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### **3.0 DESIGN BASIS AND CONSIDERATIONS**

#### **3.1 INTRODUCTION**

This section outlines some of the basic criteria under which the gas pipeline route was selected and will be instrumental in the design and construction of the gas pipeline. Certain terms and agreements between Alaska Northwest Natural Gas Transportation Company (ANNGTC) and the Department of Interior (DOI) that provided guidelines for the route selection are outlined in this section. Other general criteria utilized in the route selection are listed and were derived through negotiation with the State of Alaska and Alyeska Pipeline Service Company (APSC).

Other general guidelines are outlined that help formulate the basis for the design.

#### **3.2 AGENCIES, STATUSES REGULATIONS, CODES AND STANDARDS**

The gas pipeline will be designed and constructed in accordance with the requirements of federal and State of Alaska legislative acts, agency codes and regulations, and with industry standards and local ordinances. The current editions of codes and standards in use at the time of design criteria approval will be utilized in the design and construction unless otherwise noted. The applicable federal and State of Alaska agencies, their codes and regulations, and industry standards are listed at the beginning of each section in this Technical Information Supplement (TIS). Alyeska's document "Criteria for Re-use of the Trans Alaska Pipeline System (TAPS) Workpad, 1980," will be utilized as a minimum on TAPS workpad and on TAPS access road unless otherwise agreed upon between ANNGTC and Alyeska.

#### **3.3 RIGHT-OF-WAY (ROW)**

The facilities covered will be designed and constructed in accordance with the President's Decision and Report to Congress, Section 5.1.5, September 22, 1977; Federal Energy Regulatory Commission conditional certificate of public convenience and necessity, issued on December 16, 1977, as such is finalized; the stipulations incorporated in the "Department of Interior ROW Grant, F-24538, December 1, 1980", granted to ANNGTC; and the yet to be agreed upon State of Alaska ROW Grant. Some of the pertinent ROW siting concepts are noted below:

- The ROW will be located approximately as shown on ANNGTC's Alignment Series, an attachment to the state ROW application.
- The pipeline will be separated by 200 feet or more from facilities of TAPS, except access roads, airfields, or other facilities that are not either oil containing or civil works or structures that protect or physically support oil-containing facilities.
- Separation of less than 200 feet requested by ANNGTC may be approved at crossings of TAPS and at other locations agreed upon by the owners of TAPS and ANNGTC. At other locations where required to avoid environmental damage or terrain

constraints, requests by ANNGTC for separation of less than 200 feet may be approved, provided the following criteria have been met:

- Stability of foundation and other earth materials will be protected and maintained.
- The integrity of the pipeline will be reasonably protected and maintained.
- Significant damage to the environment (including fish and wildlife populations and their habitats) will not be caused.
- Hazards to public health and safety will not be created.
- TAPS will be reasonably protected from adverse effects of ANNGTC’s activities including the activities of its agents, employees, and contractors (including subcontractors) and their employees.
- Provided that in no case will reducing the cost of construction be the sole consideration upon which such approval is based.
- The width of the ROW is 50 feet plus the ground occupied by the pipeline; at related facilities, the ROW extends 25 feet beyond the related facilities; and the ROW includes such additional width as may be authorized as provided in the Mineral Leasing Act.

The following general criteria, in addition to the ROW requirements above, have been developed in coordination with other parties:

- Maintain a minimum of 30-foot separation between the gas pipeline and TAPS fuel gas pipeline except at crossings or unless otherwise approved.
- Locate downslope of TAPS and the Dalton Highway where practical.
- Avoid bracketing the Dalton Highway between TAPS fuel gas pipeline and the gas pipeline unless otherwise approved.
- Minimize to the extent practicable:
  - TAPS and other pipeline crossings
  - Highway and road crossings
  - Impacts on Antiquities and Cultural Resources
  - Cross drainage blockage and rechannelization
  - Construction in frost-susceptible soils
  - Cubic yard-miles for mineral material hauling
  - Socio-economic impact on communities along the corridor
  - Impact on environmentally sensitive areas
- Use existing facilities to the maximum extent feasible with appropriate accommodation for other users. The facilities considered include:
  - road bridges

- camps
- workpads
- airports
- material disposal sites
- communications
- access roads

### 3.4 ENVIRONMENTAL DATA

The Environmental Master Guide (EMG), as may be updated or amended from the original, is a functional tool that will provide the capability for rapid access to information pertinent to potential limitations on design, sensitive areas, and the timing of exploration and construction activities.

It will be utilized whenever possible to obtain and use data relating to the following areas for civil and pipeline designs:

- fisheries
- endangered species/raptors
- birds
- mammals
- vegetation and habitat types
- air quality and noise
- liquid wastes
- solid wastes
- water resources and aquatic habitat
- water quality
- oil and hazardous materials
- antiquities and cultural resources
- restoration and visual resources
- forest resources
- wetlands
- public health and safety

### 3.5 HYDROLOGIC DATA

Hydrologic data will be used as a design basis for drainage and drainage control structures for the gas pipeline and related facilities, to evaluate the impact on third party facilities and structures as well as the impacts to the environment. The following are some examples of data that have been gathered or are available to the project:

- Stream flow measurements, topographic profile, and bank and stream physiographic data.
- Historical aufeis data from annual aufeis observations as well as other sources.
- Aerial photography, especially low altitude photography, for stream and river crossings and significant reaches of particular rivers.
- Historical stage measurements of some streams and rivers.
- Flood values used for design of adjacent third party structures and facilities.
- Weather information, especially precipitation and temperature data.
- Borehole data indicating groundwater levels as well as groundwater level data from a number of standpipes along the alignment.
- For details on erosion and drainage control, bridges and river and stream crossings, see Sections 11, 14, and 16.

During the design and construction of the gas pipeline, should additional site specific data be required, it will be acquired.

### 3.6 GEOTECHNICAL DATA

Geotechnical data will be used as a design basis for terrain stability, ditch mode selection, embankment design, foundation design, workpad design, material site selection, environmental evaluation, fault crossing evaluation, general and specific geotechnical analysis for the gas pipeline as well as for evaluation of any impact on third party facilities and structures. The following are some examples of data that have been gathered or are available to the project:

- Soils, thermal state, and groundwater data from borehole logs drilled by the project and the Alaska Department of Transportation (ADOT)
- Laboratory data from index property and engineering property tests done on borehole and field samples acquired by the project and ADOT
- General and specific geological and geotechnical data from published sources (APSC, United States Geological Survey [USGS], State of Alaska, etc.)
- Aerial photography (black and white, color, infrared, etc.) from project field programs, APSC, historical government files, and government programs
- Topographic data from project field survey work, aerial photography, and published maps

- Soil resistivity data for soils along the alignment as well as site-specific areas
- Bedrock data from borehole logs, laboratory testing of samples, field reconnaissance, and published or licensed sources
- Data on lineaments and fault locations from project field programs and published maps and reports
- Terrain unit and landform data developed by the project and from published maps and reports
- General reconnaissance data from field programs such as material site reconnaissance and exploration, alignment optimization, field site descriptions, TAPS crossings reconnaissance, and highway concern evaluations
- Additional information is included in Section 21, Geotechnical

Should additional site-specific data be required during the design and construction of the gas pipeline, it will be acquired.

### 3.7 OTHER DOCUMENTS

Existing documentation listing restrictions for location, construction activities, and design considerations proximate to existing facilities will be considered in the design of the gas pipeline.

### 3.8 PIPELINE DATA

Pipe size will be 48-inch outside diameter. Initial annual average daily capacity of the pipeline will be 4,500 million standard cubic feet per day (MMSCFD). The system will be capable of being expanded, through additional compressor stations, to provide an annual average daily throughput of 5,900 MMSCFD. The pipe will be internally coated for the purpose of improving the gas flow efficiency.

### 3.9 COMPRESSOR AND METERING FACILITIES

The siting and design of the compressor stations are covered in Section 31, Compressor Stations.

Metering facilities may be installed on the pipeline at milepost (MP) 000. Custody transfer will take place at the point of metering at the Alaska Gas Conditioning Facility (AGCF) at Prudhoe Bay.

### 3.10 TAPS FACILITIES

Construction activities on TAPS workpad and access roads will be performed in such a manner as to provide notification to APSC and with the intent that TAPS ability to respond to its Oil Spill Contingency Plan (OSCP) or conduct normal operations will not be impaired without APSC's prior agreement.

Heavy wall pipe will be used at all crossings of the TAPS pipeline ROW.

Heavy wall pipe will also be used at all locations where the TAPS pipeline is aboveground and the distance between the two pipelines is less than 200 feet.

In locations where the TAPS pipeline is buried and the distance between the two pipelines is less than 200 feet, the use of heavy wall pipe, if any, will be determined on a site-specific basis. These locations will be reviewed with representatives of APSC prior to the completion of the final design. (See Section 28, Foreign Pipeline Crossings.)

The alignment requires construction over much of the TAPS Fuel Gas Pipeline (FGL) located north of the Atigun Pass. The criteria relative to the FGL is based on a general agreement between ANNGTC and APSC wherein the following FGL site conditions and improvements are assumed to be accomplished prior to the start of ANGTS workpad construction:

- The active layer and soils surrounding the FGL will be frozen at the time the gas pipeline workpad is constructed over the FGL.
- The operation of the FGL will not substantially alter the thermal conditions of the surrounding soils during the construction and operation of the gas pipeline.
- The erosion control and drainage structures are upgraded and maintained at an acceptable level prior to start of gas pipeline construction.
- Any excessive thermal degradation or hydraulic erosion be abated and maintained in an acceptable manner prior to the start of gas pipeline construction.
- Data such as the depth of the FGL, historical data on known problem areas, as-built survey, design criteria and design, and construction specifications should be made available to the project for design and construction considerations.

### 3.11 PERMANENT STATUS OR TEMPORARY STATUS

Determination of whether an element of the gas pipeline system will be considered as permanent status will be made to the extent possible prior to or during the design stage. If needed, permanent design criteria will be utilized. If the permanent status cannot be determined, temporary design criteria will be used. Should the temporary status of a structure or facility be changed to permanent, it will be upgraded according to the permanent criteria requirements prior to or during operation.

### 3.12 CONSTRUCTION SCHEDULING AND SEASONAL CONSTRAINTS

The construction schedule and design will be developed to control or prevent significant damage to the environment, to protect or maintain integrity of the pipeline system, to protect or maintain stability of foundation and other earth materials, to remove hazards to public health and safety, and to protect TAPS and other third party facilities from adverse effects caused by pipeline construction activities.

During design, construction schedules will be developed by environmental, engineering, and construction personnel who will take into consideration the seasonal constraints that apply to such (not all-inclusive) items as follows:

- Environmentally sensitive periods
- Fish passage, spawning and over-wintering areas
- Wildlife habitat
- Work in floodplains and potential impact on environment and third party facilities (for breaching of TAPS floodplain structures, see Section 16)
- Minimize construction of river and stream crossings during spring thawing of snow and break-up of streams and rivers
- Flood prone and aufeis areas
- Potential for thermal degradation of soils and effect on erosion
- Potential for thaw degradation of soils and effect on ditch wall stability
- The effect and design of grading if cuts in thaw-unstable soils are required
- Workpad thickness requirements that are based on season of construction
- Thermal aspects of design and constructing foreign pipeline crossings
- Highway access and load restrictions
- Traffic considerations for road crossing construction