



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Alaska State Office
701 C Street, Box 30
Anchorage, Alaska 99513

TAGS (983)
IN REPLY REFER TO

APR 24 1987

Memorandum

To: TAGS Project Officer
From: Chief, Branch of Pipeline Monitoring
Subject: Trans-Alaska Gas System (TAGS) Compatibility Evaluation

Attached is the preliminary compatibility evaluation for the TAGS project.

With the current proposed alignment, TAGS would be within 200 feet of TAPS for about 10 miles and within 200 feet of ANGTS for about 15 miles.

The Compatibility Review Team initially determined that the TAGS project would be compatible with foreign pipelines except for four important areas of concern. These concerns are addressed in Section II. D of the attached evaluation.

Subsequently on February 23, 1987 Yukon Pacific Corporation (YPC) submitted an amended application which included additional information in response to the Bureau of Land Management and Corps of Engineers request. YPC's responses to the four areas of concern are included as Enclosure 5 to the report. The Compatibility Review Team believes an adequate response has been made to its concerns except for the Sukakpak Mountain area which will be dealt with at a later date.

Therefore, on a conceptual basis with the exception of the Sukakpak Mountain area, the proposed TAGS project would be compatible with foreign pipelines along the TAGS alignment.

Cullen H. Kohl

Enclosure:
Compatibility Evaluation

COMPATIBILITY EVALUATION
OF THE PROPOSED
TRANS-ALASKA GAS SYSTEM
WITH
FOREIGN PIPELINES

Prepared January 1987 By
The Compatibility Review Team
Established By
Bureau of Land Management
Alaska State Office
Anchorage, Alaska

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I. INTRODUCTION:

- A. Background: Yukon Pacific Corporation (YPC) filed an amended right-of-way application on December 5, 1986 for the construction of a 796 mile, 36-inch OD, 2220 psig chilled gas pipeline. The proposed pipeline begins in the Prudhoe Bay area on the North Slope of Alaska and terminates at a liquefied natural gas (LNG) plant and marine terminal complex at Anderson Bay in Port Valdez. The LNG is proposed to be exported to Pacific Rim markets.
- B. Scope: Technical considerations identified as being pertinent to pipeline compatibility are the focus of this report. No known confidential or proprietary information was used as a basis for the conclusions of this report. The conclusions are based on a review and analysis of the TAGS December 1986 Project Description submitted by Yukon Pacific Corporation to BLM. In this analysis it is recognized that the TAPS project has been constructed and the ANGTS is authorized but unconstructed. The project description used for ANGTS is Enclosure 3 as referenced by the Office of the Federal Inspector (OFI) on October 3, 1986. The pipeline is located, as shown, on Revision 4 of the ANGTS alignment sheets.
- C. Purpose: This report is being prepared to determine if the Trans-Alaska Gas System (TAGS) is compatible; in accordance with 43 CFR 2881.1-1, with foreign pipelines e.g., Trans-Alaska Pipeline System (TAPS) and Alaska Natural Gas Transportation System (ANGTS).

II. DISCUSSION:

The following definition, criteria and assumptions as established by the review team were used for the purpose of this report.

A. Definition:

Compatibility: Construction, operation, and maintenance of TAGS will not interrupt or adversely impair the operation and maintenance of foreign pipelines in any manner which is unreasonable.

B. Criteria:1. During Construction:

The construction and initial start up activities of TAGS will not cause interruption of flow in foreign pipelines.

The construction activities of TAGS will not interrupt or adversely impair the maintenance of foreign pipelines.

The stability of the foundation and earth structures of the foreign pipelines can and will be protected from damage which could be caused by construction activities of TAGS.

2. Operations and Maintenance:

The operations and maintenance activities of TAGS will not cause the interruption of the flow in foreign pipelines.

The operation and maintenance activities of TAGS will not interrupt or adversely impair the operation and maintenance of foreign pipelines.

TAGS operation and maintenance activities will be conducted in a manner which will not endanger the stability of the foundation and earth structures of the foreign pipelines.

The integrity of the TAGS pipeline will be protected and maintained so that it will not cause damage to foreign pipelines.

C. Assumptions Used for Compatibility Determination:

1. Alaska Northwest Gas Transportation System will be in place and operational as shown on ANGTS alignment sheets, Revision 4, when TAGS is constructed. When constructed ANGTS will have features as described in Enclosure 3 of this report as provided by the OFI letter of October 3, 1986, and the supplemental EIS dated September 1976.
2. TAGS is compatible with TAPS where separation between the two pipelines is 200 feet or more. (This assumption is consistent with the DOI Grant of Right-of-way for ANGTS which stipulates a separation of 200 feet or more from TAPS, a pipeline operated at elevated temperatures and ANGTS which would be operated below 32°F as is proposed for TAGS.)
3. A minimum acceptable separation between two chilled pipelines operating under Arctic conditions has not been established by technical evaluation.

- D. Compatibility Issues: The compatibility review considered the effect and consequences of the procedures and mitigation measures proposed in the Trans-Alaska Gas System Project Description within the context of the definition of compatibility, and criteria and the parameters established by the review team.

Of special concern are three of the Special Construction Areas (section 5.2.17), namely Atigun Pass, Sukakpak Mountain Area, TAPS Oil Terminal and the section dealing with Foreign Pipeline Crossings (section 5.2.8). The three special areas and section 5.2.8, as presented in the Project Description, are not considered compatible with TAPS and ANGTS.

1. Atigun Pass (Section 5.2.17.1):

The level of detail reasonably expected at this stage of the project is that which is required to make a compatibility determination on a conceptual basis.

Compatibility among TAGS, ANGTS and TAPS cannot be assured based on the narrative information and graphic configuration (Figure 5.24) presented in the project description. The TAGS project description does not accurately represent the actual proposed location of the ANGTS pipeline with respect to the existing highway cross section.

The major compatibility concerns through Atigun Pass relating to proximity are: Construction activities, i.e., blasting, heavy equipment working over an existing buried pipe and interrupting highway traffic; excavation of frozen soils around the buried pipe if necessary for repairs; and effects of frost bulb development on the highway.

While a final compatibility determination can be made only after a detailed design has been developed for the area, it is the Compatibility Team's opinion that it is possible to develop reasonable engineering solutions to construct two buried, chilled gas pipelines through Atigun Pass in a manner that would make them compatible with each other, with TAPS and with the Dalton Highway.

To assure compatibility the engineering design solution for two chilled gas pipelines through the pass must be coordinated among all parties concerned prior to construction of the first gas pipeline to be built.

2. TAPS Oil Terminal (Section 5.2.17.7):

The project description does not identify pipeline and construction work done within the Alyeska Terminal Area. Alyeska's position not to allow pipeline construction through the TAPS terminal, requires TAGS to locate a primary route around the terminal. State-of-the-art design and construction procedures do exist and could be applied to achieve access to the TAGS marine terminal complex in a manner compatible with the TAPS marine terminal.

3. Sukakpak Mountain Area (Section 5.2.17.2):

The project description identifies conditions in the Sukakpak Mountain area as basically unsuitable for construction and operation of the TAGS pipeline. Until a suitable route has been selected a compatibility determination of this portion of TAGS can not be made.

4. Foreign Pipeline Crossings (Section 5.2.8):

The typical crossing of a buried foreign pipeline by TAGS, as depicted in Figure 5.12, does not comply with compatibility criteria II. B(2) of this report. The crossing depicted in Figure 5.12 is to be revised to insure safe trafficability on foreign pipeline work pads.

III. CONCLUSION:

The TAGS stated goal is not to construct within 200 feet of TAPS or ANGTS unless physical, environmental or safety constraints indicate the need to construct closer. A 200 foot minimum separation could generally satisfy the major issues of frost bulb interaction, blasting, protecting the integrity of TAGS, TAPS and ANGTS and preclude impairment of operation and maintenance. TAGS having satisfied the deficiencies identified above is capable on a conceptual basis of achieving compatibility with foreign pipelines. At locations closer than 200 feet, specific designs will be required prior to construction to demonstrate no adverse effect to foreign pipelines will occur.



Office of the Federal Inspector

Alaska Natural Gas Transportation System

FA-1

1000 Independence Avenue, SW
Washington, DC 20585
July 9, 1987

D-0025369

Mr. Jules V. Tileston
TAGS Project Officer
Bureau of Land Management
701 C Street, Box 30
Anchorage, Alaska 99513

Dear Mr. Tileston:

At your request, my office has reviewed the Draft Environmental Impact Statement (DEIS) for the Trans-Alaska Gas System (TAGS), including the proposed revisions to which you agreed in your meetings with the Deputy Federal Inspector, Richard Berman, culminating on May 20.

The Office of the Federal Inspector's (OFI) preliminary comments dealt primarily with: (1) the need for a more comprehensive cumulative analysis of the effects of constructing both the TAGS and the ANGTS projects; and (2) the treatment of OFI's enforcement responsibilities with regard to TAGS. Our formal comments on cumulative effects have been incorporated with the Department of Energy's June 26 comments on the DEIS. However, I would like to address separately that portion of our review that entailed consideration of my enforcement responsibilities, especially with respect to compatibility of the TAGS project with the Alaska Natural Gas Transportation System (ANGTS) Right-of-Way. The recent meetings between you and my staff have clarified the treatment of those responsibilities in the TAGS Right-of-Way and the related EIS, and the following confirms my understanding of the agreements reached.

Reorganization Plan No. 1 of 1979 placed in the Federal Inspector "exclusive responsibility for enforcement of all Federal statutes relevant in any manner to pre-construction, construction, and initial operation" of ANGTS. Since in many locations TAGS would be constructed adjacent to or across the existing ANGTS Right-of-Way, it is inevitable that OFI responsibilities will involve TAGS. In order that the applicant and the public be fully informed of the framework in which construction and operation of TAGS would take place, it has been agreed the TAGS Right-of-Way and the EIS will describe clearly the Federal Inspector's role as it concerns TAGS.

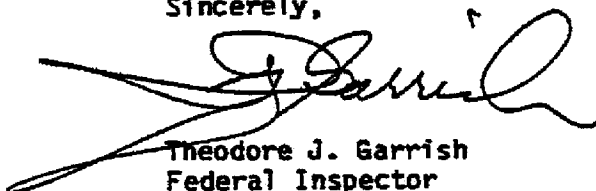
In general, the agreed-to changes clarify that the TAGS project must be constructed and operated in a manner compatible with prior right-of-ways and that the Federal Inspector will enforce Federal statutes and authorizations to the extent they are relevant to ANGTS. The revised DEIS also specifies that the Federal Inspector's primary focus will include the review approval, and enforcement of final designs and schedules for the TAGS project to assure TAGS is compatible with the construction and operation of ANGTS. Further, a copy of this letter will be included in Appendix B (Compatibility Evaluation of the Proposed Trans-Alaska Gas System With Foreign Pipelines).

My office is also reviewing the draft TAGS Right-of-Way and specific comments will be provided at a later date. My initial observations are that the TAGS Right-of-Way should acknowledge explicitly OFI enforcement responsibilities and the relationship of the authorized officer to the Federal Inspector when enforcing these responsibilities. I appreciate the desire of the Bureau for more certainty concerning the role of the Federal Inspector. To that end, I have asked Mr. Berman to work with you to identify those enforcement functions under the TAGS Right-of-Way relevant to ANGTS, and to develop a mechanism to coordinate the activities of my office and the Bureau. Your suggestion of a memorandum of understanding is a useful starting point. My objective in this effort is to ensure the Bureau and the Federal Inspector can carry out our respective roles without imposing unnecessary burdens upon the TAGS project.

Appendix B of the DEIS, which is based on the assumption that ANGTS will be in place and operational when TAGS is constructed, concludes "TAGS ... is capable on a conceptual basis of achieving compatibility with foreign pipelines" if there is a 200 foot minimum separation. I have no reason to disagree with this conclusion at this time as it relates to ANGTS in its present approved location (Revision 4 and designs currently approved by the Federal Inspector). However, if TAGS is constructed before or concurrent with ANGTS, compatibility must be evaluated in terms of the effects of TAGS on the construction of ANGTS. Appendix B recognizes compatibility is an ongoing task ("specific designs will be required prior to construction to demonstrate no adverse effect to foreign pipelines will occur"). I believe the most efficient method to enforce the ongoing compatibility of TAGS with the construction and operation of ANGTS is the inclusion of terms and conditions on compatibility in the TAGS Right-of-Way. These terms and conditions would provide the sponsors of TAGS with guidelines as to how to maintain compatibility with the ANGTS Right-of-Way. In this regard, I understand you have agreed to include in the TAGS Right-of-Way a provision setting forth the circumstances and the manner in which the Federal Inspector, in coordination with the Bureau, will enforce the compatibility of the TAGS project with the already approved ANGTS Right-of-Way where it is located on Federal lands subject to the jurisdiction of the Bureau.

Again, thank you for allowing us the opportunity to participate in your review process.

Sincerely,



Theodore J. Garrish
Federal Inspector

ENCLOSURE 1

CONTRIBUTORS:

- Edward Chacho:** Research Civil Engineer (Hydrology) Cold Regions Research and Engineering Laboratory (CRREL), Fairbanks, AK
Northern Technical Services contract with Northwest Pipeline 1980-81
CRREL, Fairbanks, AK 1981-87
- Perry Francis:** General Engineer, Bureau of Land Management, Branch of Pipeline Monitoring, Anchorage, Alaska
Authorized Officer's Field Representative (AOFR), TAPS 1981-87
- Arlan Kohl:** Bureau of Land Management, Chief, Division of Pipeline Monitoring, Anchorage, Alaska
Pipeline Staff, Washington, D.C. and Alaska 1971-79
BLM, Chief, Branch of Pipeline Monitoring 1979-87
- John Santora:** Bureau of Land Management, Ass't. District Manager for Energy and Minerals, Ukiah, California 1985-1987
Authorized Officer's Field Representative (AFOR), TAPS 1974-76
Project Manager, National Petroleum Reserve, Alaska 1976-80
Alaska Manager of Government Affairs, Northwest Alaska Pipeline Company, 1980-83
- Francis Sayles:** Research Civil Engineer (Geotechnical), Cold Regions Research and Engineering Laboratory (CRREL), Hanover, N.H.
Office of the Federal Inspector, Irvine, California 1981-1983
CRREL, Hanover, N.H. 1962-1981, 1983-1987
- Lloyd Ulrich:** General Engineer, Department of Transportation, Office of Pipeline Safety, Washington, D.C.
DOT, Drafting Gas and Liquid Pipeline Regulations 1966-68
DOT, Oversight for Design and Construction, TAPS 1971-78
DOT, Authorized Officer to OFI, ANGTS 1980-87

ENCLOSURE 2

Chronology of Compatibility Review Team Activities:

<u>Date</u>	<u>Location</u>	<u>Purpose and Attendees</u>
10-27-86	Yukon Pacific Corp	Compatibility Review Process Briefing YPC: Noah, Webb, Metz Gov't: Kohl, Francis,
10-28-86	Federal Building DSD Minerals Office	Compatibility Review Process Briefing APSC: Moses and Legg Gov't: Kohl, Francis,
10-31-86	Alyeska Pipeline Co.	Compatibility Review Process Briefing APSC: Brelsford, Harle and Prendeville Gov't: Kohl and Francis
11-5-86	Federal Building FAA Bid Room	Compatibility Review Process Briefing OFI: Berman, Black, Ellis and Kari Other Gov't: Tileston, Kohl, Francis, Santora, Ulrich and Sayles
11-5-86	Yukon Pacific Corp.	TAGS Project Briefing YPC: Noah, Webb, Metz, Lowenfells OFI: Berman, Black, Ellis and Kari Other Gov't: Tileston, Kohl, Francis, Santora, Ulrich and Sayles
11-6-86	Federal Building E-278	Receive Draft Project Description Various Federal, State and Private Agencies
1-5-87	Alyeska Pipeline Co.	Review of Compatibility Comments APSC: Brelsford, Harle, Prendeville, Hilliker and Johnson Gov't: Tileston, Kohl and Francis
1-6-87	Federal Building Arctic Room	Review of Compatibility Comments OFI: Kari and Ellis NWA: Moses, Moles, and Legg Other Gov't: Tileston, Kohl, Francis, Santora, Sayles, Ulrich, and Chacho
1-7-87	Yukon Pacific Corp	Review Project Description YPC: Noah, Webb, and Metz Gov't: Tileston, Kohl, Francis, Santora, Ulrich, Sayles and Chacho

ENCLOSURE 3

United States of America
Before the
Federal Energy Regulatory Commission

Docket No. CP80-

APPLICATION
FEDERAL REGISTER NOTICE
OVERALL TABLE OF CONTENTS
Exhibits A Through J Inclusive
Exhibits L Through P Inclusive

Volume I

Application of
ALASKAN NORTHWEST NATURAL GAS TRANSPORTATION COMPANY

For a Final Certificate of Public Convenience and Necessity
Pursuant to Section 7 (C) of the Natural Gas Act, as
amended, and Section 9 of the Alaska Natural Gas
Transportation Act of 1976 to construct and
operate the Alaska Segment of the Alaska
Natural Gas Transportation System.

July 1, 1980

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION OF
ALASKAN NORTHWEST NATURAL GAS TRANSPORTATION COMPANY
AT DOCKET NO. CP80-
FOR A FINAL CERTIFICATE OF PUBLIC CONVENIENCE
AND NECESSITY AUTHORIZING THE CONSTRUCTION
AND OPERATION OF THE ALASKA SEGMENT OF THE
ALASKA NATURAL GAS TRANSPORTATION SYSTEM

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

ALASKAN NORTHWEST NATURAL GAS
TRANSPORTATION COMPANY

DOCKET NO. CP80-

APPLICATION OF ALASKAN NORTHWEST NATURAL GAS
TRANSPORTATION COMPANY FOR A FINAL CERTIFICATE
OF PUBLIC CONVENIENCE AND NECESSITY AUTHORIZING
THE CONSTRUCTION AND OPERATION OF THE ALASKA
SEGMENT OF THE ALASKA NATURAL GAS TRANSPORTATION
SYSTEM

Alaskan Northwest Natural Gas Transportation Company ("Applicant" or "Alaskan Northwest") hereby submits its application for a final unconditional certificate of public convenience and necessity authorizing construction and operation of the Alaska segment of the Alaska Natural Gas Transportation System (ANGTS), pursuant to Section 7(c) of the Natural Gas Act, 15 U.S.C. §717f(c), Section 9 of the Alaska Natural Gas Transportation Act of 1976 (ANGTA), 15 U.S.C. §719g, and Part 157 of the Commission's Regulations. This application supplements that previously filed by Alcan Pipeline Company 1/ in Docket Nos. CP76-433 and RM77-6.

1/ Effective January 1, 1978, the name Alcan Pipeline Company was changed to Northwest Alaskan Pipeline Company.

Specifically, Alaskan Northwest proposes to construct and operate a 48-inch diameter natural gas pipeline, with a maximum operating pressure of 1260 psig, and related facilities, including seven compressor and two meter stations, extending approximately 743 miles from the Prudhoe Bay area of Alaska to a point of interconnection with the facilities of Foothills Pipe Lines (Yukon) Ltd. on the Alaska-Yukon border. Alaskan Northwest proposes to initially transport through these facilities up to an average daily volume of 2.0 Bcf of natural gas.

Alaskan Northwest is a partnership organized and existing under the laws of the State of New York. Participants in the partnership are all affiliates of major natural gas transmission companies. 2/ These companies represent a major segment of the natural gas industry in the United States and supply gas ultimately consumed in 39 states and the District of Columbia. In 1979, these companies, through their affiliates, sold in excess of 25 percent of all natural gas sold in the United States.

Northwest Alaskan Pipeline Company ("Northwest Alaskan") has been selected by the Alaskan Northwest partnership to be its operating partner. Northwest Alaskan is authorized to do business in the States of Alaska, Utah, Montana, California, Idaho and in the District of Columbia. Northwest Alaskan's principal place of business is 136 East South Temple, P.O. Box 1526, Salt Lake City, Utah 84110.

2/ Members of the partnership include Northwest Alaskan Pipeline Company - an affiliate of Northwest Pipeline Corporation and a subsidiary of Northwest Energy Company; American Natural Alaskan Company - an affiliate of Michigan-Wisconsin Pipe Line Company and a subsidiary of American Natural Resources, Inc.; Calaska Energy Company - an affiliate of Pacific Gas Transmission Company and a subsidiary of Pacific Gas and Electric Company; Northern Arctic Gas Company - an affiliate of Northern Natural Gas Company and a subsidiary of InterNorth, Inc.; Pacific Interstate Transmission Company (Arctic), an affiliate of Pacific Interstate Transmission Company and a subsidiary of Pacific Lighting Corporation; Pan Alaskan Gas Company - an affiliate of Panhandle Eastern Pipe Line Company; and United Alaska Fuels Corporation - a subsidiary of United Gas Pipe Line Company.

The names, titles, and mailing addresses of the persons to whom all correspondence and communications concerning this application should be addressed are as follows:

For Alaskan Northwest Natural Gas Transportation Company:

John G. McMillian
Chairman of the Board
of Partners
Alaskan Northwest Natural
Gas Transportation Company
P. O. Box 1526
Salt Lake City, Utah 84110

Rush Moody, Jr.*
Akin, Gump, Hauer & Feld
1333 New Hampshire Ave., N. W.
Suite 400
Washington, D.C. 20036

David K. Watkins*
Watkins & Campbell
310 N. Main Street, Suite 1200
Salt Lake City Utah 84110

For Northwest Alaskan

Darrell B. MacKay*
Vice President, Regulatory
and Governmental Affairs
Northwest Alaskan
Pipeline Company
1801 K Street, N.W., Suite 901
Washington, D.C. 20006

Cuba Wadlington, Jr.*
Director, Regulatory Affairs
Northwest Alaskan
Pipeline Company
1801 K Street, N.W., Suite 901
Washington, D.C. 20006

* Designated to receive service under Section 1.17(c) of the Commission's Regulations.

I. APPROVALS REQUIRED FOR FINAL CERTIFICATION

On September 22, 1977 the President, pursuant to Section 7 of ANTA, 15 U.S.C. §719a, issued his Decision and Report on the Alaska Natural Gas Transportation System in which he selected the Alcan proposal as the ANTS. ^{3/} This decision followed the discovery in 1968 of the largest accumulation of natural gas reserves in the United States at Prudhoe Bay, Alaska; the filing of competitive applications with the Federal Power Commission pursuant to Section 7 of the Natural Gas Act for authority to transport these reserves to the lower 48 states; the passage of ANTA by Congress; two years of formal evidentiary hearings before the Federal Power Commission; the formal recommendation to the President by that Commission; comments to the President by all interested governmental agencies and departments on such recommendation; and, execution of the Agreement on Principles between the United States and Canada.

On December 16, 1977, the Federal Energy Regulatory Commission issued to the ANTS Sponsors certificates of public convenience and necessity authorizing the construction and operation of the ANTS, conditioned upon satisfaction of the relevant terms and conditions contained in the President's Decision and Report and resolution of related matters including variable rate of return provisions, system design and pipe selection, capital cost estimates, and tariffs.

In the subsequent two and one-half years since issuance by the Commission of conditional certificates, there have been many delays in the ANTS, largely outside the control of the Applicant. During this time, however, the governments of both Canada and the United States have established a structure under which the ANTS can now be successfully completed. Also, numerous regulatory approvals required for construction and operation of the ANTS have now been obtained, including: approval of the Alaskan Northwest partnership agreement; approval of the Alaskan Northwest tariff; establishment of the incentive rate of return (IROR) mechanism; establishment of the Alaska segment design specifications; approval of pre-building of a portion of the southern Canada and lower 48 state portions of the ANTS; and the establishment of technical and environmental stipulations for construction of the system. In addition, the Office of the Federal Inspector has been established pursuant to Reorganization Plan No. 1.

^{3/} The President's Decision was ratified by a Joint Resolution of Congress on November 2, 1977. (H.R.J. Res. 621, Pub. Law No. 95-108, 91 Stat. 1268).

This application requests approval of the following three matters yet to be resolved, which require the submission of further information by the Applicant prior to issuance of a final unconditional certificate of public convenience and necessity: (1) approval of the remaining parameters necessary to implement the incentive rate of return mechanism - specifically, the Certification Cost Estimate (CCE) and the Center Point; (2) approval of Applicant's plan for the private financing of the Alaska segment of the ANGTs; and, (3) a determination that the Project costs are not unreasonably different from those considered as part of the President's Decision and Report and, therefore, that the Project continues to be in the national and public interest. 4/

By this Application Alaskan Northwest further requests (1) that the labor index or indices used to deflate actual project labor costs be those explicitly defined in the terms and conditions of the Project Labor Agreement; and, (2) that the CCE be adjusted to reflect the actual third-party monitoring and other government-related costs in establishing the Cost Performance Ratio.

Finally, Applicant requests the Commission to separately docket this Application and establish a new restricted service list. Applicant asks that a new restricted service list be compiled because of the burden and expense of serving the voluminous materials associated with this filing upon the hundreds of parties in Docket No. CP78-123 et al., who have not actively participated in these proceedings.

4/ The Applicant is filing concurrently herewith an application for a Presidential Permit, pursuant to Executive Order 10485, authorizing the construction, connection, operation, and maintenance of facilities on the International Boundary between Canada and the United States. In addition, the following matters will require Commission action prior to construction of the Alaska segment: establishment of the carbon dioxide content of the gas to be transported; and final resolution of Commission Order No. 45, which found that the construction and operation of the Prudhoe Bay gas processing facilities remain the responsibility of the Alaska North Slope producers. Finally, the following matters related to the construction and operation of the Alaska segment will be the subject of future filings: approval of shipper tariffs; approval of downstream transportation and exchange agreements; any necessary approvals to export and import Alaskan gas; and certification of the remaining portions of the ANGTs Eastern and Western Legs not previously certificated in the pre-build proceedings.

Applicant recognizes that the Commission can take no action at this time concerning approval of a plan for the private financing of the Alaska segment and the comparison of the 1977 and 1980 capital cost estimates. The financing plan cannot be submitted at this time because Applicant recently entered into both a Cooperative Agreement and a Joint Statement of Intention with the principal North Slope producers - Exxon Corporation, Atlantic Richfield Company, and Sohio Alaska Petroleum Company. The Cooperative Agreement provides for a joint sharing of the costs of finalizing the engineering and design of both the ANGTs Alaska segment and the Prudhoe Bay gas processing facilities. The Joint Statement of Intention defines the process to develop a financing plan for the Alaska segment, including significant producer participation. Execution of these agreements will facilitate completion of the final financing arrangements necessary for construction and operation of the Alaska segment.

Additionally, as part of its financial exhibits, Alaskan Northwest will submit pro forma statements of operating revenues, expenses, and income for the first five years of operation at full capacity, the projected cost of service for the Alaska segment, and an analysis of the marketability of Alaskan gas during the life of the project. Thus, the Commission determination that the ANGTs continues to be in the national and public interest, and therefore should be finally certificated, cannot be made until the above-described material has been submitted for review and approval. Accordingly, the Commission must defer its comparison of the 1977 and 1980 cost estimates pending review of such materials. Nonetheless, Applicant believes that the magnitude of the data in the instant filing, and the mandate of Section 9 of ANGTA requiring issuance of all ANGTs approvals as soon as practicable, requires submission of its CCE and Center Point request at this time. This will facilitate their timely consideration while Applicant simultaneously finalizes and submits its financing plan and related materials for later Commission review and approval.

II. THE CERTIFICATION COST ESTIMATE AND CENTER POINT REQUEST

The Certification Cost Estimate and risk analyses which support the Center Point requested are submitted herewith as Exhibits K and Z-7.

To aid in the understanding of the CCE and the Center Point request, and to ensure the expeditious approvals of both, Applicant is also submitting, as exhibits herewith, the location and description of the facilities to be constructed; flow diagrams;

alignment sheets; design criteria; and an environmental engineering manual. 5/

The following are brief summaries of these latter exhibits, which are introductory to the more detailed description of the exhibits containing the CCE and the Center Point risk analyses.

A. Location and Description of Facilities To Be Constructed

1. Pipeline

The Alaska segment of the ANOTS will commence at the discharge side of the gas plant facilities in the Prudhoe Bay field. 6/ The processing facilities will receive the gas from the production fields and treat and compress it to a delivery pressure of 1260 psig with a temperature of approximately 25° to 30° F. The gas to be transported will be provided to the pipeline from the gas plant with a gross heating value of 1100 Btu/SCF.

The pipeline itself will have a 48-inch outside diameter, and a pipe wall thickness which will vary from 0.600 to 0.864 inches, depending upon location. Internal pipe coating and a thin film external pipe coating will be applied to all sections of the pipeline as needed. With the exception of three aerial crossings, the pipe will be installed in the buried mode at depths of from 5 to 16 feet. The pipeline operating temperature of the gas will be between 0° F and +32° F under normal conditions.

The pipeline has been designed to minimize the effects of frost heave through insulation of the pipe, overexcavation, and/or rerouting to avoid soil problems. Such additional initial capital costs will reduce operation and maintenance costs over the Project life.

5/ On certain exhibits - G, G-1, K and Z-6 - there appears a statement that the information contained therein is deemed by Applicant to be confidential and/or proprietary. Applicant hereby waives confidentiality but preserves its proprietary rights to such information.

Additionally, while certain other materials may require review and/or approval by the Office of the Federal Inspector pursuant to the President's Decision and Report, they are submitted herewith for informational purposes and as background to the CCE and Center Point requests.

6/ These facilities will include unit processes for carbon dioxide and water removal; natural gas liquids extraction, separation, and selective blending; and sales gas compression and refrigeration. The plant design and construction, as well as the operation plans and engineering and economic estimates proposed in the R.M. Parsons studies, and submitted by Atlantic Richfield Company for Commission review in Docket No. RM79-19, are adopted by reference for purposes of this application.

The pipeline will parallel the Trans Alaska Pipeline System (TAPS) in a southerly direction to Milepost 274 near Prospect Creek, Alaska. The pipeline will then follow TAPS in a southeasterly direction to Milepost 535 at Delta Junction. At this point the pipeline will diverge from the TAPS route, continuing in a southeasterly direction to the Alaska-Yukon border at approximately Milepost 749, where it will interconnect with the Canadian segment of the ANOTS. The specific pipeline route utilizes existing transportation corridors and maximizes use of existing facilities such as workpads, access roads, and material and disposal sites. The route avoids, to the greatest extent possible, TAPS and other pipeline crossings, highway crossings, frost-susceptible areas, and other sensitive areas, to minimize adverse impacts to the environment and on the socioeconomic structure adjacent to the route.

The pipeline will cross 24 major streams requiring special construction considerations, such as heavy-wall pipe, continuous concrete coating, or set-on concrete weights. At three major streams, aerial crossings will be utilized. Additionally, there will be 38 uncased road crossings, 35 road crossings with 56-inch casings, and ten road crossings with 66-inch casings. Furthermore, the pipeline will cross TAPS at 23 locations and the TAPS fuel gas line at ten locations.

Section 13(b) of ANOTA, 15 U.S.C. §719k(b), provides that the State of Alaska may transport its royalty gas in the ANOTS and withdraw such gas within Alaska. Both the Applicant and the Office of Pipeline Coordinator, State of Alaska, have made analyses of the existing, potential, and projected gas markets within the State and the alternate fuel availability in these markets. Based upon these studies the Applicant has concluded that six intermediate gas taps should initially be provided in the State of Alaska. 7/

Exhibits F, F-I, F-II, F-III, F-IV, and G describe in greater detail the location of facilities, the rights-of-way, flow diagrams, and flow rates. Exhibit Z-6 contains the alignment sheets. Exhibits Z-9.0 and Z-9.1 set forth in greater detail the pipeline and civil design.

2. Compressor and Meter Stations

To provide the initial design flow rate capacity of 2.0 Bcfd, seven compressor stations will be required, each rated at 26,500

7/ While these market areas demonstrate the highest probability of future need for gas deliveries, the Applicant will consider adding additional points to the extent other points can be justified. When there is a specific proposal for gas service, Applicant will then file for the additional authorizations necessary to provide deliveries, including authorizations for any additional facilities required.

horsepower. 9/ Two refrigeration units will be installed at each compressor station to maintain the pipeline gas temperature within the temperature range of 0° to 32° F. Gas heaters will be installed at Compressor Stations No. 2 and No. 4 to assure that gas temperatures will be maintained above the hydrocarbon dew point of the mixture under all operating conditions. Each compressor station will include buildings for the compressors, refrigeration equipment, utilities, flammable liquids storage, gas scrubber units, pumps, and living quarters.

Two metering stations will be provided, one to measure the quantity of gas supplied to the pipeline from the Prudhoe Bay gas processing facilities, and the other to measure the gas delivered to the Canadian segment at the Alaska-Yukon border.

Exhibit Z-9.2 sets out in greater detail the compressor and meter stations design.

3. Other Facilities

In addition to the pipeline and the compressor and meter stations, there will be a supervisory control system, a communications system, operation and maintenance facilities, and temporary facilities. The supervisory control system will operate the pipeline, perform related system balancing, and coordinate functions with the gas processing plant and the Canadian segment. The supervisory control system master station will be located in Fairbanks at the Operations Control Center. This center will include the dispatcher console, which will provide the monitoring and control equipment necessary for centralized operation of the Alaska segment of the Project. Backup control facilities will be provided at Compressor Station No. 11.

A communications system will be installed to support the supervisory control system, and will include voice and data transmission systems, a mobile radio system, and a records communications system. The data communications system will intertie with all other pipeline segments of the ANOTS, both in Canada and the United States.

Operation and maintenance facilities will be located at four sites along the pipeline and will include warehouses for storing project spare parts, as well as garages, maintenance shops, offices, and living quarters.

Temporary facilities will include those facilities required to support the construction phase activities, including seventeen pipeline construction camps with approximately 15,000 beds, seven

8/ With the future installation of nine additional stations the segment flow rate capacity could be expanded to 3.2 Bcfd in the future.

compressor station construction camps with approximately 1,800 beds, 12 airfields, access roads, approximately 300 material and disposal sites, and a pipe yard to receive mainline pipe for the coating, welding, and insulating of such pipe.

Exhibits Z-9.3, Z-9.4 and Z-9.5 describe in greater detail the supervisory control system, the communications system, operations and maintenance facilities, and the temporary facilities.

4. Environmental Safeguards

Applicant has carried out an extensive planning program on means to minimize the potentially adverse environmental consequences of construction, resulting in the development of an environmental engineering manual. This has been developed by examination of potential environmental problems that could be encountered during all phases of construction on all facilities to be constructed, including temporary facilities. Applicant will define the mitigative measures that must be taken by all contractors regarding protection of all species of fish, wildlife, and vegetation affected by construction.

Additionally, air and water quality plans, liquid and solid waste discharge plans, noise mitigation plans, hazardous substance plans, pesticides, herbicides and chemical plans, and petroleum hauling and spill plans will be developed. To insure that these plans are followed, specific environmental control standards will be incorporated into the contracts with all execution contractors.

The environmental engineering manual is in Exhibit Z-1.1.

5. Certification Cost Estimate

The Certification Cost Estimate for the Alaska segment was prepared in accordance with the President's Decision and Report, the directions of the Commission in Conditions Nos. 7 and 8 of Order No. 31, the Certification Cost Estimate format criteria developed by the Alaskan Delegate, 9/ and Section 157.14(a)(13) of the Commission's regulations, 18 C.F.R. §157.14(a)(13).

Under Finance Condition No. 2 of the President's Decision and Report, the CCE filing must allow a comparison of the 1980 estimate with the estimate filed by Alcan in March 1977. In order to allow this comparison, the Certification Cost Estimate filing format criteria developed by the Alaskan Delegate requires the recasting of the March 1977 estimate into the same format and the same base year dollars as the CCE. Alaskan Northwest's certification cost filing fully complies with these requirements.

9/ Alaskan Delegate's Report on Cost Estimate Formats noticed August 6, 1979 in Docket Nos. CP78-123 at al.

The CCE is submitted in January 1980 dollars. The estimate is a complete estimate for the purposes of obtaining a final certificate of public convenience and necessity from the Commission and of serving as the basis for the incentive rate of return determinations. Alaskan Northwest believes that this is the most accurate estimate that could be prepared for submittal with this application. However, as contemplated by the President's Decision and Report, this estimate will not be the final cost estimate. The engineering, design, and alignment of the Alaska pipeline were "frozen" as of April 30, 1980 in order to prepare this certification cost filing in accordance with a procedural timetable which will allow the issuance of a final certificate to Alaskan Northwest by early 1981. Further design and engineering will take place between April 30, 1980 and the time that Alaskan Northwest presents its final design cost estimate and construction schedule to the Federal Inspector (i.e., prior to the commencement of construction), in accordance with Condition No. 1-5 of the President's Decision and Report. Any changes in the cost estimate resulting from design changes after April 30, 1980 will be submitted to the Federal Inspector pursuant to the President's Decision and Report and Condition No. 9 of Order No. 31.

The cost estimates submitted herewith reflect costs associated with numerous changes in the design of the facilities that have taken place since the President's Decision and Report, resulting from increased government requirements, the delays in scheduling that have occurred since such Decision, which have been largely outside the control of Applicant, the organizational changes that have been made as a result of that Decision and Reorganization Plan No. 1, and other factors enumerated in Exhibit K.

The Certification Cost Estimate submitted herewith was prepared and premised on the following assumptions: (1) all governmental approvals are obtained in the time frame included in the major milestones schedule; (2) the final design is acceptable for Notice to Proceed applications and construction bid inquiries; (3) market conditions at the time of placement of major purchase orders are generally the same as assumed in the CCE; (4) an adequate supply of a competent and trained work force will be available; (5) competitive fixed unit-rate bids can be obtained; (6) an adequate supply of contractor-owned construction equipment will be available to minimize the effects of competition between contractors in obtaining such equipment; (7) a Project Labor Agreement ^{10/} can be executed which contains the same terms and conditions regarding work rules, justification, and rates of

^{10/} The Project Labor Agreement is expected to apply to all of the various labor unions whose members work on the Project.

pay currently in effect in Alaska, with escalation to be held within the current Presidential wage guidelines; and (8) a construction work schedule of 10 hours per day, 7 days per week will be in effect.

The CCE for the total Alaska segment is \$7.9 billion. This includes \$4.1 billion for pipeline and civil work, \$887 million for temporary facilities and services, \$693 million for compressor and metering stations, \$97 million for communications and supervisory systems, \$53 million for operation and maintenance facilities, \$1.2 billion for project directorate, including Project Management Contractor (PMC) costs, and \$846 million for the normal contingency allowance. ^{11/} These costs are in January 1980 dollars and exclude any finance charge or an allowance for funds used during construction.

C. Center Point Justification

In Order Nos. 31 and 31-B the Commission provided that the ANOTS Sponsors could use either a formula approach for establishing the appropriate Center Point, or could request a Center Point without reference to the formula "...if a major change had occurred in the project which would result in a total estimated cost for the project, including likely overruns, that exceeded the estimates in the [President's] Decision." Order No. 31-B at 4. In Order No. 31-B the Commission further provided that "[t]he exhibit dealing with the Center Point should assess the likelihood of abnormal events that could increase costs which are not covered under the Change in Scope mechanism and the impact on costs that these events would have. This information will be used to set a Center Point that compensates for the possibility of abnormal events increasing costs." Order No. 31-B at 8.

Because of both the design changes and schedule delays that have taken place since issuance of the President's Decision, the Applicant has chosen to request a Center Point without reference to the CCE. The Center Point requested, 1.292, is based upon risk analyses of abnormal or unlikely events that could affect Project costs, and events examined in such analyses specifically do not include those contemplated by either the change in scope or design change mechanisms.

^{11/} This normal contingency allowance represents the expected value of the distribution of Project costs resulting from in-scope estimating uncertainties associated with the base cost estimates. In-scope estimating uncertainty is defined as the variation in Project costs and schedules resulting from: accuracy of material quantities estimates; human productivity assumptions; equipment reliability assumptions; engineering/design development; accuracy of scheduled durations; and accuracy of bid specifications based on current Project definitions.

To develop the cost impact of abnormal events, Applicant first defined over 100 possible events, each of which was assigned to one of the three Order No. 31-B categories: abnormal events, design changes, and scope changes. Applicant then defined the occurrence probability for each event classified as abnormal, the range of cost impact, and the schedule impact.

Three values were established for each cost: the most likely value; the value representing a 10 percent probability that costs will be less than the value; and the value representing a 10 percent probability that costs will be greater than the value. A similar range of schedule delays was developed for those events that could affect Project schedule. From these analyses a range of cost impacts was determined which formed the basis for the selection of the Center Point requested.

Applicant also has prepared a list of those events which will qualify as either a design change or change in scope and which were specifically excluded from the abnormal events examined in the Center Point risk analyses. ^{12/}

III. OTHER IROR MATTERS

In addition to the uncertainties associated with the CCE and the Center Point, Applicant has identified two other issues that affect the IROR procedure: the appropriate labor cost indices used to deflate actual Project labor costs; and the treatment of third-party monitoring and other government-related costs.

A. Labor Indices

In Order No. 31 the Commission stated that the actual capital cost (the sum of direct construction costs actually incurred in constructing the pipeline) should be adjusted to eliminate the effects of general inflation prior to calculating the Cost Performance Ratio and the IROR. ^{13/} For this purpose, the Commission provided an inflation adjustment mechanism to deflate direct construction costs (excluding interest during construction) to base-year prices for comparison with the CCE.

^{12/} This list is found at Exhibit 2-7, Section 5.0.

^{13/} Order No. 31 at 111.

Applicant, in accordance with the Commission's invitation in Order No. 31-B, ^{14/} proposes that the proper labor cost index component to the composite index for the inflation adjustment mechanism should be that index or indices which are explicitly defined in the terms and conditions of the Project Labor Agreement. The adoption of a labor index or set of indices by Applicant prior to negotiating actual wage rates and escalation clauses in the terms and conditions of the Project Labor Agreement will severely limit Applicant's ability to reduce costs. Such predetermined indices will establish an artificial floor for wage rate discussions and thus constrain its negotiating position. This will undoubtedly result in higher Project labor costs than if the labor indices were not predetermined.

B. Third Party Monitoring Costs

Under the terms of the Mineral Leasing Act and certain other federal and state statutes, Applicant is obligated to reimburse federal and state agencies for certain categories of expenditures involving the Project. In preparing the CCE, Applicant requested and received an estimate of reimbursable costs that would be incurred by various federal and state agencies. Applicant has not made an independent evaluation of the validity of these estimates. For submission purposes, these costs have been included in the CCE. However, Applicant proposes that the CCE be adjusted to equal the actual capital costs for third-party monitoring and other government-related costs for the determination of the Cost Performance Ratio. Applicant should not be required to accept a Cost Performance Ratio based in part on cost estimates or the subsequent actual costs that were not prepared under its supervision or control. ^{15/}

^{14/} In Order No. 31-B the Commission stated as follows:

In order to allow the sponsors to more fully develop detailed proposals for the labor cost portion of the composite index within the general framework established in Order No. 31, and for the Commission to review these proposals, the Commission will reserve a final decision on the exact specifications of the labor component of the composite index until the sponsors have filed their Certification Cost and Schedule Estimates. With the filing of the Certification Estimates, the Commission expects the sponsors to specify in detail the quarterly or annual cost categories for labor and the measure of labor wage rates for each cost category that they propose. After reviewing the specific proposals submitted by the sponsors concerning labor cost indices, the Commission will approve or modify these proposals in conjunction with its consideration of the Certification Estimates.

Order No. 31-B at 30.

^{15/} Examples of the costs included are a \$50,000,000 Community Impact Contingency Fund, training expenses to upgrade the skills of local welders, and \$22,000,000 to construct a jail and expand a hospital wing.

CONCLUSION

Wherefore, for all the foregoing reasons, Applicant, Alaskan Northwest Natural Gas Transportation Company, a partnership constituted as shown herein, respectfully requests the Commission to: (1) expeditiously review and approve the Certification Cost Estimate, as submitted herein, and a Center Point of 1.292; (2) permit the use of the index or indices in the Project Labor Agreement for deflation of direct construction labor costs; (3) provide for adjustment of the CCE to reflect actual third-party monitoring and other government-related costs in computing the Cost Performance Ratio; (4) defer its comparison of the 1977 and 1980 cost estimates pending submission of Applicant's financing plan and related materials; and, (5) issue to Applicant a final unconditional certificate of public convenience and necessity after review and approval of Applicant's financing plan.

Respectfully submitted,

Alaskan Northwest Natural Gas
Transportation Company

/s/ John G. McMillian

JOHN G. McMILLIAN
Chairman of the Board of Partners

Dated at Washington D.C.
This 30th day of June, 1980

Docket No. CP80-
Exhibit F
Hearing Exhibit No.

EXHIBIT F
LOCATION OF FACILITIES

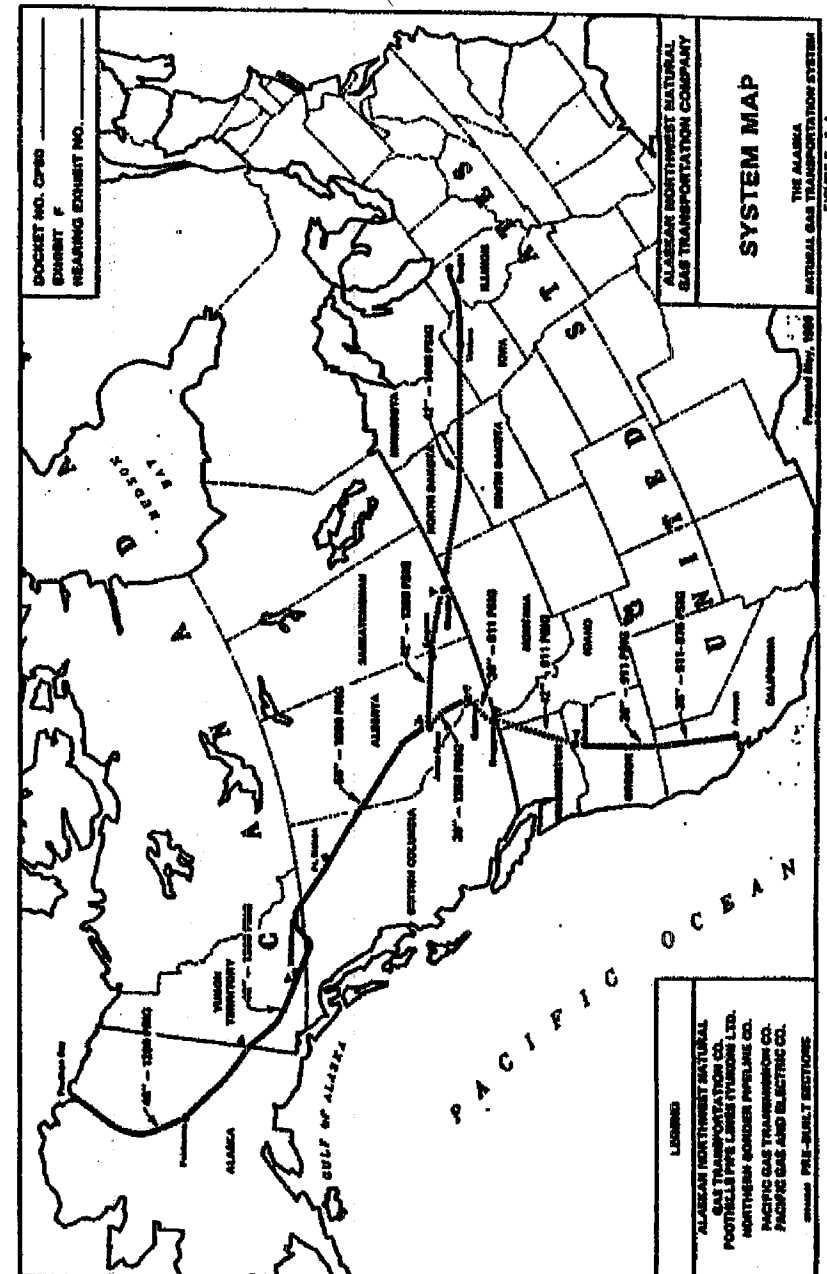
The location of the proposed pipeline and related facilities to be constructed are generally described in this Exhibit. These facilities constitute the Alaska Segment of the Alaska Natural Gas Transportation System (ANGTS), extending from Prudhoe Bay to the Alaska/Yukon border.

1.0 RELATIONSHIP TO THE ANGTS

Figure F-1-1 displays the total ANGTS, including the Alaska Segment, the Canadian Segment, and the two Lower 48 Segments (Eastern Leg and Western Leg). This map shows the relationship of the Alaska Segment, consisting of about 743 miles of pipeline, to the total ANGTS, which extends over a route of approximately 4,800 miles.

The pipeline system is designed for an initial annual average flowrate of 2,000 million standard cubic feet per day (MMSCFD) of natural gas from the Prudhoe Bay field, with 70 percent of the gas delivered to the Eastern Leg, and 30 percent to the Western Leg.

The Alaska Segment can transport up to 3,200 MMSCFD through the addition of nine intermediate compressor stations.



2.0 ALASKA SEGMENT FACILITIES

Figure F-2-1 displays a map of the Alaska Segment of the ANOTS, indicating the proposed general pipeline route, and highlighting the major planned facilities. Additional details are contained in the exhibits noted below concerning the facilities to be constructed or acquired, and the effects on existing facilities as a consequence of the proposed construction.

- o Exhibit 2-1 discusses the environmental considerations that relate to location of the proposed facilities.
- o Exhibit 2-9 discusses the engineering and design criteria that relate to the route selection and facility design.

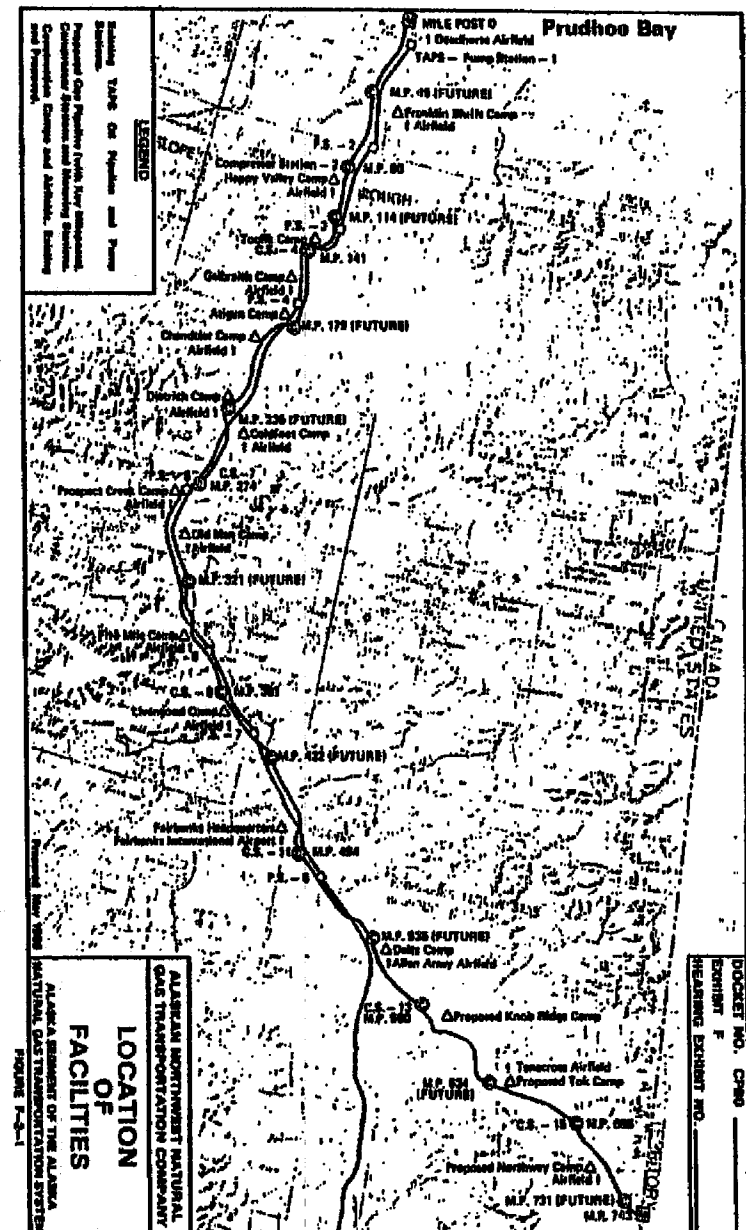
2.1 PIPELINE GENERAL DESCRIPTION

The map in Figure F-2-1 shows the proposed pipeline route, originating at Prudhoe Bay in northern Alaska corresponding to Milepost 0. The pipeline connects at this originating point to the Prudhoe Bay gas conditioning plant through the metering station at this location.

The pipeline route runs adjacent to the Trans Alaska Pipeline System (TAPS) in a southerly direction to about Milepost 274 near Prospect Creek. The pipeline then turns in a southeasterly direction to about Milepost 535 at Delta Junction.

At Delta Junction the line diverges from the TAPS route, and continues in a southeasterly direction to the Alaska/Yukon border at about Milepost 743. At this point at the Yukon metering station, the Alaska Segment of the pipeline connects to the Canadian Segment.

The total pipeline length is approximately 743 miles, consisting of 48-inch O.D. pipe operating at 1260 psig design pressure. The pipeline will be buried except for 3 aerial crossings.



2.2 COMPRESSOR STATIONS

The map in Figure F-2-1 displays the locations for the compressor stations. In order to transport the design flow rate of 2,000 MMSCFD, seven compressor stations are planned as shown (Stations 2, 4, 7, 9, 11, 13, and 15). Nine other compressor station sites are also identified on the map, representing locations for future system expansion, providing a total of sixteen locations as shown on the map.

Additional design data concerning the compressor stations is provided in Exhibits G, G I and G II, including their locations and size (rated horsepower).

Also shown are the connections at the Prudhoe Bay purchase point and the sales point at the Alaska/Yukon border, together with the location of intermediate points of connection within Alaska.

2.3 METER STATIONS

Meter stations are provided at two locations; the gas receipt point at Prudhoe Bay and the delivery point to the Canadian Segment at the Yukon border. Exhibits G and Z-9.2 provide additional data concerning the Meter Station design.

2.4 OTHER PLANNED FACILITIES

The map in Figure F-2-1 also shows the location of other planned facilities, including the construction camps and airfields, commercial and military airfields, and the Fairbanks Headquarters.

The Operations Control Center (OCC) will be located at Fairbanks, and will monitor and control pipeline operation from that point.

Other related facilities are discussed in the other exhibits referenced in 2.0 above, including the communications system, material sites, pipeline double-jointing facilities, material storage yards, and Operating and Maintenance Facilities.

EXHIBIT F-1

FACTORS CONSIDERED IN USE OF

JOINT RIGHTS-OF-WAY

Consistent with good pipelining practice, in order to minimize ecological disturbances in the area of the pipeline, to facilitate the acquisition of rights-of-way, and to ease or eliminate pipeline construction and operating difficulties, existing rights-of-way and areas adjacent to existing rights-of-way will be utilized to the maximum extent practical.

1.0 PIPELINE ROUTE

Exhibit Z-1 (Environmental Engineering Manual), Exhibit Z-6 (Alignment Sheets) and Exhibit Z-9 (Design Manual) of this application provide a detailed description of the rights-of-way which will be used, and contain alignment drawings and maps showing other facilities in the area including unrelated pipelines, electric power lines, highways and railroads.

The route of the proposed pipeline was selected so that the line will be constructed adjacent to the existing Trans Alaska Pipeline System (TAPS), the Prudhoe Bay Haul Road and the Golden Valley Electric Association's power line, where feasible, from Prudhoe Bay to Delta Junction, a distance of approximately 548 miles. From Delta Junction, the pipeline will generally follow the Alaska Highway and the Haines Pipeline corridor to the Alaska/Yukon border, a distance of approximately 193 miles.

2.0 USE OF EXISTING RIGHTS-OF-WAY

The proposed joint use of rights-of-way includes the Haines Pipeline and portions of the TAPS anticipated permanent right-of-way. The primary reason for their use is to utilize the existing utility corridor and to avoid the proliferation of right-of-way "scars" across the landscape. Joint use of these rights-of-way also reduces cost by utilizing existing clearing and grading.

3.0 USE OF EXISTING FACILITIES

Use of existing facilities is described in detail in the Exhibits referenced in Paragraph 1.0, Pipeline Route. A summary of these facilities follows:

- o The existing right-of-way for the Haines Pipeline will be used in selected locations south of Fairbanks, and also south of Delta.
- o The Prudhoe Bay Haul Road will be used for regional access north of the Yukon River.
- o The Elliott Highway will be used for regional access north of Fairbanks.
- o The Richardson Highway will be used for regional access south of Fairbanks.
- o The Alaska Highway will be used for regional access south of Delta.
- o The existing workpad, built for the TAPS oil pipeline, or new extensions thereto, will be used for construction adjacent to the TAPS pipeline where possible.
- o The gas pipeline will cross the Yukon River utilizing the existing bridge.
- o Existing secondary roads will be used for pipeline access to the greatest extent possible.
- o Existing gravel pits, if available, will be used for a source of construction materials.
- o Existing camps along the proposed gas pipeline route will be used for temporary construction facilities to the greatest extent possible.

3.0 USE OF EXISTING FACILITIES (Continued)

- o Fort Wainwright will be used for temporary construction facilities.
- o Airstrips and material storage yards from the TAPS facilities will be utilized to the greatest extent possible.
- o South of Fairbanks, existing airfields at Tanacross and Northway will service the Sears Creek, Tok and Northway camps. The military airfield at Fort Greely (Allen Army Airfield) will service the Delta camp. The Fairbanks International Airport will be used as the project central airfield for major traffic operations. Commercial air carriers will be used whenever possible.
- o The existing Alaskan infrastructure will be utilized to the maximum practical extent, including use of existing highways, railroads, road transport services, commercial communication systems and seaports such as Seward, Anchorage, Valdez and Prudhoe Bay.

4.0 ROUTING DEVIATIONS

Applicant intends to use the rights-of-way and facilities as described as of the date of this filing, or amendment or supplement thereto. However, it is understood that the actual construction of the proposed facility may require deviations because of unanticipated obstacles or difficulties, including those encountered due to terrain features, environmental and cultural resource considerations, socio-economic or other events that may occur subsequently.

Docket No. CP80-
Exhibit F-II
Hearing Exhibit No.

EXHIBIT F-II

FACTORS CONSIDERED IN LOCATING FACILITIES

IN SCENIC HISTORIC RECREATIONAL OR

WILDLIFE AREAS

Applicant states that the proposed Alaska Segment of the Alaska Natural Gas Transportation System, as proposed, will be routed through the northern edge of the Tetlin National Wildlife Refuge. This particular routing was planned prior to the establishment and dedication of the Refuge, and there is no reasonable alternative available. Any other routing for the pipeline to bypass the Refuge, would involve substantial additional environmental damage (i.e., longer access roads, more pad materials and encroachment into undisturbed areas) because the pipeline would not then be making use of existing rights-of-way through the area. These rights-of-way include the Alaskan Highway and the former Haines-Fairbanks oil pipeline corridor, within which the gas pipeline will be constructed. The Department of Interior, which has jurisdiction over this area has been consulted. In a letter to Northwest dated January 11, 1980 (AL01.0101), Interior's Authorized Officer, Mr. William M. Toskey, stated: "It is the intent of the Department to act as expeditiously as possible to issue a right-of-way grant for the construction of the proposed pipeline across the proposed Tetlin National Wildlife Refuge...." Applicant believes that the extensive stipulations for environmental protection to be attached to the right-of-way grant by the Department, and made applicable to other pipeline construction activities in Alaska, are adequate to encompass construction in the Tetlin Refuge. These stipulations, worked out over a two-year period with all concerned Federal agencies--and specifically including the U.S. Fish and Wildlife Service--are one of the bases for applicant's cost estimate and other planning. Site-specific stipulations, specifically for the Refuge, are not expected to impose any highly unusual requirements, and the general nature of construction in that area should be essentially the same as elsewhere.

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EXHIBIT F-III

STATEMENT ON ADOPTION OF GUIDELINES
CONCERNING RIGHTS-OF-WAY AND CONSTRUCTION ACTIVITIES

Applicant states that the guidelines concerning the right-of-way and construction activities set forth in Section 2.69 of Chapter I, Title I, 18 C.F.R. have been adopted by the applicant, that the relevant portions thereof will be issued to planning, construction personnel, contractors, and subcontractors on a continuing basis throughout the life of the project.

The Section 2.69 guidelines are similar in many respects to the draft Department of the Interior (DOI) stipulations expected to be attached to the Federal grant of right-of-way to be issued to Applicant with respect to Federal lands in Alaska. These stipulations provide detailed guidelines dealing with inter alia, environmental and technical matters. Applicant does not perceive any conflicts between these stipulations and the Section 2.69 guidelines. The DOI stipulations, in general, may be viewed as a more detailed elaboration of the Section 2.69 guidelines.

Several of the draft DOI stipulations, which the Applicant has adopted for planning purposes, are particularly germane to the manner in which environmental protection requirements will be implemented with respect to construction personnel and contractors.

A pertinent example is as follows:

"1.2.1 The following conditions shall apply to the design construction, operation, maintenance, and termination of the PIPELINE SYSTEM. Unless clearly inapplicable, the requirements and prohibitions imposed upon the COMPANY by these Stipulations are also imposed upon the COMPANY'S agents, employees, contractors, and subcontractors, and the employees of each of them.

- (1) The COMPANY shall ensure compliance with these Stipulations by its agents, employees, and contractors (including subcontractors at any level), and the employees of each of them.

- (2) Failure or refusal of the COMPANY'S agents, employees, contractors, subcontractors, or their employees to comply with these Stipulations shall be deemed to be the failure or refusal of the COMPANY.
- (3) Where appropriate the COMPANY shall require its agents, employees, contractors, subcontractors to include these Stipulations in all contracts and subcontracts which are entered into by any of them, together with a provision that the other contracting party, together with its agents, employees, contractors and subcontractors, and the employees to each of them, shall likewise be bound to comply with these Stipulations."

It is the Applicant's intention to require its employees, contractors, subcontractors, and other associated personnel to observe the same high standards of environmental protection at all locations--regardless of land ownership.

R-28

Docket No. CP80-
Exhibit F-IV
Hearing Exhibit No.

Docket No. CP80-
Exhibit F-IV
Hearing Exhibit No.

EXHIBIT F-IV
STATEMENTS BY THE APPLICANT CONCERNING THE REQUIREMENTS
OF THE NATIONAL ENVIRONMENTAL POLICY
ACT OF 1969, PUBLIC LAW 91-190,
83 STAT. 852, TITLE I, SECTION 102

The President of the United States, in his Decision and Report to Congress on the Alaskan Natural Gas Transportation System submitted September 22, 1977, made the following statement:

"The President hereby determines pursuant to the direction of Section 8 (a) of ANOTA (The Alaskan Natural Gas Transportation Act of 1976), that the required environmental impact statements relative to an Alaska natural gas transportation system have been prepared, that they have been certified by the CEQ and that they are in compliance with the National Environmental Policy Act of 1969.

Consequently the enactment of a joint resolution approving the Decision shall be conclusive as to the legal and factual sufficiency of the final environmental impact statements as provided by Section 10 (c) (3) of ANOTA."

Subsequently, on November 8, 1977, a joint resolution of the Congress was enacted (Pub. L. 95-158) which reads as follows:

"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, that the House of Representatives and Senate approve the Presidential decision on an Alaska natural gas transportation system submitted to the Congress on September 22, 1977, and find that any environmental impact statements prepared relative to such system and submitted with the President's decision are in compliance with the National Environmental Policy Act of 1969."

As a result of the extensive planning actions and data-gathering field programs conducted since November, 1977, Applicant has encountered nothing that would invalidate or tend to invalidate any of the fundamental conclusions reached in the environmental review process, cited above, that resulted in the President's Decision and the joint resolution by Congress.

Accordingly, Applicant believes that no additional regulatory action is required by FERC pursuant to the requirement of the National Environmental Policy Act of 1969, Public Law 91-190, 83 Stat. 852, Title I, Section 102, pursuant to Title 18 CFR, Section 157.14(a)(6-d).

EXHIBIT G

FLOW DIAGRAMS SHOWING DAILY DESIGN CAPACITY AND REFLECTING
OPERATION WITH AND WITHOUT PROPOSED FACILITIES ADDED

1.0 FLOW DIAGRAMS

Four flow diagrams are presented for the purpose of illustrating pipeline capacity in Prudhoe Bay flowrates:

1. Summer Average at 2000 MMSCFD
2. Winter Average at 2000 MMSCFD
3. Summer Maximum at 2393 MMSCFD
4. Winter Maximum at 2533 MMSCFD

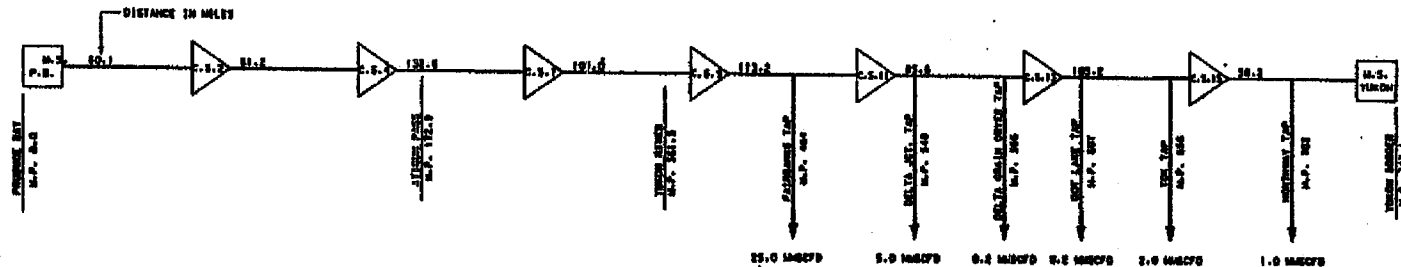
An engineering analysis of the system concluded that for these flowrates, the installation of seven compressor stations is required at an average spacing of ninety-eight miles. Each compressor station will be equipped with a single pipeline gas compressor unit, pipeline gas refrigeration units and on-site power generation. Compressors (both gas and refrigerant) and generators will be driven by gas turbine prime movers.

1.1 SUMMER AND WINTER AVERAGE FLOWRATES

The Alaska Segment operating conditions at 2000 MMSCFD annual average flow from the Prudhoe Bay gas conditioning plant are presented on the following two pages (Drawing Numbers 4680-10-00-0-001 and 4680-10-00-0-002). Summer and winter operating conditions are illustrated respectively on these drawings. These drawings show gas temperature, pressure and flowrate at every station. In addition, mainline compressor and refrigeration loads and station fuel consumptions are presented. The station fuel consumptions include the fuel requirements for the mainline turbo-compressor, refrigeration equipment, electric power generator and support facilities.

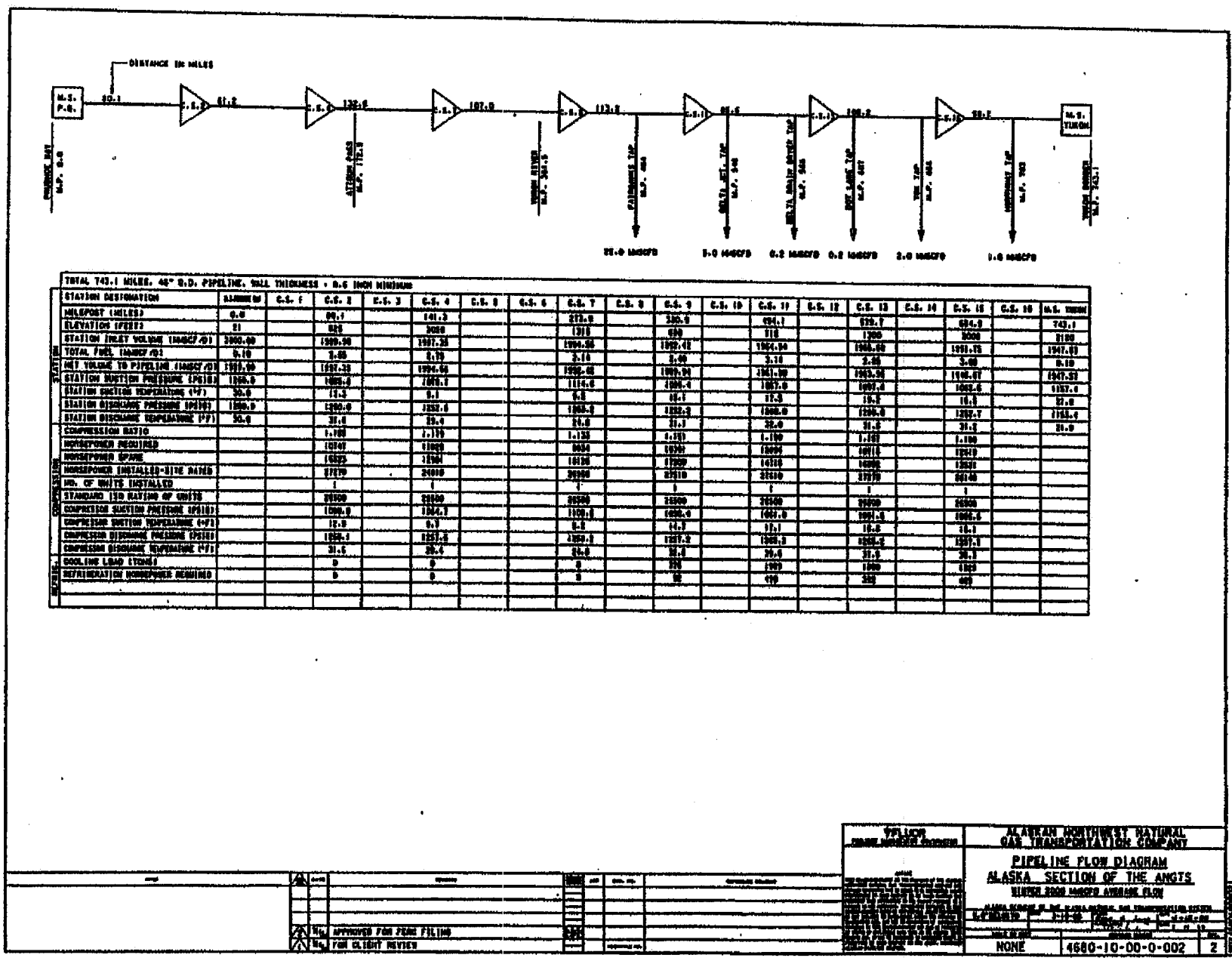
1.2 SUMMER AND WINTER MAXIMUM FLOWRATES

The Alaska Segment maximum capacity operating conditions with seven stations are shown on the following two pages (Drawing Numbers 4680-10-00-0-003 and 4680-10-00-0-004). The operating conditions for summer and winter seasons are given on separate drawings. The Segment maximum capacity of the initial system was determined by the mainline compressor driver available horsepower and refrigeration equipment capacity.



TOTAL 143.0 MILES, 48" O.D. PIPELINE, WALL THICKNESS = 0.8 INCH MINIMUM																	
STATION DESIGNATION	0.0	C.S. 1	C.S. 2	C.S. 3	C.S. 4	C.S. 5	C.S. 6	C.S. 7	C.S. 8	C.S. 9	C.S. 10	C.S. 11	C.S. 12	C.S. 13	C.S. 14	C.S. 15	M.S. WARD
MILEPOST (MILES)	0.0	20.1	40.1	60.1	80.1	100.1	120.1	140.1	160.1	180.1	200.1	220.1	240.1	260.1	280.1	300.1	320.1
ELEVATION (FEET)	21	99	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	1609
STATION INLET VOLUME (MMB/D)	2500.00	2000.00	1500.00	1000.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL FUEL (MMB/D)	2500.00	2000.00	1500.00	1000.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NET VOLUME TO PIPELINE (MMB/D)	2500.00	2000.00	1500.00	1000.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STATION INLET PRESSURE (PSIG)	1200.0	1195.0	1190.0	1185.0	1180.0	1175.0	1170.0	1165.0	1160.0	1155.0	1150.0	1145.0	1140.0	1135.0	1130.0	1125.0	1120.0
STATION INLET TEMPERATURE (°F)	30	30.3	30.6	30.9	31.2	31.5	31.8	32.1	32.4	32.7	33.0	33.3	33.6	33.9	34.2	34.5	34.8
STATION DISCHARGE PRESSURE (PSIG)	1200.0	1195.0	1190.0	1185.0	1180.0	1175.0	1170.0	1165.0	1160.0	1155.0	1150.0	1145.0	1140.0	1135.0	1130.0	1125.0	1120.0
STATION DISCHARGE TEMPERATURE (°F)	30	31.7	32.4	33.1	33.8	34.5	35.2	35.9	36.6	37.3	38.0	38.7	39.4	40.1	40.8	41.5	42.2
COMPRESSION RATIO	2.143	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172	1.172
HORSEPOWER REQUIRED	11200	11040	10880	10720	10560	10400	10240	10080	9920	9760	9600	9440	9280	9120	8960	8800	8640
HORSEPOWER SPARE	14000	13800	13600	13400	13200	13000	12800	12600	12400	12200	12000	11800	11600	11400	11200	11000	10800
HORSEPOWER INSTALLED-SIZE RATED	25000	24800	24600	24400	24200	24000	23800	23600	23400	23200	23000	22800	22600	22400	22200	22000	21800
NO. OF GATES INSTALLED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
STANDARD 100 RATING OF UNITS	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
COMPRESSION SECTION PRESSURE (PSIG)	1007.0	1004.3	1001.6	998.9	996.2	993.5	990.8	988.1	985.4	982.7	980.0	977.3	974.6	971.9	969.2	966.5	963.8
COMPRESSION SECTION TEMPERATURE (°F)	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3	20.3
COMPRESSION DISCHARGE PRESSURE (PSIG)	1004.0	1001.3	998.6	995.9	993.2	990.5	987.8	985.1	982.4	979.7	977.0	974.3	971.6	968.9	966.2	963.5	960.8
COMPRESSION DISCHARGE TEMPERATURE (°F)	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7
COOLING LOAD (TONS)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
REFRIGERATION HORSEPOWER REQUIRED	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170

WFLCORP PROJECT: NORTHWEST NATURAL GAS TRANSPORTATION COMPANY PIPELINE FLOW DIAGRAM ALASKA SECTION OF THE ANGTS DESIGN 2000 MMB/D AVERAGE FLOW	
APPROVED FOR PERC FILING FOR CLIENT REVIEW	4680-10-00-0-001 2



[illegible]

THREAT MAXIMUM FLOW	
WATER MOUNTAIN OF THE ALABAMA RIVER AND TRANSMISSION SYSTEM	
DATE	TIME
8-10-69	7:15 PM
NO.	BY
4680-10-00-0-003	J. A. ...
TYPE	STATUS
NONE	2

[illegible]

Docket No. CP80--
Exhibit G
Hearing Exhibit No.

1.2 SUMMER AND WINTER MAXIMUM FLOWRATES (Continued)

The Segment is capable of receiving 2393 MMSCFD gas during summer and 2533 MMSCFD gas during winter from Prudhoe Bay. Under these conditions, the gas delivery capability to the Alaska-Yukon border will be 2311 MMSCFD during summer and 2464 MMSCFD during winter.

EXHIBIT G-1

FLOW DIAGRAMS REFLECTING MAXIMUM CAPABILITIES

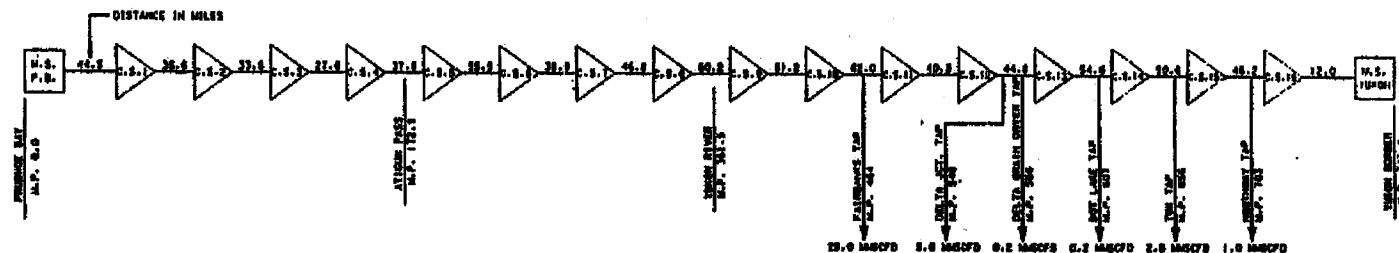
1.0 FLOW DIAGRAMS - MAXIMUM CAPABILITIES

The maximum capabilities of the Alaska Segment can be achieved by increasing the number of compressor stations to sixteen. The additional compressor stations will be of comparable design to the initial ones. They will be equipped with a single pipeline gas compressor unit, pipeline gas refrigeration units and on-site power generation. Compressors (both gas and refrigerant) and generators will be driven by gas turbine prime movers.

1.1 FLOW DIAGRAM - MAXIMUM CAPABILITY AFTER EXPANSION

The following flow diagram (Drawing Number 4680-10-00-0-005) shows operating conditions under Alaska Segment maximum capabilities during winter after expansion. The maximum capability is based on a sixteen station installation. The additional nine compressor stations after expansion will have the same equipment rating as the initial seven compressor stations.

After expansion, the Segment will be capable of receiving 3205 MMSCFD gas during winter from Prudhoe Bay with a delivery of 3096 MMSCFD gas to the Alaska-Yukon border.



TOTAL 145.1 MILES, 48" O.D. PIPELINE, WALL THICKNESS - 0.8 INCH MINIMUM																
STATION DESIGNATION	STATION M	C.S. 1	C.S. 2	C.S. 3	C.S. 4	C.S. 5	C.S. 6	C.S. 7	C.S. 8	C.S. 9	C.S. 10	C.S. 11	C.S. 12	C.S. 13	C.S. 14	M.S. 15
MILEPOST (MILES)	0.0	44.3	86.1	115.7	141.3	179.1	228.0	278.2	329.2	382.1	424.1	454.0	479.7	504.3	529.4	554.5
ELEVATION (FEET)	21	362	329	1823	2000	2193	1250	1316	1720	1300	1520	719	917	1300	1900	2000
STATION INLET VOLUME (MGD/HR)	3295.08	3294.96	3290.77	3196.51	3196.11	3190.00	3091.16	3190.52	3195.52	3191.30	3194.25	3194.00	3190.50	3191.75	3194.34	3191.13
TOTAL FUEL INLET (MGD/HR)	0.10	4.70	4.60	6.00	4.40	3.00	3.30	3.30	5.17	5.25	5.40	5.47	5.41	5.41	5.30	5.13
NET VOLUME TO PIPELINE (MGD/HR)	3294.98	3290.26	3186.17	3190.51	3190.00	3187.00	3187.86	3187.20	3190.35	3186.05	3188.85	3188.53	3185.29	3186.34	3189.04	3186.00
STATION SECTION PRESSURE (PSIG)	1800.0	1807.0	1807.0	1806.0	1806.0	1805.0	1801.0	1801.0	1800.0	1800.0	1800.0	1800.0	1800.0	1800.0	1800.0	1800.0
STATION SECTION TEMPERATURE (°F)	30.0	14.0	10.0	17.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
STATION DISCHARGE PRESSURE (PSIG)	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0
STATION DISCHARGE TEMPERATURE (°F)	30.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
COMPRESSION RATIO	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
HORSEPOWER REQUIRED	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480	24480
HORSEPOWER SPARE	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168	3168
HORSEPOWER INSTALLED-OVER RATED	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648	27648
NO. OF UNITS INSTALLED	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
STANDARD ISO RATING OF UNIT	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500	26500
COMPRESSION SECTION PRESSURE (PSIG)	1835.0	1847.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0	1848.0
COMPRESSION SECTION TEMPERATURE (°F)	12.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
COMPRESSION DISCHARGE PRESSURE (PSIG)	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0	1275.0
COMPRESSION DISCHARGE TEMPERATURE (°F)	30.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
COOLING LOAD (TONS)	3442	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122
REFRIGERATION HORSEPOWER REQUIRED	577	703	703	703	703	703	703	703	703	703	703	703	703	703	703	703

YPLUCOR PROCESS ENGINEERING DEPARTMENT		ALASKAN NORTHWEST NATURAL GAS TRANSPORTATION COMPANY PIPELINE FLOW DIAGRAM ALASKA SECTION OF THE ANGTS STATION MILEPOST FLOW IS STATIONS	
PROJECT NO. 100-100-00-005 DATE: 10-10-80 DRAWN BY: J. L. BROWN CHECKED BY: J. L. BROWN APPROVED BY: J. L. BROWN		PROJECT NO. 100-100-00-005 DATE: 10-10-80 DRAWN BY: J. L. BROWN CHECKED BY: J. L. BROWN APPROVED BY: J. L. BROWN	
APPROVED FOR PERMITS FOR CLIENT REVIEW		NONE 4680-10-00-0-005 2	

EXHIBIT G-II

FLOW DIAGRAM DATA

1.0 DESIGN DATA

Hydraulic studies have been performed using a thermal-hydraulic steady state gas flow computer program. This program uses the energy, momentum and continuity equations for determining gas conditions along the length of the pipeline. In addition, the program calculates the compressor and refrigeration loads at each station. A description of the program is found in Exhibit Z-9.0.

The Alaska Segment of the ANGTS includes seven compressor stations spaced along the pipeline from Prudhoe Bay to the Alaska-Yukon border. The stations are located along the pipeline in such a manner as to balance compressor horsepower and refrigeration loads at each station as closely as possible, while considering the constraints imposed by environmental, site accessibility, soil and other related factors. The system will be expanded to sixteen compressor stations in the future in order to handle a larger quantity of gas flow. The future compressor stations will have the same equipment rating as the initial seven stations. The design basis for the system is provided in Exhibit Z-9.0.

The pipeline generally consists of 48-inch O.D. x 0.60-inch minimum wall thickness pipe with metallurgy applicable to arctic conditions. Detailed data for the pipeline material specifications are found in Exhibit Z-9.1.

Each station consists of a single centrifugal compressor driven by a 20,000-30,000 horsepower gas turbine, a 9,000 ton nominal capacity refrigeration system capable of maintaining the gas between 0° and 32°F, and on-site electric power generation and ancillary facilities necessary for operation and maintenance. Detailed data for the stations is provided in Exhibit Z-9.2.

ENCLOSURE 4

References Used

1. Grant of Right-of-Way for ANGTS, December 1, 1980
2. Agreement and Grant of Right-of-Way for TAPS, January 23, 1974
3. Mineral Leasing Act, Public Law 93-153
4. Rights-of-Way Under the Mineral Leasing Act 43 CFR 2880
5. Trans-Alaska Gas System, Project Description, December 1986
6. Alaska Natural Gas Transportation Act of 1976, Public Law 94-586

ENCLOSURE 5

Yukon Pacific Corporation's responses to the four compatibility issues addressed on pages 2 and 3 of the Compatibility Evaluation are as follows.

1. Clarify how TAGS proposes to cross Atigun Pass, taking into account the approved Revision 4 location of ANGTS.

The TAGS pipeline route over Atigun Pass is viewed by Yukon Pacific Corporation (YPC) as a special design area meriting site specific discussion since it is a narrow "pinch point" where up to three pipelines and the Dalton Highway must be accommodated. The Atigun Pass special construction area is discussed in detail in Section 5.2.17.1 of the TAGS Project Description; additional information concerning the Atigun Pass area is provided here to supplement information in the Project Description.

The TAGS pipeline route ascends the upper Atigun River valley on the west side of the Dalton Highway and crosses the TAPS pipeline at the base of Atigun Pass. The route then ascends the north side of Atigun Pass, crossing the highway (approximately highway Milepost 247.9), TAPS, and ANGTS right-of-way. The TAGS route then ascends roughly parallel to TAPS to the continental divide, where a second crossing of the highway and the ANGTS right-of-way is made. The TAGS route then descends the south side of the pass proximate to the west side of the ANGTS right-of-way and the highway to the base of the pass. At the base of the south side of Atigun Pass, the route crosses the upper Chandalar River, and parallels the west side of the highway to the Chandalar shelf. The closest proximity to TAPS is at the top of Atigun Pass where TAGS encroaches to within approximately 120 feet of the TAPS pipeline.

An error on Figure 5.23 of the Project Description placing approximately 1000 feet of the TAGS pipeline along the west side of the Dalton Highway on the north side of Atigun Pass has been corrected, as shown on Figure 4.

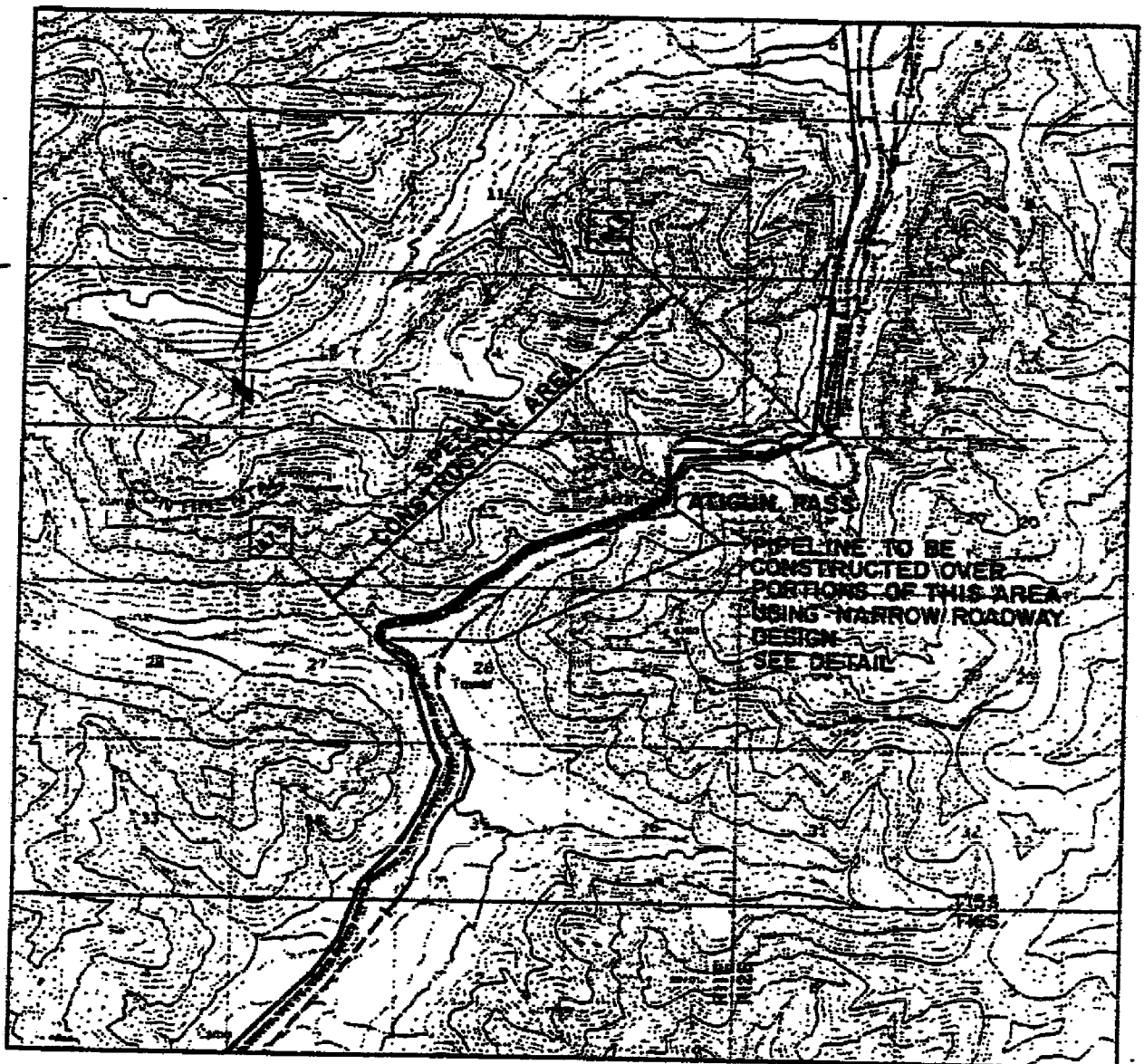
In the TAGS Project Description, Figure 5.24 (Atigun Pass Construction Area, Narrow Roadway Section) assumed a 30 foot roadway width east of and adjacent to the ANGTS pipeline at the narrow roadway section on the south approach to

Atigun Pass. This working width is consistent with roadway conditions in the pass shortly after completion of the TAPS pipeline. Over the years, continued maintenance of the highway has widened the roadway and shifted the roadway ditchline further into the hillside, thus widening the roadway slightly. Figure 5.24 represents the wider roadway conditions which were observed in the summer of 1986.

It was assumed that ANGTS has not accounted for the shift in the roadway ditch that has occurred through the years of roadway maintenance. However, maps recently received from the Alaskan Northwest Natural Gas Transportation Company indicate a late change (9-9-85) in routing on the south approach to the Continental Divide. Although the nature of the change is unclear on the map sheets, YPC has assumed that the change in ANGTS alignment takes the current ditchline at the pinch points into account.

YPC has re-evaluated the Atigun Pass special construction area in light of this new information received from the Alaskan Northwest Natural Gas Transportation Company, and has developed a slightly modified plan which allows construction of both pipelines without moving the ANGTS pipeline centerline from its 9-9-85 roadway ditch location.

A reinforced earth fill structure, with wall, will be constructed on the downslope side of the roadway in the two areas of most severe roadway constriction where additional upslope cutting must be kept to a minimum. These two areas identified by field reconnaissance are located near the top of and about half way down the south side of the pass, and total approximately 6, 250 feet in length. The reinforced earth fill base will be constructed to a height of 15.0 feet, thus increasing the roadway width and the roadway elevation by 5.0 feet. A new typical section for the proposed specially reinforced earth fill supported highway is shown in Figure 5. It is based on information obtained during site reconnaissance of the narrowest section of roadway and on recent information concerning the location of the ANGTS pipeline near the top of Atigun pass. The increase in roadway width created by the reinforced earth fill structure and the increase in roadway elevation










SCALE 1:63360

3000 0 3000 6000 9000 12000 15000 18000 21000 Feet

CONTOUR INTERVAL 100 FEET

LEGEND

-  EXISTING DALTON HIGHWAY
-  PROPOSED TAGS PIPELINE (B/G)
-  EXISTING TAPS PIPELINE (A/G)
-  EXISTING TAPS PIPELINE (B/G)
-  TRANSITION, TAPS (A/G) TO (B/G)
-  PROPOSED ANGTS PIPELINE (B/G)
-  TAGS MILEPOST



**YUKON PACIFIC CORPORATION
TRANS-ALASKA GAS SYSTEM**

**ATIGUN PASS
CONSTRUCTION AREA**

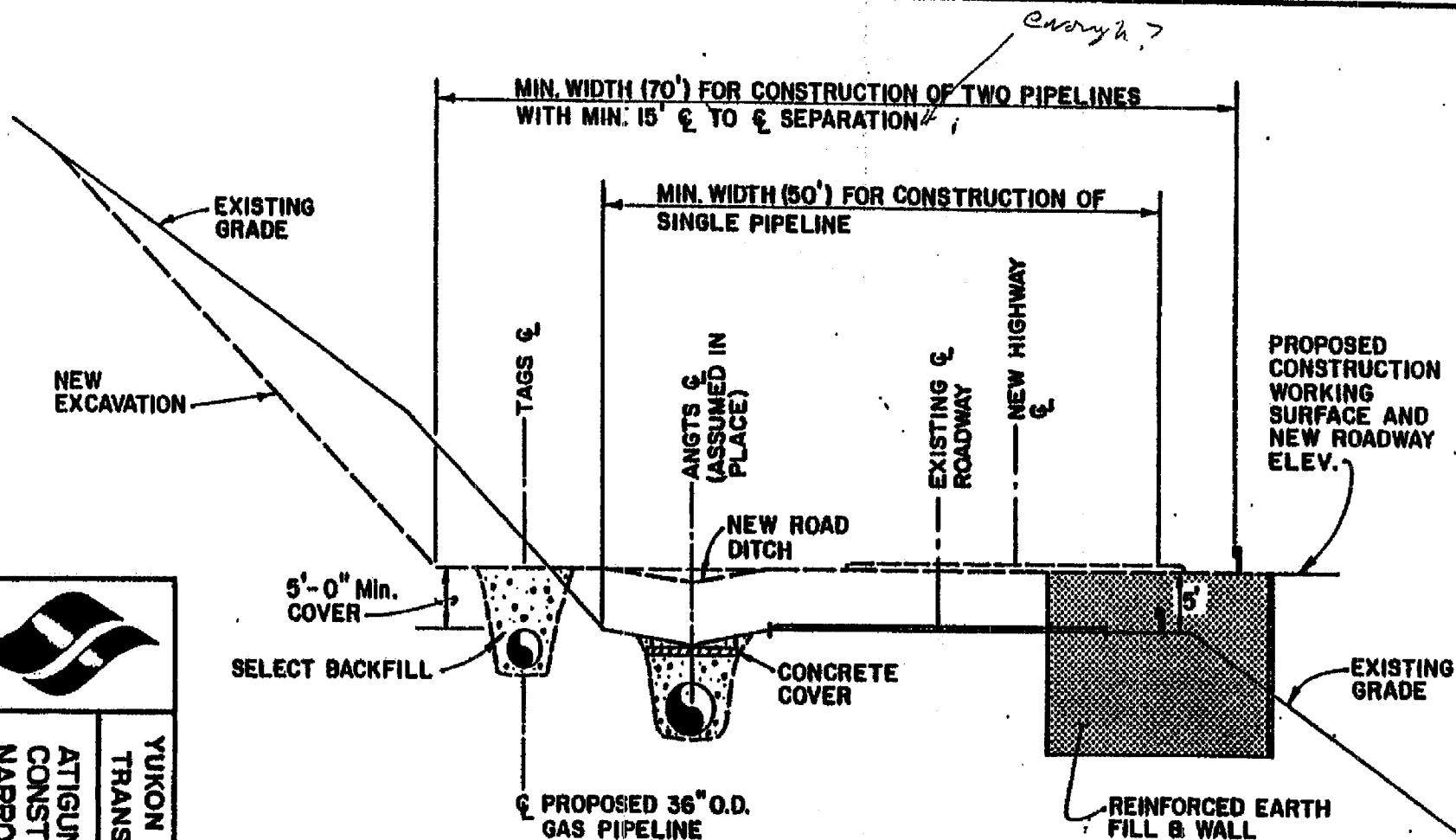
Figure 4

FEB. 9, 1987

FEB. 9, 1967



YUKON PACIFIC CORPORATION
TRANS-ALASKA GAS SYSTEM
ATIGUN PASS
CONSTRUCTION AREA
NARROW ROADWAY SECTION
Figure 5



NOTE
ANGTS REPRESENTS 48" O.D. GAS PIPELINE
PROPOSED BY NORTHWEST ALASKA PIPELINE
COMPANY AND ASSUMES CURRENT ROADWAY
DITCH IS ANGTS CENTERLINE.

TYPICAL NARROW ROADWAY CONSTRUCTION
DALTON HIGHWAY-SOUTH APPROACH TO ATIGUN PASS

Section View Looking North

will provide most of the additional width required for TAGS pipeline construction and for one future pipeline. A small cut on the uphill side of the roadway will provide the additional width for the minimum separation distance.

The remaining 4,500 feet of roadway will be widened by increasing the uphill cut and downslope fill and raising the roadway elevation. The roadway elevation will be raised to match the added elevation of the reinforced fill-supported sections. The added roadway elevation will be "feathered" at the top and base of the Highway section to prevent any significant increase in current roadway grade.

Detailed design and construction plans will be coordinated with the State Highway Department, Alyeska Pipeline Service Company, and the Northwest Alaskan Pipeline Company in order to consider in-place facilities and Rights-of-Way. Design and construction will be accomplished to assure facility compatibility.

Operations and maintenance of TAGS will also be coordinated with the State Highway Department, Alyeska and Northwest to assure continued facility compatibility through the life of the project. In the event that excavation of TAGS pipeline is ever required at a location where the two pipelines are spaced relatively close, special techniques will be employed. Hand excavation methods assisted by thawing techniques would most likely be utilized to expose the pipeline after formation of a frost bulb.

Where pipelines and highway facilities are proximate, precise as-built location data will be necessary. As-built data must be coordinated between companies, and companies should share common survey benchmarks where practical.

2. Identify TAGS route for Sukakpak Special Construction Area on scale of 1:63,300. Give special attention to proximity to TAPS and ANGTS alignments.

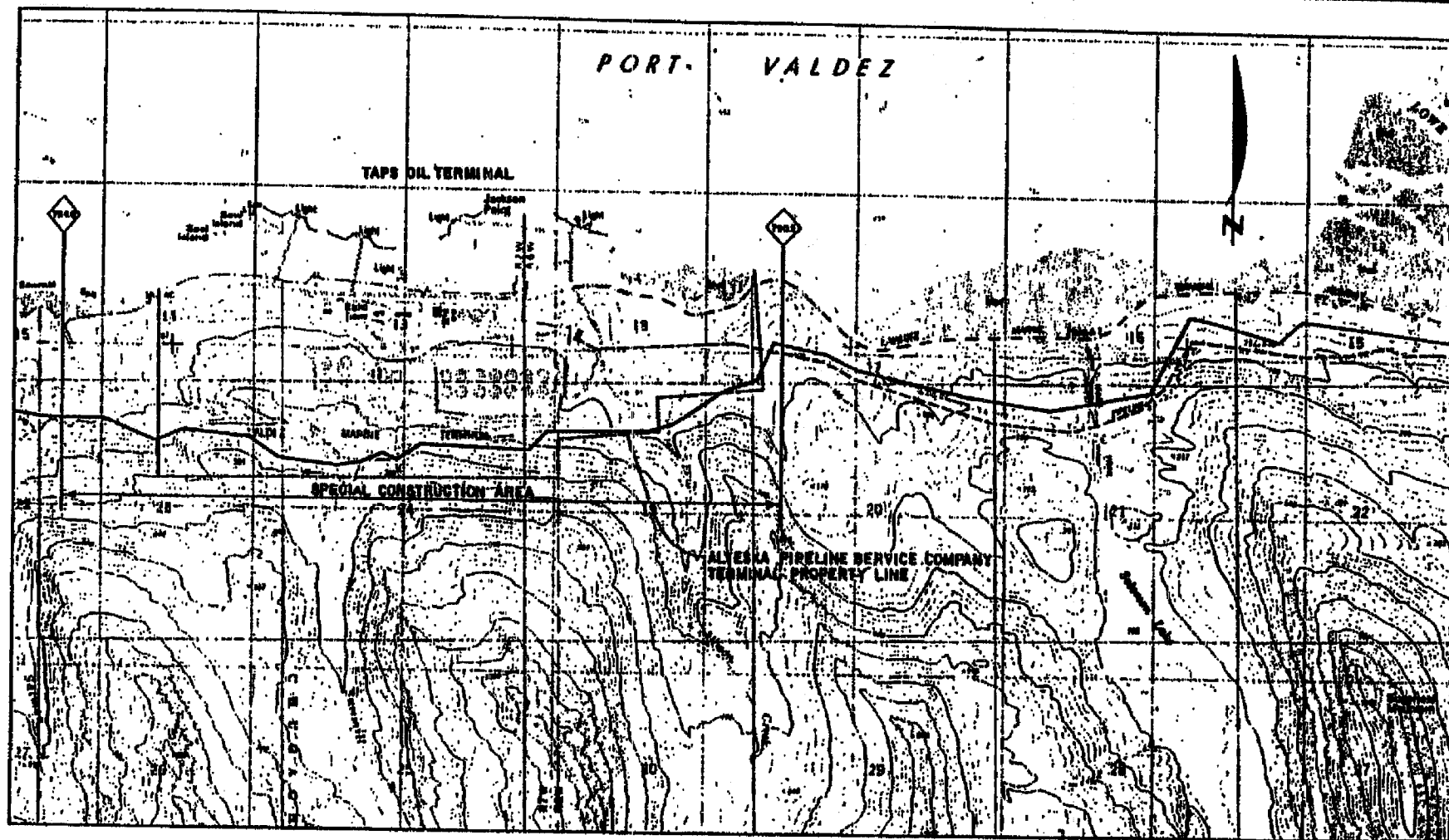
Yukon Pacific Corporation (YPC) is currently considering optional pipeline routes in the area of Sukakpak Mountain. There are a number of factors which the company feels must be considered in the routing of the pipeline in this area, including: 1) visual quality of the area; 2) constraints related to construction near TAPS of the ANGTS ROW; 3) constraints related to placement of the pipeline within the active floodplain of the Koyokuk River; and 4) the slope of Sukakpak Mountain. YPC will conduct a detailed evaluation of these factors after completion of 1987 summer field investigations. Until these detailed analyses are conducted, YPC cannot provide a complete response to your comment.

3. Provide routing of TAGS alignment around TAPS terminal, taking into account issues raised in the letter of November 23, 1986, by Alyeska Pipeline Service Company (APSC).

The TAGS alignment along the south side of Port Valdez will require a routing south of the TAPS Oil Terminal site. This pipeline segment is considered as a special construction area due to the proximity of the pipeline to TAPS facilities. The total length of this special construction section is approximately 18,500 feet.

The feasibility of preliminary routing alternatives in the area of the TAPS terminal site has been evaluated. A proposed route for the TAGS pipeline has been identified between the Fort Liscum Area (M.P. 790.5) and the mouth of Sawmill Creek (M.P. 794.0). Further route evaluation and alignment design in this area will involve coordination with the Alyeska Pipeline Service Company. Selection of a specific route location in the area of the terminal will be the result of detailed evaluation of available alternatives, design requirements, and construction procedures. Proposed TAGS operating and maintenance requirements will also affect specific route selection.

Figure 8 shows the proposed TAGS route between the Fort Liscum area and the mouth of Sawmill Creek based on initial feasibility evaluations. The TAGS alignment crosses a belowground taps section at approximately milepost 790.5



LEGEND

- PROPOSED TAGS PIPELINE (BELOW GROUND)
- - - EXISTING TAPS PIPELINE (BELOW GROUND)
- - - PROPERTY LINE
- ◆ TAGS MILEPOST

SCALE 1:25,000

1000 0 2000 3000 4000 5000 Feet

CONTOUR INTERVAL 20 METERS



**YUKON PACIFIC CORPORATION
TRANS-ALASKA GAS SYSTEM**

**TAPS OIL TERMINAL
CONSTRUCTION AREA**

Appendix B

Figure 8

FEB 9, 1967

to provide a routing south of all TAPS terminal facilities. The TAGS pipeline route generally maintains a horizontal separation greater than 1,000 feet from facilities at the TAPS terminal.

Soil conditions to the south of the TAPS oil terminal are expected to be predominately glacial till over bedrock. Local areas on glacially eroded terraces are expected to have thick organic cover over the glacial tills. After workpad grading is completed, however, it is expected that the TAGS pipeline will be buried in bedrock over most of its length. A warm gas pipeline operating mode is planned for this area.

The construction of the TAGS pipeline around the TAPS terminal is estimated to require two summers of work. Civil work related to the clearing and grading of the right-of-way will be completed during the first summer in preparation for pipeline installation during the second summer. Care will be taken from the onset of construction to avoid the diversion of natural surface drainage which could affect existing drainage controls on the TAPS terminal site. Temporary, and where possible, permanent erosion control measures will be established during the first summer working season.

Preparatory work during the first summer season on this segment will begin in the Allison Creek area and proceed to the west.

Construction of the workpad and preparation of the right-of-way will be restricted to daylight operations when work is upslope of TAPS facilities. Clearing and grubbing of the right-of-way will be followed by cut and fill construction of the workpad/construction zone.

Pipeline construction in the second summer will proceed from east to west through this area with a typical construction spread. Precautions and restrictions will be similar to those for the civil construction.

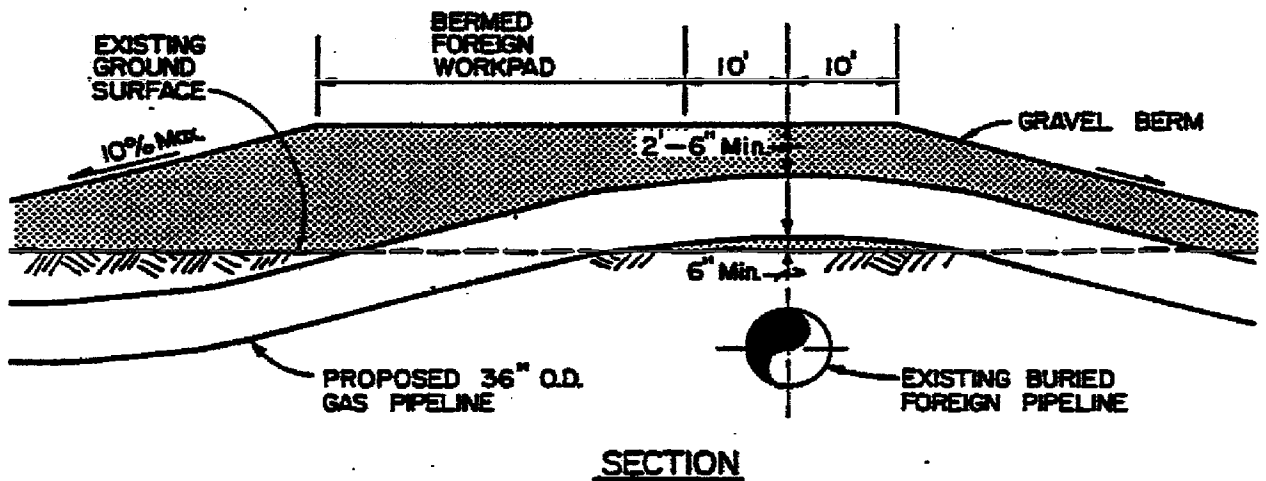
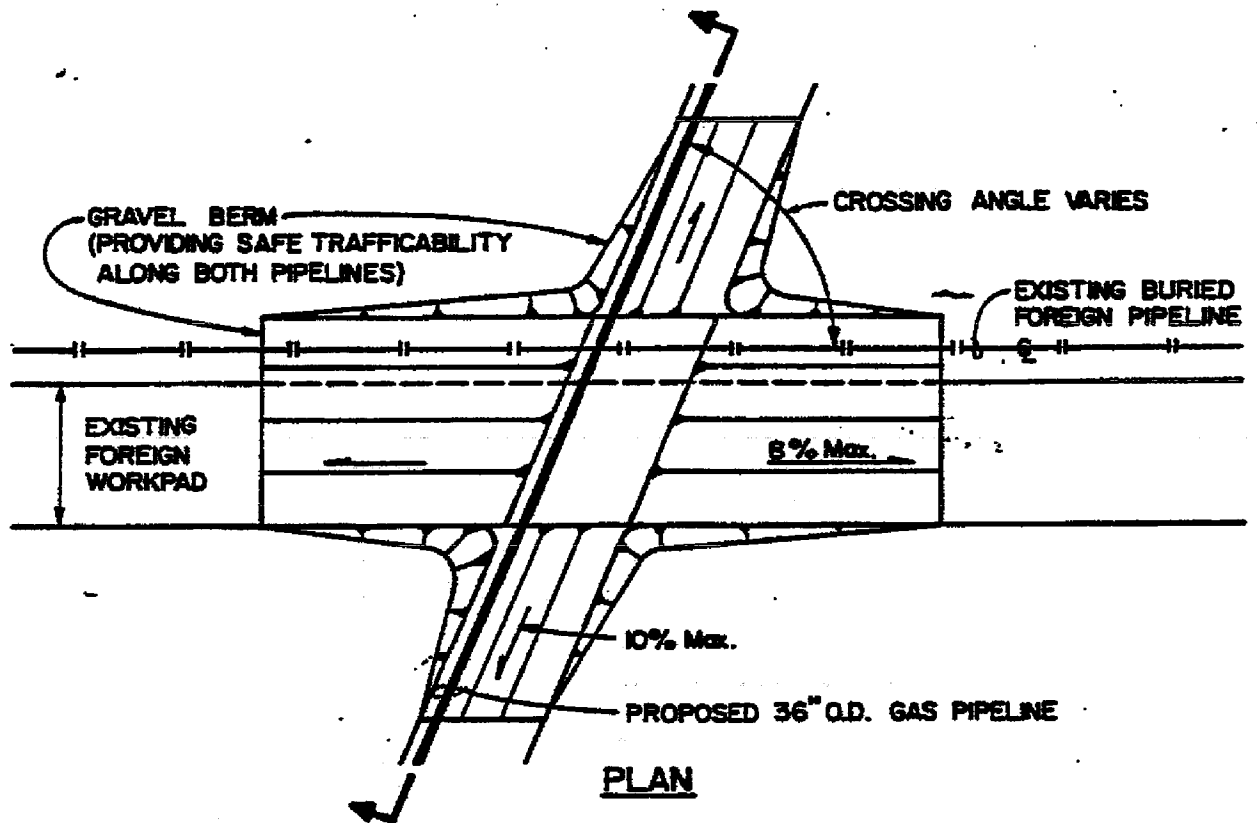
Detailed design and construction plans for this segment will be coordinated with the Alyeska Pipeline Service Company during the final design phase and before start of construction activities. Coordination between the two companies will continue throughout construction.

During operation of TAGS, the construction workpad through this segment will be utilized only for monitoring and maintenance activities, and will not be used for permanent access to the LNG Plant/Marine Terminal.

4. Clarify how the TAGS proposed typical crossing of foreign buried pipelines will accommodate access needs along those foreign pipelines by their respective operators. The typical drawing on page 5-86 shows a configuration that will not accommodate large vehicular traffic along the foreign pipeline.

Figure 5-12 of the Project Description showing a typical TAGS crossing of a buried foreign pipeline has been revised, and is shown as Figure 10. The revised scheme will accommodate large vehicular traffic along the foreign pipeline as well as along the TAGS pipeline.

In order to provide permanent access through the TAGS foreign pipeline crossing points, ramped gravel berms will be constructed. Existing foreign pipeline workpads will be ramped over the TAGS pipeline at grades of 8 percent or less. The ramped foreign pipeline workpad will be constructed so that the existing workpad width is not reduced. Placement and compaction of gravel material will be accomplished as required to provide a permanently serviceable structure. Each crossing location will require site specific evaluation of geotechnical and hydrological conditions for design. It will be necessary to coordinate design, including specific location, construction and long term maintenance efforts with existing foreign pipeline operators.



NOTES

1. TYPICAL FOR CROSSING OF EXISTING TAPS OR PROPOSED ANGTS BELOWGROUND PIPELINES.
2. SITE SPECIFIC DESIGNS MAY BE REQUIRED TO FACILITATE SURFACE DRAINAGE.



YUKON PACIFIC CORPORATION
TRANS-ALASKA GAS SYSTEM

TYPICAL CROSSING OF
BURIED FOREIGN PIPELINE
(TAGS BERMED ABOVE)

Figure 10

APPENDIX B

ANGTS SALES GAS CONDITIONING FACILITY

Proposed construction of a Sales Gas Conditioning Facility (SGCF) at Prudhoe Bay was evaluated on a conceptual basis by the Federal Energy Regulatory Commission (FERC) in a Final Environmental Impact Statement (FEIS), July 1980. The SGCF-FEIS is in addition to prior NEPA evaluations associated with authorization of the ANGTS pipeline delivery system. Both are incorporated by reference in the TAGS-DEIS.

The following discussion summarizes aspects of the ANGTS SGCF pertinent to construction of another gas conditioning plant to provide LNG quality natural gas needed for the TAGS project.

The authorized but unconstructed ANGTS SGCF would be located adjacent to the existing Central Compression Plant (CCP) constructed and operated as part of the oil production facilities at Prudhoe Bay. Structures and access roads would involve about 200 acres.

The SGCF would take natural gas flowing through the CCP that was being reinjected back into the oil-producing formation. Facilities at the SGCF would involve four identical extraction trains, each capable of processing 665 MCF/D. The extraction train would include:

- ° a low temperature separator to remove entrained liquid hydrocarbons from the feed gas received from the CCP
- ° a SELEXOL solvent treating unit to remove CO₂
- ° mechanical refrigeration for precise temperature control of hydrocarbon dewpoint.

Figure 3 from the FEIS shows the process flow diagram for the ANGTS SGCF. Table 1 identifies the composition of pipeline quality gas to be delivered to the ANGTS pipeline system described in Appendix B.

In addition to the 2 BCF/D of pipeline sales gas, other valuable products such as high CO₂ and natural gas liquids (NGL) would be produced (see page 7, FERC, 1980).

No new docking facilities were needed but upgrading of then existing facilities were evaluated as were the relationship between the SGCF and the then proposed water flood facility.

Approximately 4-1/2 years would be required for a work force of 1,000 to build the SGCF. Modular construction was evaluated with modules being shipped by sea lift barges from west coast manufacturing sites.