approval. At this time, material sites are not under consideration for waste disposal sites.

7.4.5 Land Temporarily Needed for Construction Activities

The construction ROW for the pipeline and facilities is 100 feet wide. However, lands in addition to the construction 100-foot ROW may be required temporarily for a number of construction-related activities. The activities requiring additional temporary use of lands outside the 100-foot ROW include:

- Major road crossings
- Minor road, trail, and driveway crossings
- Railroad crossings
- Foreign pipeline crossings
- Stream crossings
- Wetland crossings
- Vehicle turnarounds
- Block valve installation sites
- Side hill cut areas
- Pig launcher and receiver sites (not located at major facilities)
- Access roads

7.4.6 Water Source Development

Water is required to support construction activities; hydrostatic testing prior to pipeline operations, and pipeline O&M. Winter construction will require water and ice chips for ice workpads located within the

100-foot construction ROW, ice access road construction, ice armoring of snow roads, cleanup of equipment at camps and material sites, and construction camp usage. Summer construction will require water for earthwork (e.g., dust control and compaction, screening operations at material sites), and construction camp usage. Upon completion of construction activities, water will be needed for hydrostatic testing, to confirm that the pipeline meets design criteria and is leak-free. Additional water will be required for O&M. Alternative construction techniques will be evaluated if sufficient water is not available for man camps, ice roads and snow pads.

The calculations in Table 7.4-5, Water Requirements, are intended to provide a preliminary estimate of water needed during construction and hydrotesting phases of the project.

TABLE 7.4-5 WATER REQUIREMENTS

Water Requirements (million gallons)					
Spread	**Ice Workpads**	**Ice Access Roads**	**Hydrotesting**	**Earthwork**	**Total**
Spread 1	394.94	0.10	15.50	24.50	435.04
Spread 2	0.00	0.00	20.18	187.65	207.83
Spread 3	155.51	0.00	19.27	100.94	275.72
Spread 4	69.39	0.00	23.71	73.45	166.55
Fairbanks Lateral	0.00	0.00	0.88	2.00	2.89
				Total	**1,088.02**

Michael Baker Jr., Inc. June 2010

Available water resources are being evaluated. Alternative construction techniques will be evaluated if sufficient water is not available. Lake studies were conducted during the summer of 2010 to identify water availability between Prudhoe Bay and Galbraith Lake. A desktop study will be completed the winter of 2011 and additional lake studies are scheduled for the summer of 2011.

7.5 Pipeline Preparation

7.5.1 Double-Jointing

Raw, uncoated 40-foot pipe will be delivered to the Seward Logistic Support Site at the Port of Seward by marine vessel. From there, the pipe will be loaded onto rail cars and moved to the Fairbanks Logistics Support Site for double-jointing and coating.

Once the pipe has been coated and double-jointed, it will be delivered by truck or rail, depending on destination, to the appropriate laydown yard. Once delivered to laydown yards, pipe will remain stockpiled until stringing operations begin.

7.5.2 Stringing

Double-jointed, pre-coated pipe will be hauled from pipe storage yards by pipe stringing specialty subcontractors and distributed along the ROW. Ditching operations will be conducted ahead of pipe stringing and scheduled to avoid having an open ditch for extended periods.

7.5.3 Bending and Set-Up

In most cases, the flexibility of the pipe will allow for free stress bending along gentle curves and contours without the need for specialized equipment or techniques. More severe bends will be accomplished using cold bending or induction bending.

Cold bending can be accomplished on the ROW with a bending machine, which is moved along the ROW by a tractor. Sideboom tractors are used for handling pipe in the bending operation.

Induction bends are custom-made for specific locations and will be designed and fabricated according to design requirements and in accordance with pipeline bending criteria.

7.6 Pipe Installation

7.6.1 Signs and Markers

Aerial MP markers and warning signs at roads, trails, streams, rivers, etc., will be installed as soon as practical and as required during the construction phase. They will be constructed and installed to withstand vandalism to the extent feasible.

7.6.2 Ditch Excavation

Ditching crews are required to excavate a trench deep enough to provide the design soil cover depth over the top of the pipe or pipe insulation. The slope of the ditch walls will vary with soil characteristics, thermal conditions, and excavation method.

A chain type excavator, which excavates the ground by pulling a series of excavation buckets in a loop fashion on a mechanized arm, is the most economical method of ditch excavation in most soil types. This method of excavation minimizes the extent of surface disturbance and provides higher progress rates plus lower unit costs when compared to alternative ditching methods. Ditching machines are effective in soils without oversized material (significant cobbles and/or boulders) and without a high water table.

In areas not suited for ditching machines, ditch excavation will be done by track hoe. Blasting may be required in some areas with frozen soils or rock as addressed in Section 7.6.3. Topsoil from pipeline ditch excavation will be segregated when practical and used to enhance surface rehabilitation and aid in future revegetation of the area.

Construction scheduling is the most appropriate way of limiting thaw of open-ditch segments. To the extent possible, thaw-unstable soils will be excavated during winter seasons. In all cases, durations of open-ditch construction activities will be minimized.

Impacts to animal migration will be mitigated by using the measures addressed in Section 8.0, Resource Values and Environmental Concerns. Mitigation measures regarding wildlife movement through construction areas and ditch excavation sites are addressed in Section 8.2.10, Wildlife Resources. Additional information regarding fish and fish habitat mitigation measures resulting from construction activities is provided in Section 8.2.9, Fisheries Resources.

7.6.3 Rock and Frozen Soils Blasting

Blasting may be required to break up and fracture high-density frozen soils or rock during trench excavation. Safety-controlled blasting techniques will be used in all situations where blasting is required

within proximity to inhabited areas or existing facilities. A Blasting Control Plan will be developed to mitigate health, safety, and environmental impacts. The Blasting Control Plan will address the following issues:

- Blast hole loading and placing of explosives
- Timing delays, wiring, and use of detonation systems
- Training, and licensing of personnel performing and supervising blasting activities
- Technical support, quality control, and compliance supervision for blasting activities
- Blasting in environmentally sensitive areas such as near fish habitat or in areas and during sensitive life stages of wildlife (e.g., Dall sheep lambing, bear denning, raptor nesting).
- Blasting near existing infrastructure

The Blasting Control Plan will be implemented and used in all locations. Standards identified in the Blasting Control Plan will become more stringent as the pipeline approaches foreign (other) pipelines, structures, and environmentally sensitive areas that may be impacted by blasting activities. The Blasting Control Plan will follow all applicable requirements for health, safety, and environmental protection, including Alaska Department of Fish and Game (ADF&G) blasting standards.

7.6.4 Line-Up and Welding

Mainline welding (excluding tie-ins and other miscellaneous welds) will be performed by either manual or mechanized welding systems that permit consistent, high-quality welding, and provide a desired production rate. Welding will be conducted according to project-specific procedures with qualified welders.

Field welding crews will bevel each joint of pipe to the profile required for automatic welding. Pipe ends will then be preheated prior to welding. Post-weld heat treatment for stress relieving will not be required. Each step of the welding process will be visually inspected by qualified welding inspectors. A combination of nondestructive testing inspection methods will be used to determine weld quality.

7.6.5 Lowering-In

Sideboom tractors with slings will be used for lowering each welded pipe string into the ditch. Longer sections require proportionately additional equipment for handling.

A separate tie-in crew will manually weld the lowered-in pipe strings together to complete the pipeline section. Other locations requiring tie-in welds include valves, road crossings, river crossings, and other special crossing areas.

7.6.6 As-Built Survey

Prior to backfill, an as-built survey will be completed to record the condition of the pipeline as lowered-in. These data are used as a baseline for future operational considerations and include recording the location-specific significant features, such as field joints and valve locations.

7.6.7 Buoyancy Control

For the proposed pipeline diameter and wall thicknesses, some portions of the pipeline may be buoyant in high water table areas, in wetlands, at water crossings, and at directionally drilled crossings.

Pipeline buoyancy control will be provided by saddle bags for ditching in high-water-table areas where the ROW soils are competent, dense, and non-organic. If pumping of the water-filled ditch is not possible, the weights will be installed on the flooded pipe by equipment working on mats adjacent to the ditch line. If saddle bags are used, appropriate measures will be taken to ensure coating integrity.

Concrete coating, bolt-on river weights, or saddle bags will be applied for buoyancy control for pipeline sections that are in poor, sandy soils, and are across high-water-table, open-cut-ditch stream crossings.

Buoyancy control for HDD can be accomplished by installing a small pipe inside the main pipeline. The smaller pipe will be filled with water to provide needed buoyancy control of the pipeline while being pulled into place.

7.6.8 Ditch Breakers, Padding, and Backfill

Ditch plugs will be used wherever slope and soil conditions indicate the probability of excessive erosion along the ditch line.

Coarse-grained material is required around and under the pipe to protect the pipeline whenever the ditch passes through material that could damage the pipe coating, to mitigate buoyancy problems (outside of floodplain areas), and to protect against excessive loss of pipe cover due to erosion. In areas where these potential problems do not exist, ditch spoil will be placed into direct contact with the pipe.

After placement of weights or plugs (where required), backfill crews will fill the trench with either ditch spoil or imported backfill materials to about one foot over the top of the pipe. The remaining ditch spoil material is used to complete ditch backfill and crowned over the ditch and left in place. In sensitive stream areas, excess ditch backfill may be removed to designated spoil disposal areas.

7.6.9 Tie-Ins

Separate welded sections of the pipeline will be connected with tie-in welds. Tie-in welds will also be made to short sections of the pipeline or fittings at river crossings, mainline valves, road crossings, pipeline crossings, and after long sections of the pipeline are hydrostatically tested. Pipe end bevels will be inspected and repaired by end-prep milling machines, by grinding, or by filing.

The pipe ends will be preheated when necessary to maintain weld quality. The weld will be made with successive passes to build up the metal of the beveled ends. Radiographic inspection of the weld will be made, and the pipe coating in the tie-in zone will be applied.

7.7 Special Construction Areas

7.7.1 Road and Railroad Crossings

All arterial roads and railroad crossings will be installed without casings, either by the “slick-bore" or open-cut method. Major road crossings will be accomplished by a boring method that creates no disruption to the road surface and allows traffic to flow unimpeded. In situations where the pipe cannot be installed by boring, a trench will be excavated. This open-cut method may involve building a temporary bypass or bridge to maintain traffic flow.

All TAPS access road crossings will be bored. Because of corrosion control issues, no cased crossings are proposed for the project.

7.7.2 Foreign Pipeline and Utility Crossings

Existing foreign pipelines and utility lines will be crossed by going below the existing pipeline or utility. A minimum clear separation of 12 inches is required between the existing foreign pipeline/utility line and the proposed pipeline. Typical design drawings that illustrate this feature are included in Attachment 1.

It is assumed TAPS has approximately 4 feet of cover. It is also assumed that Alyeska Pipeline Service Company (Alyeska) and TAPS owners will accept the 12-inch minimum clearance between pipelines at crossings; however, more may be required. Minimum pipeline cover depth when crossing a belowground section of TAPS will be approximately 9 feet.

The proposed pipeline route is expected to cross TAPS at seventeen locations within the project area. Table 7.7-1, ASAP Crossings of TAPS, provides crossing locations.

TABLE 7.7-1 ASAP CROSSINGS OF THE TRANS ALASKA PIPELINE SYSTEM

Crossing	ASAP Milepost
1	24.22
2	97.62
3	111.64
4	115.67
5	133.13
6	149.57
7	167.58
8	173.49
9	173.92
10	186.89
11	257.08
12	262.44
13	316.93
14	348.85
15	356.42
16	362.27
17	374.72

Michael Baker Jr., Inc. December 2011

7.7.3 Unstable Soils

Detailed engineering efforts and geotechnical studies will identify areas where permafrost, frost heave, fault crossings, thaw settlement, frost bulbs, slope and soil instability, areas sensitive to erosion, and where unique soil structures are likely to occur. These findings, as well as construction methods to appropriately mitigate these conditions, will be defined during detailed engineering.

7.7.4 Avalanche Hazards

Along sections of the ROW where avalanches are a concern, current construction planning limits construction to the summer months, when slope instability is less prevalent. However, appropriate precautions will be taken and conditions monitored since warming temperatures in avalanche areas present the potential for "slush bursts".

7.7.5 Pipe Installation Methods For Water Bodies

The placement of the buried pipeline across specific fish-bearing streams is likely to have the greatest potential effect to the fishery resources of the project area. Proposed stream crossing methods have been determined based upon the presence of fish resources and engineering needs and are provided in Attachment 4. Each belowground stream crossing will be conducted in a manner and during a time period that avoids or minimizes potential fishery effects. Stream crossings will be accomplished using one of four crossing modes: open-cut, open-cut isolation, HDD, or bridge crossing.

Open-Cut Method

Open-cut is the most common crossing method used and is accomplished by excavating a trench across a stream or river bed and pulling or carrying the pipe into position. Trench excavation is accomplished using conventional excavation equipment, such as mechanical ditchers, draglines, dredgers, clams, or backhoes operating within the stream bed or from a floating barge. Some river and stream beds may require drilling and blasting that would be controlled and monitored.

Open-Cut Isolation Method

An isolated crossing technique will be used at locations where an open-cut is prevented by overwintering and spawning fish, or where stream flow conditions make open-cut impractical. This method is similar to an open-cut, but involves damming the watercourse to permit excavation while maintaining stream flow using pumps or dams and flumes. This method is limited to locations where stream flows do not exceed the capacity of the dam, flume, or pump equipment.

When a crossing is completed, the watercourse bed will be stabilized and the downstream dam will be removed first, followed by the upstream dam. Flume equipment will be shut down, restoring the stream to natural flows conditions.

Horizontal Directional Drilling

An HDD process may be used where disruption to the banks or bed of the stream is not permitted. With this method, a drilling rig on an inclined plane is set up on one bank and a pilot hole is drilled under the riverbed and to the surface on the other bank. The pipe is then pulled back as the pilot hole is enlarged by reaming.

Equipment typically found on an HDD site includes:

- Rig unit; power unit and generators
- Drill pipe rack and drill pipe
- Water pump
- Drill mud supply, drill mud mixing tank, drill mud pump, and mud handling and cleaning system
- Cuttings settlement tanks and pits
- Rollers and pipeline handling equipment

- Sidebooms and other heavy equipment
- Pipeline, welding, coating, and testing equipment

The availability of a dependable supply of water to the HDD drilling site is required for the following:

- Initial drilling fluid make-up
- Additional drilling fluid as the drill progresses
- Replacement fluid for drilling fluid escaping into the formation due to seepage or hydraulic fracture
- Pre-testing, where warranted, of the pipe string

Water could potentially be pumped from a water body to the drill site or hauled to storage tanks onsite.

Bridge Crossings

The current construction plan assumes the pipeline is attached to the following existing highway bridges:

- Chulitna River Bridge
- Coal Creek Bridge
- Hurricane River Bridge

The crossing of the Yukon River will be accomplished with the construction of a new pipeline bridge. The following items must be considered during construction planning efforts for each bridge location:

- Site accessibility for construction equipment
- Crane pads and pick points for heavy component erection
- Weights and haul routes for prefabricated components and materials
- Environmental restrictions during construction
- Proximity to access roads
- Cold-weather limitations with regard to concrete work

Refer to Attachment 1 for detailed typical design drawings for stream or river crossings.

7.7.6 Wetland Crossings

Wetlands in Alaska are usually defined as areas that are predominantly surface-saturated with water in the summer months. These areas are sometimes referred to as swamps, marshes, bogs, and muskegs. Construction methods used in wetlands will depend largely on the stability of the soils at the time of construction. If wetland soils are not excessively saturated and can support mobile construction equipment such as mats or timber riprap, construction would occur similarly to conventional cross-country construction techniques. Where wetland soils are saturated or inundated, the pipeline may be installed using the push-pull technique.

Push-Pull Technique

This technique involves stringing and welding the pipeline outside of the wetland and excavating and backfilling the trench using a backhoe supported by equipment mats or timber riprap. Platforms for positioning all equipment are constructed on each side of the wetland crossing.

The prefabricated pipeline would be installed by equipping it with buoys and pushing or pulling it on rollers across the water-filled trench. Once the pipeline has been floated into the trench, the buoys would be removed allowing the pipeline to sink to the trench-bottom. Pipe installed in wetlands will typically be fitted with buoyancy control measures.

7.7.7 Mainline Block Valves

The primary function of mainline block valves is to provide a means of restricting or stopping the flow of gas through the pipeline as necessary for safety, maintenance, or operational purposes. Mainline valves (MLVs) will be installed according to the operational needs of the ASAP system and will meet the design and installation requirements defined in 49 CFR §192.179(a) – Transmission Line Valves, at approximately 20-mile intervals.

MLVs will be installed on reinforced concrete pads placed over a compacted subgrade. In some areas fill may have to be imported to meet the subgrade requirements. Prior to construction, the site will be cleared using the same techniques as for the construction ROW. Installation of MLVs will be accomplished by tie-in crews using a sideboom or crane for lifting and setting the valve assembly. Depending on their location, access to MLV sites will be provided by workpads or construction access roads.

7.7.8 Aerial Pipeline Mode

The current construction plan assumes the first six miles (MP 0 to MP 6) of the pipeline will be constructed aboveground on steel vertical support members (VSMs) spaced at approximately 20-foot increments. Once the necessary ROW preparations have been made VSM locations will be surveyed, marked, and foundations drilled. Installation of VSMs will include standing and bracing the member, then backfilling around the VSM column with concrete slurry. Once VSMs have been installed, welded sections of pipe will be lifted and placed using sidebooms. Tie-ins will be accomplished in a manner similar to the remainder of the pipeline.

7.8 Special Design Areas

7.8.1 Denali National Park and Preserve

The segment referred to as Denali National Park and Preserve (DNP&P) begins at MP 534, approximately 5 miles south of Healy, and runs to MP 555, approximately 8 miles south of McKinley Village.

From MP 534, the alignment leaves the Parks Highway, crosses Bison Gulch, and then runs southeast to a crossing of the ARRC railroad. From here, the alignment descends a steep grade to the second Nenana River crossing, approximately 750 feet upstream of the Parks Highway bridge. To avoid the DNP&P, the alignment turns northeast and climbs up to and across the Parks Highway near MP 535. Once across the highway, the pipeline alignment runs south in the east ditch of the highway to pipeline MP 540.

During preliminary route planning, three alternate pipeline alignments were considered between MP 540 and MP 555.

The ASAP route currently planned will diverge from the Parks Highway at pipeline MP 540 and continue southeast of the Nenana River, approximately parallel to an existing power line ROW to MP 555 in a side-hill cut configuration. This route crosses Lynx Creek at MP 541, Montana Creek at MP 542, and Yanert River at MP 546. Option 1 alignment does not enter the DNP&P.

Alignment selection was based on limited engineering and survey data; analysis of aerial imagery; visual survey conducted at the site; and due diligence efforts to identify potential risk and negative implications—such as environmental and regulatory complications—associated with constructing the pipeline near a highly sensitive area such as DNP&P.

As the project progresses and survey and engineering data become available, detailed analysis may necessitate significant revisions to the Option 1 alignment.

7.8.2 Atigun Pass

Atigun Pass is a 10-mile section of the ASAP alignment that traverses, and is surrounded by, dramatic terrain and rocky soils. This portion of the pipeline is located at a pinch point between TAPS and the Dalton Highway. As a result, construction in this area may require an additional 12-foot lane along the Dalton Highway. A retaining wall may also be necessary between MP 175 and MP 176 to facilitate pipeline construction.

Because of the potential for avalanches in the Atigun Pass area, current construction plans assume all construction in this area will take place during the summer months. As a result, extensive maintenance to workpads, access roads, and even the Dalton Highway may be required to mitigate saturated soil conditions resulting from spring breakup and thawing conditions. These conditions could also hinder the movement and maneuverability of heavy, non-tracked equipment used to import construction materials. Specifics of soil conditions and behavior will be developed as detailed engineering progresses.

7.9 Contingency Planning

The construction contractor or developer will be required to prepare contingency plans for development, construction, and O&M. Each plan will address specific contingencies related to the particular aspect of the project. Plans will be developed in accordance with all pertinent regulations and will follow Best Management Practices (BMPs).

7.9.1 Holder Contacts

Daniel R. Fauske, Alaska Gasline Development Corporation, Permit Applicant, (907) 338-6100.

7.9.2 Agency Contacts

- Ron Dunton, BLM Gas Pipeline Project Manager, (907) 271-3132
- Serena Sweet, USACE, (907) 753-2819
- Mike Thompson, State Pipeline Coordinator's Office (SPCO), (907) 257-1330

7.10 Safety Requirements

A Safety Plan will be developed to identify what procedures will be put into place to make sure all operations are performed in a safe manner and that all applicable health and safety laws and regulations are followed. The Safety Plan will address construction, pipeline startup, and O&M. O&M safety is also addressed in Section 10.5.

7.11 Waste Management

7.11.1 Waste Handling and Disposal

Proper waste management is necessary to provide for human safety and environmental protection. A Comprehensive Waste Management Plan will be developed and followed so that hazardous and non-hazardous wastes generated by ASAP construction activities are minimized, identified, handled, stored, transported, and disposed of in a safe and environmentally responsible manner, and in full compliance with applicable state, federal, and local laws and regulations.

Each worker, contractor, and vendor working on ASAP is individually responsible for performing daily work tasks in a manner that conserves resources, limits impacts to the environment, and minimizes the generation of wastes. Details of how wastes are to be handled will be provided in the Comprehensive Waste Management Plan, including the following:

- Waste accumulation areas, including satellite accumulation areas, central accumulation areas, recyclable accumulation areas, and universal waste accumulation areas
- Management of recyclable metals, burnable wastes, and oily wastes
- Waste transport and disposal, including sampling (as necessary), profiling, and manifesting
- Wastewater treatment, including disposal of domestic wastewater and hydrostatic testing water
- Municipal waste treatment
- Waste fluid handling, including fuels and lubricants for equipment

It is anticipated that, where possible, materials will be reused or recycled. Burnable and oily wastes may be burned for heat recovery and to reduce waste volume. Domestic wastewater from camps and hydrostatic testing water will be treated and discharged in accordance with applicable permit stipulations, where possible. Hazardous and toxic wastes will be accumulated and transported offsite for appropriate disposal at a licensed disposal facility. Other wastes will likely be disposed of in an appropriate landfill.

Waste disposal sites, including landfills, or monofills may be permitted for this project; however, requirements and potential locations have not yet been identified.

7.11.2 Industrial Wastes and Toxic Substances

A Spill Prevention and Control Plan (SPCP) is required where hazardous materials are stored or used, including pesticides, paints, solvents, petroleum products or fertilizers. The SPCP will identify potential spill or source areas such as loading, unloading, storage, and processing areas, and areas designated for waste storage and disposal. The SPCP will identify material handling procedures and storage requirements and outline the actions to reduce spill potential. The SPCP is a companion document to the Comprehensive Waste Management Plan.

The construction contractor will be required to have a SPCP approved before beginning construction. The SPCP should include:

- Performance of maintenance, including refueling, of construction vehicles to prevent spills
- Storage of fuels and other hazardous materials containment requirements
- Identify individuals responsible for implementing the SPCP
- Define measures for storage and disposal of each kind of waste
- Specify spill response and cleanup procedures

- Describe spill response equipment to be used, including personal protective equipment
- Reporting requirements
- Periodic inspection and documentation requirements

The SPCP will be developed in accordance with all pertinent regulations and will follow BMPs. It will address specific requirements, such as:

- Refueling of vehicles will not be performed within 100 feet of a wetland, stream, or other water body.
- Fuel storage areas will be lined and bermed to contain 110 percent of the volume of fuel stored.
- Vehicle maintenance trucks will contain small spill response kits.
- Drip trays will be used under vehicles when parked to capture fuel, oil, and grease from vehicle leaks.
- All personnel will be trained in the notification and spill response requirements of the SPCP.
- Personnel will be trained in proper use of freeze depressant during hydrostatic testing.

A Spill Prevention and Control and Countermeasure Plan (SPCC) must be developed for each storage facility (e.g., tank) with a capacity to store in excess of 1,320 gallons of fuel. SPCCs are preventative measures to assure that a spill is contained and countermeasures are established to prevent petroleum spills from reaching navigable waters. The SPCC must be maintained on site.

8.0 RESOURCE VALUES AND ENVIRONMENTAL CONCERNS

Resource values and environmental concerns for the pipeline route are summarized in the following sections. Impacts to resources are expected to be temporary and localized and associated primarily with the construction phase.

8.1 Location with Respect To Existing Corridors

The ASAP route generally follows existing state highway corridors from Prudhoe Bay south. To minimize project impacts to environmental resources, existing infrastructure and ROWs will be used for pipeline installation to the extent feasible.

8.2 Anticipated Conflicts with Resources or Public Health and Safety

8.2.1 Air

The construction and operation of ASAP are not expected to have significant effects on air quality within the project area. The proposed project's emission levels will trigger new-source construction permitting either as minor source or major source permitting.

The proposed project's emission inventory is under development, but the primary air contaminants will include nitrogen oxides (NO_X), carbon monoxide (CO), small-diameter particulate (PM10 and PM2.5), sulfur dioxide (SO_2), and volatile organic compounds (VOCs) collectively known as "criteria pollutants." The level of expected emissions will dictate whether the proposed project is permitted as a minor source or as a major source. The major source regulations require best available control technology (BACT) to reduce emissions. The major source regulations also require the applicant to demonstrate that the proposed project will not significantly adversely affect existing air quality.

Construction Phase

The proposed project will have a localized effect on air quality during the project construction phase primarily due to diesel-powered mobile construction equipment and perhaps some windblown dust during the summer construction season. These potential particulate matter impacts in the Fairbanks non-attainment area for particulate matter (PM) 2.5 from construction of the Fairbanks Lateral will be mitigated by BMP measures for fugitive dust control and the use of ultra-low-sulfur diesel fuel by construction equipment. Since much of the proposed pipeline will parallel or share existing transportation corridors, including the Parks Highway and the ARRC railroad, fugitive dust emissions will be managed as a public safety factor to people traveling on the highway and railroad. Some open burning may be conducted during construction and will be subject to applicable Alaska Department of Environmental Conservation (ADEC) air quality regulations.

Construction activities will require measures to minimize short-term effects to air quality. These include:

- Developing and implementing a quality control/quality assurance program that tracks and assures implementation of all permit conditions associated with eliminating or reducing effects to local air quality
- Scheduling construction activities at times when there will be the fewest number of tourist or local residents engaged in outdoor recreation

- Reducing fugitive dust from construction traffic on unpaved roads
- Minimizing the number and location of permanent access roads
- Maximizing use of snow and ice roads during pipeline construction
- Burning of slash at times that minimizes effects to air quality
- Using construction camp incinerators to dispose of only those materials that the incinerator is designed and permitted to burn

Operation Phase

The stationary facilities associated with the project will be located outside of the Fairbanks non-attainment area for $PM_{2.5}$ and will neither directly nor indirectly impact the National Ambient Air Quality Standards (NAAQS) or Alaska Ambient Air Quality Standards (AAAQS) for particulate matter. Effects from operation of the proposed project on air quality will be due to combustion products from natural-gas-fired equipment located at the GCF, Straddle and Off-Take Facility, Cook Inlet NGL Extraction Facility, compressor stations and the venting of small quantities of hydrocarbon vapor at compressor stations or at other select locations along the pipeline alignment. Likely environmental effects of emissions from these facilities will be minimal because the proposed project will have a maximum of 2 relatively small compressor stations and hydrocarbon venting is expected to occur only during abnormal operations. Additionally, the GCF, Straddle and Off-Take Facility, and Cook Inlet NGL Extraction Facility may likely require implementation of control technologies to reduce emissions and to demonstrate compliance with NAAQS and AAAQS.

The largest air emission sources at the GCF, Straddle and Off-Take Facility, Facility and compressor stations will be combustion products in the exhaust of turbines. It is anticipated that operating compression duty at a given station will be approximately 14,000 horsepower or less. Compression duty at the other facilities will be significantly higher due to conditioning and removal of the gas from the pipeline. Smaller internal combustion equipment will be required for power generation and refrigerant compression. All gas-fired equipment will be fitted with BACT to reduce emissions as appropriate for the particular equipment and governing codes and standards.

The criteria pollutants emitted from the compressors will result in an insignificant regionalized effect on air quality with respect to NAAQS and AAAQS. Hazardous air pollutants (HAPs) from the facilities should be below applicable EPA/ADEC HAP regulatory thresholds. HAP applicability will be confirmed as part of the emissions inventory. The facilities will result in CO_2 emissions and the CO_2 emissions will be quantified as part of the proposed project emission inventory.

The facility emissions, depending on their location and size, could possibly have an effect on visibility by producing a visible vapor cloud during cold weather. Location of permanent facilities will consider local air quality requirements. Special attention has been given to ensure facilities do not cause significant long-term effects on designated Class I airshed for DNP&P and Gates of the Arctic National Park and Preserve, to local communities. This special attention has also been given to public recreation areas such as BLM recreation sites in the Transportation and Utility Corridor through the Brooks Range southward to the Yukon River, similar state and local facilities located along the Elliott and Parks Highways, and to DNP&P.

Project maintenance-related activity, primarily from vehicle traffic, will result in a smaller, localized, insignificant effect on air quality.

Potential Effects

Potential effects from operation of the GCF, Straddle and Off-Take Facility, Cook Inlet NGL Extraction Facility and compressor stations include increases in oxides of nitrogen (NOx) and increases in carbon

monoxide from the combustion process. Increases in greenhouse gas (GHG) emissions of carbon dioxide (CO_2) will also occur as a result of the combustion process. Minor increases in particulate matter (PM_{10} and $PM_{2.5}$) emissions will likely occur from construction activities and from operation non natural gas combustion equipment at the facilities. Minor increases in SO_2 and VOC emissions from construction equipment and non-natural-gas-fuel-burning equipment will also occur.

Mitigation

Mitigation measures that can be implemented to address effects on public health and safety include:

- Implementation of BMPs during construction activities to mitigate fugitive dust and reduce particulate matter emissions.
- Utilization of Best Available Control Technology (BACT) for combustion equipment to mitigate NO_x and CO emissions.
- Utilization of ultra low sulfur diesel fuel for construction equipment and non natural gas combustion equipment to mitigate SO_2 emissions, particulate matter emissions and VOC emissions.
- Operate all combustion equipment in accordance with manufacturer's specifications to mitigate NO_x, CO, VOC and particulate emissions resulting from incomplete combustion.
- Maintain emissions control equipment in accordance with manufacturer's specifications to mitigate emissions and maintain emission control efficiency.

At the present time, there are no EPA-approved control technologies available for GHG emissions mitigation on construction equipment and combustion equipment. These technologies are currently in the research and development phase and can be utilized for GHG mitigation once these technologies are available and can be evaluated as part of BACT.

8.2.2 Noise

Noise sources within the boundaries of ASAP are expected to be temporary and localized during construction. Noise sources during operations and maintenance will be limited to activities associated with O&M of the facilities. Measures to ensure compliance with requirements for noise abatement will be implemented.

Construction Phase

Increased noise levels during project construction activity will be localized and transitory as construction activity proceeds along the proposed 737-mile pipeline length. The primary sources of construction-related noise include diesel-powered mobile equipment, pipe installation, and construction worker verbal communication.

Operations and Maintenance Phase

The proposed project should have little to no effect on the surrounding areas. Much of the area adjacent to the route is undeveloped with low ambient noise levels. Noise generated at the GCF, compressor stations, Straddle and Off-Take Facility, and Cook Inlet NGL Extraction Facility may include compressors, boilers, generators, and heaters. In addition, there will be noise during operations and maintenance from vehicles on access roads and nearby highways, and equipment operating at material sites. The project compressor stations may implement noise abatement measures through engineering and design controls. There may be some additional, short-term noise increases resulting from vehicle traffic and small fixed-wing aircraft and helicopters during maintenance and/or surveillance activities.

Potential Effects

The potential effects from noise could include:

- Short-term increases in ambient noise levels from construction activities – trucks bringing materials, heavy equipment trenching and moving pipe, human interactions (radios, conversations), and worker private vehicles
- Minor and localized effects on air quality from project-maintenance-related activity, primarily from vehicle traffic
- Fixed-wing aircraft and helicopter traffic

Mitigation

Mitigation measures that can be implemented to address effects on soils include:

- Development and implementation of an Noise Abatement Program
- Development and implementation of a Construction Communications Plan to inform adjacent residences of construction activities

8.2.3 Geologic Hazards

The benefit of undertaking a geologic hazard assessment of the route is to ensure that effective design, construction, and operational mitigation measures are in place to reduce the potential for pipe integrity issues and to reduce the number of non-routine maintenance interventions. To the extent possible, known geologic hazards will be taken into account in the selection of final pipeline routing and final pipeline and facility design. A geologic hazard is defined as a naturally occurring or project-induced geological, geotechnical, or hydrological phenomenon that could load the pipeline, causing a pipeline integrity concern, or that could impact the ROW, causing an environmental concern.

Potential Effects

The potential effects from geologic hazards could include:

- Freezing of unfrozen ground
- Thawing of permafrost terrain
- Landslides
- Tectonic/seismicity
- Hydrotechnics/watercourse hydraulics
- Erosion
- Geochemical
- Unique soil structure

Mitigation

Mitigation measures that could be implemented during construction and operations and maintenance to address effects of geologic hazards on the integrity of the project include:

- Design Considerations
  - Special installation techniques and foundations
  - Earthquake mitigation measures and special design considerations at fault crossings

  - Special design considerations at river crossings
  - Erosion control measures
- Operational Considerations
  - Slope stability monitoring
  - Seismic/earthquake monitoring
  - River hydrology monitoring
  - O&M Manuals
  - Quality Assurance Manual
  - Inspection Services Manual
  - Design Basis Updates
  - Surveillance Manual
  - Environmental Management System Compliance Manual
  - Other controls to be determined

8.2.4 Mineral and Energy Resources

There are areas along the proposed route that may be used for mining activities, both recreational and commercial. Recent exploration mining by International Tower Hill Mines Ltd. in Interior Alaska near Livengood has identified potential large-scale mineral resources. There are a significant number of mining claims in the vicinity of Wiseman, adjacent to Gates of the Arctic National Park and Preserve. Additional research will be required to identify mining claims along the proposed route and identify active claims. Further coordination with mining interests will occur once the specific route is identified and negotiations for access are filed.

Potential Effects

- Potential gas source to provide energy in support of mining operations
- Potential increased access opportunities should be examined and potential conflicts with mining evaluated

Mitigation

Mitigation measures that can be implemented to address effects on mineral and energy resource development activities include:

- Development and implementation of a Construction Access Plan and Traffic Control Plan, including coordination with mining operators and adjacent landowners

8.2.5 Paleontological Resources

Paleontological resources are fossilized remains, imprints, and trace fossils of plants and animals used to study past ecosystems, evolution, and the origination and destruction of organisms. Effects on paleontological resources are permanent and irreversible. Ground-disturbing activities have the potential to adversely affect paleontological resources, particularly if those activities extend below alluvial deposits or deep soils and into sedimentary bedrock.

Fossils are protected by the Antiquities Act of 1906, as they are non-renewable resources. In addition, fossils on federal lands are protected by the Federal Land Policy and Management Act of 1976. The Paleontological Resources Preservation Act (PRPA) was passed into law on March 30, 2009. PRPA

requires the management and protection of paleontological resources on federal land by the Secretaries of the Interior and Agriculture (U.S. Code: 16 USC 470). Specific provisions for the various land-managing agencies reinforce policies regarding the collection and curation of paleontological resources and the confidentiality of location information. Fossils associated with archaeological sites and large caves are protected by the Archaeological Resources Protection Act (ARPA) of 1979 and the Federal Cave Resources Act of 1988. The Alaska Historic Preservation Act (AHPA) protects paleontological resources in Alaska.

According to the TAPS Renewal, all known Pleistocene fossils discovered in the ROW were removed at the time of discovery. There are currently no known paleontological sites listed in the Alaska Heritage Resource Survey (AHRS) database within the proposed corridor. However, for the segments of the project route south of Livengood, studies may be required prior to commencement of construction to determine the presence of bedrock units known to contain fossils within the proposed corridor, as well as evaluations of shallow bedrock and near-surface alluvium for the potential to yield fossils.

Potential Effects

The potential effects on paleontological resources could include:

- Ground-disturbing construction activities such as trenching, grading, and excavation
- Development of workpads, pipeline laydown yards, camps, fuel storage sites, materials storage sites, disposal sites, and the placement of fill materials over the resource

Mitigation

Avoidance is the preferred mitigation measure. If permanent effects are unavoidable, they should be mitigated in accordance with requirements of the appropriate agencies and applicable laws. If any known or previously undiscovered paleontological resources are encountered during construction activities, the owner/operator will be required to contact the SPCO (if on state lands) and the Authorized Officer as responsible for paleontological and cultural resources if on public land. A qualified paleontological monitor may be required to be on-site during construction near known paleontological resources, or areas where the likelihood of finding such resources is high.

While paleontological studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated paleontological discovery.

8.2.6 Soils

Soil characteristics along the proposed pipeline consist primarily of weathered bedrock, glacial till and outwash, fluvial sand, silt and clay, lacustrine silt and clay, colluviums, and windblown silt and fine sand. Physiographic regions crossed by the route are:

Arctic Coastal Plain Region

The Arctic Coastal Plain soils are composed primarily of organic silt several feet thick over coarse sands and gravel, with massive ground ice present. The Sagavanirktok River's braided floodplain is principally unvegetated coarse-grained alluvium. Previously deposited sandy silt may line sand and gravel in the river channel remnant of former floodplains. Cold, continuous permafrost underlies the Arctic Coastal Plain, averaging temperatures less than 19°F and a thickness of 670–2,150 feet. At shallow depths, the soil is ice-rich and primarily frozen, but still susceptible to seasonal thawing. Lakes and river channels

with depths greater than 6 feet may insulate the underlying soil enough to develop thaw bulbs (BLM 2002).

Arctic Foothills Region

The Arctic Foothills are composed of coarse-grained, glacial depositions of a mixture of clay, sand, gravel, and boulders. These moraines are often covered with windblown silt, while thaw ponds and basins are partially filled with colluvia, and rich peat and organic rich slopewash deposits partially fill upland, flat-floored depressions (BLM 2002). Cold, continuous permafrost also underlies the Arctic Foothills, again averaging temperatures less than 19°F. Till in the region may be compromised of massive ground ice locally totaling up to 50 percent of its volume. As on the Arctic Coastal Plain, the Sagavanirktok River insulates the surrounding ground, creating discontinuous permafrost adjacent to the active channel and thaw bulbs beneath the water. Permafrost becomes more continuous as distance from the Sagavanirktok River increases (BLM 2002).

Brooks Range Region

The Brooks Range is underlain with coarse-grained sand and gravel in the Atigun and Dietrich River valleys. Cold, continuous permafrost can be found throughout the Brooks Range except in alluvium beneath major active river channels. The depth of permafrost is greater in the northern areas of the Brooks Range than in the southern, and is also greater in soils with larger grain sizes. Ground ice is less than 15 percent of the total volume in fluvial silt and sand, while it may be up to 95 percent of the total volume in lacustrine silt and clay, especially near Galbraith Lake (BLM 2002).

Chandalar Ridge and Lowland Region

Glacial advances during the Pleistocene left deposits of coarse-grained glacial till in the Chandalar Ridge and Lowland region. Near the main channels of the Middle Fork Koyukuk and South Fork Koyukuk Rivers, coarse-grained and glacial fluvial sediment deposits are found, while fine-grained silt and clay of eolian and lacustrine origin are found over coarse-grained till away from the main channel. Discontinuous permafrost with temperatures between 26°F and 30°F is found underlying this section. Permafrost is generally absent under unvegetated floodplains, but old floodplains may be underlain with permafrost 5–50 feet thick. The lowlands between the Koyukuk River forks realize well-developed thaw lakes in the silts present there (BLM 2002).

Kokrine-Hodzana Highlands and Yukon-Tanana Uplands

Residual soils, a few feet thick, from weathering bedrock are dominant on hilltops away from the Tanana and Yukon Rivers. The soil at the bottom of valleys can be up to 40 feet thick and compromised of a combination of colluviums, fluvial sands, gravel, and weathered bedrock. Windblown silt is common over coarse-grained subsoil in the uplands and deposited from floodplains. Discontinuous permafrost is found here with average temperatures between 26°F and 30°F. Permafrost is absent near major streams. Old floodplains may be in the process of creating new permafrost because of the migration of the rivers. Thermokarst lakes are common in valley bottoms, where ice-rich soils witness freezing at depths of up to 50 feet (BLM 2002).

Ray Mountains

The Ray Mountains are composed of an overlapping series of compact ranges that move in an east-west direction and are underlain by the Ruby terrain. Metamorphic bedrock in the area is generally covered in rubble, which results in shallow and rocky soils. Permafrost is primarily discontinuous and varies in thickness from thin to moderate.

Cook Inlet Basin

The Cook Inlet Basin is gradually sloping lowland and was covered by ice and flooded by proglacial lakes several times during the Pleistocene epoch. Accordingly, the Cook Inlet Basin floor is composed of fine-textured lacustrine deposits surrounded by lesser amounts of coarse-textured glacial tills and outwash. The basin contains numerous lakes, ponds, wetlands, and several river systems. The area is generally free of permafrost and has a mix of maritime and continental climates, which means moderate fluctuations of seasonal temperature and abundant precipitation.

Potential Effects

The construction and operation of ASAP is not expected to have significant effects on soils within the project area. Most of the potential effects on expected to be minimal and limited to a short period of time during construction. Effects on soils are likely to be limited to erosion and production of storm water runoff.

Mitigation

Mitigation measures that can be implemented to address effects on soils include:

- Development and implementation of an Erosion Control Plan (Section 7.4.3)
- Development and implementation of a SWPPP (Section 7.4.3)

8.2.7 Water Resources

The construction and operation of ASAP is not expected to have significant effects on surface waters or groundwater within the project area. Most of the potential effects on groundwater and surface waters are expected to be minimal and limited to a short period of time during construction. All disturbed areas will be returned to pre-project contours and revegetated with native vegetation to maintain surface drainage patterns. Groundwater drainage patterns should also reestablish immediately after construction activities and site restoration have been completed. BMPs and mitigation measures will be used to minimize long-term effects on both groundwater and surface water within the project area. The ASAP is not crossing any waterways included on the list of Alaska Impaired Waters.

Direct Effects

The ASAP will cross an estimated 495 waterways and drainages of which 27 are major streams, 75 are anadromous fish streams, and an additional 7 have been nominated for inclusion in Anadromous Waters Catalogue.

Pipeline construction will not result in long-term alterations to stream flow, stream profile, or structural components of streams and other waterbodies crossed by the pipeline. For most stream crossings, short-term disturbances will be limited to the actual construction disturbances. Streambeds, streambanks, and riparian areas will be restored to pre-project contours and configurations to the maximum extent possible. Streambanks and riparian areas will be re-vegetated to prevent erosion and to maintain streambank stability. The pipeline will be buried to a depth that provides a minimum of five feet of cover at each stream crossing to minimize potential for streambed scour.

Large sections of the pipeline route are located within existing transportation and utility corridors that have in-place drainage structures and related structures with a demonstrated ability to avoid long-term adverse effects on water quality or substantial effects on the existing surface water or groundwater regimes. The project developer will adopt these designs and practices where applicable in the design and location of the pipeline project.

Potential Effects

Maintaining the existing thermal regime is an important factor in limiting impacts to water resources and water-dependent resources. A chilled pipeline may create ice damming along streams and waterways or thick layers of ice formed by successive freezing of stream overflow (aufeis fields). This could result in a reduction of water flow downstream, diversion of water outside of existing stream channels, or storage of water in aufeis fields. The chilled pipeline may also reduce the water temperature at stream crossings, affecting fish behavior or causing direct effects on fish habitat (delaying hatching of fish eggs). A pipeline that is maintained at a higher temperature that the surrounding soils and waters it passes through can also result in negative impacts. The most obvious is melting permafrost soils.

The pipeline operating temperature relative to the surrounding ground is recognized as a significant issue and is discussed in Section 4.3. In concept, the pipeline will be operated at below freezing temperatures in predominantly permafrost terrains to protect the thermal stability of the surrounding ground. Similarly, the pipeline will be operated at above freezing temperatures in predominantly thawed ground settings so as not to create frost bulbs around the pipe that could lead to frost heave displacement of the pipeline or adverse hydraulic impacts on drainages crossed by the pipeline.

Mitigation

Mitigation measures that can be implemented to avoid or minimize adverse effects on surface and ground waters include:

- Minimize the number of river and stream crossings
  - Use existing bridges where feasible
  - Use directional drilling to minimize disturbance to water bodies where practicable
- Maintain, to maximum extent practicable, the existing surface hydrology at all water body crossings
  - Prevent discharges that have the potential to adversely affect water bodies
  - Stabilize cut slopes immediately when the designed grade is obtained
  - Initiate reclamation of disturbed areas as soon as practicable
  - Ensure water withdrawals meet federal and state standards and guidelines
- Keep construction activities within the footprint of the pipeline ROW and the disturbed area of the adjacent construction zone to the maximum extent practicable
- Minimize the construction of new permanent access roads by emphasizing winter construction using snow-ice roads
- Perform water crossings in a manner that minimizes effects on water quality
  - Use materials for dam construction that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Use materials for flume pipe system that do not introduce sediment or other harmful substances into waters when using the open-cut isolation method
  - Position flume pipe system discharges to prevent erosion or scouring
- Minimize the effect of the pipeline on the existing thermal regime
  - Design the pipeline and component to take into account the thermal regime, including placement and size of compressor stations and chillers.
  - Use engineering controls such as insulation and non-frost susceptible fill to control the thermal signature of the pipeline.
- Implement dewatering practices that avoid adverse effects to vegetation and to existing quality of surface waters, including erosion and scouring

- Locate fuel storage, equipment refueling, and equipment maintenance operations at least 100 feet from surface waters
- Avoid contaminated sites
- Use temporary bridges for transportation of construction equipment and materials

8.2.8 Wetlands and Vegetation

Wetlands

Wetlands evaluation for ASAP began in 2008 with a reconnaissance survey of the pipeline alignment. Pre-mapping of the route and a limited fieldwork program were completed in 2009. The 2009 effort included field survey of the route in the Minto area. The results of the 2008 and 2009 fieldwork and pre-mapping were submitted in The Wetland Technical Report In-State Gas Pipeline Project Prudhoe Bay to Wasilla, Alaska, April 2010 (POA 2009-651) submitted to the USACE in April 2010.

For purposes of evaluating wetlands along ASAP in 2010, a 2,000 foot (1,000 feet each side of centerline) planning corridor fieldwork was established for aerial photo interpretation, pre-mapping, and desktop analysis and through discussions and meetings with the USACE. Once pre-mapping of the corridor was completed, wetland determination points were identified where the wetland classification through pre-mapping appeared inconclusive, where there were problematic wetland/upland boundaries, or for those wetlands that lacked National Wetland Inventory (NWI) coverage. These determination points were uploaded to a GPS system for field data collection. A total of 121 field observation data points were visited between 2008 and 2009 using data collection protocol evaluated and accepted by the USACE. A total of 399 data points were visited in 2010. All wetland areas were mapped in 2009 and 2010 and analyzed to the Cowardin subclass level with added modifiers to the class or lower level in the hierarchy (e.g., PSS1B). Other site-specific data collection protocol utilized the *1987 U.S. Army Corps of Engineers Wetlands Delineation Manual,* the *2007 Regional Supplement of the Corps of Engineers Wetland Delineation Manual: Alaska Region*, and the Magee protocol for assessing wetland functional capacity (Magee, 1998). This wetland mapping approach allowed incorporation of all wetland types within the entire 2,000-foot-wide corridor to be classified, while concentrating field efforts verification of wetland types within the 300-foot-wide analysis corridor (150 feet each side of centerline), which allows for adjustments to the pipeline alignment to avoid wetlands, if determined practical and feasible.

The purpose of the 2010 field survey was to document vegetation, soil, and hydrological conditions; verify pre-mapped wetland and upland signatures; adjust pre-mapped wetland/upland boundaries and classifications based on field conditions; and collect wetland function data. A total of 399 sites were evaluated during the 2010 field season. The 2010 Wetland Preliminary Jurisdictional Determination Report includes results of field studies from 2010 and is expected to be submitted to USACE in early 2011. Based upon this report and the 2009 Wetlands Technical Report submitted in April 2010, USACE will make a Jurisdictional Determination.

The wetlands mapped along the route were divided into vegetation type and wetland class as represented in Table 8.2-1. Acreage represents mapped wetlands in the 300 foot corridor. The total acreage affected by the project is expected to differ from the totals due to the project planning and mitigation efforts. Planning efforts to avoid wetlands by moving the pipeline alignment or the use of HDD will reduce the affected acreage of wetlands.

TABLE 8.2-1 ALASKA STAND ALONE GAS PIPELINE WETLANDS RELATIVE ABUNDANCES

Wetland Type	Approximate Number of Features	Approximate Acreage[(1)] and Percent	
Freshwater Forested/Shrub Wetland	3,238	9,095	68
Freshwater Emergent Wetland	969	3,959	30
Riverine	255	188	1
Freshwater Pond	346	118	<1
Lake	19	12	<1
Total	**4,829**	**13,372**	**100**

Notes: (1) Linear distance x 300-foot wetlands survey corridor

Potential Effects

The construction and clearing activities associated with ASAP would have both direct and indirect effects on wetlands and vegetation. Effects related to pipeline construction will be categorized as either temporary or permanent. As the proposed pipeline will be buried, the majority of permanent effects are expected to be limited. An example of direct and permanent impacts to a wetland area are draining and filling for construction activities, roadways, and pipeline location placement. Temporary effects on wetlands and vegetation during construction include clearing, grubbing, and trenching activities associated with the laying of pipe.

Mitigation

The permitting process for placing fill in wetlands requires compliance with the mitigation steps outlined in NEPA to maintain wetland functions. These steps include:

- Avoid: A wetland should not be affected if there is a less environmentally damaging practicable alternative.
- Minimize: Unavoidable effects should be minimized to the extent possible.
- Compensate: Any remaining effects should be offset, if practicable and appropriate, through restoration, enhancement, creation, and/or preservation actions.

Mitigation options will be developed collaboratively with the USACE upon their review of the 2011 PJD. At that time, site-specific BMPs will be defined and applied as means of mitigation. Overall, mitigation measures will likely be geographically dependent, as some procedures will have a greater efficacy toward the northern end of the proposed pipeline corridor, whereas others might be better suited to the southern portions. Traditional construction methods can help avoid significant effects on wetland habitats and will likewise avoid long-term effects on wetland functions and values if mitigation measures are implemented. Traditional wetland mitigation measures may include the following:

- Schedule pipeline construction across wetlands during the winter to the maximum extent practicable
- Avoid and minimize ground-disturbing activity in wetland habitats
  - Limit grading except for trenching, to the maximum extent practicable to preserve root systems
  - Maintain slope stability
  - Use mats or other types of mitigation during non-winter construction to prevent rutting
  - When possible, locate permanent facilities including compressor stations, access roads, and workpads outside of wetlands

  - Reduce construction ROW width across wetlands as practical
- Maintain existing hydrologic systems
- Reestablish vegetation that is typical of the general area, where practicable
  - Segregate topsoil and use as top trench fill to the greatest extend practicable
  - Reseed and revegetate affected areas upon completion of construction activities
- Minimize the number of stream crossings
- Use existing bridges or HDD when crossing streams
- Contain fuel and lubricant spills during construction

Vegetation

The ASAP route traverses a variety of vegetation types from arctic tussock tundra in the north to taiga in the interior and south. Arctic tundra and alpine tundra areas are distinguished by cold climates, short growing seasons, and low vegetation dominated by grasses, sedges, mosses and lichens. Taiga, or boreal forest, stretches across most of Alaska and is distinguished by trees of moderate height, including conifer forests, marshes, and bogs. The southernmost area of the ASAP is typically covered by deciduous trees such as aspen, cottonwood, and birch.

Potential Effects

The most likely impacts to vegetation will be the direct impacts from brush clearing of the ROW and removal of the vegetative mat during grading. These effects are expected to be short-term and transitory, only occurring during construction activities. Upon completion of construction activities, remediation, rehabilitation, and restoration of all ground-disturbed areas associated with the pipeline construction will be implemented as discussed in Section 9.0.

Another potential effect of the project is the introduction of non-native invasive plants (NIPs) or non-native weeds. These are plant species that have been introduced to an area where they did not naturally evolve. Some NIPs can produce significant changes to vegetation, composition, structure, or ecosystem function. A total of 332 NIPs are currently being tracked in Alaska. It is typically more effective to prevent the introduction and spread of NIPs than to attempt to control infestations.

Mitigation

Mitigation measures that can be implemented to prevent the introduction and spread of NIPs include a NIP Prevention Plan. The NIP Prevention Plan will address procedures to reduce or eliminate the spread of NIPs at project locations such as airports, particularly at gravel airstrips, material sites, temporary use areas such as laydown yards and camps. Restoration of cleared areas will also be addressed in the NIP Prevention Plan. Leaving cleared areas un-restored may present an opportunity for NIPs to establish a foothold without competition from local species. More information about rehabilitation and restoration is provided in Section 9.0. The NIP Prevention Plan will provide details of the measures to be used to control invasive species through appropriate site preparation, monitoring, revegetation of disturbed areas with native species, and performance standards.

8.2.9 Fisheries Resources

The ASAP will cross an estimated 495 waterways and drainages of which 27 are major streams, 75 are anadromous fish streams, and an additional 7 have been nominated for inclusion in the Anadromous Waters Catalogue. Along the ASAP route, fish are an important subsistence and recreational resource. A listing of potentially sensitive areas and fish habitat along the proposed route is found in Attachment 7.

Potential Effects

There could be temporary and localized effects on fisheries resources from ASAP construction depending on the construction methods used. However, a long-term effect on fish populations is not expected from pipeline operations. Probable short-term effects that may occur are alteration or loss of fish habitat and temporary obstructions to fish passage during construction. Temporary loss of habitat may result from diverting rivers or stream channels, removing riparian vegetation, excavating stream-bed materials, or altering the water quality.

To ensure habitat impacts do not cause direct mortality to fish, fish population size, and fish habitat, ADF&G permits are required under Alaska Statutes (AS), Title 16, which protects freshwater habitat in streams and rivers that support anadromous fish. The ADF&G has developed effective standards and practices to protect fishery resources during sensitive periods. Each crossing will be evaluated for fishery resources, and the proposed crossing technique will be developed cooperatively with the ADF&G to avoid adverse effects to fish and fish habitat.

Mitigation

Mitigation measures that can be implemented to minimize effects on fish include:

- Follow mitigation measures for water quality identified in Section 8.2.7
- Minimize the number of fish stream crossings where practicable.
- Use open-cut isolation methods for stream crossings at locations where an open-cut is prevented by overwintering and spawning fish, or where stream flow conditions make open-cut impractical.
- A Blasting Control Plan as identified in Section 7.6.3 will be developed in accordance with ADF&G blasting standards to protect adult fish, juvenile fish and developing fish eggs when blasting activities occur in or near streams.
- Use existing bridges or HDD.
- Use pipeline designs and construction scheduling that minimize disruption of fish passage and spawning fish and effects to fish habitat.
- Develop supplemental site-specific fishery data to fill data gaps for the design of fish stream crossings and for lakes where water will be withdrawn during the winter for snow/ice road construction and maintenance during pipeline construction.
- Maintain to the maximum extent practicable existing stream hydrologic regimes at fish stream crossings.
- Maintain to the maximum extent practicable existing temperature regimes along corridor.
- Use construction methods and reclamation of disturbed areas that eliminates or reduces the potential for erosion and sedimentation reaching fish streams.
- Minimize cumulative effects to surface hydrology, stream bottom, and stream bank habitats when the pipeline crossing of a fish stream is downstream from an existing stream crossing by the highway, TAPS, or other buried utility system.
- Use temporary bridges for transportation of construction equipment and materials
- To the maximum extent practicable, locate material storage, refueling activity, fuel, and related liquid storage at least 100 feet from the bank of a fish stream.
- Implement hydrostatic testing in a manner that minimizes the potential that freeze depressants could be inadvertently discharged to fish bearing waters.
- Assure water withdrawals use appropriately-sized fish screens and other state and federal guidelines for fish protection.

8.2.10 Wildlife Resources

Wildlife resources are widely distributed along the proposed route. Construction and O&M activities will affect wildlife resources; however, the effects are likely to be short-term and localized. A listing of wildlife, habitat, and periods of sensitivity along the proposed route is found in Attachment 7.

Potential Effects

Potential effects on wildlife are likely to be associated with construction activities and will be temporary and localized. Individual animals are expected to be potentially affected and not the entire population. The potential short-term effects on wildlife during construction include:

- Temporary disturbance/displacement resulting in short-term changes in habitat use and short-term changes in behavior
- Temporary habitat loss or alteration
- Obstruction to movement
- Death/injury to animals due to collisions with vehicles

In general, long-term effects on wildlife from ASAP are not expected. However, increased access to remote areas with the addition of access roads could lead to increased human use of the area for hunting.

Mitigation

Mitigation measures that could be implemented to address wildlife resources include:

- Avoid locating pipeline facilities in sensitive wildlife habitats to the maximum extent practicable.
- Schedule construction activities to avoid effects during sensitive periods in the life cycle of wildlife to the extent practicable, including scheduling excavation activities during times of the year when major movements across the ROW occur (i.e., migrations).
- Minimize the duration of open-ditch construction activities to mitigate the risk of animal entrapment in an open ditch.
- Develop systems or mechanisms to facilitate escape of wildlife from the pipeline trench in the event wildlife becomes trapped (e.g., escape ramps)
- Develop a Blasting Control Plan as identified in Section 7.6.3 in accordance with ADF&G blasting standards to protect wildlife. A Blasting Control Plan is particularly necessary if blasting is required in sensitive areas or during sensitive life stages for wildlife.
- Ensure construction camp operations and pipeline facility construction activities comply with measures that avoid attracting wildlife.
- Adopt motor vehicle and aircraft procedures that minimize disturbances to wildlife.
- Identify and then avoid or minimize situations where wildlife may be killed in defense of life or property.
- Avoid or minimize construction and operational activities during sensitive periods in life cycles such as moose and caribou calving, bear denning, raptor nesting, and nesting migratory birds.
- Limit public accessing to ROW for recreation or hunting by blocking entry areas with large boulders, berms, or fencing.
- Rehabilitate pipeline construction access roads in a manner that allows public access and consistent safe operation of the pipeline system and that is in accordance with the plans of the landowner/land manager.

- The following plans will be developed prior to construction activities and followed during construction and operations to minimize human interactions with wildlife:
  - Wildlife Interaction and Habitat Protection Plan
  - Blasting Control Plan identified in Section 7.6.3 which follows ADF&G standards protective of wildlife in sensitive areas or during sensitive life stages
  - Bear Avoidance and Human Encounter/Interaction Plan
- To minimize human/carnivore interaction and discourage wildlife presence and feeding opportunities the following plans will be developed to assure the appropriate handling and disposal of wastes:
  - Comprehensive Waste Management Plan
  - Hazardous Materials Emergency Contingency Plan

8.2.11 Sensitive and Threatened and Endangered Species

A variety of federal regulations provide protection for designated species in Alaska. Regulations relevant to the proposed pipeline include the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA). In addition to these federal regulations, the State of Alaska has lists of endangered species (5 Alaska Administrative Code (AAC) 93.020) and species of special concern.

Species included in this discussion are either listed under the ESA, have previously been listed, or are considered a species of special concern by the State of Alaska or BLM.

Threatened and Endangered Species

The pipeline route is located within an area that provides habitat for some species that have been federally listed as threatened. There are no endangered species that occur near the route.

Polar bears (*Ursus maritimus*) and beluga whales (*Delphinapterus leucas*) are found near the planned project area. Polar bears have recently been listed as threatened under the ESA and may occur in the vicinity of proposed pipeline alignment. Cook Inlet beluga whales were listed by the National Marine Fisheries Service (NMFS) as endangered under the Endangered Species Act of 1973 on October 22, 2008 (Federal Register 73:205 (62919)). A proposed rule for designation of critical habitat was published in the Federal Register on December 2, 2009 (Federal Register 74:230 (63080). This project is not expected to affect polar bears and beluga whales, nor the subsistence harvest of these animals. Polar bears may be temporarily displaced by the operation of heavy equipment during winter pipeline construction activities at the northern portion of the pipeline route near Prudhoe Bay. The temporary displacement of polar bears would be expected to have no effect on the present subsistence harvest of polar bear by Alaska Natives. Construction and operation activities are not planned to occur in Cook Inlet. This project is not expected to affect Cook Inlet beluga whales or the subsistence harvest of beluga whales.

Steller's eiders (*Polysticta stelleri*) and spectacled eiders (*Somateria fischeri*) are threatened species that may occur in the vicinity of proposed pipeline alignment. Migratory birds are federally protected by the U.S. Fish and Wildlife Service (USFWS). Eagles are protected under the Bald Eagle Protection Act and the MBTA.

Arctic and American peregrine falcons were listed as threatened and endangered, but were delisted in 1994 and 1999 respectively. They are, however, still considered species of special concern by the State of Alaska. Peregrine falcons are uncommon migrant breeders in the Prudhoe Bay area. The Sagavanirktok and Colville Rivers serve as the main breeding areas for Arctic peregrine falcons. Nesting concentrations are greatest at Franklin and Sagwon Bluffs.

BLM Sensitive Species

The BLM within Alaska must designate and manage sensitive species in part to reduce the likelihood and need for new listings under the ESA as per BLM 6840 Manual direction. The BLM must include as sensitive species those designated as candidate and proposed under the ESA, as well as species that have been de-listed from the ESA within the past five years. At-risk species with no current ESA status are based upon the following eligibility criteria:

1) Species must be native species that occur on BLM lands or land which BLM has a significant management capability to affect the conservation status of, and
2) One of the two following conditions applies:
   (a) The species is known or predicted to be undergoing a downward population trend that could affect the viability of the species, or a distinct population of the species is at risk across a significant portion of its range; or
   (b) The species depends upon specialized or unique habitats and there is evidence that such areas are being threatened with alteration such that the continued viability of the species is at risk.

Species that do not meet the criteria to be placed on the BLM Sensitive Animals and Plants Lists, but whose status will be re-evaluated in the future are placed on the BLM Watch List. Watch species are not sensitive species and are not subject to sensitive species policy. However, additional research will be performed and information gathered, prior to re-evaluation during subsequent sensitive species list revisions. Table 8.2-2 provides numbers of species on the BLM Sensitive Species and Watch Lists.

TABLE 8.2-2 BUREAU OF LAND MANAGEMENT SENSITIVE AND WATCH LIST ANIMALS AND PLANTS

	BLM Sensitive Species List	BLM Watch List
Birds	15	6
Mammals	4	0
Fish	2	2
Insects	3	1
Plants	50	49

Potential Effects

The effects of the ASAP project are expected to be temporary and localized. For ESA species, they will be limited to marine vessel transit to a Southcentral Alaska port and to West Dock. For other species, effects will be due to construction activities along the alignment.

Mitigation

Mitigation measures that can be implemented to address Sensitive, Threatened, and Endangered Species are those identified in Sections 8.2.8, Wetlands and Vegetation; 8.2.9, Fisheries Resources; and 8.2.10, Wildlife Resources. In addition, mitigation measures identified in the Section 7 consultation as part of the NEPA process and included in permits as stipulations will be followed.

8.2.12 Cultural Resources

Cultural resources include archaeological and historic sites, and structures and features that are protected under the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (NHPA) as amended, and the Archaeological Resources Act of 1979. The existing level of knowledge of cultural resources along the ASAP route varies, primarily because much of the route has not been surveyed extensively.

The existing knowledge is based on previous cultural resource studies that were designed for different projects and whose degree of applicability to ASAP varies. The most extensive and exhaustive of these surveys were undertaken prior to construction of TAPS and the Dalton Highway. The surveys conducted in advance of these projects provided substantial information about cultural resources within and near ASAP from the North Slope to Livengood. However, the existence of cultural resources is less well understood between Livengood through the Minto Flats to the Parks Highway, and for parts of the alignment where it departs from the immediate vicinity of the ROW occupied by the Parks Highway, ARRC railroad, and the Anchorage-Fairbanks Intertie.

Several other issues arise with the cultural resource studies completed for TAPS. The TAPS surveys were completed in the 1970s and 1980s, and the primary focus at that time was on prehistoric sites. Of the historic sites or structures that were documented along the route, many were not considered eligible for inclusion to the National Register of Historic Places (National Register) because they were not "historic" at the time (generally defined as 50 years or older). However, many of these places may now meet the criteria for inclusion on the National Register. In addition, survey methods, field documentation, and mapping methods used during TAPS have changed dramatically in the past 30–40 years. Archaeologists now use more advanced Global Positioning System (GPS) mapping which results in more accurate field locations. Many sites documented during TAPS may need to be site-checked for accuracy and to see if the sites are still intact or if they have been destroyed.

There is also potential for the project to impact Traditional Cultural Properties (TCP). A TCP is a place (often an ethnographic landscape) that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that are rooted in that community's history, or its importance in maintaining the continuing cultural identity of the community (Parker and King 1998). Similarities exist between TCPs and historic and archaeological sites. In fact, historic and archaeological sites can be all or part of a TCP. The key difference is TCPs exhibit a continuing role and importance to people today.

Identification of potential cultural resources (sites, structures, TCP) prior to ground disturbance is key to ensuring adverse impacts are avoided and/or mitigated. The project developer will be required to implement the following measures during the planning and construction of the pipeline:

- Identify cultural resources, in accordance with Section 106 the NHPA (36 CFR 800.4) and the Alaska Historic Preservation Act (AS 41.35).
- Determine whether or not the properties that may be affected by the undertaking are included in or determined to be eligible for inclusion in the National Register.
- Participate in consultation per Section 106 of the NHPA to determine what constitutes adverse effects to identified cultural resources.
- Assist the federal agency in the resolution of adverse effects.

Inventory, documentation, and preservation of cultural resources and mitigation of adverse effects to cultural resources will be based on a programmatic agreement between the concerned federal permitting entities, State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation. The agreement will clarify the procedures for considering cultural resources and will formalize the relationships between the various agencies. The affected federally-recognized Tribes, Alaska Native Corporations, and the public will participate in the implementation of the agreement, as required by Section 106.

Cultural Resources Work Completed to Date

In 2008, cultural resources baseline characteristics were examined in a desktop study and in 2009 known cultural resources within a 5-mile corridor centered on the proposed pipeline were inventoried with an overflight from Anchorage to Deadhorse and a vehicular survey on the return trip between Deadhorse and Anchorage. The purpose of these reconnaissance efforts was to acquire a preliminary assessment of the project area to facilitate future fieldwork planning. In 2010, 75 miles (approximately ten percent) of cultural resources fieldwork was completed. Areas surveyed in 2010 included segments between Happy Valley, on the North Slope, and Trapper Creek in Southcentral Alaska.

Potential Effects

An adverse effect to a cultural resource, as defined by 36 CFR 800.5(a)(1), is found when:

> "*an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.*"

The potential effects on cultural resources could include:

- Ground-disturbing construction activities such as trenching, grading, and excavation
- Development of workpads, pipeline laydown yards, camps, fuel storage sites, materials storage sites, disposal sites

Archaeological investigation, excavation(s) and documentation will have to be complete prior to pipeline construction and support activities in order to identify and evaluate potential effects on historic properties. Adverse effects must be resolved prior to construction. Adverse effects are resolved through mitigation agreed upon during Section 106 consultation.

Mitigation

Avoidance is generally the preferred mitigation measure for cultural resources eligible for the National Register. If negative effects are unavoidable, they should be mitigated in accordance with Section 106 and in coordination with the appropriate agencies, entities, and individuals. Mitigation measures can be specific to each cultural resource and will be determined and conducted in accordance with AS 41.35 and Section 106. More than one field season of archaeological survey may be required for determining the necessary level of mitigation.

Some areas within the pipeline ROW may be determined "high priority" areas for containing cultural resources. High priority areas are those areas that are known to contain high densities of cultural resources. These areas are defined through analysis of previous cultural resource studies, existing data on file at the Alaska Office of History and Archaeology's Alaska Heritage Resource Survey (AHRS) database, consultation with SHPO and other interested parties, and through current archaeological fieldwork completed for ASAP. In high priority areas, an archaeological monitor may be required during construction.

Alternatively, after the archaeological surveys have been conducted, the contractor may wish to avoid certain areas containing cultural resource sites rather than pay for lengthy and expensive excavations. Measures mitigating adverse effects may vary by specific cultural resource, but may include one or a combination of the following:

- Archaeological excavation, analysis, and documentation of all or part of the cultural resource site

- Perform Historic American Building Survey/Historic American Engineering Record (HABS/HAER)-level documentation for historic buildings and structures
- Perform archaeological monitoring of construction activities
- Provide interpretation for and involvement of the public. Some examples include brochures, signage, or partnering with local schools, museums, and/or heritage preservation groups, among others.
- Consultation with state and federal agency historic preservation officers
- Consultation with Alaska Native Tribes

The HABS/HAER documentation would be completed for historic structures prior to pipeline construction and support activities. Archaeological monitoring, as implied above, may be conducted during construction activities. Interpretation for the public can be initiated as soon as appropriate information is gathered. Interpretive material does not generally have to be completed prior to the activity that causes adverse effects. Public interpretive signage, for example, is most often installed after an activity is complete or near its completion.

While cultural studies will be performed prior to beginning construction activities, there is always the possibility that cultural resources will be discovered during the project. An Unanticipated Cultural Discoveries Plan will be developed to outline the exact procedures that will be followed in the event of an unanticipated cultural discovery.

8.2.13 Visual Resources

Visual resources are defined as those land, water, vegetation, animals, and structures that are visible on the land. The ASAP route passes through the vast, treeless tundra of the Arctic Coastal Plain, the mountains of the Brooks and Alaska Ranges, Tanana Flats, the Nenana River Valley, DNP&P, the Alaska Range, and the Susitna River Valley.

Potential Effects

Once constructed, most of the pipeline aboveground facilities, including compressor stations, valves, and other related structures, may be visible from adjacent public roads. The proposed pipeline ROW will be cleared within sight of some BLM and state recreation sites and will be visible from ridgelines along the eastern boundary of the Wilderness Area within Gates of the Arctic National Park and Preserve, DNP&P, and Denali State Park.

However, much of the pipeline will be located adjacent to an existing highway, pipeline, or powerline ROW, which will further minimize visual effects. In areas where the pipeline will be near major roadways used by tourists and other visitors, portions of the newly cleared ROW soil disturbance, construction with attendant equipment operations and activity, and any permanent facilities that will be required for operation will be seen. Many of these activities and much of the disturbed ROW will be transitory in nature. The entire project in an area usually takes several months to complete prior to restoration.

In addition, the project developer will be required to work with the BLM and state agencies in an effort to minimize and/or mitigate effects on areas of high scenic and visual values and expects to create only intermittent and localized effects on visual resources. All portions of the pipeline corridor that pass through BLM-administered land are managed in accordance with Class IV visual resource management (VRM) objectives, which provide for management activities that require major modification of the existing character of the landscape by allowing a high level of change. Consequently, major modifications to the existing landscape are allowed for activities related to energy transportation. The

pipeline corridor will be managed according to the Class IV VRM objectives. Every effort will be made to minimize visual effects, particularly in areas of high scenic and visual value.

Mitigation

Mitigation measures that can be implemented to address effects on visual resources could include:

- Review the practicality of avoiding or minimizing significant adverse effects on visual resources created by the construction and operation of ASAP and incorporate proven mitigation measures into the design and location of the project where appropriate.
- Minimize the construction of new permanent access roads by using snow/ice roads during construction.
- Restore the construction zone in a manner that facilitates reestablishment of the adjacent natural vegetation.
- Use root balls, salvaged native plant materials, and topsoil removed from the construction footprint for redistribution on disturbed areas where feasible.
- Maintain a screening of existing natural vegetation when the pipeline is offset from a highway.
- Use existing disturbed areas to the maximum extent practicable for temporary construction activities such as construction camps, material stockpiling, pipe jointing, and pipe bending.
- Minimize locating pipeline facilities, new material sites, and construction material stockpiling in places with special visual resource values that would be visible to the general public.
- Blend the pipeline system into the natural setting to the extent practicable when crossing places with high visual resource values.
- Use revegetation species that are appropriate for the general area.
- Regrade construction disturbances to a condition that blends with the surrounding terrain and surface drainage patterns.
- Monitor reclaimed, disturbed construction areas and take remedial action where expected revegetation success is not achieved.

8.2.14 Social and Economic

Larger Alaska communities along the route will be better-prepared to absorb temporary construction impacts and will likely experience positive long-term effects. The smaller communities north of Fairbanks, however, may experience some temporary effects on rural lifestyle during construction, yet will potentially benefit in the long-term from lower energy costs. In addition, there are a number of the communities with for-profit village corporations that could benefit from the influx of construction opportunities in the region. The project may also result in improved opportunities to distribute CNG (and possibly propane) to rural Alaska communities via the Yukon and Tanana Rivers and to use CNG as a substitute for gasoline and diesel fuel in cars and trucks in communities along the Parks Highway. The project could provide employment opportunities for isolated communities that currently have high unemployment rates. In addition, first-class cities and first-class boroughs with taxing authority may have the opportunity to generate tax revenue.

In addition, many communities, while not located adjacent to the ROW, use the nearby region for subsistence activities. For example, residents of communities not actually adjacent to the pipeline ROW such as Anaktuvuk Pass, Nuiqsut, Alatna, Allakaket, Stevens Village, and Tanana obtain furbearing animals, caribou, fish, and moose from the region near the ROW. Summer construction activities are more likely to affect these activities.

Table 8.2-3 and Figure 8.2-1, list those communities that could potentially be affected by ASAP construction and O&M, because of their location near the project ROW or because the community uses the region near the project ROW.

TABLE 8.2-3 COMMUNITIES ADJACENT TO OR IN THE VICINITY OF THE PIPELINE ROW

Community	Population	City Classification	Borough	Regional/Village Corporation
Nuiqsut	424	Second-class city	NSB	ASRC/The Kuukpik Corporation
Anaktuvuk Pass	287	Second-class city	NSB	ASRC/Nunamiut Village Corporation
Alatna	22	Unincorporated	FNSB	Doyon, Limited
Allakaket	100	Second-class city	Unorganized borough	Doyon/K'oyitl'ots'ina Limited
Wiseman	16	Unincorporated	Unorganized borough	N/A
Coldfoot	13	Unincorporated	Unorganized borough	N/A
Evansville	13	Unincorporated	Unorganized borough	Doyon/Evansville Incorporated
Bettles	19	Second-class city	Unorganized borough	
Stevens Village	64	Unincorporated	FNSB	Doyon, Limited
Livengood	24	Unincorporated	Unorganized borough	N/A
Minto	191	Unincorporated	Unorganized borough	Doyon/Seth-De-Ya-Ah
Manley Hot Springs	81	Unincorporated	Unorganized borough	Doyon/Bean Ridge Corporation
Fairbanks	32,506	Home rule	FNSB	Doyon/None
Nenana	479	Home rule	Unorganized borough	Toghotthele Village Corporation
Tanana	251	First-class city	Unorganized borough	Tozitna, Ltd. Village Corporation
Anderson	275	Second-class city	DB	N/A
Healy	1,002	Unincorporated	DB	Doyon/Mendas Chaag Native Corporation
Cantwell	200	Unincorporated	DB	Doyon/ Ahtna, Inc
Talkeetna	894	Unincorporated	MSB	N/A
Willow	2,218	Unincorporated	MSB	CIRI/Montana Creek Native Association and Caswell Native Association
Houston	1,588	Second-class city	MSB	N/A
Big Lake	3,331	Unincorporated	MSB	N/A
Wasilla	7,245	First-class city	MSB	N/A
Anchorage	290,5788	Home Rule	Municipality of Anchorage	N/A

State of Alaska Community Database: 2009 Department of Commerce, Community and Economic Development (certified/not certified). http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.htm. Accessed 11/23/2010

Potential Effects

- Increased employment opportunities and workforce development
- Changes in community demographics
  - increase in local population numbers
  - change in population characteristics (more children or seniors=increase need for schools, health care)
- Increased demand for retail/service and housing

- Increase in seasonal residents
- Changes in employment and income levels
  - former non-cash economy communities experience influx of cash
  - unemployed now have opportunities previously out-of-town or non-existent
- Changes in the aesthetic quality of the community
  - temporary structures, pipeyards, construction yards
- Increased opportunities for local and regional business development to support construction
- Increase in opportunities to develop housing
- Pressure on regional public safety and emergency services
- Health care systems may not have capacity to handle influx of workers and families

Mitigation

Mitigation measures that can be implemented to address effects on socioeconomics include:

- Time construction activities to avoid subsistence activities where possible.
- Time construction activities to avoid high-use tourist and local recreation seasons (e.g., wildlife viewing, hunting, snowmachining, fishing, dog sledding)
- Time construction activities to prevent impacts to local business (i.e., avoid summer and fall construction for recreational and tourist areas)
- Develop and implement traffic control plans to prevent negative impacts to local businesses by blocking access during construction
- Identify and promote work opportunities for local residents
  - Prepare an Economic Opportunity Plan to describe how the project will operate to enhance locally based economic and employment opportunities for Alaska residents and businesses. Coordinate with the local village corporation, tribal government, and city government, and other groups to identify qualified individuals that are interested in working on the project.
  - Promote use of local businesses to support the project (lodging, food, services, sundries)
- Develop training programs for local residents so that they can be employed during construction and O&M
  - Coordinate with Alaska training centers and universities on workforce development and training opportunities, which may include, but are not limited to, future job fairs in the region.

8.2.15 Subsistence

Subsistence activities in Alaska are governed federally by the Alaska National Interest Lands Conservation Act (ANILCA) and by the state subsistence law. Federal and state law define subsistence as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Since 1997 the State of Alaska has taken over a dual subsistence management role and coordinates with the Federal Subsistence Management program in order to effectively manage federal and state laws. Under ANILCA only rural residents qualify for subsistence but under the State of Alaska subsistence law all state residents qualify for subsistence.

Projects that require federal permits and are determined to potentially have an effect on the human environment are required to evaluate the effects of those projects on subsistence uses and needs under

Section 810 of ANILCA. ANILCA requires the preparation of an evaluation of effects of a project on subsistence use and needs, a finding of whether subsistence uses will be significantly affected, convening of a public hearing with prior notification in the area, and a Section 810 determination. An evaluation of subsistence uses will be completed per Section 810(a) of ANILCA (16 USC Section 3120) as part of the Environmental Impact Statement (EIS) to be prepared by the USACE, as the lead federal agency.

Projects that take place in Alaska within a designated coastal district fall under the jurisdiction of the Alaska Coastal Management Program (ACMP). For each coastal district that a project enters the Coastal Management Plan for that area must be abided by. State subsistence issues may be addressed within the Coastal Management Plans that the project enters. The ASAP will be located in the Northwest (North Slope Borough) and Southcentral (Matanuska-Susitna Borough) Coastal Districts. State subsistence issues could also be addressed within the EIS scoping process that USACE is coordinating.

Table 8.2-4 lists communities (by region) that are found along the proposed ROW route(s) in which subsistence or personal use harvesting activities are most likely to occur. Subsistence resources of concern for all three regions include waterfowl, anadromous and freshwater fish, furbearers, large mammals, and vegetation.

TABLE 8.2-4 SUBSISTENCE OR PERSONAL USE COMMUNITIES BY REGION

North Slope	Interior	Southcentral
Barrow	Alatna	Talkeetna
Prudhoe Bay [a]	Allakaket	Trapper Creek
Nuiqsut	Wiseman	Willow
Anaktuvuk Pass	Coldfoot	Houston [a]
	Evansville	Big Lake [a]
	Bettles	Wasilla [a]
	Steven's Village	Palmer [a]
	Livengood	Skwentna
	Minto	Susitna
	Manley Hot Springs	Knik
	Fairbanks North Star Borough [a, b]	Municipality of Anchorage [a, c]
	Nenana	
	Tanana	
	Anderson	
	Healy Lake	
	Healy	
	McKinley Park	
	Cantwell	

a = Communities determined to be non-rural and therefore do not fall under ANILCA. (Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands in Alaska, Effective July 1, 2010-June 30, 2012)
b = Fairbanks North Star Borough includes Ester, Fox, North Pole, Eielson AFB, College, Harding Lake, Moose Creek, Pleasant Valley, Salcha, and Two Rivers
c= Municipality of Anchorage includes Eklutna

Potential Effects

Effects of ASAP on subsistence are expected to be limited to construction. Construction activities may cause short-term, localized effects on subsistence wildlife species and subsistence activities.

Mitigation

Mitigation measures that can be implemented to address effects on subsistence activities include:

- Identifying locations and times when subsistence activities occur, and avoiding work during these times and in these areas to the maximum extent practicable
- Scheduling work (e.g., blasting) to avoid conflict with subsistence activities when possible.
- Notifying workers that subsistence activities are ongoing in the area and directing them to avoid activities that may affect the activities (e.g., not removing trap line markers)
- A Wildlife Avoidance and Human Encounter/Interaction Plan will be developed and implemented for the construction and operation of ASAP to avoid impacts to subsistence species

8.2.16 BLM Projects

There are no known BLM projects in or near the proposed pipeline ROW.

8.2.17 Recreation Activities

The ASAP alignment will avoid, to the greatest extent practicable, recreation areas. It will avoid all national parks and refuge areas, including the Arctic National Wildlife Refuge, Gates of the Arctic National Park and Preserve, Yukon Flats National Wildlife Refuge, and Denali National Park and Preserve (DNP&P). The alignment will pass through Minto Flats State Game Refuge and Denali State Park, and may pass through the Willow Creek State Recreation Area and the Nancy Lake State Recreation Area.

In addition to these parks and designated recreation areas, areas along the entire route, both public and private, are used for recreation. As a general rule, tourism-related travel and destinations include DNP&P, with Anchorage and Fairbanks often being trip anchor locations.

Potential Effects

Pre-construction and construction activities (noise, traffic congestion/delays, competition for campgrounds) can cause short-term adverse effects on tourism and recreation. Some combination of barge traffic delivering pipe and other heavy construction materials to the Southcentral Alaska ports will temporarily increase traffic congestion in these communities. Distribution of construction supplies by the existing highway and railroad transportation systems may result in temporarily increased use of these systems. Construction activities adjacent to tourist and recreation facilities and areas near the Dalton and Parks Highways, as well as local road networks in the Fairbanks, Palmer, Wasilla, and Anchorage areas, will involve temporary delays of traffic.

Tourism peaks during the summer. The major seasons for recreation tend to focus on salmon fishing in the spring and early summer, with big game and waterfowl hunting in the fall. Adverse effects can be minimized by conducting pre-construction and construction activities during winter to the extent feasible. Scheduling summer pre-construction and construction activities to avoid the peak tourist and recreation seasons will greatly reduce any adverse effects.

No long-term effect on tourism or recreation is expected once construction is complete. No new public vehicular access is expected. Existing public access will be retained.

Mitigation

Mitigation measures that can be implemented to address effects on tourism and recreation use areas include:

- Retain existing public access routes and uses.
- Avoid areas with tourist-related facilities.
- Avoid areas with public recreation facilities.
- Avoid creating new public vehicular access to remote areas.
- Minimize impacts to the existing natural landscape to the extent practicable.
- Schedule pre-construction work to avoid peak periods of tourism and recreation.
- Conduct early and continuing consultation with the public, tourism, and recreation businesses.
- Provide new recreation-related opportunities when compatible with pipeline operation.
- Collocate with existing and planned transportation and utility system where practicable.

8.2.18 Wilderness

The proposed pipeline route does not cross federally-designated wilderness areas.

Potential Effects

The proposed pipeline route does not cross any designated wilderness areas, but it parallels the eastern boundary of the Gates of the Arctic National Park and Preserve. While wilderness users may have an expectation for a quiet and remote, undisturbed experience, there will be overflights from helicopters and fixed wing aircraft associated with environmental and engineering fieldwork, pipeline construction, and O&M activities. The above pipeline activities will require close coordination with the applicable local, state, and federal agencies to minimize unnecessary noise that could affect the wilderness experience.

Mitigation

Mitigation measures that can be implemented to address potential effects on wilderness include:

- Development and implementation of a communications plan for fieldwork, construction, and O&M activities.
- Coordinate location of communication towers used to support overflights with federal wilderness area land managers.

9.0 STABILIZATION AND REHABILITATION

A Stabilization, Rehabilitation, and Restoration Plan will be developed to address rehabilitation and restoration of all ground-disturbed areas associated with the pipeline construction, including the construction ROW, material sites, camp sites, temporary access roads, ice roads and pads and temporary use areas.

The Stabilization, Rehabilitation, and Restoration Plan will include specific requirements for restoration activities for each section of the pipeline prior to construction, including site preparation, monitoring, and performance standards. The Stabilization, Rehabilitation, and Restoration Plan will address the following topics:

- Soil replacement and stabilization
- Seeding
- Fertilizing
- Control of non-native invasive plants (NIPs)
- Limiting access to the ROW
- Reclaiming constructed roads

The Stabilization, Rehabilitation, and Restoration Plan identifies sensitive areas along the ROW or in temporary use areas that may require special attention such as erosion-prone areas. A range of engineering controls or maintenance measures will be identified to address the potential problem.

9.1 Soil Replacement and Stabilization

9.1.1 Ditch Backfilling

Once a large section of pipeline is ready for placement in the ditch, the soil or bedding material will be placed on the bottom of the ditch and the ditch will be prepared for the pipeline to be placed on top. The pipeline will be placed within the ditch and, the remaining portion of the ditch will be filled as described in Section 7.6.8.

During construction efforts, soil will be replaced as soon as practical after the pipeline section is laid down. This is particularly important during winter construction to reduce the introduction of snow or other precipitation into the ditch. In areas of concern (such as wetlands where the native vegetated mat was side-cast during ditch excavation) it will be placed as the top portion of trench backfill in the ditch, providing the vegetative mat can be salvaged during removal. The backfilled ditch vegetation will be monitored after construction to ensure that the vegetated mat grows in and erosion of the fill above the pipe does not occur.

9.1.2 Clean-Up

Following pipe installation, ditch backfilling, and hydrotesting (discussed in Section 10.2.1), crews will perform clean-up, including leveling of the pipeline ROW and shaping of a crown over the pipeline ditch, as required. Crews will dispose of any remaining scrap materials, timber, or other debris. Wood debris will be disposed of as identified in Section 7.4.2 and scrap materials and rubbish will be hauled to a designated, permitted landfill for disposal. Crews will be equipped with dozers, front-end loaders, and dump trucks to facilitate clearing and construction ROW clean-up.

In addition to restoration of the construction ROW, material sites, camp sites, ice roads and pads, temporary use areas and temporary access roads will be re-contoured and restored to an acceptable condition as required by applicable permits. Generally, revegetation of disturbed areas is planned for long-term stabilization.

Snow pad areas will require a summer cleanup check to verify that all construction materials have been removed from the construction ROW. Any remaining debris will be removed utilizing low-ground-pressure vehicles to minimize disturbance to surface vegetation.

9.1.3 Ditch Stabilization

Stabilization of the backfilled ditch may be a multi-year process in some areas, particularly areas with fine-grained, ice-rich soils. The pipeline ditch may intercept overland flow that may erode backfill material from the pipeline ditch and could potentially serve to channel for water into nearby waterways and wetlands. The interception of stream flow and wetland cross drainage could pose significant problems, particularly in areas of continuous and discontinuous permafrost in rolling or mountainous terrain. Rehabilitation, especially in ice-rich soils, may require extensive, repeated ditch maintenance and long-term thermal stabilization activities before the habitat can return to its former stability and productivity.

The Stabilization, Rehabilitation, and Restoration Plan will include techniques developed to address rehabilitation and restoration of all ground-disturbed areas associated with the pipeline construction, including the construction ROW, material sites, camp sites, temporary access roads, ice roads and pads and temporary use areas.

9.1.4 Erosion Control

The Stabilization, Rehabilitation, and Restoration Plan, the Erosion Control Plan, and final design plans will include BMPs and storm drainage design to control surface flow along the crowned ditch and the project. Along the construction ROW, in areas where ice roads and construction pads are not used, the construction pad will be left in place and erosion control BMPs will take into account the wider construction width not just the crowned ditch.

These plans will also address the fact that the crown will likely not remain after one or two years after the annual freeze thaw cycle results in some settlement. Temporary and permanent erosion and sediment control BMPs and drainage controls will be designed to work in concert to provide an acceptable erosion and sediment control for the project.

Erosion control measures for ditch excavations performed through stream beds and banks as identified in the Erosion Control Plan will be applied as soon as the backfill is placed into the ditch to complete pipe coverage. Specific materials to use for erosion control of the bed and banks will be determined on a case-by-case basis and identified in the construction plans for each crossing.

The project designers will develop appropriate methods to respond to local conditions based on existing terrain, geology, hydrology, slope, disturbed area, thermal regime, climate and other factors in the final design and relevant plans. Options available to direct flow from the crowned ditch line include:

- Installation of wattles at an angle and at predetermined spacing along the crowned ditch line based on slope angle to direct flow away from the ditch line
- Installation of temporary flexible piping to carry offsite and up-gradient water across the ditch line to vegetated down slope areas

- Periodic installation of flow breaks in the crowned section to transfer water from one side of the ditch line to the other for storm drainage
- Use of native fill berms to direct flow away from the crowned ditch at specified intervals based on slope
- Construction of drainage channels to direct flow from the construction area
- Installation of permanent culverts in some areas
- Development of earthen ditch blocks used to retain or direct water

9.2 Seeding Specifications

Seeding of the disturbed corridor will be conducted in consultation with the BLM and State of Alaska and adhere to ADNR's *Plant Materials Center Revegetation Manual for Alaska* (Wright, 2009). The methods and procedures outlined in the manual provide specific regional information for revegetation of disturbed areas with native plants to limit the potential for colonization by invasive species. The NIP Prevention Plan will also be consulted to limit the potential for colonization by invasive species.

Seed mixes will be developed for different geographic areas and fertilizers applied at an optimum rate per acre. Hand methods, hydro-seeding, and aerial seeding will be employed to rehabilitate surfaces as required and will be identified in the Stabilization, Rehabilitation, and Restoration Plan.

9.3 Fertilizer

Application of fertilizer will be conducted in consultation with the BLM and State of Alaska. Standard practices and planning will be followed to ensure that adequate volume, type, and quality of fertilizer are used where needed. Fertilizing ground-disturbed areas will be performed as construction progresses. Erosion control measures will be applied on top of the seed and fertilizer application. As project development proceeds, specific uses will be determined.

9.4 Control of Non-Native Invasive Plants

Procedures will be developed to control the introduction and spread of NIPs as part of pre-construction, construction, and rehabilitation and restoration activities. NIPs can be introduced and spread into an area from the use of airports (particularly at gravel airstrips), material sites, and temporary use areas such as laydown yards and camps.

Control of NIPs will also be addressed as part of restoration of cleared areas. Leaving cleared areas un-restored may present an opportunity for NIPs to establish a foothold without competition from local species.

9.5 Limiting Access to the Right-of-Way

Large boulders, berms, or fencing will be used to limit access to the project ROW.

9.6 Potential Reclaim of Constructed Roads

The need for reclamation activities of constructed roads will be mitigated largely by clearing the ROW and constructing the pipeline in winter when soils are frozen. However, a large number of temporary gravel access roads will be constructed for ASAP (Attachment 5). Land owners will be consulted about the reclamation of constructed roads during the planning phase.

10.0 OPERATION AND MAINTENANCE

Operation and maintenance of ASAP encompasses all activities after completion of construction activities, including startup, day-to-day activities necessary for the pipeline to function, and maintenance of equipment, systems, facilities, and pipe. Maintenance includes both preventative maintenance to make sure equipment and systems continue working efficiently, and corrective maintenance to fix or replace equipment and systems that are not working.

An O&M Plan will be prepared and followed in accordance with 49 CFR 192.605. The O&M Plan will provide written procedures for conducting operations and maintenance activities. Because ASAP is a transmission line, the O&M Plan will also include procedures for handling abnormal operations. The O&M Plan will be prepared before pipeline operations commence and will be updated at least once every calendar year.

The O&M Plan must include procedures to provide safety during maintenance and operations, including procedures for the following situations:

- Operating, maintaining, and repairing the pipeline in accordance with applicable requirements
- Controlling corrosion
- Maintaining construction records, maps, and operating history and making these documents available to the appropriate operating personnel
- Gathering data needed for reporting incidents in a timely and effective manner
- Starting up and shutting down any part of the pipeline in a manner designed to assure operation within the pipeline's MAOP limits plus the build-up allowed for operation of pressure-limiting and control devices
- Maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service
- Starting, operating, and shutting down gas compressor units
- Periodically reviewing the work done by operator personnel to determine the effectiveness, and adequacy of the procedures used in normal O&M and modifying the procedures when deficiencies are found
- Taking adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making emergency rescue equipment available when needed, including a breathing apparatus, and a rescue harness and line.
- Systematic and routine testing and inspection of pipe-type or bottle-type holders including:
  - Provision for detecting external corrosion before the strength of the container has been impaired
  - Periodic sampling and testing of gas in storage to determine the dew point of vapors contained in the stored gas which, if condensed, might cause internal corrosion or interfere with the safe operation of the storage plant
  - Periodic inspection and testing of pressure limiting equipment to determine that it is in safe operating condition and has adequate capacity
- Responding promptly to a report of a gas odor inside or near a building
- Implementing the applicable control-room management procedures

In addition, the O&M Plan must include safety procedures when operating design limits have been exceeded (i.e., during abnormal operations), including procedures for the following situations:

- Responding to, investigating, and correcting the cause of the following:
  - Unintended closure of valves or shutdowns
  - Increase or decrease in pressure or flow rate outside normal operating limits
  - Loss of communications
  - Operation of any safety device
  - Any other foreseeable malfunction of a component, deviation from normal operation, or personnel error, which may result in a hazard to persons or property
- Checking variations from normal operation after abnormal operation has ended to determine continued integrity and safe operation of the pipeline
- Notifying responsible operator personnel when notice of an abnormal operation is received.
- Periodically reviewing the response of operator personnel to determine the effectiveness of the procedures controlling abnormal operation and taking corrective action where deficiencies are found

O&M Facilities

Three O&M facilities are planned for the ASAP, one at the GCF in Prudhoe Bay, one in Fairbanks, and one at the Cook Inlet NGL Facility in Wasilla. Each location will include office facilities, a maintenance garage, and both warm and cold warehouse space. The Wasilla O&M facility will also house the pipeline control systems. Each O&M facility will be accessible via road and will have sufficient parking for staff, visitors, and maintenance vehicles.

10.1 New or Expanded Access for Operation and Maintenance

All major facilities will be accessible via the road. In addition, a number of roads will provide access to the ASAP operational ROW. Attachment 5 includes a list of existing and new permanent roads that will be used to access facilities or the ROW.

10.2 Inspection and Testing of Pipeline

10.2.1 Cleaning, Hydrostatic Testing, and Drying

After completion of the pipeline, it will be hydrostatically tested to ensure the pipeline has the strength necessary to meet design conditions and verify that the pipeline is leak-free. Water for hydrostatic testing will be withdrawn only from designated, permitted, surface-water sources with the capacity to supply the desired volumes without adverse affects on aquatic habitat and associated biota (particularly over-wintering fish).

Hydrostatic testing will most likely be done using untreated, heated water approximately 36°F to 38°F under most conditions. In winter, water will be freeze-protected, or compressed air will be used to test the pipe. Test water releases will be confined to designated, permitted upland locations and will be diverted to settling basins as necessary to comply with discharge permit limitations.

Plans for hydrostatic testing will be developed in accordance with all pertinent regulations and will follow BMPs. Specific information regarding hydrostatic testing will be developed by the construction contractor and operator of the pipeline. Analysis of each spread must be conducted to determine test sections. Once test sections are determined, a test manual will be prepared for use by the testing contractor to ensure the final tests meet the federal safety regulations.

10.2.2 Corrosion Control

In general, the entire pipeline will be externally coated with fusion bonded epoxy and internally coated with a two-part epoxy coating. The pipeline will be coated with an additional abrasion resistant coating for HDD crossings and where the pipeline will be placed in rocky ground or stream crossings where concrete coating is not used for buoyancy control.

A cathodic protection system has been preliminarily designed to protect the pipeline from corrosion. The cathodic protection is a partially redundant system where both sacrificial anodes in impressed current will be used. Between Prudhoe Bay and Healy, both systems will be used due to permafrost soils. Based upon the boundary of permafrost soils, beginning near Healy and continuing south, only the impressed current system will be employed.

Deep anode ground beds and gas-fired thermoelectric generators will be located at each compressor station site to protect station piping and the pipeline between stations. The GCF and NGL facilities will have separate cathodic protection systems.

10.2.3 Leak Detection and Emergency Response

A Supervisory Control and Data Acquisition (SCADA) system will be implemented to collect measurements and data along the pipeline, including flow rate through the pipeline, operational status, pressure, and temperature readings. This information may all be used to assess the status of the pipeline. The SCADA system will provide pipeline personnel with real-time information about equipment malfunctions, leaks, or any other unusual activity along the pipeline.

The pipeline operator will develop and implement an Emergency Response Plan in accordance with 49 CFR 192.615 to minimize the hazards resulting from a pipeline emergency, including a leak. The Emergency Response Plan will at a minimum include:

- Procedures for receiving, identifying, and classifying notices of events which require immediate response by the operator
- Procedures for notifying fire, police, and other public officials as necessary; establishing and maintaining adequate means of communication with appropriate officials; and coordinating responses in the event of an emergency
- Procedures for the prompt and effective response to a notice of emergency events, including gas detection inside or near a building, fire near or involving the pipeline or related facilities, explosions near or involving the pipeline or related facilities, or a natural disaster
- Availability of personnel, equipment, tools, and materials needed at the scene of an emergency
- Procedures for emergency shutdown and pressure reduction in any section of the pipeline system as necessary to minimize hazards to life or property
- Procedures for protecting life and property in the event of an emergency

10.3 Removal or Addition of Pipes and Pumps for Pipeline Maintenance

In general, removal or addition of equipment or pipe for maintenance is expected to occur at major facilities where the pipeline is aboveground. It is possible that removal or addition of equipment or pipe may take place at other locations (e.g., MLVs). All procedures for these activities will be detailed in the O&M Plan. Procedures will be developed and carried out in accordance with applicable regulation and will follow BMPs.

10.4 Right-of-Way Maintenance Schedules

In general, it is expected that limited maintenance will be required on the ROW. A schedule for maintenance will be developed in accordance with all pertinent regulations and will follow BMPs.

10.5 Safety

The ASAP will be designed, constructed, operated, and maintained in accordance the requirements of the Pipeline and Hazardous Materials Safety Administration (PHMSA) within the U.S. Department of Transportation. These requirements are included in 49 CFR Subtitle B and are intended to ensure adequate protection for the public from natural gas pipeline failures. The ASAP will meet or exceed these requirements. These requirements address:

- Pipeline safety programs and rulemaking procedures (49 CFR Part 190)
- Annual reports, incident reports, and safety-related condition reports for natural gas pipelines (49 CFR Part 191)
- Minimum federal safety standards for transportation of natural gas by pipeline (49 CFR Part 192)

An O&M Plan will be developed as discussed in Section 10.1 and a Safety Plan will be developed as discussed in Section 7.10. O&M will be performed in a manner that is protective of personal health, safety, and is protective of the environment.

Damage Prevention
A Damage Prevention Program as identified in 49 CFR 192.614 will be implemented to prevent damage from excavation activities, including excavation, blasting, boring, tunneling, backfilling, the removal of aboveground structures by either explosive or mechanical means, and other earthmoving operations. As part of the Damage Prevention Program, the pipeline operator would participate in the state one-call system for excavators to call for excavation activities (utility locates) as required by 49 CFR 192.614. Participation in the one-call system may not be necessary if access to the pipeline is physically controlled by the operator.

Public Awareness
The operator of ASAP will develop a public education program that follows the American Petroleum Institute's (API) Recommended Practice 1162. The education program will include provisions on the one-call notification system (utility locate), hazards associated with an unintended release and indications that a release has occurred, and reporting procedures and steps to be taken if a release occurs.

10.6 Industrial Wastes and Toxic Substances Near Right-of-Way

The pipeline operator will have a SPCP approved prior to operation of the pipeline. This plan will address operations and maintenance of vehicles, storage of fuels and other hazardous materials, containment requirements, liquid and solid storage and waste disposal, spill response and cleanup procedures, reporting requirements, and periodic inspection and documentation requirements. The plan will be developed in accordance with all pertinent regulations and will follow BMPs.

10.7 Inspection and Maintenance Schedule

A Continuing Pipeline Surveillance Plan for ASAP will be developed in accordance with 49 CFR 192.613. This plan will detail procedures for continuing surveillance of the pipeline and associated facilities so that appropriate action may be taken in the event of equipment failures, leakages, corrosion,

substantial changes in cathodic protection, or other unusual operating and maintenance conditions. The Continuing Pipeline Surveillance Plan will adhere to all pertinent regulations and will follow BMPs.

10.7.1 Aircraft

Aerial patrols may be used to identify any areas of concern regarding ASAP. In particular, aerial patrols can identify threats to pipeline integrity from erosion or water undermining the pipeline (after storm events, ice damming, etc.), after seismic events, and identify construction activities or unauthorized digging in the vicinity of the pipeline. Procedures for aerial patrols will be described in the Continuing Pipeline Surveillance Plan.

10.7.2 Ground Inspection

Ground inspection will be performed when aerial patrols identify any areas of concern, in the event of excavation near the pipeline (during or immediately after the activity), and on a periodic basis. Procedures and frequency of ground patrols will be described in the Continuing Pipeline Surveillance Plan.

10.8 Personnel and Work Schedules

Information about O&M personnel requirements and work schedules are based upon early planning stage man-load estimates. Additional information regarding the number of personnel to be employed for O&M will be developed as the project progresses.

Preliminary calculations for O&M estimate that 10 workers will be required in Prudhoe Bay to run and manage the GCF and the Prudhoe Bay O&M Facility; 10 workers in Fairbanks for the Fairbanks O&M Facility; and 30 workers in Wasilla for the Cook Inlet NGL Extraction Facility and the Wasilla O&M Facility. Off-site housing will be provided for GCF workers, likely at a commercial camp located within Deadhorse. Personnel located in Fairbanks and Wasilla will be responsible for providing their own housing within local communities.

Personnel requirements have not yet been determined for compressor stations and the Straddle and Off-Take Facility; they may be manned on a full-time ongoing basis or periodically in the event of emergencies or for O&M activities.

10.9 Fire Control

Fire control systems will be in place at all major facilities. More detailed information will be developed as ASAP design progresses. Fire control systems will be developed in accordance with all pertinent regulations and will follow BMPs. In the event of a fire, the Emergency Response Plan will be followed as described in Section 10.2.3.

10.10 Contingency Planning

Contingency planning will be performed on an ongoing basis to identify specific situations when things could go wrong, and develop procedures to address these scenarios. Contingency planning will focus on the most likely events, but would also consider events that have a low likelihood of occurring, but would have major impacts (e.g., terrorist attack). The objective of contingency planning is to develop mechanisms and procedures so that ASAP personnel can respond in a timely manner to an unexpected event.

11.0 TERMINATION AND RESTORATION

Upon reaching the end of the ASAP's functional life, the pipeline will be shut down. Shut-down will include removal of all product and removal or in-situ remediation of ASAP-associated equipment and facilities. Landowners will be consulted about necessary revegetation in areas where structures are removed. Specific plans for termination and restoration activities will be developed in accordance with pertinent regulations and will follow BMPs applicable at the time of shut-down.

11.1 Removal of Structures

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.2 Status of Pipe at Termination

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.3 Obliteration of Roads

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

11.4 Stabilization and Re-Vegetation of Disturbed Areas

This information will be provided by the construction contractor and operator of the pipeline. Plans will be developed in accordance with all pertinent regulations and will follow BMPs.

12.0 REFERENCES

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