Item 2 - Project Design And Capacities

18 C.F.R. §157.34(c)(2): Size and design capacity (including proposed certificate capacity at the delivery points named in (1) above to the extent that it differs from design capacity), a description of possible designs for expanded capacity beyond initial capacity, together with any estimated date when such expansions designs may be considered;

Size and Design Capacity

The proposed Project will have the size and design capacities summarized in Table 2 below.

Table 2: Proposed Size and Design Capacities

Section Of The Proposed Project	Design Parameter	Value
Point Thomson Pipeline	Pipeline diameter (inches)	32
	Pipeline grade	X65
	Pipeline length (miles)	58
	Pipeline capacity (base design – Bcf/d)	1.1
	Pipeline capacity (with max compression – Bcf/d)	1.5
	Inlet gas receipt temperature (°F)	30
	Minimum design outlet gas delivery temperature (°F)	2
GTP For The Alaska-Canada Pipeline	Processing capacity – inlet raw gas (Bcf/d)	5.3
	Processing capacity – CO_2 (Bcf/d)	0.6
	Delivery capacity – outlet sales gas to pipeline (Bcf/d)	4.5
	Inlet gas average receipt temperature (°F)	60
	Outlet gas delivery temperature (°F)	< 30
	Outlet CO_2 temperature (°F)	100+

Table 2: Proposed Size and Design Capacities (Continued)

Section Of The Proposed Project	Design Parameter	Value
GTP For The Valdez Pipeline	Processing capacity – inlet raw gas (Bcf/d)	3.6
	Processing capacity – CO_2 (Bcf/d)	0.44
	Delivery capacity – outlet sales gas to pipeline (Bcf/d)	3.0
	Inlet gas average receipt temperature (°F)	60
	Outlet gas delivery temperature (°F)	< 30
	Outlet CO_2 temperature (°F)	100+
Pipeline Segment Downstream Of The GTP - Alaska-Canada Pipeline	Pipeline diameter (inches)	48
	Pipeline grade	X80
	Pipeline length – Alaska (miles)	734
	Pipe capacity (base design – Bcf/d)	4.5
	Pipe capacity (with max compression – Bcf/d)	5.9
	Inlet gas receipt temperature (°F)	< 30
	Minimum design outlet gas delivery temperature (°F)	26
	Outlet gas delivery point capacity – Livengood (MMcf/d)	No less than the In-State Needs Study value of 9
	Outlet gas delivery point capacity – Fairbanks (MMcf/d)	No less than the In-State Needs Study value of 55
	Outlet gas delivery point capacity – Parks Highway Spur (MMcf/d)	Included in Fairbanks capacity

Table 2: Proposed Size and Design Capacities (Continued)

Section Of The Proposed Project	Design Parameter	Value
Pipeline Segment Downstream Of The GTP - Alaska-Canada Pipeline	Outlet gas delivery point capacity – Delta Junction/Richardson Highway Spur (MMcf/d)	No less than the In-State Needs Study value of 272
	Outlet gas delivery point capacity – Tok (MMcf/d)	No less than the In-State Needs Study value of 0.4
	Outlet gas delivery point capacity – Alaska-Canada Border (Bcf/d)	4.370 – 4.570 (seasonal capacity)
Pipeline Segment Downstream Of The GTP - Valdez Pipeline	Pipeline diameter (inches)	48
	Pipeline grade	X80
	Pipeline length – Alaska (miles)	803
	Pipe capacity (base design – Bcf/d)	3.0
	Pipe capacity (with max compression – Bcf/d)	As per future requirements
	Inlet gas receipt temperature (°F)	< 30
	Minimum Design outlet gas delivery temperature (°F)	26
	Outlet gas delivery point capacity - Livengood (MMcf/d)	No less than the In-State Needs Study value of 9
	Outlet gas delivery point capacity - Fairbanks (MMcf/d)	No less than the In-State Needs Study value of 55
	Outlet gas delivery point capacity - Delta Junction Area/Richardson Highway Spur (MMcf/d)	No less than the In-State Needs Study value of 1.4

Table 2: Proposed Size and Design Capacities (Continued)

Section Of The Proposed Project	Design Parameter	Value
Pipeline Segment Downstream Of The GTP - Valdez Pipeline	Outlet gas delivery point capacity – Parks Highway Spur (MMcf/d)	Included in Fairbanks capacity
	Outlet gas delivery point capacity - Glennallen (MMcf/d)	No less than the In-State Needs Study value of 270
	Outlet gas delivery point capacity – Valdez (MMcf/d)	No less than the In-State Needs Study value of 7
	Outlet gas delivery point capacity - Valdez LNG Terminal (Bcf/d)	2.775

Designs for Initial and Possible Expanded Capacity

1. The gas transmission pipeline segment between the outlet of the Point Thomson plant and the inlet of the GTP consists of a single 32-inch pipeline traversing a distance of approximately 58 miles with a base case capacity of 1.1 Bcf/d and a maximum operating pressure of 1130 psig. A system capacity of 1.5 Bcf/d could be accommodated by designing to a higher maximum operating pressure. The pipeline system will be designed to maintain flowing gas temperatures below 32°F. Maintaining these gas temperatures recognizes the presence of permafrost soils along the route and will support stable operation from a geotechnical perspective. Base case design assumes that gas will be delivered to the GTP at 670 psig.

2. The gas transmission pipeline segment between the outlet of the GTP and Boundary Lake (Alaska-Canada Pipeline and Canadian Pipeline) consists of a single 48-inch pipeline traversing a distance of approximately 1700 miles (734 miles in Alaska and 966 miles in Canada). The base capacity assumes that 4.5 Bcf/d will be received into the pipeline at the outlet of the GTP and that 0.336 Bcf/d of this throughput will be delivered at various locations within the state. For this system, 17 compressor stations will be installed on the pipeline system (6 in Alaska and 11 in Canada). With additional compression, pipeline capacity is expandable to 5.9 Bcf/d. The maximum operating pressure will be 2500 psig. From the outlet of the GTP to a location approximately 867 miles downstream, the pipeline system will be designed to maintain flowing gas temperatures at 32°F or lower. The remainder of the pipeline system to the Alberta border will be designed to generally maintain flowing gas temperatures above 32°F. Maintaining these gas temperatures recognizes the presence of permafrost soils along the route and will support stable operation from a geotechnical perspective. The delivery pressure at the Alberta border will be approximately 1225 psig.

3. The gas transmission pipeline segment from the outlet of the GTP to the LNG terminal facilities near Valdez (i.e. the Valdez Pipeline) consists of a single 48-inch pipeline traversing a distance of approximately 803 miles. Base case capacity assumes that 3.0 Bcf/d will be received into the pipeline at the outlet of the GTP and 0.342 Bcf/d will be delivered at various locations within the state. For this case, two compressor stations will be installed. Pipeline capacity is expandable with additional compression. The maximum operating pressure will be 2500 psig. From the outlet of the GTP to a location approximately 730 miles downstream, the pipeline system will be designed to maintain flowing gas temperatures at 32°F or lower. The remainder of the pipeline system to the LNG terminal will be designed to generally maintain flowing gas temperatures above 32°F. Maintaining these gas temperatures recognizes the presence of permafrost soils along the route and will support stable operation from a geotechnical perspective. The delivery pressure at the LNG terminal is designed to be approximately 900 psig.

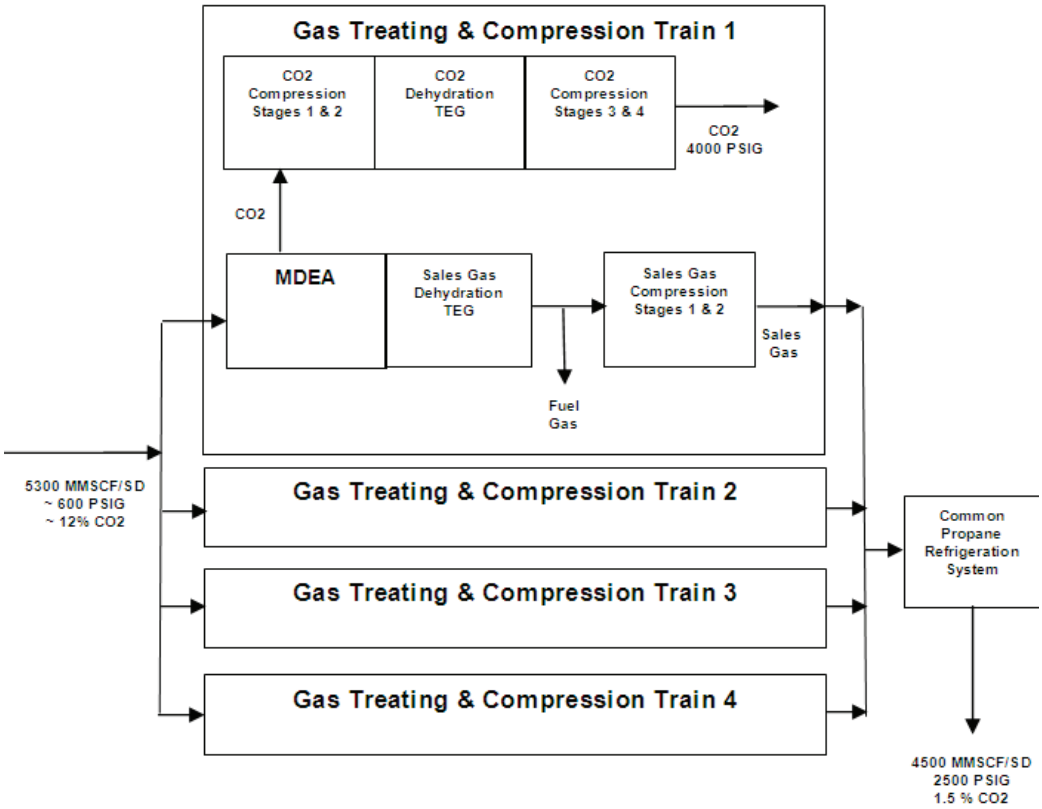
4. The GTP will be designed to handle raw gas with an inlet pressure of about 600 psi, and an average inlet temperature of 60°F, and can be expanded to treat additional gas. It will operate in conjunction with and is necessary to deliver pipeline quality gas into either the Alaska-Canada Pipeline or the Valdez Pipeline. Shippers will be required to meet the gas quality specifications in TC Alaska's FERC Gas Tariff, attached as Exhibit I to Appendix C, but will not be required to have their gas treated at the GTP. The outlet sales gas from the GTP will have a pressure and temperature of approximately 2500 psi and 30°F respectively.

    - The proposed GTP design for the Alaska-Canada Pipeline will treat approximately 5.3 Bcf/d of inlet gas, and deliver approximately 4.5 Bcf/d of pipeline quality gas with a CO_2 content between 1.5% and 2%. The GTP is expected to remove approximately 0.6 Bcf/d of acid gas and consume approximately 0.2 Bcf/d of fuel gas.

    - The GTP design for the Valdez Pipeline will treat approximately 3.6 Bcf/d of inlet gas, and deliver approximately 3.0 Bcf/d of pipeline quality gas with a CO_2 content of ≤50 ppm. The GTP is expected to remove approximately 0.44 Bcf/d of acid gas and consume approximately 0.17 Bcf/d of fuel gas.

    Figure 2 summarizes the GTP design configuration.

Figure 2: Simplified Block Flow Diagram of Gas Treating Trains



5. APP will assess the market demand for additional capacity every two years through public nonbinding solicitations or similar means. Based on the results of the current and future Open Seasons, APP will add capacity to accommodate demonstrated market needs unless such needs cannot be accomodated due to economic, engineering, design, capacity, or operational constraints, or unless the addition of capacity would adversely impact the timely development of the Project.

   APP will first make use of compression to add capacity, consistent with the requirements of AGIA. As the use of additional compression was preplanned in the initial design, such expansions will be relatively inexpensive and will be considered ahead of other options such as looping. To achieve the capacity addition, the use of more compressor stations and line heaters will be needed.

   Without expansion, the initial Alaska-Canada Pipeline and Canadian Pipeline design makes use of up to 17 compressor stations – 7 chilled and 10 unchilled. Of the 7 chilled, 6 are planned for Alaska and 1 in the Yukon, spaced roughly at equal intervals along the pipeline. The design is for Arctic service and suitable for installation on permafrost. The 10 unchilled compressor stations will be all located in Canada and also spaced at roughly equal intervals along the pipeline. One of the 10 will be a double unit station.

The initial pipeline design also includes 3 heater stations, 1 in the Yukon and 2 in British Columbia. A seasonal variation in duty at these heater stations is anticipated and the typical design uses four 20 million Btu/h line heaters.

By adding 16 intermediate compressor stations, the pipeline capability is expandable to approximately 5.9 Bcf/d. Of these 16 intermediate stations, 8 will be chilled stations - 7 in Alaska and 1 in the Yukon. The remaining 8 unchilled stations will be in Canada and 1 of these will be a two unit station.

This expanded design will therefore make use of a total of 33 stations - 15 chilled and 18 unchilled. Of the unchilled, 10 stations will require aerial coolers to control the temperature - 5 of the original stations and 5 of the incremental stations. For the 5.9 Bcf/d volume, two additional line heaters will also be required at an existing British Columbia site. As with the Alaska-Canada pipeline design, the Valdez pipeline may also make use of additional compressors and heaters for future expansion.

The GTP capacity can be expanded by approximately 0.45 Bcf/d by debottlenecking the gas treating trains. Helper motors will be required for both the sales gas and CO_2 compressors as well as for additional plant processing loads. An additional 80,000 BHP is envisioned for this expansion scenario and necessitates the addition of a fifth turbine power generator rated at about 73 MW or 100,000 BHP.

More significant GTP capacity expansion of approximately 1.125 Bcf/d is available through the addition of a gas treatment train, which would be comprised of acid gas removal, dehydration, sales gas compression and CO_2 compression equipment. The utilities and infrastructure (sales gas chilling, heat medium, flares/vents, water treatment, etc.) will also be required to be expanded in order to support the additional train. To supply the additional sales gas chilling refrigeration power load, an additional turbine power generator is anticipated to be required for this alternative also.