B-87
114083

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Trans-Alaska Oil Pipeline Operations: More Federal Monitoring Needed

To protect public lands, the operator of the Trans-Alaska Pipeline System was required to abide by federally imposed stipulations designed to prevent or detect oil leaks. With few exceptions, everything has gone smoothly for the pipeline; but the operator has sometimes varied from the requirements. Department of the Interior monitors have not determined whether these variances are justified, and their ability to do so is hindered by key staff vacancies.

Spot-checks along the pipeline indicated that environmental problems identified by Interior monitors were being corrected. However, additional research is necessary to determine the long-term environmental impact of pipeline activity.

EMD-81-11
JANUARY 6, 1981

014027

For sale by:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Telephone (202) 783-3238

Members of Congress; heads of Federal, State, and local government agencies; members of the press; and libraries can obtain GAO documents from:

U.S. General Accounting Office
Document Handling and Information Services Facility
P.O. Box 6015
Gaithersburg, Md. 20760

Telephone (202) 275-6241

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-199479

To the President of the Senate and the
Speaker of the House of Representatives

This report evaluates the effectiveness of the Department of the Interior's monitoring of Trans-Alaska Oil Pipeline System operations. It was prepared in response to a request from the Chairman, Subcommittee on Oversight and Investigations of the House Committee on Interior and Insular Affairs, but should be of general interest to the Congress in view of the pipeline's importance to this Nation's energy needs.

Copies of this report are being sent to the Director, Office of Management and Budget; and the Secretary of the Interior.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

TRANS-ALASKA OIL PIPELINE OPERATIONS: MORE FEDERAL MONITORING NEEDED

D I G E S T

The Trans-Alaska Pipeline System is delivering 1.5 million barrels of oil a day. It has transported over one billion barrels in the 3 years of its existence. With few exceptions, the operation has gone smoothly.

The pipeline will continue to be a major transporter for much of the rest of this century, and possibly into the next. The Alyeska Pipeline Service Company (the operator) and Department of the Interior monitors must assure that both pipeline and environmental integrity are maintained over this period.

To see how well the pipeline monitoring effort is being carried out, GAO evaluated several technical and environmental stipulations imposed on Alyeska as conditions for the pipeline's right-of-way across Federal lands. A number of these stipulations were unprecedented; some involved state-of-the-art technology. Compliance with some is still forthcoming. The Department of the Interior, through the Bureau of Land Management's Office of Special Projects, is charged with the primary monitoring responsibility.

TECHNICAL REQUIREMENTS

At times, Alyeska has deviated from various technical requirements designed to prevent or detect oil leaks. Whenever this happens, the Office of Special Projects is supposed to determine whether stipulated requirements are being satisfied and, if they are not, to take corrective action. But this has not always happened.

--The Office has determined that Alyeska, after abandoning the state-of-the-art curvature-monitoring tool ("superpig"), is not complying with the stipulation for a system that would detect pipeline settling and thus provide an early warning leak prevention system. The Office's consultants, although maintaining that a curvature-monitoring tool is still highly desirable, recommend waiving the stipulation. (See p. 7).

The stipulation was considered necessary for the protection of public lands, and subsequent leakage incidents lend credence to its necessity (e.g., the pipeline deformation which led to two June 1979 leaks probably could have been detected before any leakage occurred, had the superpig been operating as planned). The Office should not waive the stipulation but, now that the superpig has been abandoned, should work with Alyeska in investigating new and alternative technologies that will fulfill the stipulated requirement.

--Alyeska has not run internal corrosion pitting surveys (the corrosion pig) as frequently as required in the approved corrosion control plan. The Office has not reached agreement with Alyeska as to the optimal usage of the corrosion pig. (See p. 16).

--The line volume balance leak detection method is not operating at the sensitivity specified in the approved design. The Office should determine whether this lesser sensitivity is justified. (See p. 20).

--The effectiveness of the earthquake-monitoring system has not been thoroughly evaluated by the Office. (See p. 23).

STAFFING DIFFICULTIES

Given these variances, accelerated Federal monitoring seems desirable. But the Office of Special Projects' monitoring ability has been diminished, and will continue to be so, until key staff vacancies are filled. Fourteen of the Office's 44 positions are vacant, including 5 of 9 professional specialist positions and 3 of 7 field monitors. The Office is encountering difficulty in filling vacancies because of executive branch hiring limitations imposed to cut costs. The importance of filling these staff positions is accentuated by Interior's de-emphasis of the use of consultants. Since applicable Office costs are charged to Alyeska, these hiring limitations unnecessarily impede the Office's monitoring ability. (See p. 3).

ENVIRONMENTAL REQUIREMENTS

The environmental requirements reviewed included those for big game crossings, fish passage, erosion control, and revegetation. GAO and a consultant with Arctic environmental expertise spot-checked conditions along the length of the pipeline, noting that Alyeska has been responsive to various environmental problems that Interior monitors identified. However, in order to fully adjudge the company's compliance with the stipulations, long-term environmental impact research is necessary. (See p. 30).

Office of Special Projects' spot-checks should be supplemented by research to determine the long-term effects of Alyeska's activity. Research which has been done has been uncoordinated and inadequate. The problem is exacerbated by an Office decision which precludes other agencies, including the U.S. Fish and Wildlife Service and the U.S. Geological Survey, from charging the cost of pipeline-related environmental studies to Alyeska. The decision was made because Alyeska contested similar charges in a suit brought in 1978. The suit is still pending

in the U.S. Court of Claims. Only through an organized and sustained research effort can it be determined whether corrective actions required of Alyeska are sufficient, insufficient, or excessive. The Office is neither conducting nor sponsoring such research.

Some of the research necessary to evaluate the long-term environmental impact in the Arctic may have its greatest benefit in determining the need for or extent of safeguards appropriate for any future development in Alaska, and thus the cost of such research may not all be properly chargeable to Alyeska.

RECOMMENDATIONS

The Secretary of the Interior should direct the Authorized Officer, Office of Special Projects, to:

--Work with Alyeska--now that the super-pig has been abandoned--in investigating new and alternative technologies and in developing an acceptable approach to fulfill the stipulated requirement for a system that will detect pipeline settlement and thus provide an early warning leak prevention system.

--Determine the optimal usage for the corrosion pig, amend the corrosion control plan accordingly, and require Alyeska to comply with that usage.

--Determine the line volume balance leak detection technique's effectiveness and optimal sensitivity.

--Determine the effectiveness and reliability of the earthquake-monitoring system.

The Secretary of the Interior should direct the Authorized Officer to establish a list of priority research requirements necessary to evaluate the long-term environmental impact of

Alyeska's actions, and conduct such studies, or arrange to have them conducted. Consideration should be given to such research projects as:

--the necessity for and effectiveness of big game crossings;

--timeframe for natural vegetation to return to a disturbed area without reseeding;

--long-term effects of oil on vegetation;

--effects of changes in hydrology and modification to stream and wetlands, including potential fish passage problems in the future;

--impact of gravel extraction along the Trans-Alaska Oil Pipeline corridor;

--pipeline effects on raptors and endangered species; and

--pipeline effects on key staging areas for migratory birds.

In addition, GAO recommends that the Director, Office of Management and Budget, exempt the Office of Special Projects from hiring limitations imposed for the purpose of reducing Federal spending, insofar as such limitations relate to the Office's Trans-Alaska Pipeline System monitoring activities. (Recommendations to the technical and environmental requirements are shown beginning on pages 28 and 49, respectively.)

AGENCY AND COMPANY COMMENTS

Rather than an overall response, the Department of the Interior submitted individual comments from the Assistant Secretary, Land and Water Resources; the Geological Survey; and the Fish and Wildlife Service. (See app. V.)

The Assistant Secretary, who has direct responsibility for the Office of Special Projects, responded positively to all of

GAO's recommendations, except for the one concerning exempting the Office from hiring limitations. Closer scrutiny of the Office's organization and staffing is first required, he feels. This is also consistent with the response from the Office of Management and Budget. (See app. VIII.)

The Geological Survey also expressed general agreement with the report and emphasized the need for continuing research to assess the long-term environmental impacts of the pipeline. The Fish and Wildlife Service also agrees with the need for ascertaining the long-term environmental effects of the pipeline, and believes it should play a major role in such an effort. But, the Service disagrees with our conclusion that Alyeska was generally responding well to identified environmental deficiencies and felt, overall, that monitoring by the Office of Special Projects has been ineffective.

Alyeska commented that the draft report contained factual inaccuracies, that it should recognize that pipeline owners should not be required to fund all environmental impact research, and that it should recognize that Alyeska's performance with regard to the stipulations is the best that is technologically possible. (See app. VI.)

Alyeska's alleged "errors of fact" are more disagreements either with judgments of the Office of Special Projects or its consultant, cited in the report, or with the report's conclusions on the need for more Federal monitoring. A more detailed treatment of Alyeska's and the agencies' responses, and GAO's evaluation of them, is included in Chapter 4. In addition, because of the length and nature of Alyeska's comments, GAO's responses have been annotated--section by section--on a full text of Alyeska's letter. (See app. VII.)

Contents

ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
APO	Alaska Pipeline Office
BLM	Bureau of Land Management
CMS	Curvature Monitoring System
DOT	Department of Transportation
DRA	Drag-reduction additive
EEI	Ecology and Environment, Inc.
GAO	General Accounting Office

JFWAT	Joint Fish and Wildlife Advisory Team
MRI	Mechanics Research, Incorporated
NCR	Nonconformance reports
NMFS	National Marine Fisheries Service
NTP	Notice to Proceed
OMB	Office of Management and Budget
OPSO	Office of Pipeline Safety Operations (DOT)
OSP	Office of Special Projects
TAPS	Trans-Alaska Oil Pipeline
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

CHAPTER 1

INTRODUCTION

THE TRANS-ALASKA OIL PIPELINE SYSTEM

The Trans-Alaska Oil Pipeline System (TAPS) began transporting oil in June 1977. It is currently transporting about 1.5 million barrels per day, which will be its maximum output unless more Alaskan oil is discovered. (See app. I.) Alyeska Pipeline Service Company (Alyeska) operates the pipeline for eight owner companies.

Much of the 800-mile long pipeline crosses Federal land. As conditions for the right-of-way traversing this land, the pipeline owners agreed to various stipulations imposed by the Government. These stipulations were part of the "Agreement and Grant of Right-of-Way for Trans-Alaska Pipeline" (Agreement and Grant).

The Stipulations

There were 22 general, 14 environmental, and 11 technical stipulations in the Agreement and Grant. A list of these stipulations is included in appendix II. Some of the stipulations were pertinent primarily during construction of the pipeline, while others remained or became cogent in the post-construction (operational) phase. Although several Federal agencies were charged with enforcing aspects of the stipulations, the Alaska Pipeline Office--now reorganized as the Bureau of Land Management's Office of Special Projects (OSP)--was established as the primary Federal monitor for TAPS.

Office of Special Projects

Public Law 93-153 directed the Secretary of the Interior to issue, administer, and enforce the right-of-way permit through Federal lands and to issue regulations or stipulations for protection of the environment. The law provided for the reimbursement by the permittee of monitoring expenses incurred by the Federal Government. The Secretary and the pipeline owners signed the Agreement and Grant on January 23, 1974. The Agreement and Grant included the stipulations required by Public Law 93-153. Also on January 23, 1974, the Secretary

named the Department's Authorized Officer and delegated to him responsibility for ensuring compliance with the terms, conditions, and stipulations of the Agreement and Grant. From 1974 to 1979, the Alaska Pipeline Office's Authorized Officer reported directly to the Undersecretary of the Interior or to the Assistant Secretary of the Interior for Land and Water Resources. In October 1979, the Alaska Pipeline Office was reorganized as the Office of Special Projects within Interior's Bureau of Land Management (BLM). 1/ The Authorized Officer now reports to BLM's Alaska State Director.

OSP, during the post-construction phase, has scaled down its monitoring role. Staff numbers have decreased from a peak of 150 (including consultants) during contruction to 44 (including 14 vacancies) presently. Monitoring costs charged by OSP to Alyeska ranged from a 1976 high of $11.4 million to a 1979 low of $1.9 million, including consultant charges. Federal monitoring no longer includes the extensive technical and environmental consulting work which marked the construction and early operational phase. Consultant charges ranged from a high of $7.7 million in 1976 to a low of $0.8 million in 1979. OSP attempted to extend the contract of Mechanics Research, Inc. (MRI), the organization which had been OSP's primary consultant since February 1, 1974. The Bureau of Land Management has disapproved the extension. All consultant work has now been terminated.

Legal options

OSP can enforce compliance with the stipulations by invoking the following options, as specified in the Agreement and Grant:

--OSP can perform at Alyeska's expense, if Alyeska fails to comply with certain stipulations and provisions of the Agreement and Grant.

--the Government may institute court action against Alyeska. Equitable relief, including injunctive relief and the remedy of specific performance, is available.

1/To simplify the following discussions, the Department of Interior's former Alaska Pipeline Office will be referred to by its new name--the Office of Special Projects (OSP).

OSP may also carry out its responsibilities by exercising the following options:

--OSP may hire, at Alyeska's expense, consultants to monitor the operation and maintenance of the pipeline system.

--OSP can demand that Alyeska repair or replace seriously damaged real or personal property.

--OSP may require Alyeska to rehabilitate any seriously damaged natural resources.

--OSP may order the temporary suspension of any or all construction, operation, maintenance, or termination activities if necessary to protect public health, public safety, or the environment from immediate, serious harm.

For a detailed analysis of OSP's legal rights and options to enforce the stipulations and generally monitor and protect the Government's interests in the pipeline, see appendix IV. OSP officials advised that these measures provide Federal monitors with a broad range of legal options which should be sufficient to assure compliance with the Agreement and Grant.

Staff duties

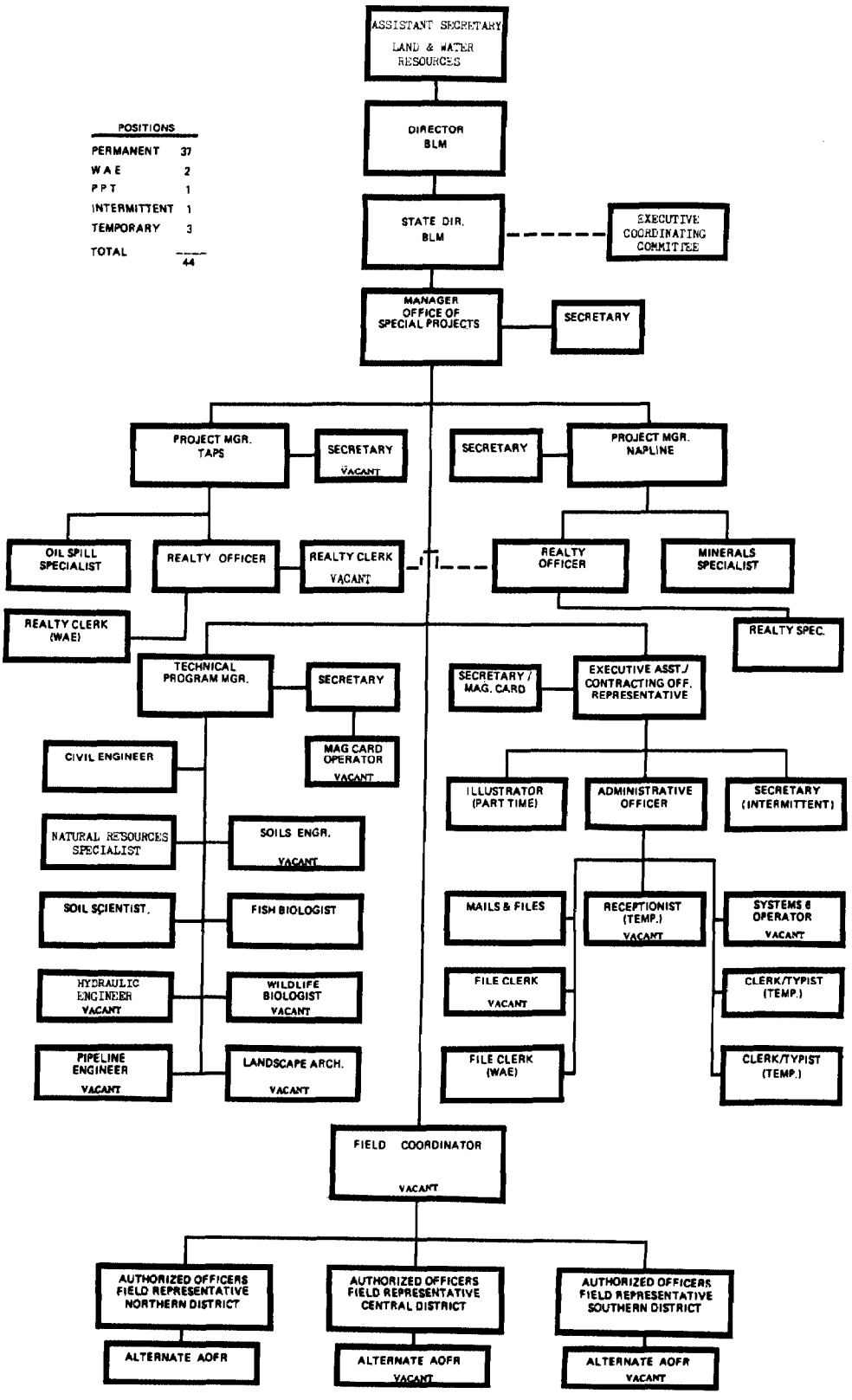
OSP's major responsibilities include monitoring the TAPS oil pipeline and processing permits for work being done on the proposed natural gas pipeline which will traverse Alaska. Expenses incurred for TAPS-related work are charged to Alyeska; gas pipeline expenses are charged to Alaskan Northwest Natural Gas Transportation Company. The accompanying organizational chart reflects this division of labor. (See p. 4.) There is a project manager for TAPS, a project manager for the gas line, and a pool of specialists directed by a technical program manager. These specialists are available to work on either the oil or gas pipeline projects. Authorized Officer Field Representatives conduct field inspections along the TAPS pipeline route.

OSP's staff presently includes 44 positions; 14 of those positions are vacant. Five of the nine positions in the specialist pool are vacant, including pipeline engineer, soils engineer, hydraulic engineer, wildlife biologist, and landscape

ORGANIZATION CHART
OFFICE OF SPECIAL PROJECTS

7/15/80

POSITIONS	
PERMANENT	37
WAE	2
PPT	1
INTERMITTENT	1
TEMPORARY	3
TOTAL	44



architect. Also vacant are three of seven field monitoring positions and six clerical positions. OSP is experiencing considerable difficulty in filling these positions, even though the resultant expenses would be charged to the parties being monitored, because executive branch hiring limitations have been imposed. OSP officials do not know when these positions will be filled. A description of duties for these vacant specialist positions follows:

--The pipeline engineer is responsible for monitoring Alyeska's superpig program, kaliper pig runs, corrosion control program, earthquake-and fault-monitoring program, and leak detection system.

--The hydraulic engineer is responsible for reviewing both TAPS and gas pipeline activities, primarily for the effects their gravel mining activities will have on streams and rivers.

--The soils engineer will be responsible for evaluating the settlement-monitoring program, which is part of Alyeska's superpig alternative.

--The wildlife biologist evaluates the effects of Alyeska's activities and reviews gas pipeline permit applications for the effects upon wildlife populations, including endangered species.

--The landscape architect would be involved in project siting decisions for the gas pipeline, and land restoration decisions for both the oil and gas lines.

OBJECTIVES, SCOPE, AND METHODOLOGY

The first objective of this review was to evaluate whether TAPS' primary Federal monitor--the Bureau of Land Management's Office of Special Projects--was assuring Alyeska's compliance, now that the pipeline is operational, with key technical and environmental stipulations. The second objective was to ascertain whether OSP was assuring that the actions required of Alyeska were effectively accomplishing the intent of the applicable stipulation.

To form the basis for this review, we selected several stipulated requirements. The requirements included in the review were not meant to be a randomly selected, statistically

representative sample of the universe of all such requirements. Rather, their selection was based on one or more of the criteria below:

--Measures of continuing importance during the pipeline's post-construction period.

--Measures of specific interest to Congress.

--Measures adopted specifically for the TAPS line, i.e, "experimental" measures.

While conducting this review, we interviewed agency officials, analyzed studies, reports, and internal memoranda from governmental and private sector sources, and conducted field inspections along the TAPS route in conjunction with a consultant hired for that purpose. For a detailed description of the consultant's duties and his resultant report, along with his biographical sketch, see appendix III.

CHAPTER 2

THE TECHNICAL REQUIREMENTS

In order to determine whether OSP was assuring that the technical requirements placed on TAPS were in place and effective during the post-construction phase, GAO reviewed several oil leakage prevention measures which had come under congressional scrutiny after leaks developed in TAPS in June 1979.

After the leaks, Alyeska was asked in congressional hearings what it would do to prevent further leakage. Alyeska stated that it would take various actions, including re-running the curvature-monitoring and corrosion-monitoring "pigs" through the pipeline, and improving the line volume balance leak detection techniques. Alyeska also stated that it would be implementing its earthquake-monitoring system. The following sections summarize the status of these items.

THE PIPELINE CURVATURE-MONITORING TOOL, OR "SUPERPIG"

In March 1980, after over 8 years of development and the expenditure of over $5 million dollars, Alyeska abandoned further development of the curvature-monitoring tool (often called the "superpig"). This is a 14-foot long state-of-the-art device which was intended to measure pipeline curvature as it was propelled by oil through the pipeline. If operating as designed, it would have enabled Alyeska to detect the changes in pipeline curvature which precede wrinkling and possible leakage. With this kind of warning, Alyeska could take counter-measures to prevent oil leakage.

The superpig was deemed necessary because the pipeline would be buried, in places, in frozen soils which could result in differential settlement. Heat from the oil pipe could melt ice in the soil, causing the pipeline to settle. The settlement could be of such magnitude that the pipe would eventually buckle and leak. A curvature-monitoring tool would, through successive curvature measurements of the pipeline, alert Alyeska that the pipe was bending, in time for the problem to be corrected before leakage occurred.

According to officials from the Department of the Interior, Department of Transportation, and National Transportation


EXIT

Safety Board, the pipeline deformation which led to the June 1979 leaks probably could have been detected before any leakage occurred, had the superpig been operating as planned.

During the summer of 1980, Alyeska discovered indications of pipeline settlement in several places. Alyeska took action to detect and prevent possible settlement, including affixing settlement-monitoring rods to the pipe, and putting grout (cement) beneath it. OSP and MRI have concluded, however, that Alyeska's present settlement-monitoring program, lacking the superpig, does not comply with the applicable stipulation.

The requirement

The Agreement and Grant stipulations do not specifically require a superpig. Stipulation 3.3.1 in the Agreement and Grant required that the pipeline owners establish a comprehensive monitoring system sensitive enough to detect the "approach to operational tolerance limits of the pipeline." The operational tolerance limits are those limits at which the pipeline, when subjected to stress, will wrinkle and consequently may leak. Stress tests of the pipe determined these limits.

The stipulation provided that the existence of this monitoring system was a prerequisite in determining which construction mode to use--whether to bury the pipe or require construction in the more expensive above-ground mode. Consequently, during construction, the existence of this monitoring system would be presumed when deciding which construction mode to select. The superpig was designed to provide early warning leak prevention--to detect the approach to the pipeline's operational tolerance limits which the stipulations required.

Stipulation compliance

The abandoned program

Foreseeing the need for this device, the pipeline owners had contracted for the development of a curvature-monitoring tool with AMF Tuboscope in 1971. Tuboscope had previously pioneered in the development of another type of pipeline pig, used to detect evidence of corrosion. The company designed a device which would take curvature measurements as it was propelled by oil within the pipeline--the superpig. The pipeline owners submitted the superpig program description to OSP in February 1974. To augment the superpig measurement system, Alyeska proposed to measure internal pipe diameter

changes (ovality) with kaliper pigs, to visually inspect the line with aircraft and land vehicles, and to conduct periodic on-site inspections.

The presumed existence of the superpig was a factor in determining the construction mode to be used; i.e., various forms of below-ground or above-ground construction. In some cases, this factor was instrumental in the construction mode decision. OSP officials were unable to identify these cases, or to quantify how many pipeline miles were involved. Unofficial estimates were that about 35 to 40 miles were affected.

A specific advantage for the superpig was foreseen by Alyeska in June 1977, when the company stated that the device would be the primary instrument used to monitor buried animal crossings. The superpig would easily detect pipe settlement before pipe integrity was threatened, the company stated.

After an August 1977 monitoring trip, OSP's soils engineer attested to the need for a superpig:

> "There are isolated locations where settlement and slumping are taking place in areas where straight pipe is buried. Generally these areas are not critical because Super Pig data can be compared to an original straight pipe to determine change in curvature."

Stipulation 3.3.1 required that the deformation-monitoring system be operational prior to the transmission of oil through the line. Oil began to flow through the pipeline in June 1977. The superpig had not been run through TAPS at this time. It had been tested in another line, however, and in June 1977 MRI and OSP judged the superpig operational because "the hardware and software exist in sufficiently developed form to permit the measurement objectives to be met." Largely because of various mechanical problems with superpig, however, baseline data for the full pipeline was not obtained by Alyeska until May 1978. The superpig was run again in December 1978 and after the June 1979 leaks. These leaks were caused when ice melted under the pipe, causing it to buckle and crack. This was the situation that superpig was designed to detect and prevent, according to Department of the Interior officials.

In July and August 1979, Alyeska ran the superpig several times in the northern section of the pipeline. On one such run, the superpig stuck in a pipeline valve. It was later

determined that the pig stuck because the valve was not fully open. Also, Alyeska advised that the design of the pig itself contributed to the accident. Removal of the pig cost between $2 million and $3 million, according to OSP. Alyeska canceled all future superpig runs for 1979.

In September 1979 Alyeska advised OSP that it was undertaking a program to evaluate the adequacy of superpig data. Alyeska announced that Tuboscope, superpig's developer, would no longer be substantially involved in the project, effective October 1, 1979. On October 9, 1979, Alyeska informed OSP that it had determined the 1978 baseline data to be invalid. On March 21, 1980, Alyeska advised OSP that the superpig program was being abandoned. Alyeska stated that its analysis had shown superpig data to be unreliable, that the pig had proved to be unsafe to run in the pipeline, and that a more practical program had been substituted.

Federal monitoring

MRI stated that OSP review of this program consisted mainly of informal discussions with Alyeska and Tuboscope personnel. Both MRI and OSP reported difficulties in obtaining the data necessary to adequately monitor the program. For instance, MRI's June 1980 final report characterized OSP's input to the superpig design as minimal. By the time OSP initiated review activities in 1974, the design was finalized. OSP was not able to obtain much detailed documentation of the curvature-monitoring system at this time, either because it was lacking or would not be supplied by Tuboscope because of its supposedly proprietary nature. MRI further stated:

> "During early review meetings in 1974 with Alyeska and its contractor, AMF Tuboscope, some early design specifications and configuration drawings for the Curvature Measurement System (superpig) were provided. Subsequent feasibility of the instrument was demonstrated by the Lakehead tests in 1976, and operational requirements were presented in briefings by Alyeska to the APO (Alaska Pipeline Office--now OSP) on June 4, 1977, and June 29, 1978."
>
> "However, this information was not submitted in accordance with the formal Notice to Proceed (NTP) process which is delineated in the Stipulations. In addition, no periodic written progress reports or detailed status reports were ever submitted,

including schedules of sufficient detail to determine the critical milestones necessary to meet the 1977 startup schedule for the pipeline."

MRI concluded that the review of the curvature-monitoring program design could not be adequately conducted. This was due partially to Alyeska's reluctance to submit documentation. Subsequently, when the superpig developed mechanical problems, neither OSP nor MRI had sufficiently detailed knowledge of the superpig design to independently determine which aspects required correction. Thus, OSP decisions regarding the curvature-monitoring system were dependent on Alyeska's information and judgment.

Verifying Alyeska's reasons for abandoning the program

Alyeska abandoned the superpig program because baseline data had proven to be unreliable, and because the pig was unsafe to run in the pipeline. MRI's final report on the superpig concluded that Alyeska's statistical analysis of the data was incomplete--that Alyeska had not conclusively shown that this data was invalid. As for the difficulties of running the superpig through the pipe, MRI stated that the kaliper pig (which is part of Alyeska's alternative program) also would stick in a partially closed valve. (This may no longer be the case. OSP advised that a recent change in the Kaliper pig design allows it to pass check values without locking them open.) Neither MRI's nor OSP's pipeline engineer, who had primary staff responsibility for monitoring the program, were convinced that the superpig program was a proven failure.

In October 1979, Alyeska offered to provide its computer facilities for OSP to conduct the additional statistical studies necessary to confirm Alyeska's conclusion that the baseline data were invalid. Alyeska agreed to allow OSP to conduct detailed hardware inspections, and to provide the superpig data tapes. OSP, however, decided not to devote the considerable resources that it thought necessary to evaluate the program, and neither obtained much of the information requested nor conducted the statistical analysis.

Staffing difficulties

Primary OSP staff responsibility for this program has been vested in OSP's pipeline engineer. This position became vacant in June 1980, and because of hiring limitations imposed

upon the Executive Branch by the Office of Management and Budget (OMB), OSP officials do not know when the position will be filled. Additionally, OSP has attempted to fill its vacant soils engineer position three times in the last 2 years, but has been unsuccessful because of hiring limitations. In its latest (August 1980) attempt to hire a soils engineer, OSP stated:

> "We consider hiring of the 'Soils Engineer' position as a number 1 priority and absolutely necessary to the function of our office. Without a soils engineer, this office has not been able to monitor the TAPS 'Stability Monitoring Program' which is the proposed substitute for the 'Super Pig."

Additionally, when OSP proposed to extend MRI's contract to December 31, 1980, BLM disapproved the extension. All consultant work has now been terminated. MRI would have been used to continue evaluation of the superpig program and Alyeska's alternative monitoring program.

The Alternative Program

In January 1980 Alyeska submitted a pipeline stability monitoring program to OSP, which the company determined would satisfy Stipulation 3.3.1 even though it did not include the superpig. The submitted program would identify pipeline deformation via the following:

--Quarterly kaliper pig runs. The kaliper pig can detect dents and similar pipeline deformation.

--Visual surveillance. This includes ground inspections supplemented by aerial surveillance, aerial photography, and other techniques.

--Thermistor monitoring. Two-hundred thermistor strings (temperature measuring devices) were installed during construction, and 80 were to be added subsequently. Periodic readings taken from these devices determine ground temperatures and melting in critical areas.

After identification of the problem using the above techniques, Alyeska's program goes into the problem confirmation and remedial action phases.

MRI's June 1980 final evaluation of the superpig program concluded that Alyeska's alternative program did not comply

with Stipulation 3.3.1, and that Alyeska should ask OSP to grant a waiver to that stipulation. The stipulation states that

> "***an acceptable comprehensive monitoring system of the pipeline shall be developed which will include, but not be limited to, making deformation measurements sufficiently sensitive and prompt to detect the approach to operational tolerance limits***"

MRI concluded that the surveillance techniques in the alternative monitoring program were not sensitive enough to detect the approach to operational tolerance limits of the line, and that the proposed system would not necessarily prevent leaks of the type previously experienced in TAPS. However, MRI stated, in the absence of a workable curvature-monitoring device, the alternative program is the best available, and:

> "The effectiveness of this system cannot be fully demonstrated until sufficient time has elapsed to accumulate experience and confidence in all aspects of the problem identification and confirmation phases of the program. This should be reflected in the periodic progress reports and evaluated by the Department of Interior's monitoring task group."

MRI further concluded:

> "Until further advances to the state-of-the-art for measuring buried pipe movement are made, the proposed techniques are considered adequate."

In a July 1980 memorandum to the Assistant Secretary, Land and Water Resources, Department of Interior, OSP agreed with its consultant's conclusion that Alyeska's alternative program did not comply with Stipulation 3.3.1. OSP stated:

> "Of the three surveillance techniques presented*** in the alternate monitoring program, the Kaliper pig is the only survey instrument that is capable of recording deformation anomalies in the pipe at periodic intervals. It is not, however, sensitive enough to detect the approach to operational tolerance limits of the pipeline***. Nevertheless, we consider it to be the best alternative means currently available of detecting potential pipe stress problems in the pipeline."

OSP recommended that Alyeska's alternative monitoring program be approved, subject to the following conditions:

--Alyeska shall not revise the program without the Authorized Officer's prior approval.

--Alyeska shall investigate new technology for monitoring pipeline settlement.

--Alyeska must, if it uses any measurement system similar to the aborted superpig, account for the loss of the initial baseline survey in predicting the approach to operational tolerance limits.

As of November 7, 1980, the Department of the Interior had taken no final action on this matter.

Resumption of the superpig program

Resumption of the program, according to OSP and MRI, would be expensive, time-consuming, difficult, and possibly fruitless. Both parties stated that resumption of development work would be significantly hampered by removal of Tuboscope technical personnel from the project. MRI reported that the conduct of further development work without the aid of these technical personnel would require at least 1 year of extensive effort by two or more highly qualified persons. Even if the program development were successfully completed, significant data were lost because Alyeska suspended the 1979 superpig field survey. MRI's final report concluded:

"To conduct such development work without the aid of the original design staff is estimated to require more than one year of extensive effort by a highly qualified staff of engineering and programmer personnel. Even if this work were to be initiated, there is not assurance that the program can be adequately corrected to give results within the accuracy required to detect the approach to operational limits. If it were conclusively determined that the 1978 baseline data could not be used with any degree of confidence, then the effort to complete further modification of the CMS (Curvature Monitoring System) program would not be worthwhile, since the basis for use of the instrument would be lost."

However, MRI stated, a curvature-monitoring tool is still highly desirable for pipelines buried in the Arctic.

> "All of these techniques (in Alyeska's deformation monitoring program) are extremely useful if performed on a reasonable periodic basis; however, they are not necessarily adequate to detect the approach to operational limits (movement prior to failure) for a pipeline buried in the permafrost soils found in the Arctic. Pipeline failure in such regions could result in severe damage to the environment. This would apply to either crude oil or chilled gas transportation systems in which melting of the permafrost results in differential settlement, or differential movement of the pipe is caused by frost heaving action. The most recent attempt at advancing the state-of-the-art in pipeline monitoring has been abandoned by Alyeska as being impractical. Consequently, the need for the development of a sensitive measurement device continues to be highly desirable for future pipelines built in arctic regions."

THE CORROSION-MONITORING PIG

The Agreement and Grant stipulates that the pipeline owners provide for periodic internal pitting surveys to detect evidence of corrosion. Both stipulations and DOT regulation require that Alyeska formulate and follow a corrosion control program. Alyeska's approved corrosion control program included a provision for corrosion pig runs to conduct internal pitting surveys annually for the first 3 years of pipeline operation and less frequently thereafter. Alyeska has not complied with this requirement.

In December 1979, Alyeska advised OSP that various corrosion tests performed to that date had shown no significant corrosion problem. The company also stated that, although running a corrosion pig was considered safe by industry standards, there were certain risks to running it in a pipeline containing in-line check valves. Consequently, the company proposed that, contrary to approved plans, the corrosion pig would not be run in 1980 unless unfavorable results from other corrosion-monitoring techniques were obtained.

According to MRI, corrosion of crude oil pipelines can occur whenever the pipe material deteriorates because of a

chemical or electrochemical reaction with its environment. Either external or internal corrosion, if not controlled, could cause holes and oil leakage in TAPS. The pipe must be protected externally from atmospheric corrosion, and internally from the corrosive action of water and sulphur compounds which are present in the oil being transported.

The corrosion pig that Alyeska used was built by Vetco, Inc. It is 17 feet long and weights 8,600 pounds. The device, as it is propelled by oil inside the pipeline, electro-magnetically measures pipe thickness. It is able to detect both internal and external corrosion. According to OSP's pipeline engineer, it is the primary detection method for internal corrosion.

Alyeska's internal corrosion control system also includes:

--corrosion probes at each pump station to monitor the potential for corrosion caused by the crude oil stream;

--cleaning pig runs to prevent the buildup of water and soils in pipeline low spots; and

--statistical sample data obtained by taking ultrasonic thickness measurements of the pipe at selected locations.

A specific advantage foreseen for the corrosion pig by OSP was the ability to detect corrosion caused when the pipeline's external coating becomes disbonded. Alyeska planned to use it to verify the overall effectiveness of their corrosion control measures.

The requirement

OSP and the Department of Transportation's (DOT's) Materials Transportation Bureau, Office of Pipeline Safety Operations (OPSO) monitor Alyeska's corrosion control program. OSP's responsibilities arise from Stipulation 3.10 of the Agreement and Grant, which required pipeline owners to provide detailed corrosion control plans to the Department of the Interior, and to provide for periodic internal pitting surveys by electromagnetic or other means. DOT is responsible for enforcing pipeline safety regulations (49 CFR 195). These regulations require that Alyeska prepare and follow a corrosion control plan.

In 1974 and early 1975, Alyeska submitted its proposed corrosion control plan to DOT through OSP. The plan included a provision for running the corrosion pig periodically. DOT described this provision as necessary in order for Alyeska to meet the requirements of DOT's pipeline safety regulations. The approved plan included the following corrosion pig requirement:

> "A pipeline pig designed to measure metal thickness will be used annually for the first 3 years. Based on favorable results of the first three years, the time between runs thereafter will be increased to 3, then to 5 years."

Alyeska confirmed, prior to pipeline startup, that the pig would be run on this schedule. A January 1977 Alyeska report on the corrosion control program reiterated that the pig would be used annually for the first 3 years, and that:

> "This will give a measure on external corrosion as well as internal corrosion. This equipment will scan the entire 360 degrees of the pipe and would therefore verify the effectiveness of the external monitoring system."

In June 1977, OSP approved Alyeska's corrosion control system as adequate to allow the oil to begin to flow.

Stipulation compliance

Alyeska's approved corrosion control plan included a provision that the pig be used annually for the first 3 years of operation. In 1977, the year oil flow started, DOT unsuccessfully attempted to have Alyeska run the pig right after oil startup. Alyeska refused, saying to do so was more conservative than industry practice.

> "We know of no company that has ever run a corrosion pig to determine internal corrosion in a pipeline handling noncorrosive crude such as will be pumped in the Trans-Alaska pipeline."

It was not until December 1978 that the first and only corrosion pig run of the entire pipeline was completed. Alyeska reported no evidence of corrosion. In 1979, one-fourth of the pipeline was surveyed by the pig, and Alyeska again reported no evidence of corrosion. The corrosion pig has not been run

subsequently. Thus, in the first three years of pipeline operation, the pig has been run through the entire pipeline once and through 25 percent of it on another occasion.

OSP officials stated that the major cause of pipeline leaks in the United States is corrosion. Alyeska advised that these statistics include a large number of old lines which were uncoated and/or installed prior to cathodic protection practices. Most such leaks for pipelines handling oil similar to TAPS crudes, according to Alyeska, were due to external corrosion. In OSP pipeline engineer's estimation, no other monitoring systems are as effective as the corrosion pig in identifying internal corrosion, and consecutive runs of the pig are necessary to establish a corrosion trend. OSP iterated its position to Alyeska in January 1980:

> "Pending review by this office of a thorough analysis of the 1978 baseline corrosion data, we cannot ascertain the acceptability of this data as an adequate baseline. In any case, the acquisition of a complete additional set of data is needed to establish any trends. Hence the need to make a complete run in 1980 seems inevitable. We thoroughly appreciate the need to minimize the running of heavy pigs of this type. We must also, however, point out that other corrosion data cannot be correlated directly by instrumented pig data. If the instrumented pig portion of the corrosion program is to be kept as a viable tool, at least one more complete acceptable run is necessary prior to initiating the three-year intervals.
>
> "Your corrosion program to date appears adequate, however, the corrosion instrument is an important portion of the program. We look forward to receiving your schedule for the next corrosion instrument survey."

In June 1980, OSP's pipeline engineer advised that Alyeska had not shown that a variance from the approved corrosion pig schedule was desirable. The pig had been run safely in TAPS and in other pipelines, and consecutive runs of the pig were desirable. However, OSP officials advised in August 1980 that they were now prepared to advise Alyeska that running the corrosion pig in 1980 would not be required. OSP had tentatively decided not to require a 1980 corrosion pig run because, since

other Alyeska tests had indicated low corrosion potential, there was no immediate danger from corrosion. Additionally, there was a danger that the pig would get stuck where the pipe was deformed ("wrinkled") in Atigun Pass. Contrary to Alyeska's proposal, however, OSP still thought the pig should be run on a periodic basis--that, in fact, it might be desirable to increase the frequency of corrosion pig runs as the pipeline grows older. OSP officials advised that their ability to monitor Alyeska's corrosion control program had been hampered since the pipeline engineer's position became vacant in June 1980.

Upon contact with DOT's Materials Transportation Bureau and OPSO in June 1980, we determined that officials from these agencies had not yet evaluated Alyeska's 1980 corrosion control program. A Materials Transportation Bureau official advised us in August 1980 that the agency would review Alyeska's corrosion control manual and the actions taken by Alyeska for compliance with the regulations at the next scheduled inspection of the pipeline (Fall 1980). DOT officials would also consult with the Department of the Interior, relative to the corrosion control plan, at that time.

LEAK DETECTION: THE LINE VOLUME BALANCE METHOD

In response to the stipulations, Alyeska submitted plans, which were approved by OSP, for a leak detection system which would detect leaks of a specified magnitude. The sensitivity to detect leaks of this magnitude has not been achieved. However, it was recognized that it would take time and operational experience with the pipeline to attain this sensitivity. OSP has not yet determined whether the line volume balance method is operating at its maximum feasible sensitivity.

The line volume balance method is TAPS' primary leak detection technique, according to MRI, because it is the most sensitive and is industry proven. In total, Alyeska's leak detection system consists of air and ground surveillance, and several automated leak detection techniques. Line volume balance was designed to be the most sensitive, by far, of the automated techniques.

The line volume balance technique accounts for the oil in the pipeline every 30 minutes, by comparing the volume of oil entering the system to the volume of oil coming into the terminal. This comparison must take into consideration

temperature and pressure effects on oil volume, volumes stored in tankage, slack line conditions, oil in and out of topping plants, and other factors. It was expected that the sensitivity specified in the approved design for line volume balance would not be achieved immediately. Rather, the technique would be refined as actual operating characteristics of the pipeline became known.

The requirement

Stipulation 2.14.2 required the pipeline owners to provide means for oil spill control, including leak detection. 1/ Alyeska submitted a design for a leak detection system, in response to this stipulation, which OSP approved. The system was to be sensitive enough to detect pipeline leaks in the range of 560 to 750 barrels per day. The line volume portion of the leak detection system was to provide this sensitivity.

Stipulation compliance

In 1977 and 1978 evaluations of the leak detection system, MRI concluded that since line volume balance is the primary leak detection method for TAPS, primary emphasis should be placed upon making this system operable. Continued effort should be made to improve its sensitivity over a reasonable period of time. MRI concluded that OSP's monitoring goals during the operational phase should include verifying the size leak that line volume balance would detect, and reaching agreement with Alyeska on a reasonable schedule to achieve the approved sensitivity.

Alyeska's schedule

OSP, after the oil began to flow, indicated to Alyeska that it was dissatisfied with the rate of progress on line volume balance. In March 1978, OSP advised Alyeska that:

> "From a mechanical leak detection standpoint, we expect Alyeska to better your timetable for getting

---

1/Although the leak detection system, and consequently the line volume balance method, arise from a stipulation classfied as environmental, it is substantively more similar to the technical requirements discussed and is thus included here.

> the***Line Volume Balance part of the leak detection system***within the design leak level tolerance represented by Alyeska and approved by this office."

In August 1978, OSP requested that if Alyeska could not bring the leak detection system into compliance with approved specifications, then it should apply for a temporary waiver from the applicable stipulation. Alyeska refused to apply for a waiver, replying that it had no reason to believe that the operational goals established for the project could not be met.

After congressional hearings on the June 1979 oil leaks, Alyeska implemented various changes designed to improve the line volume balance leak detection technique. In March 1980, the company stated that it wanted to:

> "***wait for a period of several weeks or months until a clear picture is available of the performance of all the improvements which have recently been carried out to the line volume balance, and to reassess our operational requirements at that time."

Sensitivity and reliability

In the Summer of 1979, the line volume balance's sensitivity was 3,000 barrels per day, and it was experiencing numerous false alarms at that sensitivity. Alyeska and Department of the Interior officials testified in July 1979 at congressional hearings that the system's sensitivity and reliability could be improved. Consequently, in the latter half of 1979, Alyeska implemented system changes, and the company reported that a lower false alarm rate had been attained. Alyeska also reported that the system was more sensitive than 3,000 barrels per day 25 percent of the time.

In March 1980, OSP reviewed Alyeska's line volume balance method and verified that the false alarm rate had been substantially reduced. However, OSP stated that only time and experience would demonstrate if the system is capable of detecting real spill-related problems. In March 1980, OSP advised that the system was operating at an average sensitivity of about 5,000 barrels per day. Our April 1980 spot-check determined that the system's average sensitivity for the 24-hour period immediately preceeding the check was 3,885 barrels per day. In August 1980, OSP officials advised that they had not reviewed line volume balance since March 1980,

but that they planned to conduct a followup review soon. A September 1980 spot-check showed the average sensitivity to be 5,243 barrels per day.

As has been true in other cases discussed in this study, OSP's monitoring efforts have been hampered by an inability to fill key staff vacancies. The OSP staff member most familiar with line volume balance left the organization in June 1980, and OSP does not know when it will be able to fill the vacated position. One of the duties assigned to this position (pipeline engineer) is monitoring the line volume balance leak detection technique. In the meantime, OSP's technical program coordinator is reviewing output from the system. However, for a full evaluation of the system, and a determination of its maximum sensitivity, OSP officials advised in September 1980 that a technical consultant probably would be required.

EARTHQUAKE-MONITORING SYSTEM

In September 1979, Alyeska's earthquake-monitoring system was completed and became operational. After much dispute with OSP, Alyeska still contends that the earthquake-monitoring system, programmed shut-down, and special contingency plans are not required by the Federal and State stipulations; however, Alyeska agrees these measures will help ensure continued operation of the pipeline in the event of a seismic occurrence. OSP has not done a thorough study of this system, now that is operational, nor has it determined the system's reliability or evaluated the need for such a system in future pipelines.

The earthquake-monitoring system, built by Sunstrand Data Control, Inc., is a computer-based, strong-motion, seismic monitoring system which is designed to provide immediate detection and evaluation of seismic activity near the pipeline. Seismic activity is detected by instruments located at Pump Stations 1, and 4 through 12, and at the Valdez Terminal. The local instruments not only measure ground acceleration but also calculate data which indicate the severity of the earthquake. When it detects an earthquake, the system alerts the Valdez Operations Control Center that a seismic disturbance is occurring. After the disturbance stops, the terminal computer retrieves both the measured and calculated data from the local instruments. The terminal computer then evaluates and compares this data with the design criteria on a mile-by-mile basis to produce a list of locations where the earthquake may have caused damage. The pipeline controllers are responsible for notifying the pump stations of items which should be inspected.

Depending on the severity of the event, the data produced indicate a degree of alarm which ranges from "no action required" to "shutdown" of the pipeline.

The requirement

Stipulation 3.4.1 of the Agreement and Grant required that the pipeline system be designed and constructed by application of modern, state-of-the-art seismic design so that no oil would leak from the effects of earthquakes ranging in Richter magnitudes of 5.5 in the northern area to 8.5 in the most southern area of the pipeline. Where such design was not technically feasible, special design was required which included:

--a network of ground motion detectors which would monitor, record, and signal an earthquake;

--a rapid programmed shutdown and immediate inspection of the system integrity; and

--a contingency plan for oil spill control for each seismically hazardous area.

Stipulation compliance

Alyeska considered its design of the entire pipeline was such that it would withstand an earthquake of the stipulated magnitude without oil leakage; therefore, Agreement and Grant requirements had been met. Hence, the special design for an earthquake-monitoring system was not a stipulated need. Stipulation interpretation notwithstanding, Alyeska submitted its proposal and intent for development of an earthquake-monitoring system based on its need for flexibility to make timely and effective operational decisions following a major earthquake. The proposed system was considered to be more advanced than any other system of this type in operation.

The OSP staff geologist and the Chief of Geological Survey's Branch of Earthquake Hazards agreed that although the probability of oil leakage from earthquake effects may not be large, it had not been shown to be zero. Therefore, in the opinion of these officials, the earthquake-monitoring system was required by stipulation.

In May 1977, OSP accepted Alyeska's position that the entire pipeline was designed to withstand a contingency earthquake and that stipulation requirements had been met. However, OSP continued to require an earthquake-monitoring system as part of Alyeska's overall Operations Supervisory System and as a requirement of the Terminal Control System.

In June 1977, prior to startup of oil in the pipeline, OSP approved Alyeska's design and proposed operational procedures for the earthquake-monitoring system, and accepted the temporary system configuration proposed for startup as adequate.

In December 1978, Alyeska again disputed OSP's requirement of an earthquake-monitoring system and contended that the specific stipulations had been complied with which stated:

> "The Pipeline shall be seismically designed, where technically feasible, by appropriate application of the best practicable technology available, to prevent any oil leakage from the effects***of earthquakes***"

Alyeska further maintained that the collection and use of information which would be available with an earthquake-monitoring system was the prerogative of Alyeska management. Alyeska did not believe the system was necessary and requested that OSP withdraw the requirement.

In February 1979, the OSP advised Alyeska that it would continue to require an earthquake-monitoring system as part of the operations control center data output. OSP's reasoning for this position was that there was no assurance that wrinkling or other overstressing of the pipeline would not occur in the event of an earthquake. Should such an event occur without the earthquake-monitoring system in place, OSP would require that the pipeline be shut down until a thorough inspection was made to ascertain damages; if the monitoring system was in place, uninterrupted operations may be possible after such an occurrence.

In February 1979, Alyeska agreed to finish and install the earthquake-monitoring system in order to minimize the possibilities for shutdowns after earthquakes and to maximize effectiveness in detecting earthquake damage.

Alyeska's earthquake-monitoring system was completed and became operational in September 1979. Operational experience indicated a need for some changes to the system, according to Alyeska.

The OSP pipeline engineer visited the Valdez Operations Control Center in March 1980. His appraisal of the system, having witnessed a test, was that it was functional but not operating continuously. The engineer advised that OSP has not yet reviewed the method and logic of the computer data. A check with OSP in September 1980, showed this still to be the case. The Assistant Secretary, Land and Water Resources, Department of the Interior, advised in November 1980 that the earthquake-monitoring system would be reviewed shortly.

In April 1980, we visited the Valdez Operations Control Center and received an explanation of the earthquake-monitoring system. We were advised that the system does not identify the exact epicenter of an event; however, it does give the general area, such as between two specific pump stations. The pipeline controller does not rely solely on Alyeska's earthquake-monitoring system; he calls the Alaska Tsunami Center at Palmer, Alaska, to confirm data received from Alyeska's system. The controller then places a plastic overview sheet on a map which indicate the portion of the pipeline which may have been affected. As of this time, there have not been any seismic occurrences near the pipeline with sufficient magnitude to activate the alarm system.

CONCLUSIONS: TECHNICAL REQUIREMENTS

As required in the Agreement and Grant, the designs and plans for the technical requirements discussed in this report were submitted to OSP by Alyeska several years ago. As actual operational experience is gained, the designs and plans may prove not to be optimal. If Alyeska varies from the original, it is incumbent upon OSP to determine whether stipulated requirements are being satisfied and, if they are not, take corrective action.

Several items reviewed--the superpig, corrosion control pig, and line volume balance leak detection method--exemplify such variances:

--The curvature monitoring tool ("superpig") has been abandoned. OSP and MRI have concluded that Alyeska's alternative program does not satisfy stipulated requirements.

--The corrosion pig has not been run as frequently as required by Alyeska's approved corrosion control plan.

--The line volume balance portion of the leak detection system is not operating at the sensitivity specified in the approved design.

Alyeska has advanced reasons in justification for these variances, including the following:

--The superpig is not a practical monitoring device. Baseline data has been gathered but it is invalid. The pig has shown that it is inherently unsafe to run in the pipeline.

--The corrosion pig, because of problems experienced in running heavy pigs in the line, will not be run as scheduled. It will be run only if other detection measures indicate a corrosion problem.

--The line volume balance leak detection method is operating at the maximum sensitivity and reliability currently possible. Further improvements can be made, and the system can be given a final evaluation, only after the accumulation of considerable data over an extended period of time.

These variances have not been uncontroversial. The superpig--the instrument which would detect pipeline settlement and thus provide an early warning leak prevention system--was considered necessary to protect pipeline integrity and public lands at the time the right-of-way for the pipeline was granted. Leaks have since developed under conditions which the stipulated system was designed to detect, i.e., settlement of the pipe caused by the melting of ice-rich soil beneath it. OSP's technical consultants have concluded that, although current technology has failed to provide an instrument capable of offering this early warning, it continues to be highly desirable for pipelines buried in the Arctic. These technological consultants, and OSP, have concluded that Alyeska's present settlement-monitoring program--lacking such an instrument--does not comply with the stipulated requirement.

In addition, although OSP now appears to be changing its position, it had argued for the desirability of running the corrosion pig in 1980, as required by Alyeska's approved corrosion control plan. And line volume balance, described by OSP and MRI as Alyeska's primary leak detection method, has

not yet achieved the sensitivity specified in its approved design.

Given these variances, an accelerated monitoring program seems desirable. However, OSP is not pursuing these matters through consultant work, and such evaluation by OSP staff is hampered by an inability to fill vacancies in key positions. OSP has not

--reached agreement with Alyeska, now that the company has abandoned the superpig program, on an acceptable approach to fulfill the stipulated requirement to detect pipeline settlement and thus provide an early warning leak prevention system;

--determined and reached agreement with Alyeska upon what constitutes optimal usage of the corrosion pig;

--determined the line volume balance leak detection technique's effectiveness and optimal sensitivity; and

--determined the effectiveness and reliability of the earthquake-monitoring system.

OSP's ability to monitor these facets of Alyeska's operation is hampered by key staff vacancies--notably those of pipeline engineer and soils engineer. The costs incurred by OSP for monitoring Alyeska's activities are charged to Alyeska. It is of no advantage to the Government to impose hiring and personnel limitations which preclude the filling of OSP positions. Such restrictions impede effective monitoring of the pipeline--the kind of monitoring which the Trans-Alaska Pipeline Authorization Act (the law that made Federal monitoring activities reimbursable) intended.

RECOMMENDATIONS: TECHNICAL REQUIREMENTS

We recommend that the Secretary of the Interior direct the Authorized Officer, Office of Special Projects, to

--work with Alyeska--now that the superpig has been abandoned--in investigating new and alternative technologies and in developing

an acceptable approach to fulfill the stipulated requirement for a system that will detect pipeline settlement and thus provide an "early warning" leak prevention system;

--determine the optimal usage of the corrosion pig, amend the corrosion control plan accordingly, and require Alyeska to comply with that usage;

--determine the line volume balance leak detection technique's effectiveness and optimal sensitivity; and

--determine the effectiveness and reliability of the earthquake-monitoring system.

We recommend that the Director, Office of Management and Budget, exempt OSP from hiring limitations imposed for the purpose of reducing Federal spending, insofar as such limitations relate to OSP's Trans-Alaska Pipeline monitoring activities.

CHAPTER 3

THE ENVIRONMENTAL REQUIREMENTS

The protection of the environment was a basic intent of the Agreement and Grant through the development of technical, environmental, and general stipulations. This agreement states:

> "In the construction***, operation, maintenance*** and termination of the Pipeline System, Permittees shall employ all practicable means and measures to preserve and protect the environment, as provided in this Agreement."

In order to evaluate whether Federal monitors are assuring that stipulated requirements are in fact preventing or minimizing environmental impacts, we selected several environmental requirements for review. A consultant with Arctic environmental and biological expertise was hired to assist in this evaluation. Requirements arising from stipulations dealing with erosion, revegetation, big game crossings, and fish passage were selected for review.

This review indicated short-term impacts, such as widespread erosion, sedimentation, and alteration of natural drainages, occurred during the construction phase of TAPS. Many of these impacts, according to MRI, resulted from Alyeska's failure to implement erosion and drainage control procedures concurrently with construction. Numerous environmental nonconformances were identified by OSP in the early operational phase. Alyeska applied more effort to restoration and revegetation once the oil was flowing, and all of these early operational phase nonconformances have been resolved to OSP's satisfaction.

New erosion and drainage-related problems will develop which affect streams and rivers. The Agreement and Grant requires that Alyeska conduct a maintenance program for the life of TAPS designed to prevent erosion and damage to natural resources. OSP surveillance and monitoring identify maintenance problems of this sort. Our spot-checks along the length of the pipeline indicated that Alyeska has responded to problems identified by OSP. With but a few exceptions, our consultant felt that maintenance of the TAPS right-of-way and work pad can only be considered excellent by any significant construction and environmental criteria. However, the

Federal research effort to determine the long-term environmental impact of pipeline activity is considered to be inadequate. (See the related statement from the Cold Regions Research and Engineering Laboratory on page 47)

ENVIRONMENTAL MONITORING

There was a need to insure that the construction and future operation of TAPS caused only minimal adverse impacts to fish and wildlife populations and their habitat. Consequently in January 1974, the Joint Fish and Wildlife Advisory Team (JFWAT) was formed under the authority of the Cooperative Agreement between the Department of the Interior and the State of Alaska, effective January 8, 1974, to act as advisor to the Authorized Officer and the State Pipeline Coordinator. The team had no line authority and was made up of biologists from the Alaska Department of Fish and Game (ADF&G). U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Bureau of Land Management (BLM).

In addition to JFWAT support, Ecology and Environment, Inc. (EEI), was subcontracted by MRI (OSP's technical support contractor) to supplement MRI's capability with environmental expertise. Their purview included spot-checks on Federal lands to assess Alyeska's compliance with the requirements and standards implicit in the environmental stipulations. Fish and wildlife matters were spot-checked less often than other environmental aspects since JFWAT was assigned the primary responsibility for monitoring these concerns.

JFWAT was disbanded in December 1977 and the EEI subcontract expired in December 1979. Monitoring of TAPS on Federal lands is now accomplished by the Authorized Officer's Field Representatives and other members of OSP's staff. Environmental compliance on State lands is monitored by the State Pipeline Coordinator's office. If a situation exists on State lands which may affect pipeline integrity, the Federal monitor becomes involved.

Special studies relating to the environmental aspects were done by USFWS and U.S. Geological Survey (USGS). These studies were approved by the Authorized Officer as cost-reimbursable under the Agreement and Grant. Alyeska took exception to the appropriateness of some of these charges, stating that the costs were not incurred as a result of monitoring pipeline activities. In 1978, in conjunction with the eight owner companies, Alyeska filed suit in the U.S. Court of Claims

contesting these as well as other charges. Because of this dispute, the Authorized Officer took the position that special studies planned and programmed by agencies other than OSP after fiscal year 1978 would not be approved as chargeable to Alyeska until the matter has been decided by the court. The court decision on the contested study costs is still pending.

Thus, the extensive study effort which previously marked Federal monitoring has been discontinued. JFWAT studies were short-term and ceased when the organization disbanded in December 1977. OSP is not presently retaining EEI (whose contract expired at the end of 1979) nor any other environmental consultants. Federal agencies which were previously conducting studies on various TAPS-related subjects are now inhibited from doing so by the Authorized Officer's decision not to allow study costs to be charged to Alyeska, pending results of Alyeska's court suit. Within its presently defined role of spot-checking Alyeska's compliance, OSP is not--through staff, consultants, or agreements with other agencies--engaged in any ongoing studies which would determine the long-term effects of pipeline construction and operation on the environment.

BIG GAME CROSSINGS

The 800-mile pipeline system crosses habitat and migration routes of several species of large and small wildlife, such as caribou, moose, bison, bear, sheep, wolf, and fox. TAPS borders or crosses the known migration routes of three caribou herds and several populations of moose. Early studies of caribou and moose indicated caribou would not go freely under a barrier and moose would move under a pipe only at certain heights. To mitigate the impact on these herds of wildlife in their migration routes and habitat, pipeline design was stipulated to allow free passage throughout the life of the TAPS project.

Controversy presently exists as to the effectiveness and need for the big game crossings. Studies done during the construction phase have been inconclusive. Large animals have been observed crossing the pipeline in areas not specified as big game crossings, i.e., where a standard construction mode for above-ground pipe exists. Conversely, observations also have indicated that some animals failed to achieve free passage whereas others, such as cows with calves, have avoided the pipeline corridor. JFWAT reports state

"***because environmental conditions necessary to fully appraise the impact of the pipeline have not yet occurred, a deferred evaluation of ***compliance***is necessary," (and) "***free passage and movement cannot be demonstrated."

According to our consultant, long-term Federal commitment to research on this subject is needed. Insufficient research has been accomplished to determine the necessity of big game crossings for TAPS and future pipelines.

Compliance with the stipulation from which the big game crossing requirement stems necessitates that free passage and movement of big game animals be provided throughout the life of the TAPS project. OSP is conducting no long-term evaluation to determine whether Alyeska's actions are sufficient to satisfy the intent of this stipulation. Sufficient data are not yet available to determine what effects the presence of TAPS may have on the behavior of these animals and their migratory movements. Continued study of the affected herds is necessary to evaluate possible effects.

The requirements

Stipulation 2.5.4 of the Agreement and Grant requires that free passage and movement of big game animals be provided throughout the life of the TAPS project.

Research of reindeer and caribou behavior in the presence of pipeline structures had been accomplished prior to pipeline construction; however, no similar studies had been done with moose. Earlier studies had determined that caribou would not go freely under a barrier. Observations of moose behavior at a location where a 48-inch above-ground siphon was built indicated that moose would not move under the pipe when it was less than 5 feet above ground, and no evidence that moose crossed over the pipe even when the pipe was partially buried. In addition, moose were observed to parallel the pipe for a distance of one-half mile without crossing.

The design criteria ultimately agreed upon were a minimum vertical clearance of 10 feet to allow for heavy snowfall for a span of 60 feet, placed at maximum intervals of one-half mile in areas known to contain significant numbers of moose. Caribou passage required special pipeline burial techniques. Historically established passage points were considered in deciding the placement of pipeline animal crossings.

Stipulation compliance

A total of 556 wildlife crossings were specifically constructed, and an additional 268 sites have been designated crossings where the pipe, because of natural terrain conditions, exceeds 10 feet in height and spans a minimum of 60 feet.

In December 1977, JFWAT reported that Alyeska was required to relocate or take other remedial action on 245 of the 556 crossings in order to meet the required finished dimensions of 10 by 60 feet.

In late 1976 and early 1977, Alyeska balked at correcting certain specified big game crossings on State land. Alyeska contended that of 468 moose they observed crossing under the pipeline, 211 crossings (45 percent) took place at points of 7 feet or less clearance and 57 (12 percent) at clearances of no more than 5 to 6 feet. In response to this, the State Pipeline Coordinator threatened, under provisions of the State right-of-way lease, "to contract out the necessary work to bring the large mammal crossings into compliance with approved design standards***" and Alyeska would be charged for all expenses. Alyeska subsequently submitted its corrective action plan, which was approved by the State Coordinator. In August 1980, the State Pipeline Coordinator's office advised that all big game crossings are now adequate.

JFWAT has conducted studies to assess effects of TAPS on moose and caribou movements. These studies state that compliance with the stipulations for free passage and movement cannot yet be demonstrated. Only the caribou study continues and is currently funded by Alaskan Northwest Natural Gas Transportation Company.

Contrary to the earlier belief that caribou would not go under a barrier, caribou have been observed crossing under segments of the pipeline. An ADF&G biologist stated "Obviously the pipeline isn't a problem for some caribou." A 1980 article in the Oil & Gas Journal stated the construction of 500 animal crossings was one example of the extra cost which was of little value and not needed. This article quoted an Alyeska official as stating, "The animals cross anywhere, they don't go to the animal crossings."

According to Alyeska, in the Nelchina Basin of South-central Alaska (Spring and Fall) caribou movements under the

elevated pipeline have been documented. Alyeska stated that no interruptions to migration or "bunching or herding" on one side of the elevated line have been documented or observed.

Federal and State wildlife biologists, in a report on the effects of TAPS on moose movements recorded during the period October 1974 through June 1977, described instances where some moose failed to achieve successful crossings of the pipeline. This report concludes that a deferred evaluation of industry's compliance with this stipulation is necessary:

> "The concept of free passage and movement of big game animals as contained in Stipulation 2.5.4.1 of the right-of-way lease agreement was not defined or expanded upon when the lease was signed. In the broadest sense, a stipulation as all-encompassing as this would be impossible to satisfy since it has been shown that certain animals under certain conditions have failed to achieve free passage. A reasonable definition of the stipulations would require that the welfare of moose populations not be compromised during construction and operation of the pipeline. If significant numbers of moose from a given population failed to reach their traditional seasonal ranges, or if the residents of an area adjacent to the pipeline failed to exploit the energy sources within their home range due to interference of the pipeline, the stipulation clearly would not have been satisfied. Because of the open-ended nature of the stipulations, and because environmental conditions necessary to fully appraise the impact of the pipeline have not yet occurred, a deferred evaluation of industry's compliance with this stipulation is necessary."

Stipulation effectiveness

State and Federal biologists agreed that the standards for construction for big game crossings, including buried sections for caribou and 10-foot high elevated sections for moose and bison, resulted in final designs which they felt might meet the stipulation calling for free passage and movement of big game animals. However, the biologists who established the standards indicated that they were not sure

that big game would in fact use these kinds of buried and elevated crossings, and that they did not intend to free the pipeline builders from their obligation to meet the stipulation. The JFWAT Federal coordinator who helped develop the standards stated, "We only said the kinds of crossings we recommended stood the best chance of meeting the stipulation, based on the knowledge we had at that time." Biologists maintain that if in the future it becomes apparent the crossings are not meeting the stipulations, then Alyeska will be obligated to try other methods.

The continuing study of caribou movements in 1978 and 1979 by the ADF&G reported an avoidance of the pipeline corridor, particularly by cows and calves, and the question of crossing success in relation to <u>any</u> pipe mode has proven largely irrelevant:

> "Human activity apparently represents the principal impediment to local movement since avoidance of the corridor occurs irrespective of the pipe structure which would otherwise be encountered."

This study, which centered on one herd of caribou, concluded that this herd is thought to be stable or increasing slowly.

According to our consultant, the question of whether big game crossings are adequate will take many years of research to answer. For example, he stated that passage by caribou east and west across the Haul Road and under or over the pipeline is adequately being managed by bulls--particularly in periods of insect harassment. There were also indications that cows with calves were not managing to cope with the situation in natural efforts to reach the Saganivanirktok River bars and gravels to escape insects. The consultant found that there may be significant stresses being put on the caribou population by this factor since without escape, extreme physiological stress is put on individual animals by insect harrassment even to the point of death due to metabolic imbalance (i.e, more energy expended than received through food and rest). He concluded that research on this question by the FWS, ADF&G and University scientists has been ad hoc and opportunistic at best. A long-term Federal commitment to research in this area is required in order to answer questions surely to be posed by further arctic developments affecting caribou movements. Also a parallel problem exists in areas of moose concentration. Since pipeline completion, snow conditions have not been near maximums of record. The question of pipeline blockage of moose movements under severe snow conditions remains unresolved.

OSP officials agree that a determination as to whether the stipulated big game crossings are fully effective or if they should be required of future pipelines cannot be made without further research of the total impact of TAPS on the actions and movements of big game herds.

EROSION AND REVEGETATION

The Agreement and Grant stipulations require that Alyeska's construction, operation, maintenance, and termination activities avoid or minimize erosion and disturbance to vegetation. It is important that vegetation along the pipeline route be protected as much as possible or replaced where disturbed, in order to maintain the stability of the soil, preclude erosion, and otherwise minimize environmental disturbances. Alyeska acknowledged that uncontrolled water runoff is the most important single cause of erosion. MRI stated that widespread erosion, sedimentation, and alteration of natural drainages were among the TAPS short-term impacts, and that many of these problems resulted from Alyeska's failure to implement its erosion control procedures concurrently with construction. This resulted in numerous OSP-identified environmental nonconformances in the early operation phase. More effort was applied to restoration and revegetation once the oil was flowing. All nonconformance reports have since been resolved to OSP's satisfaction.

Erosion and drainage control will continue to be a critical concern and will require continued maintenance of access roads and the work pad. Annual maintenance to correct problems that arise from breakup and heavy rains should limit the number of serious problems which develop. Our spot-checks indicated that Alyeska has been respondent to erosion and revegetation problems identified by OSP.

More research is considered necessary to address the long-term effectiveness of Alyeska's erosion and revegetation techniques. OSP has no such studies in progress, however.

The requirements

Stipulation 2.4 of the Agreement and Grant required that all pipeline system construction, operation, maintenance, and termination activities be performed so as to avoid or minimize disturbance to vegetation. In addition, Alyeska was to construct erosion control facilities to avoid induced and accelerated erosion, to lessen the possibility of forming

new drainage channels, and to avoid or minimize disturbance to the natural stability of the soil caused by temperature changes. The stipulations require revegetation of disturbed areas by seeding and/or planting.

The technical stipulations were specific as to construction of the pipeline at streams, below and above ground, and the design of culverts and bridges necessary for the maintenance of the pipeline. Stipulation 3.6.2 specified that erosion control procedures should accommodate the maximum rainfall and snow melt rate of the region and the effects that result from thawing produced by flowing or ponded water on permafrost terrain.

Stipulation compliance

According to Alyeska, uncontrolled water runoff is the most important single cause of erosion. Land surface protection employed to prevent this includes mulches, benches, diversion barriers, and sandbags. Stream bank controls include the use of rock-filled wire baskets, various sizes of rocks used as fill in low areas, and vegetation.

Grass seed mixes were developed for a wide range of environmental conditions encountered along the route. In the summer of 1977, comprehensive rehabilitation, restoration, and revegetation measures were implemented by Alyeska. OSP feels that results so far have been mostly successful, with some failures in massive ice situations and in areas of high elevation or extreme northern latitude. In January 1979, OSP reported that about 98 percent of all grass seeding work had been completed. The willow planting program at game crossings and planting for aesthetic purposes would carry over into future years. The OSP soil scientist stated there is not much left to be done in the revegetation effort; however, if any erosion or vegetation problem arises later, Alyeska is obligated to correct it.

MRI reported in December 1977 that among the TAPS short-term impacts were widespread erosion, sedimentation, and alteration of natural drainages. Whereas a certain amount of sedimentation was inevitable, e.g., when making a below-ground crossing or actually installing a drainage control structure, much of it resulted from Alyeska's failure to implement its erosion control procedures concurrently with construction. Other impacts resulting from poor implementation of erosion and drainage control included erosion of the work pad to the point that access was prevented, transport of sediments into

adjacent undisturbed areas, and (in a few instances according to OSP) trees dying when trapped in ponds created by inadequate drainage.

During the construction phase and the first 6 months of operation, the MRI monitors issued 3,956 nonconformance reports (NCR) on environmental concerns. Just prior to the start-up date, MRI reported that all pipeline integrity nonconformances were either corrected or, through reevaluation, determined to be within design tolerances. However, many of the environmental nonconformances not only remained outstanding but increased during this period, since Alyeska's contractor efforts were used primarily on work related to safe oil pumping activities. In November 1977, there were 474 outstanding nonconformance reports documenting the work in Alyeska's post-construction restoration plans which were not completed. The following table shows the major activities comprising this figure.

Activity	Nonconformance reports
Revegetation work	227
Erosion control work	126
Surface drainage	64
Clean-up activities	13
Excavation and embankment	12
Grading	8
Other	24
Total	474

A more concerted effort was applied to restoration and revegetation plans once the oil was flowing. Alyeska's efforts in 1978 and 1979 resulted in all nonconformance reports being closed out to OSP's satisfaction by early 1980. According to OSP's soil scientist, seeded grass requires at least two growing seasons for successful evaluation. The scientist is continuing evaluation of erosion control and revegetation

success this summer. In July 1980, his observations indicated no severe erosion had taken place from the spring breakup.

Erosion and drainage control will continue to be a critical concern throughout the operations phase. MRI reported that new erosion- and drainage-related problems are likely to develop from heat-induced effects of the buried pipeline, and continued maintenance will be required.

At the request of OSP, a USFWS biologist who had been a member of JFWAT and associated with the construction phase of the pipeline made a surveillance trip along the TAPS corridor in the summer of 1979. The purpose of the trip was to evaluate and report on the condition of project features relative to fish and wildlife resources and TAPS environmental stipulations. This 1979 report cited such problems as inadequate drainage/erosion controls, potential fish entrapment, revegetation requirements, improper culverts, and improper housekeeping at camp sites and solid waste disposal pits.

In the summer of 1980, our consultant and one of our staff members accompanied an OSP representative on a tour of the pipeline to observe and evaluate the areas cited by this report. The most outstanding and most numerous comments concerned inadequate erosion and drainage control. A total of 24 of these problem areas were cited. Our observations indicated that 3 of the 24 areas had not yet been repaired. In approximately seven of these areas, additional maintenance was needed. Other areas not cited in the report were noted where routine maintenance was needed.

The need for revegetation was cited in the 1979 report for only two areas. One of these areas was at a camp site which will be restored by Alyeska when all camp facilities are removed. The other area involves the State-maintained Haul Road which was constructed concurrently with and roughly parallel to the pipeline.

Stipulation effectiveness

MRI reported in December 1977 that the stipulations proved to be a sound and practicable concept. However, MRI further stated that in a number of instances, the stipulations should have established definite time limits for compliance and that:

> "Ambiguous wording such as '***as soon as practical' and '***in a timely manner' conveyed little direction

to the Government or to Alyeska***. Examples which should have time limits spelled out are***initiation of erosion control and revegetation, and corrective actions on noncompliances."

MRI further concluded that erosion and sedimentation was widespread and much of it resulted from Alyeska's failure to implement its erosion control procedures concurrently with construction.

The Interior Department's impact statement predicted that 30,000 acres of Federal land would be disturbed. MRI estimates approximately 26,600 acres were disturbed; therefore, the impacts are somewhat less than expected. The successful completion of the restoration program will result in some resource values being returned to the previously disturbed areas.

Our consultant emphasized that the major drainage structures and erosion control problems which still exist are associated primarily with the State-maintained Haul Road rather than with TAPS access roads and work pad. Two erosion areas were cited by the consultant as being caused by inadequate hydraulic design through the Haul Road, such as inadequately sized culverts. Alyeska built the Haul Road under State contract and turned it over to the State of Alaska at the time of its completion; Alaska is responsible for maintaining this road. The Haul Road problem is a subject of an ongoing GAO review and will be reported upon subsequently.

According to our consultant, maintenance of the TAPS right-of-way and work pad, with but a few exceptions, can only be considered excellent by any significant construction and environmental criteria. For example, at one site where USFWS reported drainage and erosion control measures as being "woefully inadequate," existing efforts appear to be both practical and responsive to stipulations. Erosion along the pipeline often is a problem of degradation caused by melting of ice-rich soils rather than drainage control; a problem where surface maintenance will be required on a continuing basis. Melting of ice-rich soils (thermal degradation or subsidence) causes slumping and settlement of the access roads and work pad. Thermal subsidence was severe in one northern segment of TAPS where the pipe was buried in ice-rich permafrost. However, Alyeska is evaluating pipeline integrity here to determine what controls are necessary. The long-term solution may require a change in design and possibly relocation of the pipe.

Revegetation efforts are still being evaluated. According to OSP, reseeding efforts require two growing seasons before evaluation is possible. A study should be undertaken to determine how long it would take for natural vegetation to return to a disturbed area without reseeding.

Nowhere along the pipeline did there appear to be permanent, fenced-in vegetation-recording plots to learn the true rate of natural plant regeneration either in barren or reseeded areas. A cost/benefit examination, which explores the necessity of fertilizer/exotic plant reseeding versus natural regeneration is needed.

According to our consultant, the planting experiments on non-indigenous willows, which currently appear healthy, are doomed to failure due to the relationship of plant physiology to micro-climatic profile. Additionally, no apparent effort is being made to record plant succession under oil spill conditions, such as exists in the area of the Mile Post 734 oil leak which occurred in 1979. A study needs to be performed to determine the long-term effects of oil on Alaskan vegetation.

The Authorized Officer's decision to disallow reimbursable charges for any TAPS-related studies by other agencies after fiscal year 1978, based on Alyeska's pending court suit, has resulted in the cancellation of previously planned research of the pipeline's environmental effects. Currently, USFWS is performing a vegetation study at Prudhoe Bay regarding gravel construction in the oil production field. This study originally was planned to include the impact of gravel construction all along the TAPS corridor. However, when USFWS was advised that reimbursable funds would not be available for such a study, the program had to be reduced in scope; the pipeline portion was cancelled. According to USFWS, preliminary results of this study at Prudhoe Bay indicate substantial changes in biota; gravel construction has biologically and physically altered the wetlands.

FISH PASSAGE

TAPS crosses more than 600 streams, of which nearly 400 are documented as fish streams, and six rivers which are major drainage systems. Multiple crossings occur in several rivers. The Agreement and Grant stipulates that Alyeska shall provide for uninterrupted movement and the safe passage of fish. However, major construction inevitably and at times irreparably damages fish habitat.

Federal and State biologists believe many of the common problems at stream crossings--with inadequate drainage structures, for example--originally occurred because so little was known about a number of the streams, particularly those north of the Yukon River. As one fisheries biologist who has studied streams along the corridor since 1970 explains.

> "When we're talking about Alaskan streams, we're talking about an entirely different thing than streams in the Lower 48; coming here and dealing with these streams is like landing on the moon and looking at streams***"

In December 1977, after the startup of oil, MRI reported that timely and proper implementation of the erosion- and drainage-control procedures would have in virtually all cases avoided unnecessary erosion, sedimentation, and interference with fish movement; the short-term, unavoidable environmental impacts due to construction were, for the most part, those associated with mandatory surface disturbance, such as construction of access roads and the work pad. MRI further stated that most of those problems had been corrected and further predicted that the rehabilitation program, which included such things as revegetation, restoration of hydrologic conditions in rivers, and correction of deficiencies in erosion and drainage control, would reduce these impacts to some degree.

Our spot-checks showed that Alyeska is being respondent to OSP-identified fish passage problems. A continued and concerted monitoring effort by OSP is necessary to recognize potential fish passage problems so that corrective action can be taken in a timely manner.

Rehabilitation and restoration of disturbed lands continue. A final assessment of the effectiveness of the stipulated requirements cannot be made until sufficient evidence has been collected on the affected fish and their habitat. Several agencies contacted have indicated a need for additional studies in order to evaluate the full long-term impacts of TAPS. The studies would treat modifications to streams and wetlands, changes in hydrology, the effect of gravel construction along the pipeline corridor, and the impact of sedimentation, erosion, and water quality on fish and their habitat. OSP has no such studies in progress.

The requirements

Stipulation 2.5.1.1 of the Agreement and Grant required that Alyeska provide for uninterrupted movement and safe passage of fish. Any artificial structure or any stream channel change that would cause a blockage of fish should be provided with a fish passage structure or facility that meets all Federal and State requirements. Other stipulations stated that under certain situations Alyeska should take specific action to:

--prevent harm to fish;

--prevent trapping or stranding of fish;

--construct levees, beams or other suitable means to protect fish and fish passage and to prevent siltation of streams or lakes;

--avoid channel changes in fish spawning beds; however, where channel changes cannot be avoided, new channels should be constructed according to written standards supplied by the Authorized Officer;

--protect fish spawning beds;

--repair all damage to fish spawning beds; and

--conduct all construction, operation, maintenance, and termination activities so as to provide maximum protection to fish and wildlife and their habitat.

During the construction phase of the pipeline, JFWAT performed in an advisory role and had primary responsibility for monitoring fish and wildlife matters. Regardless of the degree of environmental stipulation compliance by Alyeska, JFWAT recognized it was inevitable that in many instances irreparable damages would occur to fish and wildlife habitat. JFWAT disbanded at the end of the construction phase; monitoring on Federal land is now done by OSP staff.

Stipulation compliance

According to MRI, Alyeska experienced many operational difficulties during construction from river and floodplain

crossings which resulted in nonconformance reports. A majority of the NCRs fell under three problem types:

--Alteration of natural drainages.

--Erosion and river or stream sedimentation.

--Debris in river or streams.

MRI stated that alterations of natural drainage were caused by insufficient drainage structures, improper placement of such structures, dike construction across drainages, and improper diversions at floodplain material sites and river crossings. Alyeska's failure to utilize proper ditch plugs resulted in high velocity flow of ditch water into waterways, causing erosion and river or stream sedimentation. Construction-generated debris was allowed to accumulate in rivers and streams.

River and floodplain construction activity cannot take place without some environmental impact. MRI concluded that Alyeska's failure to execute adequate procedures led to avoidable environmental impacts. Most NCRs had been complied with by December 1977; OSP reported no outstanding NCRs as of January 1980.

In December 1977, MRI's general assessment was that Alyeska's overall stipulation compliance with fish and wildlife protection requirements was poor, and further stated:

> "Particular areas of poor performance are fisheries stream siltation, and barriers to fish passage. A great deal of governmental pressure was applied to Alyeska in order to correct fish and wildlife problems, but resolution of these problems often was not timely***. The overall impact of the Trans-Alaska Pipeline on fish and wildlife must be assessed as significant in the short-term, although not of major magnitude. The long-term impact cannot be assessed until the completeness and effectiveness of Alyeska's rehabilitation work is known."

Monitoring of TAPS during the operational phase is primarily accomplished by the Authorized Officer's Field Representatives, who are on the pipeline on a weekly basis, and by technical staff members. Each year since the start-up

of oil through 1979, the U.S. Fish and Wildlife Service, at the request of the Authorized Officer, has conducted a surveillance trip of the entire pipeline corridor to evaluate the condition of project features relative to fish and wildlife resources and TAPS environmental stipulations. The specific sites commented upon which need attention would then be re-examined by OSP.

During the summer of 1980 our staff accompanied an OSP representative on a tour of the pipeline for the purpose of observing the areas cited in the 1979 USFWS surveillance report. This report had cited nine areas with potential problems of fish passage. In almost every instance, maintenance work had been accomplished; there was no evidence of fish blockage. For the most part the (USFWS 1979) report concerns had been repaired, were being attended to, or were scheduled for attention.

Stipulation effectiveness

USFWS recently completed one year of a planned three-year study, "Evaluation of Stream Crossing and Effects of Channel Modifications on Fishery Resources along the Route of the Trans-Alaska Pipeline." Five areas along the pipeline are being studied. Initial results of this study indicate that only one of the five areas studied contains significant barriers to fish passage, where natural channel disturbances resulted from pipeline construction. Also, improper placement of a culvert caused most of the stream flow to bypass a culvert. The absence of a drainage structure from ponds resulted in the loss of stream surface flow. Minimal impacts were noted in another area of the study during rain storms when high flows increased the velocity through culverts and low water crossings. The study stated that upstream passage through these culverts and low water crossings is probably unimpaired at normal flows except for very young fish. In one area, the report stated that Alyeska's maintenance program prevented blockage at the downstream edge of roadway crossings by removal of gravel accumulation. The report further concluded that some low water crossings created barriers to fish passage and loss of fisheries habitat, and stated:

> "When considered on a case-by-case basis, the loss of several hundred feet of fish habitat in a very small stream may seem insignificant. However, considering the importance of these small streams to recruitment and rearing of young fish and the large number of these streams crossed by the oil pipeline project, the total impact has been of major proportions."

Prior to 1980, since oil start-up, USFWS was making an annual routine surveillance trip of the entire TAPS corridor to evaluate fish and wildlife aspects. In 1980 the Authorized Officer did not consider the USFWS surveillance trip to be necessary. OSP decided to conduct the inspection with its own professional staff.

Improper erosion and drainage controls have a large effect on the many fish streams and habitat along the TAPS corridor. In this respect, those problems associated with the Haul Road, which was built in conjunction with and parallel to the pipeline, contribute to problems of fishery sensitive areas. As stated previously, maintenance of the Haul Road is a responsibility of the State. The ability of the Federal Government to deal with Haul Road problems will be addressed in a later report.

From observations noted during the summer of 1980, our consultant noted a need for additional maintenance at some fish streams. In two instances where culverts were inadequate, a small amount of downstream channeling would be desirable and hydrologically helpful without loss of fish habitat. The consultant noted that, overall, maintenance of the TAPS right-of-way and work pad is excellent, with few exceptions; fish passage was generally assured in the locations observed.

CONCLUSIONS

The Agreement and Grant requires that Alyeska conduct a continuing maintenance program for the life of TAPS to prevent progressive or irreversible degradation of environmental quality. New erosion-and drainage-related problems will develop which affect streams and rivers; maintenance problems will recur. Periodic maintenance is required to provide maximum protection to fish and wildlife and their habitat. OSP spot-checks identify maintenance problems of this sort, and Alyeska has generally taken adequate corrective action. However, in order to evaluate compliance with and to determine the effectiveness of the environmental stipulations, the long-term effects of Alyeska's activities must be ascertained. As reported by the U.S. Army Cold Regions Research and Engineering Laboratory in its summary of a May 1980 workshop on environmental protection of permafrost terrain,

> "Long-term monitoring through routine collection of post-construction baseline programs should be part of any large project. Unfortunately, once a

project is completed, there is little interest or funds available to insure continued monitoring. Post-construction impacts can only be assessed through appropriate monitoring and analyses programs."

OSP is conducting no such research itself, nor is it sponsoring such study through the use of other Federal agencies. Thus, OSP is not assuring that stipulated requirements are effective, in that no provision is being made for evaluation of resultant long-term environmental consequences.

Our consultant characterized the present status of TAPS-related environmental research as ad hoc, opportunistic, and insufficient to adequately judge the project's long-term effects. JFWAT studies conducted during the construction phase were short-term; the studies ceased with the disbanding of the organization in December 1977. Several Federal agencies have indicated their desire to study the impacts of TAPS, however, few such studies are being conducted. Federal agencies which were conducting such studies are now inhibited from doing so by an Authorized Officer's decision not to allow study costs to be charged to Alyeska, pending results of a court suit brought in 1978 by Alyeska contesting the validity of some study costs.

Some of the areas in which studies are needed, as recommended by the Federal and State agencies contacted, are:

--Changes in hydrology and modification to stream and wetlands.

--Impact of gravel construction along the TAPS corridor.

--Effectiveness of big game crossings.

--Methods and success of revegetation programs. How long would it take for natural vegatation to reappear without a reseeding program?

--Effects of oil spills on natural vegetation over a period of time.

--Effect on raptors and endangered species.

--Effect on key staging areas for migratory birds.

The results from such studies could cause OSP to redirect Alyeska's actions to further minimize environmental impact, and would be beneficial in reducing such impact on future Arctic construction projects. Various avenues are open to OSP for the conduct of such studies, including:

--OSP staff.

--consultants.

--other Federal agencies.

--appropriated funds.

It is recognized that some of the research necessary to evaluate the long-term environmental impact in the Arctic may have its greatest benefit in determining the need for or extent of safeguards appropriate for any future development in Alaska, and thus the costs of such research may not all be properly chargeable to Alyeska. The ability of OSP staff to conduct these studies would be hampered by numerous key staff vacancies, including wildlife biologist, soils engineer, and hydraulic engineer. The vacancy problem has been addressed in Chapter 1.

RECOMMENDATION

We recommend that the Secretary of the Interior direct the Authorized Officer to establish a list of the priority research requirements necessary to evaluate the long-term environmental impact of Alyeska's actions, and conduct or arrange to have such studies conducted. Consideration should be given to the research projects previously mentioned in this report.

CHAPTER 4

AGENCY AND COMPANY COMMENTS AND OUR EVALUATION

Comments on a draft of this report were solicited from the Department of the Interior, Alyeska Pipeline Service Company, and the Office of Management and Budget. Agency and Alyeska comments are analyzed below and their full texts are included as appendices V, VI and VIII. In addition, because of the length and nature of Alyeska's comments, our responses have been annotated on the full text of Alyeska's letter. (See app. VII.)

DEPARTMENT OF THE INTERIOR

Rather than preparing an overall response, the Department of the Interior submitted separate comments from the Office of the Assistant Secretary, Land and Water Resources; Geological Survey; and Fish and Wildlife Service.

Assistant Secretary--Land and Water Resources

The Assistant Secretary, who is directly responsible for OSP, responded generally favorably to the analysis and recommendations included in our draft report and indicated that OSP either was doing, would be doing, or should be doing the kinds of analyses required to assure Alyeska was fulfilling the various stipulated requirements. Specificially, the Assistant Secretary stated that:

--OSP, in consultation with the Department of Transportation's Materials Transportation Bureau, the National Transportation Safety Board, and the State of Alaska, is preparing a revised curvature-monitoring plan that will meet the requirement of the applicable stipulation.

--OSP and the Department of Transportation have jointly requested Alyeska to submit a revised corrosion pig survey schedule for review and approval, and to fully justify any proposed change in the frequency of the surveys.

--OSP will begin an evaluation of Alyeska's line volume balance leak detection technique and the earthquake-monitoring system shortly.

In addition, the Assistant Secretary concurred with our conclusions that long-term evaluations of the effectiveness of environmental requirements are needed, and with our recommendation that OSP coordinate this effort with other Federal and State of Alaska agencies.

The Assistant Secretary indicated that he considered the OSP organization to be adequate to perform the necessary monitoring of TAPS on a continuing basis and that, prior to endorsing our recommendation that OSP be exempted from hiring limitations, he wanted to subject the organization and staffing to closer scrutiny. He said that it is not entirely clear that the vacancies in OSP have prevented that Office from fulfilling its mission objectives. We believe, however, that the report identifies various monitoring deficiencies that can be directly traced to staff vacancies. For example, unless the soils engineer vacancy is filled, OSP's ability to review Alyeska's settlement-monitoring system will continue to be severely hampered.

We agree that the present OSP organization, if fully staffed, may prove to be adequate. Otherwise, it is not. Exempting OSP from the hiring limitation, as recommended in our report, would help solve the vacancy problem and, we continue to believe, would be an important step to achieving the level of Federal monitoring needed.

Geological Survey

The Geological Survey commented that they generally agree with the analysis and conclusions of the report and emphasized the need for a continuing research program to assess long-term impacts of the pipeline on the environment and to obtain design insights for future developments in the Arctic and sub-Arctic.

Fish and Wildlife Service

USFWS stated that the report deals effectively with the need for studies related to the evaluation of long-term environmental consequences, needs for intensified monitoring, and the current problem related to Alyeska's funding of surveillance and monitoring studies. But USFWS expressed three major concerns with our draft report: (1) that it did not give sufficient credence to measures recommended by USFWS in its June 1979 surveillance report; (2) that it failed to identify and address needs related to the environmental/ biological qualifications of monitors being utilized during

the operational phase of TAPS; and (3) that it failed to deal effectively with matters arising from the technical stipulations.

The 1979 surveillance report

The June 1979 report, referred to by USFWS, resulted from a monitoring trip requested by OSP's Authorized Officer and conducted by representatives from several agencies. It formed the basis for our spot-checks conducted during an August 1980 field trip to determine the present status of the previously identified environmental deficiencies. The spot-checks were conducted by our staff and an environmental consultant, accompanied by OSP staff. USFWS takes issue with the conclusions drawn by our consultant (see app. III), stating that sufficient credence was not given to the 1979 report.

USFWS' underlying assumption, without site-specific evidence to the contrary, is that the necessary corrective action has not been taken. Our consultant, whose credentials are well-established in a broad range of Arctic environmental fields (see p.) found that, with few exceptions, the problems identified in the report had been addressed by Alyeska. The primary evidence cited by USFWS contradicting this finding is its survey in August/September 1980 timeframe, which identified fish passage problems in Atigun Pass. We recognize in the report that, since future problems will undoubtedly arise, compliance with the stipulations is an ongoing process. Effective monitoring requires that OSP, and other agencies, maintain surveillance and are sensitive to such changing conditions.

In the conduct of this review, several USFWS officials were contacted to determine what TAPS-related research was being conducted, what additional research was necessary, and what effect OSP's decision not to allow research costs to be charged to Alyeska had had. USFWS was concerned that former JFWAT members had not been contacted as part of this review. Obtaining a recount of problems experienced during construction from former JFWAT members was not deemed necessary. The JFWAT experience is well-documented, and was included as a part of our review. Also, environmental problems experienced during construction have been addressed in our previous reports. The purpose of this review was to evaluate monitoring during the pipeline's operational phase. And in doing so, we sought current information.

A primary reason for the selection of our environmental consultant, in addition to his expertise, was his independence. He was not involved in the identification of the problem areas being evaluated nor responsible for their correction. We believe his independence, combined with his expertise, lends credence to his conclusions. We recognize that in a few instances, he took exception to the actions recommended in USFWS' 1979 report. Experts, on occasion, disagree. We believe this is another reason for OSP to conduct or arrange to have conducted longer-term sustained studies of pipeline impacts.

OSP's need for environmental expertise

We concur with USFWS' comment that OSP needs additional environmental/biological expertise. A major theme of this report is that OSP needs to obtain expertise in several areas, both environmental and technical. The report recommends that OSP fill professional staff vacancies, including those of wildlife biologist and hydraulic engineer. OSP currently has a full-time fish biologist and a full-time soil scientist on its staff. A fully staffed OSP, in conjunction with its ability to hire consultants and utilize personnel from other Federal agencies, should afford sufficient environmental/ biological expertise.

USFWS concurred with the report's conclusion that long-term effects of the pipeline project must be ascertained and indicated that they should have a major role in the planning and conduct of such studies. We agree. OSP has stated (see p. 76) that it will coordinate its research activities with other agencies, and we assume that would include USFWS.

The technical stipulations

USFWS commented that the report did not deal effectively with Federal monitoring of the technical stipulations, i.e., Alyeska's corrosion control, leak detection, and settlement-monitoring systems. USFWS also indicated that filling OSP's professional staff vacancies, as the report recommends, would not necessarily assure effective monitoring.

We understand USFWS' position but believe it may be based on the following misconceptions:

--that technical requirements and procedures established years ago, before any operational

experience was obtained on the pipeline, are currently optimal. A rigid interpretation of these requirements could force inappropriate procedures on Alyeska, as well as shut off the possibility of requiring Alyeska to adopt new, more appropriate measures.

--that technical expertise would be of no avail to OSP in determining the validity of Alyeska's reasons for varying from originally stipulated requirements.

We continue to believe that OSP can effectively monitor the pipeline's highly technical requirements only by availing itself of the requisite expertise. Lacking such expertise, OSP would be unable to evaluate the reasons given for such variance, and, based on this evaluation, require the appropriate action. The report recommends that this expertise be acquired, and that Alyeska's programs that vary from originally stipulated requirements be analyzed. Based on that analysis, OSP would be in a position to require any necessary remedial action.

ALYESKA PIPELINE SERVICE COMPANY

Alyeska summarized its concerns regarding the draft report as follows:

--it contains factual inaccuracies;

--it fails to recognize that TAPS owners are not responsible for funding long-term environmental studies, and that the only costs which are reimbursable by the TAPS owners are those costs which can be justified as reasonable and necessary costs of monitoring pipeline maintenance and operation;

--it fails to recognize Alyeska's performance with regard to the stipulations is the best that is technologically possible.

Factual inaccuracies

Alyeska provided various comments which it characterized as "errors of fact." As can be seen in our response to them

in appendix VII, Alyeska's comments are often disagreeements not with GAO but with judgments that OSP and its technical consultant, MRI, have made about Alyeska's programs, or about the need for additional monitoring recommended by the report. OSP, upon reviewing this draft report, concurred with our recommendations for additional monitoring. The disagreements about the adequacy of Alyeska's programs only reinforce our belief that OSP needs to more thoroughly evaluate them. Such evaluation is of particular importance when Alyeska's actions apparently diverge from stipulated requirements.

Alyeska did provide some useful additional information--much of the type requested but not made available by Alyeska during our review--which has been included in the report.

Funding research

Concerning Alyeska's position on funding environmental studies, the draft report specifically stated that some of the research necessary to evaluate long-term environmental impacts may not be properly chargeable to Alyeska, and that the Authorized Officer pursue alternative funding sources for such research. The Authorized Officer must decide which research costs are within the scope of the Agreement and Grant of Right-of-Way and are thus properly chargeable to Alyeska. The pending U.S. Court of Claims decision will offer guidance in this matter, but we believe the delay in deciding this case should not preclude initiation of the necessary research effort.

The best performance technologically possible

Alyeska's third point appears to be an acknowledgment that it has fallen short of meeting the stipulated requirements. Indeed, a theme of this report is that Alyeska has varied from such requirements. It should be noted that the standards which led to these requirements were often established by the pipeline owners themselves, and approved by the Federal Government as conditions for moving ahead with pipeline construction or operation. Our position is OSP has not conducted the analysis necessary to independently assure that Alyeska's present performance either meets a minimal level of acceptability or is the best that is technologically possible. The report recognizes that some variance may be justified. But it also states that it is necessary for Federal monitors to independently assess

the surrounding facts and circumstances before making that judgment. This type of analysis--which Interior has agreed is needed--requires highly specialized technical expertise, and the report finds that OSP has been hampered by an inability to fill key technical staff positions necessary to conduct this analysis.

OFFICE OF MANAGEMENT AND BUDGET

OMB agreed that the pipeline monitoring effort should not be jeopardized by lack of personnel, but indicated its understanding that Interior had assigned high priority to such effort and had not restricted allocation of personnel to the Office of Special Projects. OMB also pointed out that hiring and retaining professional staff in Alaska is difficult because governmental salaries are not competitive with private industry. Nonetheless, it indicated that it has asked Interior to review OSP's structure and responsibilities once again.

Despite OMB's comments, the fact remains that Interior's actions have been ineffective. Numerous vacancies, in a wide range of fields, have gone unfilled for long periods of time. OSP has, at times, been precluded from filling vacancies because of a hiring "freeze". The relative priority assigned to OSP by Interior is irrelevant during a hiring freeze--hiring is simply precluded. Moreover, hiring limitations take forms other than an absolute freeze--for instance, requiring OSP to recruit only within the Bureau of Land Management--which makes it more difficult to fill specialist positions.

It is true that OSP has lost staff to other organizations. When it tries to fill the resulting vacancies, hiring limitations have been major impediments. Thus, exemption from hiring limitations--which we feel is appropriate in this case since Alyeska and not the Government are funding the expense--would enhance OSP's recruiting ability by broadening the range of applicants and allowing hiring on a more timely basis.

TAPS THROUGHPUT--WHY NOT 2 MILLION BARRELS PER DAY?

The Trans-Alaska Pipeline System was designed to deliver a maximum of 2 million barrels of oil per day. In order to reach this capacity all 12 pump stations must be in operation. At the present time, the daily throughput is 1.5 million barrels per day with nine pump stations on line. Facilities are being installed to activate Pump Station No. 7 this year.

Alyeska is expected to decide this year whether to activate an additional pump station (No. 5), which is now used only for drain-down storage from the Brooks Range. The other unused station site, Pump Station No. 11, will be activated only in the event additional crude oil production is developed in an area where movement through TAPS is feasible.

The Alaska Oil and Gas Conservation Commission is the State agency which regulates crude oil and natural gas production in Alaska based on predicted production performance over the life of the oil field. The maximum allowable crude oil production for the Prudhoe Bay Field is a daily average of 1.5 million barrels plus natural gas liquids. The designed maximum capacity throughput for TAPS will not be reached unless additional oil is discovered and developed in northern Alaska. The Prudhoe Bay Field is predicted to continue production at an average of 1.5 million barrels per day until

1985/1986, at which time it will begin to decline. By the year 2000, production will be down to about 300,000 barrels per day and by 2005 may be as low as 85,000. Production at a low level will probably continue until 2012 to 2015.

Alyeska's present throughput with nine pump stations has been increased through use of a drag-reduction additive (DRA). DRA has increased the line flow by more than 150,000 barrels per day. The use of DRA allows higher throughput without spending capital to increase pump-station horsepower.

Conoco, Inc., the developer of DRA, is supplying the material to Alyeska. Conoco and Alyeska are using 5,000-gallon truck-transportable pressure tanks to move DRA. It is moved by rail cars from Lake Charles, Louisiana, to Seattle, where the pressure tanks are filled and transported by ship to Anchorage. It is then trucked to the pump stations. The "empties" are returned to Seattle for refilling from rail cars.

Injection of the DRA is required at several points along the line. Injection has occurred at Pump Stations Nos. 1, 4, 6, and 10. In October 1979 the commencement of operation of Pump Station No. 2 eliminated the need for DRA at Pump Station No. 1.

If additional crude oil becomes available, the pipeline's ultimate capacity of 2 million barrels per day could be

APPENDIX I

reached by adding pumping power according to the original design, at which time DRA might be eliminated entirely.

APPENDIX II

Stipulations for the Agreement and Grant of Right-of-Way for the Trans-Alaska Pipeline

Table of Contents

APPENDIX III

Environmental Aspects of Federal Efforts to Monitor Pipeline Operations in Alaska

by D.M. Hickok

I. GAO Charge to Author

GAO requested that the author:

A. Provide background on areas of specific concern to its investigators relative to the Alyeska Trans-Alaska Pipeline;

B. Accompany GAO investigators on field checks and provide independent insight on the background of specific situations and comments upon Alyeska's degree of compliance with certain environmental stipulations; and

C. Offer any ancillary observations or evidence on stipulation applicability or other situations which are affecting the environmental monitoring program of the pipeline. More specifically this charge is reflected in the statement provided by GAO and appended as Appendix A

II. Scope of Author's Activity

In executing the requested activity, the author has:

A. Reviewed background material;

B. Contacted a few particularly knowledgeable people for their insight on certain matters (see list appended as Appendex B);

C. Secured current information on areas of potential difficulty pertinent to the construction of a cold gas pipeline in proximity with TAPS;

D. Traveled with representatives of the GAO and APO along the pipeline route for on-site field inspections.

1. Travel over the northern segment (Fairbanks to Prudhoe Bay) was made July 22, 23, and 24 with Mrs. Isabella Seeley, GAO, Anchorage, and Mr. Jack Cough representing the APO/BLM, Anchorage, for the northern district.
2. Travel over the southern segment (Fairbanks to Valdez) was made August 5, 6, and 7 with Mrs. Isabella Seeley, GAO, Anchorage, and Mr. Cy Price, APO/BLM, Anchorage; and

E. Participated in various discussions with GAO investigators.

III. Appraisal Results

A. General Comments.

This examination of the question of federal monitoring of the Trans-Alaska Pipeline System involves four major aspects. These are: 1) My responses to GAO investigators on historic and background matters; 2) Review of a June, 1979 surveillance trip report made by Mr. Lew Pamplin, U.S. Fish and Wildlife Service, by on-site examination to ascertain the scope and degree of APO/TAPS response to his condition evaluations of the pipeline at that time; 3) Commentary on pipeline-related environmental research not now being performed and believed essential to future operations; and 4) Commentary on what might be considered ancillary problems to the main question of this inquiry but which concern integrated questions of public policy relative to the pipeline, environmental matters, and public land law administration generally.

B. The Pamplin Report and On-site Pipleine Inspection.

As an overall observation, with but a few exceptions, the maintenance of the TAPS right-of-way and work pad can only be considered excellent by any significant construction and environmental criteria. Candidly, I was delighted and favorably impressed.

APPENDIX III

Specific sites contained within the Pamplin report were visited and discussed with GAO investigator Seeley. For the most part the Pamplin 1979 report concerns had been repaired, were being attended to, or scheduled for attention. Some exceptions will be further noted here, but in the main they were well cared for or were beyond the purview of federal monitoring through APO/BLM. Since Mrs. Seeley took notes on our reactions to matters of adequacy, I will limit my remarks here to those few matters which I regard as not yet under sufficient control. These follow under subject headings with specific site reference as examples.

Northern Section

a. Drainage structures and erosion control features in fishery sensitive areas. The major problems still existent with situations of this type are associated primarily with the Haul Road rather than with the TAPS access roads or work pad. Nevertheless, some sites require comments and this follows:

A.R. 85-APL-1. In this situation some of the Pamplin recommendations appeared to have been accomplished. I agree with the APO/BLM appraisal and that the addition of a drainage structure as suggested by Pamplin in the access road is unnecessary.

A.R. 87-3, S.F. Fish Creek. Aufeis conditions in this meadow are a natural phenomena. I do not believe additional bridges per se as recommended by Pamplin will ameliorate the alleged fishery impacts. Existing efforts appear to be both practical and responsive to stipulations. Additional structures here could in fact make the situation worse.

Douglas Creek. Here the pipeline is upstream of the haul road a short distance. A natural spring-fed meadow produces aufeis, even without the stricture of the road. Nevertheless, culvert size on the haul road is inadequate as are downstream outlets. Here a small effort at fisheries stream channel management, rather than the maintenance of "natural conditions," could be hydraulically helpful.

A.S. 98, access road to M.S. 98-02. The "erosion" problem cited by Pamplin here is in my opinion a problem of thermal degradation rather than drainage control. I see no need for an additional structure. Surficial maintenance should solve the problem without the need for drainage enhancement.

A.S. 98, Sta. 862+10 (Spring Creek). I have no comment, pro or con, relative to the need to breach the block points here. This is an operational problem for TAPS and APO/BLM to settle. Adequate fish passage at low flow seemed to be assured.

A.S. 104, Sta. 1608+00. I concur here with APO/BLM. Fish passage during our inspection was good and no entrapment conditions were observed. Flows to all culverts were operational and adequate. A dike as proposed by Pamplin is not necessary in my opinion.

A.S. 104, Disaster Creek. This situation is clearly caused by inadequate hydraulic design through the Haul Road. (This same comment applies to the Douglas Creek situation mentioned earlier where some downstream stream channeling seems desirable and could be effected without fisheries habitat diminishment.)

APPENDIX III

South Side of Atigun Pass. Much of the work here by Alyeska may prove to be overreactive to the north-side Atigun Pass problem. Currently, the "cure" may be worse than the "disease." The control of sediment-laden discharges could, it appears, be more effective and less potentially damaging to fisheries.

b. Thermal subsidence and potential surface erosion conditions effecting work pad or Haul Road integrity.

A.S. 93-4. Access road and work pad are slumping due to thermal degradation. Surface maintenance is needed.

A.S. 100. There is thermal subsidence in the work pad here requiring correction.

A.S. 109, Chandalar River Crossing. Thermal subsidence here will continue for a long time. The only remedy is constant attention. The problem is caused by initial pipeline design and was predicted in this area years ago.

Putulgayuk Area (State Lands). Thermal subsidence of the pipeline here is severe and caused by errors in design (i.e., burying the pipe in ice-rich permafrost). Although TAPS is evaluating pipeline integrity here and doubtless will effect controls, the long-term solution will probably require design and quite probably location change.

c. Pollution or oil spill situations. Three significant oil pollution situations exist on the northern section. Of these, the Prospect camp spill is under adequate control and rehabilitation progress and the North Atigun Pass condition had been repaired but some final cleanup and rehabilitation work is yet to be done. Perhaps the worst situation from any point of view is the continued existence and nonresolution between cognizant federal and state agencies at SWDS 117-1 and OMS 119-4 where oil cleanup debris from the North Atigun spill is "stored." Where such material is "stored" and how it is treated appears to be a major flaw in Alyeska and inter-agency oil spill contingency plans.

d. Big game crossings. The question of whether big game crossings are adequate on the northern section will take many years of research to answer. With reference to caribou, there appears to be indications, at this time, that passage by caribou east and west across the Haul Road and under or over the pipeline is being managed by bulls adequately — particularly in periods of insect harassment. There are also indications that cows with calves aren't managing to cope with the situation in natural efforts to reach the Saganivanirktok River bars and gravels to escape insects. There may be significant stresses being put on the caribou population by this factor since without escape extreme physiological stress is put on individual animals by insect harassment even to the point of death due to metabolic imbalance (i.e., more energy expended than received through food and rest). Research on this question by the FWS, ADF&G and University scientists has been ad hoc and opportunistic at best. A long-term federal commitment to research in this area is required in order to answer questions surely to be posed by further arctic developments affecting caribou movements.

A parallel problem exists in areas of moose concentration. Since pipeline completion snow conditions have not been near maximums of record. The question of

pipeline blockage of moose movements under severe snow conditions remains unresolved.

e. Revegetation. No where along the pipeline was I able to observe, or ascertain, the existence of permanent, fenced-in vegetation recording plots to learn the true rate of natural plant regeneration either in barren or reseeded areas. There is a cost/benefit question here needed to be examined which explores the necessity of fertilizer/exotic plant reseeding versus natural regeneration.

The planting experiments on nonindigenous willows, even though individual plants may appear currently healthy, are, in my opinion, doomed to failure due to the relationships of plant physiology to micro-climatic profile.

f. Ancillary observations. (See GAO note, Appendix C)

1. Coordination and inter-agency decisions. It is said that, "The proof of the pudding is in the eating." Along the northern section of the pipeline, coordination and the effecting of decisions involving more than one authority is potently observable as unpalatable. Examples abound. Some of these are as follows:
   - The lack of decision on where and how to dispose of North Atigun spill materials;
   - The choice by BLM Fairbanks district to new sites for Northwest Pipeline fly camps when either old Alyeska camp sites or reclaimed material sites are available in close proximity, resulting in new environmental disturbance and a cumulative effect of greater than necessary environmental disturbance;
   - The lack of hydraulic or drainage resolution between the state controlling the Haul Road and APO/BLM-Alyeska controlling the pipeline and work pad; and
   - The often unnecessary (from an environmental point of view) of the state opening up Alyeska revegetated material sites, with or without BLM district authorization.

   Several questions of public land policy are apparent in these circumstances. The appearance is that "the right hand does not know what the left hand is doing" or that expediency and desire are of greater motivation than reason. Or still worse no organization wishes to accept the leadership for problem resolution. In this context, above all else, the federal monitoring of the pipeline is failing and this is not a problem to place on the doorstep of the Alyeska Pipeline Service Company.

2. BLM-FLPMA enforcement. The enactment and implementation of FLPMA by the Congress and the administration came after major pipeline construction decisions. One can see complete reason for not involving FLPMA-related decisions in the later days of pipeline construction. One cannot see any reason for not enforcing FLPMA provisions in pipeline-related operations or proximity matters at the current time. Several matters need resolution, perhaps only by Congressional direction. These are:
   a. The agreement or disagreement with administrative practice to approve dual standards on the payment for gravel by Alyeska on the one hand for pad maintenance and nonpayment from the state for Haul Road maintenance. Despite the fact that the Haul Road was a RS 2477 decision

APPENDIX III

initially, the case can be argued on the one hand that the state held "grandfather rights" for gravel and on the other that the enactment of FLPMA imposed new orders for the payment of public lands materials. GAO attorneys should, in my opinion, examine this issue.

b. Two outrageous situations exist in the execution of public land policy involving the use of the Haul Road and adjoining public lands hinging upon decision processes pertinent to the Mineral Leasing Act and FLPMA. These are:
   - The access of hunters and fishermen along the Haul Road under the guise of mineral property interests. This is resulting in preferential citizen treatment; and
   - the granting of permission, whether passive or active, for mineral purpose access construction across the public lands in a manner which is highly destructive to the environment. In this case, one of the most blatant cases of environmental degradation that this author has observed in 20 years of arctic and sub-arctic work was observed off the haul road in the vicinity of AS-102 and 103. The tundra-tiaga vegetative mat was disturbed creating a muddy morass and extreme erosion, much of which deposits in an active fisheries stream. The occasion of one set of environmental standards for Alyeska and another for the mining community is unacceptable in terms of public land policy. Investigation of this type of problem is required; and finally

c. The question of dual standards for the maintenance of the TAPS right-of-way on the one hand and the state Haul Road require investigation.

   During TAPS and Haul Road construction, no family situations were allowed. Now with state maintenance of the Haul Road, ADOTPF is allegedly bringing wives and children in to live in haul road maintenance camps. Two effects are immediately obvious. One, educational requirements and burdens to local and/or state government, and two, the further building of the cumulative or mass environmental effect. The allowance of this "mass" effect to occur is having and will have greater degrading environmental influences than any in-situ occurrence of erosion or pollution in the long run. A further problem is obvious in the poorer application of maintenance standards to the Haul Road itself than to the TAPS work pad. In the vicinity of Sukapak Mt. (near Wiseman), thermal degradation of the Haul Road is severe and needs full-scale attention — not just maintenance grading and berm gravel additions. Similarly, the Haul Road on the northern end, across state selected lands, is generally very poorly maintained. Additional gravel is required since grading is now merely redistributing base materials.

Southern Section

The trip along the southern section of the pipeline brought to light only a few situations requiring comment. Generally, the condition of the TAPS work pad was excellent, with but a few exceptions. Similarly, hydraulic-fishery problems were minimal. One potential dual standard problem exists with the environmental clean up standards being enforced on the Copper River Valley Electric Association power line right-of-way which lies in close proximity

to much of the TAPS alignment. Here, slash and debris clean up needs completion. Despite reluctance on the part of Copper Valley, BLM officials insisted they would require clean up to required stipulations. Whether this will be done or not will require further surveillance. Again, as for the northern section, the following are specific comments with reference to the Pamplin report:

A.S. 17, Rock Creek. The Rock Creek crossing is well maintained, only crossed in winter, and I see the APO/BLM decision as proper.

A.S. 10, Small Creek-Boulder Creek. Comments is same as above.

A.S. 14 Sta. 318+40. The Tonsina flats are obviously important fish and wildlife habitat. Beaver activity in relation to dams or roadways (a matter of the author's specialty many years ago) requires a balanced approach between dam or roadway integrity and fish and wildlife habitat preservation. Fish passage here is assured and the actions of APO/BLM are sound. The work pad just north of this location is not as well maintained as it might be, however, and evidence of thermal subsidence exists over a fairly long stretch. Minor maintenance now could save much over the long run.

A.R. 23-APL-1A, Bear Creek. Agree with APO/BLM assessment.

A.S. 35, A.R. 35-APL/AM-6, M.S. 35-2. From observations at the time of our inspection, I cannot concur with the Pamplin recommendations. The situation appears well in hand hydraulically and from a fishery point of view.

M.P. 734. This oil spill situation has not in my opinion been adequately examined. Nor has adequate research been instituted. The likelihood of eastward long-term oil seepage is not being monitored. It could and should be watched through the installation of simple perforated pipes. On the diked westward side, oil seepage remains evident. Here, although contained, no effort is being made to record plant succession under oil spill conditions in this tiaga/muskeg environment. Permanent long-term vegetative transects need establishment.

In summary, the inspection of the southern section illustrated no significant problems. In fact, after the northern section view was rather anti-climactic. The Copper River Electric Association right-of-way is the major problem. One final observation, however, is in order under the heading of public policy and applies equally to the northern and the southern sections. Involved is the problem of pipeline security, obviously a necessary situation. Equally important, however, is the execution of law and administration that is equitable to all uses of the public lands. Alyeska was granted a non-exclusive right-of-way across the public lands for pipeline purposes. They, in the usage of this privilege, have no right in law to prevent, hinder, or harass other uses of the public lands. In effect, their security poses "police state" situations where the general public are denied or hindered in usage of public lands. Additionally, bona fide federal and state officers as well as legitimate investigators of resource and environmental matters are subjected to totally unnecessary and unwarranted security measures that go far beyond Alyeska's rights under any easement to cross public lands. Admittedly, security of the pipeline is a paramount national interest but so is equal treatment under law for all citizens. I believe a full-scale Congressional inquiry into this difficult balancing problem is necessary.

APPENDIX III

APPENDIX A

Perform a limited number of field checks to determine if the design criteria implementing the stipulations were met during construction; whether constructed facilities are being maintained; and where possible attempt to determine their effectiveness in meeting the environmental concerns of the stipulations. Sites chosen for selection should reflect the areas of concern identified above. If site checks are inappropriate for specific facilities or sites etc. due to it being an inappropriate time of year or for other reasons, this should be noted and recommendations made as to when field observations would be appropriate. (CONTRACTOR)

SIGNIFICANT ENVIRONMENTAL STIPULATIONS

1. 2.5.1.1 Fish passage ways.
   Protection of spawning grounds (No. 1 per Alyeska of impacts on the company.
   Zones of restricted activities.

2. 2.5.4.1 Big games movements.

3. 2.4.4.1 Seeding and planting.

4. 2.4.1.3 Erosion control.

POTENTIAL AREAS OF CONTRACTOR ASSISTANCE

1. Determination of whether design criteria effectively address stipulations.

2. Background on areas of critical concern.

3. Identification of major areas of compromise.

4. Determination of whether existing environmental monitoring programs are adequate.

5. Determination to the extent possible of whether stipulations were adequate to address potential impacts.

6. Identify sites and perform field checks. (Most critical)

APPENDIX III

APPENDIX B

Informational contacts made by D.M. Hickok

Dr. Jerry Brown, CRREL, U.S. Corp of Army Engineers, Hanover, New Hampshire

Mr. Robert L. Means, former Washington D.C. staff assistant for pipeline matters to Assistant Secretary Guy Martin, Arlington, Virginia

Dr. David Klein, Leader, University of Alaska Wildlife Cooperative Unit, Fairbanks, Alaska

APPENDIX III

APPENDIX C

GAO NOTE REGARDING CONSULTANT'S REPORT

The Ancillary Observations section of this report is intended primarily to recommend possible issues, beyond the scope of the immediate review for, GAO's future analysis. These comments are not intended to be thorough analyses of these issues, and do not represent GAO's final position. GAO is presently pursuing some of these matters in a separate review.

SIGNIFICANT LEGAL OPTIONS AVAILABLE TO DEPARTMENT OF THE INTERIOR

The legal options available to the Department of the Interior (Office of Special Projects) in connection with Alyeska's activities derive from statutory law, the Agreement and Grant of Right-of-Way, and general contract law. The following is a synopsis of the significant options.

FEDERAL LAW

The applicable statutes are Titles I and II of Public Law 93-153 (Nov. 16, 1973). Title I amended Section 28 of the Mineral Leasing Act of 1920. Section 28 governs rights-of-way through Federal lands for oil pipelines. Title II, the Trans-Alaska Pipeline Authorization Act (the Pipeline Act) authorized the construction of the trans-Alaska oil pipeline. Section 203 (c) expressly subjects rights-of-way issued under the Pipeline Act to the provisions of Section 28.

In Title I, Section 28 (l) provides that the holder of a right-of-way shall reimburse the United States for costs incurred in monitoring all phases of the pipeline, as determined by the Secretary of the Interior or an appropriate agency head. Thus, Alyeska must reimburse the United States for all appropriate monitoring expenses. Section 28 (a) provides for suspension or termination of the right-of-way by the Secretary or agency head under certain circumstances.

Generally, the holder must be given notice, a hearing, and reasonable opportunity to perform before suspension or termination occurs.

Title II contains additional provisions affecting the trans-Alaska pipeline. Section 204 (a), governs the nature and limitations of liability for damages in connection with pipeline activities. Strict liability is imposed on the holder of the right-of-way. In addition, under section 204 (b), Alyeska is responsible for control and removal of pollutants caused by its activities. If Alyeska fails to adequately control or remove pollutants, the Secretary (with or without assistance) may do so at Alyeska's expense.

AGREEMENT AND GRANT OF RIGHT-OF-WAY

The Agreement and Grant of Right-of-Way between the United States and Alyeska contains provisions regarding the rights and remedies of the United States. Some of these overlap provisions of the Mineral Leasing Act; others are unique.

Under paragraph II of the Agreement the United States may enter any part of the pipeline for inspection or monitoring. Expenses incurred directly or indirectly for monitoring the pipeline are reimbursable to the United States under paragraph 12. The United States may employ consultants or contractors to assist in monitoring the pipeline system; these costs are also reimbursable.

Paragraph 13 of the Agreement requires the repair or replacement of damaged Federal property (real or personal), and the rehabilitation of damaged or destroyed natural resources caused by or connected with the construction, maintenance, etc., of the pipeline on Federal lands. As an alternative remedy, the United States may bring a cause of action for money damages, instead of requiring repair or replacement.

A comprehensive remedy for the United States is contained in paragraph 18 of the Agreement. If Alyeska fails to act within 30 days after the United States demands performance of certain activities required by the stipulations, the United States may carry out these activities at the expense of Alyeska.

Paragraph 18 (B) lists the actions which if not performed by Alyeska, may be performed by the United States. Most of the items listed are general categories, rather than specific acts, e.g., "abate any condition causing or threatening to cause a hazard, harm or damage" or "perform seismic monitoring." This leaves room for interpretation concerning whether Alyeska has failed to perform a required action, and what the United States may do when it takes over a particular stipulated activity. Alyeska may dispute whether the work involves an action required by a provision listed in 18 (B), whether its

failure or refusal to perform was justified, and the reasonableness of the specification for, and the cost of, such work.

For serious threats to public health and safety or to the environment, temporary suspension orders (paragraph 25), or termination or suspension of the right-of-way (paragraph 31) may be ordered. The Agreement describes the requirements and procedure for exercising this option.

CONTRACT LAW

The United States may seek equitable remedies available for breach of contract, for example a lawsuit for specific performance. In this connection, paragraph 39 of the Agreement recognizes that all remedies existing in equity or law still may be sought by the United States. To exercise this remedy, the United States would bring a court action.

APPENDIX V

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

NOV - 7 1980

Mr. J. Dexter Peach
Director, Energy and Minerals Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

In response to your request of October 8, 1980, we have reviewed your draft report entitled "Trans-Alaska Oil Pipeline Operations: More Federal Monitoring Needed." We have attached comments which were prepared by our several bureaus and offices concerned with the report.

We appreciate being able to comment on your report and hope our responses are helpful.

Sincerely,

William L. Rendig
Assistant Secretary - Policy,
Budget and Administration

Enclosures

APPENDIX V

OFFICE OF THE ASSISTANT SECRETARY -
LAND AND WATER RESOURCES

The major recommendations of the GAO report address technical requirements, environmental requirements, and staffing. Our comments on these recommendations are as follows:

1. Technical Requirements.

Overall, we believe that the approach to monitoring as addressed in the stipulations and as implemented by the Office of Special Projects is effectively accomplishing intended objectives. The specific monitoring mechanisms evaluated are discussed below:

a. Curvature Monitoring System. The Office of Special Projects is continuing to work with Alyeska to develop a plan to meet the requirements of stipulation 3.3.1 which in part requires that "...an acceptable comprehensive monitoring system of the pipeline shall be developed which will include but not be limited to making deformation measurements sufficiently sensitive and prompt to detect the approach to operational tolerance limits (which shall be clearly specified) of the pipeline...". A revised plan has been made necessary because Alyeska has been unable to develop a reliable curvature pig. Any plan adopted will fulfill the requirements of the stipulation, and in order to ensure complete input into any plan devised, the Office of Special Projects has consulted with the Department of Transportation's Materials Transportation Bureau, the National Transportation Safety Board, and the State of Alaska.

The plan will be approved by the Assistant Secretary, Land and Water Resources prior to implementation. It is anticipated that a revised Curvature Monitoring Program will be available for review within a month from now.

b. Corrosion Pig Survey Schedule. The Office of Special Projects and the Department of Transportation's Materials Transportation Bureau, Office of Pipeline Safey Operations, have jointly requested Alyeska to submit a revised corrosion pig survey schedule for review and approval. If a change in the frequency of surveys is requested, Alyeska has been notified that a complete justification must accompany any such request.

c. Line Volume Balance Leak Detection System. Alyeska has modified this system to reduce the number of false alarms and to provide more data to the controller at Valdez to assist him in differentiating an actual leak from a false alarm and to pinpoint its location. In addition, a revised table (which is based on Prudhoe Bay crude oil) to determine volume of oil at given temperatures will be incorporated into the leak detection computer program. Some operating experience is needed after the modifications have been made to determine their effect on improving accuracy and reliability. Further evaluation is required to determine if the maximum sensitivity and reliability have been achieved. This evaluation is scheduled to begin shortly.

APPENDIX V

d. Earthquake Monitoring System. Although the Authorized Officer concurred with Alyeska that the pipeline was designed to prevent oil leakage; he determined that an earthquake monitoring system was necessary as a part of the supervisory control system. While the earthquake monitoring system is considered to be operational by Alyeska, its performance has not been thoroughly reviewed. An evaluation will be performed shortly.

2. Environmental Requirements.

We concur with the statements in the report that long-term evaluations of the effectiveness of environmental requirements are needed. We do not view these evaluations or studies to be basic research, but rather practical studies to assist in the design of future projects and the evaluation of those projects. Resolution of the suit pending in the U.S. Court of Claims should give some guidance in determining which costs are properly chargeable to the Permittees and which should be borne by Government with appropriated funds.

The list of possible study projects suggested in the GAO report such as effectiveness of big game crossings, effectiveness of reseeding versus natural invasion of vegetation, long-term effects of spilled oil on vegetation, effects of changes in stream hydrology, and impacts of gravel extraction are among the priorities for such research which are being considered.

Although we generally do not see the role of the Office of Special Projects as a research agency for these studies, we are prepared to provide some coordination of the effort, with study design and evaluations being performed by interested Federal (FWS, USGS, etc.) and State of Alaska agencies. The studies themselves would most likely be performed through contracts, agreements, or grants, to Federal and State agencies, universities, or private consultants.

3. Staffing.

Overall, the staff set up by the Assistant Secretary, Land and Water Resources and the Bureau of Land Management for administering the Agreement and Grant of Right-of-Way is achieving the intended level of surveillance required to protect the environment and the national interest. The success of both the Department and the Permittees in this regard is reflected by the GAO report. We consider the Office of Special Projects organization to be adequate to perform necessary monitoring of the TAPS project on a continuing basis.

The non-renewal of Mechanics Research Incorporated's (MRI) contract was based on the decision that the level of consulting required no longer justified a management contractor. Under its contract with the Bureau of Land Management, MRI secured the services of various contractors who performed the actual work efforts. The Bureau of Land Management's action should not be interpreted as a ban on contracting. It is clear that the monitoring program calls for the selective use of technical consultants, and this will be continued.

APPENDIX V

It is not entirely clear that the vacancies in OSP have prevented the office from fulfilling its mission objectives. Prior to endorsing a recommendation that the office be exempted from hiring limitations, closer scrutiny of OSP's organization and staffing is required. The personnel issue will be closely monitored at a management level. The issue is particularly important as the scope and role of OSP involvement in the Alaska Natural Gas Pipeline System becomes fully known.

APPENDIX V

U.S. FISH AND WILDLIFE SERVICE

The report correctly identifies numerous problems related to pipeline monitoring needs. However, we are greatly concerned about erroneous conclusions reflected in the report which were drawn by the GAO's consultant on the basis of spot field checks and very limited informational contacts. We believe the consultant's report would have reflected a more accurate assessment of environmental issues had biologists having first hand experience with the construction of the pipeline and specific, on-site knowledge of environmental problems been contacted. As near as can be determined from the report, no past member of the Joint Fish and Wildlife Advisory Team (JFWAT) actively involved in monitoring the pipeline during and following construction was interviewed, nor requested to participate in the consultant's field investigations. At least seven of these people presently reside in the Anchorage area and could have readily been contacted.

The GAO consultant's report does not reflect the participation of a fishery biologist during the field checks, particularly one having the necessary background experience to formulate accurate conclusions relative to fish passage. Yet, the report repeatedly takes issue with recommended corrective actions relative to fish passage and other problems contained in the June, 1979 U.S. Fish and Wildlife Service (USFWS) surveillance report prepared by Mr. Lew Pamplin. We believe that it is unlikely that consistently correct conclusions could be reached with respect to appropriate mitigation needs by a cursory inspection by an observer who did not have the on-site benefit or counsel of biologists with pipeline monitoring experience. We find it particularly unfortunate that Mr. Pamplin, who is a recognized expert on environmental problems related to pipeline construction, and who was a JFWAT field monitor during and following pipeline construction, was not contacted nor informed of the study leading to this report. (Mr. Pamplin is currently employed in the position of Supervisory Biologist with the office of the Federal Inspector, Alaska Natural Gas Transportation System in Anchorage).

We would further like to point out that the recommendations contained in the 1979 USFWS report represent the concern of eight biologists (both State and Federal) who participated in portions or all of the two-week field inspection which was conducted during June, 1979. More than half of these biologists had previous Trans-Alaska Pipeline System (TAPS) monitoring experience. Thus, we still consider all of our 1979 recommendations valid and are hopeful that necessary corrective actions will be taken.

We agree with the report's conclusion that long-term effects of the pipeline project must be ascertained. The USFWS has nationwide responsibility and expertise to investigate and evaluate effects of major projects on fish and wildlife resources, determine appropriate mitigative measures, monitor project effects, and conduct follow-up studies. We believe we should play a major

APPENDIX V

role in determining and designing the studies to be undertaken. We further believe that we should conduct or have a major responsibility for directing interdisciplinary studies in conjunction with other appropriate State and Federal agencies, and also play a major role in environmental monitoring. The type of studies listed on page 48 partially address the kind of information needed, although we believe that the need for studies related to raptors and endangered species, and key staging areas for migratory birds, may be relatively minor compared to some which are not listed - particularly those related to fish passage and waters which flow through disturbed areas. It is particularly important that such studies encompass the haul road, where environmental problems in some instances greatly exceed those related to corresponding locations in the pipeline workpad. [See GAO note 1, p. 84.]

As stated in the report, the USFWS made annual surveillance trips of the entire pipeline prior to 1980. Numerous problems related to fish passage and erosion were reported annually to the Authorized Project Officer, now the Office of Special Projects (OSP). During the years that these surveys were conducted, corrective action by OSP or Alyeska was often minimal or only partially effective. Since the Authorized Officer did not approve USFWS's request to conduct a surveillance trip in 1980 no monitoring was accomplished by the USFWS. Thus, we are at a disadvantage in determining to what extent those problems identified in 1979 were corrected prior to the GAO contractor's spot inspection during the summer of 1980. However, our Ecological Services' Special Studies group conducted surveys in the Atigun Pass area during August and September, 1980. They discovered disturbing losses of indigenous fish populations resulting from discontinuous surface flows in small streams intersected by the pipeline and haul road. The results and conclusions of these surveys were transmitted to the State Director, Bureau of Land Management (BLM) on October 3, 1980. Thus, we do not agree with the conclusion in the report (page 47) that fish passage is generally assured by current maintenance practices. We believe that this incident points out the ineffectiveness of the present monitoring program, and that misleading conclusions may have been made by GAO's contractor on the basis of brief spot checks of stream crossings.

Our most recent information indicates continued violation of stipulation 2.5.1.1. of the Grant of Right-of-Way, "Permittee shall provide for uninterrupted and safe passage of fish . . . ."

Although somewhat clearer in other sections of the report, we find the reference to the current U.S. Court of Claims case on page 32 (first sentence) to be misleading. The Authorized Officer did not take the position that ". . . special studies planned and programmed by agencies other than OSP after 1978 would not take place until the matter has been decided by the court." He merely determined that, until the case is settled, Alyeska will not be required to fund such studies.

The report over-emphasizes unfilled OSP personnel vacancies as a major obstacle to effective monitoring - at least with respect to environmental problems. It has been our observation for some time that a major deficiency in the monitoring program is related to the professional surveillance experience and expertise

of individual monitors and the willingness of OSP to take issue with Alyeska regarding compliance with Agreement and Grant stipulations. Filling existing vacancies will not necessarily provide OSP with adequate or appropriate monitoring capability. Engineers have been primarily relied on in the past to monitor all aspects of the operation phase of the pipeline - environmental as well as engineering concerns. We do not believe that environmental problems will be adequately recognized or dealt with until monitors with biological backgrounds are utilized on a full-time basis or an interagency interdisciplinary team approach is adopted.

We believe the report incorrectly emphasizes that major deficiencies in the effectiveness of the three major technical monitoring systems (e.g. the curvature monitoring tool, "super pig", the corrosion pig, and the line volume balance portion of the leak detection system) are due to vacancies in OSP's key personnel positions. It is difficult to understand how filling of these positions will rectify current Alyeska violation/non-compliance with stipulated monitoring requirements when OSP has agreed to the abandonment of these three systems on the basis of "Alyeska's information and judgement" (page 12). Thus, this decision was not based on lack of sufficient or experienced personnel, but rather was at least ". . . due partially to Alyeska's reluctance to submit documentation" and OSP's aquiesence to Alyeska's unilateral decision to abandon the agreed upon monitoring procedures. Therefore, the report's recommended technical requirements (pages 28, 29) are essentially meaningless unless specified monitoring goals and time tables are included.

The original leak detection system submitted by Alyeska in response to Stipulation 2.14.2 of the Agreement and Grant, and approved by OSP, was to be sensitive enough to detect pipeline leaks in the range of 580 to 750 barrels per day. As of September 1980, the sensitivety of the system currently employed averaged 5,243 barrels per day. This discrepancy is directly related to OSP's failure to adequately enforce Agreement and Grant Stipulations.

It is imperative that the leak detection system be refined as expeditiously as possible. As was dramatically illustrated by the 1979 Atigun Pass pipeline rupture, even relatively small spills have the potential for disastrous environmental impacts. Early detection is particularly of concern in view of severe engineering and geo-technical problems which exist at Atigun Pass and possibly other locations.

In summary, we have three major concerns with the draft GAO report; (1) it does not give sufficient credance to measures recommended by the USFWS in their June, 1979 surveillance report, (2) it fails to identify and address needs related to the environmental/biological qualifications of monitors being utilized during the operational phase of TAPS, and (3) it fails to deal in an effective manner with measures required to develop and implement effective pipeline leak detection and corrosion monitoring systems.

On the other hand, we believe the report deals effectively with other issues, particularly the need for studies related to the evaluation of longterm environmental consequences, needs for intensified monitoring, the current problem related to Alyeska's funding of surveillance and monitoring studies, and the relaxing of Alyeska's restrictive security system.

APPENDIX V

U.S. GEOLOGICAL SURVEY

We have reviewed the subject draft report, which deals with the operational phase of the Trans-Alaska Pipeline, in which the Geological Survey had no direct involvement or responsibility. From a basis of geological and hydrological research accomplished in earlier phases of development, we find general agreement with the analyses and conclusions of the draft report.

One finding of the study merits special emphasis: a program of continuing research is lacking and is required to assess long-term impacts of the pipeline on the environment and to obtain design insights for future developments in the arctic and subarctic. In addition to the research topics listed on pages 26 to 29 of the report, we believe it is critical to resume the program of monitoring streamflow and channel changes that was recessed for lack of funds in 1978, and to commence a study of the extent and nature of surface and subsurface changes near the gravel pad caused by thawing of permafrost soils. Knowledge of both topics is fundamental to understanding the long-term impacts on biological systems.

APPENDIX V

TECHNICAL COMMENTS

Assistant Secretary - Land and Water Resources

Page iii, last paragraph - The word "policy" in the 5th line should be changed to "decision." We do not have a policy of prohibiting other agencies from charging the cost of pipeline related environmental studies to Alyeska. Rather, it was a decision to preclude such charges until the Courts decided on the pending suit brought by Alyeska.

Page 7, paragraph 4 - The first sentence should be changed to read "The superpig was deemed necessary because the pipeline would be buried, in places, in frozen soils which could result in differential settlement". This change is recommended so that the terminology in the sentence is consistent with Stipulation 3.3.1.

Page 9, paragraph 3 - The last sentence should be changed to read as follows: The superpig was intended to be designed to provide early warning detection of the approach to operation limits of the pipeline as the stipulations required. The superpig was to measure changes in pipe curvature, not to detect leaks.

Page 10, 1st paragraph - There were no variances granted under Stipulation 3.3.1 Construction Modes. [GAO has made appropriate changes to the final report.]

Page 10, penultimate para. - "leaks were caused when ice melted under the pipe" is perhaps misleading - makes it sound as if the pipeline was supported on a solid block of ice. At Atigun Pass (MP 166) there was an undetected ice lens in the bedrock and at Pump Station #12 (MP 734) there was a mound of undetected ice-rich silt beneath the pipe.

Page 21, paragraph 1 - last sentence should read "The line volume balance portions. . ."

Page 33, paragraph 1 - Suggest adding the following sentence: "Also it is not known whether it is the haul road and the traffic on the road and pipeline workpad that causes some caribou to avoid the area or fail to cross the area to traditional feeding grounds."

Page 33, last paragraph - An additional criterion for locating the caribou and moose crossings was to put them at historically established crossings.

Page 34, paragraph 1 - Suggest substituting "because of natural terrain conditions" for "for non-wildlife reasons."

Page 38, paragraph 3 - We suggest the first sentence read as follows for clarification: "Grass seed mixes were prepared for a wide range. . ." The grass seed mixes were not based solely on the revegetation tests conducted by Alyeska. Other factors and previous professional experience also entered into the decision.

We suggest the words "grass seeding work" be inserted after "98% of all" in the second to the last sentence, since it could be concluded that 98% of the area was already revegetated, which was not the case. We also suggest adding critical moose habitat to the willow planting program.

Page 38, last paragraph - This statement is correct, if it is limited to the Trans-Alaska Pipeline and its related facilities, as defined in the Agreement and Grant. The statement does not apply to material sites. For example, since after the material sale contract is terminated, Alyeska has no further obligations under the terms of that contract. Some construction sites (e.g. temporary camps) are not available for revegetation yet, and new sites will be disturbed during operations (e.g. maintenance work or looping) and more revegetation efforts will be needed following termination of the Agreement and Grant.

Page 39, 1st paragraph - Suggest adding the phrase "in a few instances" to the last sentence since we are aware of only a few places where this occurred.

Page 39, last paragraph - Suggest the following wording for clarification: "According to OSP's Soil Scientist, seeded grass requires at least two growing seasons before evaluation for successful establishment. The scientist is continuing on evaluation. . ."

Page 46, first line - For clarification it is suggested that "at the request of the Authorized Officer" be inserted after "(USFWS)."

Page 47, 1st paragraph - last sentence - The statement as written is incorrect. The Authorized Officer did not request USFWS assistance in conducting the 1980 post breakup inspection. The decision was made to do the inspection in-house with our own professional people. The costs of BLM participants not on the OSP staff, were reimbursable by Alyeska, as would the costs of USFWS personnel, had the Authorized Officer elected to request their assistance.

HICKOK REPORT

Page 3, paragraph 6.- Re: Putuligayuk Area - It is inferred that thermal subsidence of the pipeline is severe and caused by errors in design (bury in ice-rich permafrost). No specific area is indicated, but we assume the inference is to severe surficial settlement occurring at MP 12-South. Alyeska's current assessment of the problem as explained to us on September 26, 1980, is that even though thawed to a depth of 40 feet, the in-situ material is stable below the spring line of the pipe. Above this elevation, ice-rich material (slop on top) is present and has undoubtly contributed to the noticeable surficial slumping of the workpad.

Page 3, paragraph c. - Oil cleanup debris was stored only at SWDS 117-1. Since Mr. Hickok's report was written, the oily debris at SWDS 117-1 has been disposed of (buried) at that site in accordance with the State of Alaska Department of Conservation (ADEC) permit requirements, which are acceptable to us.

Page 4, paragraph f.1. Example 1 - As noted above, this has been resolved since Alyeska got a permit from ADEC.

Example 2 - We do not believe Mr. Hickok had all the background information available to him with regard as to how BLM decisions were made. A brief summary of some of the reasons each of the four campsites were selected are as follows:

1. BLM intends to use the campsites as administrative sites after Northwest is through using the sites.

2. Each of the fly campsites is located within the "development nodes" identified in BLM's Utility Corridor Land Use Plan developed through BLM's planning process which involves public participation.

3. The 7-Mile Fly Camp could not be located in the nearby material site 79-1 because of the existing State Department of Transportation and Public Facilities maintenance camp and an existing solid waste disposal site.

4. The Prospect Fly Camp is located at the Prospect State airport on a site BLM plans to reserve to the Federal government for an administrative site.

5. The Chandalar Campsite is on a previously disturbed site.

6. The fly campsite near Material Site 119-4 could not be located in that material site, since it is the only gravel site in the area.

Example 3 - We do not believe the concern is clearly stated. It is assumed that reference is being made to cases where adequate drainage is provided for across the oil pipeline workpad, but is not being provided for across the haul road on the same stream.

Page 4, paragraph 2.a. - Free use of gravel and timber materials to State and local governments is provided for by law, which was not repealed by FLPMA.

Page 4.b. - The proper reference should be the Mining Laws of 1872, rather than the Mineral Leasing Act.

GAO note 1: Page references were changed to reflect their position in this final report.

APPENDIX VI

Alyeska pipeline SERVICE COMPANY 1835 SOUTH BRAGAW STREET, ANCHORAGE, ALASKA 99512, TELEPHONE (907) 278 1611, TELEX 090 25 127

October 30, 1980 Letter No. 80-2060-G

Mr. J. Dexter Peach, Director
Energy and Minerals Division
General Accounting Office
441 "G" Street, Room 5120
Washington, D.C. 20548

Dear Mr. Peach:

Alyeska Pipeline Service Company, as the Agent for the Owners of the Trans Alaska Pipeline System, appreciates the opportunity to comment on the Energy Minerals Division draft report, "Trans-Alaska Oil Pipeline Operations in Alaska: More Federal Monitoring Needed". Our comments are of two types:

1. Suggested corrections to factually erroneous statements contained in the draft report, and

2. Comments regarding the central themes, conclusions, and recommendations of the report.

There are numerous errors of fact in the draft. Alyeska believes that the Congress should have the benefit of accurate information when considering this report. Factual inaccuracies are addressed primarily in the appendix enclosed herewith. Comments on GAO conclusions and assumptions are also incorporated in the appendix. Most of the comments contained in the body of this letter concern what we perceive to be the central themes and conclusions of the report.

The primary thrust of the report appears to be that there have been substantial deficiencies on the part of the Office of Special Projects (OSP) in monitoring compliance with the Stipulations contained in the Agreement and Grant of Right-of-Way, particularly with regard to a perceived lack of long-term environmental impact research, as a result of understaffing and a moratorium on the use of outside consultants. The recommendation to increase staffing and undertake various studies and investigations assumes that much, if not all, of the costs of such increased staffing and investigation is chargeable to the TAPS Owners. It may well be, of course, that the OSP could effectively utilize people hired to fill certain vacant positions. Alyeska believes, however, that a true understanding of the Stipulations, efforts undertaken to meet them, and the monitoring of those efforts, would lead one to disfavor a greatly expanded monitoring effort. Although the Department of the Interior and the OSP are, of course, free to conduct whatever research they may deem necessary to gauge the impact of TAPS, we do not agree that the TAPS Owners

1211

may properly be charged for all of the activities recommended in the draft report. As you are aware, the issue of the extent to which OSP costs are reimbursable is currently being litigated in the United States Court of Claims.

The issue of reimbursability is brought most clearly into focus in the area of long-term environmental research. No single company or industry should be asked to bear the full cost of research undertaken to develop knowledge for the benefit of society at large. Environmental research undertaken to obtain data for the general public benefit is not a reimbursable monitoring activity within the terms of the Agreement and Grant of Right-of-Way. Section 12E of the Agreement and Grant of Right-of-Way provides that: "The Department shall administer this Agreement and such other agreements to reasonably assure that unnecessary employment of personnel and needless expenditure of funds are avoided". Alyeska, as Agent for the TAPS Owners, has the right to require the OSP and other federal agencies to justify any claims for reimbursement of costs as being proper monitoring costs within the terms of the Agreement and Grant of Right-of-Way.

Another recurring theme is the suggestion that Alyeska may not be conforming to the Stipulations because of a failure to achieve greater technological advances. The authors of the draft report fail to understand Alyeska's efforts to advance the state of existing technology with respect to systems designed to prevent or detect oil leaks. The report appears to be critical of Alyeska's decision to substitute other monitoring techniques for the curvature monitoring pig; the authors of the report tend to overlook the basic fact that, after the investment of millions of dollars and the expenditure of several years of intensive effort in an attempt to come up with a workable and reliable tool, the pig simply did not work. After all, when people attempt to do something that has never been done before their efforts may not always be fully successful. Alyeska has substituted a multi-faceted monitoring program for the curvature pig, is employing the best available technology, and is continuing to attempt to improve its monitoring ability. Alyeska is complying with the Stipulations. Additional monitoring by the OSP will not alter these facts.

A similar misunderstanding appears to exist with regard to the line volume balance system. The report seems to lose sight of the fact that this is only one element in a comprehensive leak detection system. It also loses sight of the fact that Alyeska's line volume balance system is, to the best of our knowledge, the most sensitive leak detection system in the industry. We have already advanced the state of technology in this area, and we are continuing efforts to improve the system. Additional monitoring would not further advance the state of technology.

We suggest, therefore, that the draft report be revised as follows:

1. Factual inaccuracies should be corrected in accordance with the attached appendix;

APPENDIX VI

2. The report should recognize that the TAPS Owners are not responsible for funding all OSP projects, particularly long-term environmental studies, and that the only costs which are reimbursable by the TAPS Owners are those costs which can be justified as reasonable and necessary costs of monitoring pipeline maintenance and operation under Section 12 of the Agreement and Grant of Right-of-Way; and

3. The report should recognize that in many areas Alyeska has attempted, and is attempting, to go beyond existing technology and cannot always guarantee success in these efforts. Reliance on alternative available technological tools where new and better ones have not yet been developed is hardly a reasonable basis for criticism.

We hope that you will review the attached comments and incorporate them into the final report.

Very truly yours,

ALYESKA PIPELINE SERVICE COMPANY,
Agent for the TAPS Owners

By _____
for F. G. Turpin
President

FGT/LEV/ls

Attachments

APPENDIX VI

ALYESKA'S COMMENT TO:

U.S. GENERAL ACCOUNTING REPORT,

"TRANS-ALASKA OIL PIPELINE OPERATIONS:
MORE FEDERAL MONITORING NEEDED"

Curvature Monitoring Pig ("Superpig") - General Observations

In 1971 - three years before pipeline construction commenced - the TAPS Owners contracted with AMF Tuboscope for the development of the superpig. Tuboscope was an industry leader in development of pipeline pigs and equipment. After eight years of effort, of design and redesign, of application of very sophisticated technology, after Alyeska had retained other consultants to try to assist Tuboscope by developing mathematical models and complex computer programs to interpret data from the superpig, superpig simply did not work as had been hoped. The draft GAO report mentions only lack of reliable baseline data and safety concerns as reasons for "abandoning" the superpig program. While it is true that there was no reliable baseline data and that the pig was unsafe to run in the pipeline, these were not the only factors involved. Alyeska did not arbitrarily "abandon" a workable tool - Alyeska substituted an alternative monitoring program because the superpig had not proved to be a practical or useful tool.

The discussion of the alternative Pipeline Stability Monitoring System contained in the report is incomplete and therefore misleading. Enclosed herewith is a copy of a description of that program. We disagree with any suggestion that this program fails to conform to the Stipulations. We believe that the program is comprehensive. It involves not only the Kaliper pig, visual surveillance and thermistor strings mentioned in the draft report, but also the making of

APPENDIX VI

soil borings, engineering analyses of construction data, the installation of settlement rods and piezometers, and the use of load cell tests. These techniques can detect deformation anomalies in the line, and are, as admitted in the draft report, the best available monitoring techniques available anywhere. Alyeska, after all, has a strong and compelling interest in avoiding oil leaks and continues to strive to improve its ability to detect potential problem areas.

Reference: Digest page ii

--OSP has determined that Alyeska, after abandoning the state-of-the-art curvature monitoring tool ("superpig"), is not complying with the stipulation for a system that would detect pipeline settling and thus provide an early warning leak prevention system. OSP's consultants, although maintaining that a curvature monitoring tool is still highly desirable, recommend waiving the stipulation...

Comment:

Alyeska is complying with the stipulations. Superpig is not mandated by the stipulations. Alyeska's alternative to Superpig is a comprehensive system that does provide early warning of potential leaks. See Superpig General Observations above.

Reference: Digest page ii

The stipulation was considered necessary for the protection of public lands, and subsequent leakage incidents lend credence to its necessity (e.g., the pipeline deformation which led to the June 1979 leak at Atigun Pass probably could have been detected before any leakage occurred, had the superpig been operating as planned).

Comment:

This statement is inaccurate. The concensus of the experts is that the cracking of the line at Atigun probably resulted from a suddent failure of pipeline support. Even if the Superpig had worked as hoped for, it could not have given advance warning of such a sudden failure. While gradual deformation could probably have been detected by an operational Superpig, the alternative Pipeline Stability Monitoring System can also detect gradual deformation.

[See GAO note 1, p. 106.]

APPENDIX VI

CORROSION PIG - GENERAL OBSERVATIONS

The corrosion pig is one aspect of Alyeska's overall corrosion control and detection plan. The scheduling and frequency of corrosion pig surveys undertaken thus far conforms to industry practice for new pipelines. The corrosion control and detection plan includes, in addition to the corrosion pig, the following:

1) A Cathodic Protection System which is monitored by means of periodic pipe-to-soil potential surveys to determine its effectiveness.

2) Examination of buried pipe at excavated sites for possible corrosion.

3) Periodic examination of metal coupons which are placed in the flowing crude oil stream to determine the rate of corrosion.

4) Periodic wall thickness readings of above-ground pipe.

With these methods Alyeska can obtain reliable information regarding potential corrosion problems from sources external and internal to the pipeline. Prudhoe Bay crude oil is not, moreover, considered to be corrosive at pipeline temperatures.

Although the corrosion pig has not been run in accordance with the schedule set forth in the original corrosion control plan we are confident that, based on data from all components of the corrosion control system, there has been no danger to pipeline integrity due to corrosion and therefore no need to run the

APPENDIX VI

pig more frequently than it has been. Because the use of a 17-foot long, 8,600 pound pig through a pipeline containing 80 in-line check valves does involve some risk of pipeline shutdown or loss of throughput, we believe it would not be in the national interest to run the pig more frequently than necessary to obtain essential data.

While the schedule for future runs remains to be determined, we have always kept the OSP informed regarding the scheduling of corrosion pig surveys and will continue to do so.

APPENDIX VI

Reference: Digest page ii

--Alyeska has not run internal corrosion pitting surveys (the corrosion pig) as frequently as required in the approved corrosion control plan. OSP has not reached agreement with Alyeska as to the optimal usage of the corrosion pig.

Comment:

See Corrosion Pig, General Observations, above.

Reference: Digest page ii

--The line volume balance leak detection method is not operating at the sensitivity specified in the approved design. OSP should determine whether this lesser sensitivity is justified.

Comment:

The line volume balance leak detection method is one aspect of a far broader system. Whether or not it is as sensitive as described in the approved design, it is the most sensitive system of which we are aware. We have already stretched the limits of the state-of-the-art. Alyeska can hardly be criticized for not utilizing a technology that does not exist. The OSP has been provided with all information necessary to justify the level of sensitivity of the system.

Reference: Digest page ii

--The effectiveness of earthquake monitoring system, which Alyeska maintained was not specifically required by the stipulations, has not been thoroughly evaluated by OSP.

Comment:

Because the Earthquake Monitoring System is not required by the stipulations, the OSP has no monitoring responsibility. Alyeska installed the system to assist it to more readily identify potential problem areas in the event of an earthquake. In any case, it is our understanding that the system has been evaluated by the OSP.

Reference: Digest page iii

The environmental requirements reviewed include those for big game crossings, fish passage, erosion control, and revegetation. GAO and a consultant with Arctic environmental expertise spot-checked conditions along the length of the pipeline, noting that Alyeska has been responsive to various environmental problems identified by Interior monitors. However, in order to fully adjudge the company's compliance with the stipulations, long-term environmental impact research is necessary.

Comment:

Alyeska did comply with the stipulations as written and interpreted by OSP. Long-term surveillance will only determine how good the stipulations were.

Reference: Digest pages iii-iv

OSP spot-checks should be supplemented by research to determine the long-term effects of Alyeska's activity. Research which has been done has been uncoordinated and inadequate. The problem is exacerbated by an OSP policy which precludes other agencies, including the U.S. Fish and Wildlife Service and the U.S. Geological Survey, from charging the cost of pipeline-related environmental studies to Alyeska. The decision was made because Alyeska contested some such charges in a suit brought in 1978. The suit is still pending in the U.S. Court of Claims. Only through an organized and sustained research effort can the efficacy of the corrective actions required of Alyeska--whether those actions suffice, or alternatively, are insufficient or excessive--be determined. OSP is neither conducting nor sponsoring such research.

Comment:

Alyeska maintains that long-term environmental impact research should be funded by the public as being in the national interest. The extent of Alyeska's obligation to reimburse the government for OSP activities is subject to determination by the Court of Claims.

Reference: Page 1-1

Alyeska Pipeline Service Company (Alyeska) operates the pipeline for seven owner companies.

Comment:

There are eight owner companies, not seven.

APPENDIX VI

Reference: Page 2-1 to 2-2

As designed, it would have enabled Alyeska to detect the changes in pipeline curvature which precede wrinkling and possible leakage.

Comment:

"It" is the Superpig. The fact that it was designed to detect pipeline curvature does not mean that the design ever became a reality or that the superpig ever became a reliable operational tool. See Curvature Monitoring Pig-General Observations, above.

Reference: Page 2-2

According to officials from the Department of Interior, Department of Transportation, and National Transportation Safety Board, the pipeline deformation which led to the June 1979 leaks probably could have been detected before any leakage occurred, had the superpig been operating as planned.

Comment:

See earlier comment, re: Digest, page ii, on Superpig's ability to detect Atigun problem.

Reference: Page 2-6

Stipulation 3.3.1 required that the deformation monitoring system be operational prior to the transmission of oil through the line. Oil began to flow through the pipeline in June 1977. The superpig had not been run through TAPS at this time.

Comment:

Such heavy pigs cannot be run in the TAPS system without liquid in the pipeline.

Reference: Page 2-6

These leaks were caused when ice melted under the pipe causing it to settle, bend and break. This was the situation that superpig was designed to detect and prevent, according to Department of Interior officials.

Comment:

The pipe "buckled" and "cracked"; it did not "break".

APPENDIX VI

Reference: Page 2-6

In July and August 1979, Alyeska ran the superpig several times in the northern section of the pipeline. On one such run, the superpig stuck in a pipeline valve. It was later determined that the pig stuck because the valve was not fully open. Removal of the pig cost between two and three million dollars, according to OSP. Alyeska cancelled all future superpig runs for 1979.

Comment:

The valve in question was a check valve. The fact that the valve was not fully open is not the only or primary cause for the pig sticking. The configuration of the pig was also a contributing factor.

Reference: Page 2-7

For instance, MRI's June 1980 final report characterized OSP's input to the superpig design as minimal. By the time OSP initiated review activities in 1974, the design was finalized.

Comment:

This is inaccurate. Design was established and fabrication was underway, but major design changes continued throughout the whole program, thus allowing the OSP ample opportunity to comment and offer its input. See also comment regarding Page 2-8 below.

Reference: Page 2-8

"During early review meetings in 1974 with Alyeska and its contractor, AMF Tuboscope, some early design specifications and configuration drawings for the Curvature Measurement System (superpig) were provided. Subsequent feasibility of the instrument was demonstrated by the Lakehead tests in 1976, and operational requirements were presented in briefings by Alyeska to the APO on June 4, 1977, and June 29, 1978.

However, this information was not submitted in accordance with the formal Notice to Proceed (NTP) process which is delineated in the Stipulations. In addition, no periodic written progress reports, or detailed status reports were ever submitted, including schedules of sufficient detail to determine the critical milestones necessary to meet the 1977 startup schedule for the pipeline."

APPENDIX VI

> MRI concluded that the review of the curvature monitoring program design could not be adequately conducted. This was due partially to Alyeska's reluctance to submit documentation. Subsequently, when the superpig developed mechanical problems, neither OSP or MRI had sufficiently detailed knowledge of the superpig design to independently determine which aspects required correction. Thus, OSP decisions regarding the curvature monitoring system program were determined on Alyeska's information and judgment.

Comment: Alyeska conducted numerous briefings in the 1974-1978 time period. The OSP was fully informed.

MRI, the OSP Consultant, was provided with a great deal of information, and reviewed designs and design changes. Alyeska did not resist requests for access to design information that it had. It would be unreasonable to expect Alyeska's contractor to freely disclose information that was proprietary.

Reference:

> As for the difficulties of running the superpig through the pipe, MRI stated that the kaliper pig (which is part of Alyeska's alternative program) also would stick in a partially closed valve.

Comment: This is incorrect. The kaliper pig is designed to pass through check valves, and, unlike the superpig, it is not an articulated or jointed device.

Reference:

> "Of the three surveillance techniques presented...in the alternate monitoring program, the Kaliper pig is the only survey instrument that is capable of recording deformation anomalies in the pipe at periodic intervals. It is not, however, sensitive enough to detect the approach to operational tolerance limits of the pipeline..."

Comment: This is an inaccurate statement. First, the monitoring program also includes the placement of settlement rods, which do record deformation anomalies and are sufficiently sensitive to detect the approach to operational tolerance limits of the pipeline. Second, the Kaliper pig can, in some cases, detect the approach to operational tolerance limits.

APPENDIX VI

Reference: Page 2-15 to 2-16

The pipe must be protected externally from atmospheric corrosion, and internally from the corrosive action of water and sulphur compounds which are present in the oil being transported.

Comment:

Prudhoe Bay crude is not considered corrosive at pipeline temperatures. Moreover, frequent cleaning pig runs prevent the buildup of water and/or solids in low spots in the pipeline where internal corrosion might otherwise tend to occur.

Reference: Page 2-17

"This will give a measure on external corrosion as well as internal corrosion. This equipment will scan the entire 36% of the pipe and would, therefore, verify the effectiveness of the external monitoring system."

Comment:

"360°"

Reference:

Alyeska's approved corrosion control plan included a provision that the pig be used annually for the first three years of operation. In 1977, the year oil flow started, the Department of Transportation unsuccessfully attempted to have Alyeska run the pig right after oil startup. Alyeska refused, saying to do so was more conservative than industry practice.

"We know of no company that has ever run a corrosion pig to determine internal corrosion in a pipeline handling noncorrosive crude such as will be pumped in the Trans-Alaska pipeline."

Comment:

It should be pointed out that the corrosion pig was not completed at that time. Alyeska's plan was to run the pig in the first 12 months of operation for the purpose of obtaining an early baseline - not to detect corrosion. See also Corrosion Pig - General Observations, above.

Reference: Page 2-18

OSP officials stated that the major cause of pipeline leaks in the United States is corrosion.

APPENDIX VI

Comment: These statistics include, as a large percentage, old lines that were never coated and/or that were installed prior to cathodic protection practices. Most such leaks which occurred in pipelines handling crude oil similar to TAPS crude were due to external correction. There are many modern pipelines that have no corrosion problems.

Reference: Page 2-21

The line volume balance method is TAPS primary leak detection technique, according to MRI, because it is the most sensitive and is industry proven.

Comment: This method of leak detection is one part of a comprehensive plan - it is not the "primary" leak detection technique. To the best of our knowledge, the TAPS leak detection system is the best available in the pipeline industry. This has been confirmed by several independent sources. See also comment regarding Digest, p. ii on subject of leak detection.

Reference: Page 2-29

In February 1979, the OSP advised Alyeska that it would continue to require an earthquake monitoring system as part of the operations control center data output. OSP's reasoning for this position was that there was no assurance that wrinkling or other overstressing of the pipeline would not occur in the event of an earthquake. Should such an event occur without the earthquake monitoring system in place, OSP would require that the pipeline be shut down until a thorough inspection was made to ascertain damages; if the monitoring system was in place, uninterrupted operations may be possible after such an occurrence.

Comment: It must be remembered that the pipeline is designed to resist even the most severe earthquake. Thus, there is no basis in the Stipulations for requiring an earthquake monitoring system. The fact that we do have the system, however, is a

APPENDIX VI

further reason why it would be unnecessary and unreasonable to mandate a pipeline shutdown in the event of an earthquake. Also, such a shutdown without adequate reason, would not be in the national interest.

Reference: Page 2-30

In April 1980, GAO staff members visited the Valdez Operations Control Center and received an explanation of the earthquake monitoring system. We were advised that the system does not identify the exact epicenter of an event; however, it does give the general area, such as between two specific pump stations. The pipeline controller does not rely solely on Alyeska's earthquate monitoring system; he calls the Alaska Tsunami Center at Palmer, Alaska to determine the precise epicenter. The controller then places a plastic overview sheet on a map which indicates the portion of the pipeline which may have been affected. As of this time, there have not been any seismic occurrences near the pipeline with sufficient magnitude to activate the alarm system.

Comment:

Alyeska's primary interest is in knowing the degree of stress on the pipeline resulting from an earthquake -- this information is derived from Alyeska's earthquake monitoring system. Tsunami Center data regarding the precise epicenter of an earthquake is not essential to an assessment of pipeline integrity. The Tsunami Center would be contacted to confirm data received from Alyeska's system.

Reference: Page 3-5

Federal agencies which were previously conducting studies on various TAPS-related subjects are now precluded from doing so by the Authorized Officer's decision not to allow study costs to be charged to Alyeska, pending results of Alyeska's court suit. Within its presently defined role of spot-checking Alyeska's compliance, OSP is not--through staff, consultants, or agreements with other agencies--engaged in any ongoing studies which would determine the long-term effects of pipeline construction and operation on the environment.

APPENDIX VI

Comment: Obviously, the respective agencies of the federal government charged with resource management obligations are not precluded from conducting TAPS-related research. What is precluded is continued funding by Alyeska of research studies that cannot be justified as pipeline monitoring activities under the Agreement and Grant of Right-of-Way.

Reference: Page 3-8 to 3-9

Studies have been accomplished by JFWAT to access the effects of TAPS on moose and caribou movements. These studies state that compliance with the Stipulations for free passage and movement cannot yet be demonstrated.

Comment: Quoting JFWAT reports of 1974-1977 period do not reflect the current situation regarding animal passage under TAPS. To date, there does not appear to be much doubt as to the ability of moose to move freely under the elevated TAPS system. In fact, little use of the 10x60 foot elevated animal crossings have been documented. However, what has been documented by both ADF&G and APSC biologists is that moose are not reluctant to crossing under the elevated pipeline at most locations, regardless of pipeline height. To suggest that Stipulation 2.5.4 has not been met to date by current pipeline design, for moose movements, is not supported by existing observations. Discussion of caribou movement can be found below.

Reference: Page 3-10 to 3-11

State and Federal biologists agreed that the standards for construction for big game crossings, including buried sections for caribou and 10-foot high elevated sections for moose and bison, resulted in final designs which they felt might meet the stipulation calling for free passage and movement of big game animals. However, the biologists who established the standards indicated that they were not sure that big game would in fact use these kinds of buried and elevated crossings, and that they did not intend to free the pipeline builders from their obligation to meet

APPENDIX VI

> the stipulation. The JFWAT Federal coordinator who helped develop the standards stated, "We only said the kinds of crossings we recommended stood the best chance of meeting the stipulation, based on the knowledge we had at that time."

Comment:

What has not been stated...is that the criteria established for animal crossings, i.e., 10x60 feet, to date, appears to have been an extremely conservative dimension.

Alyeska unsuccessfully attempted to negotiate a "lower" animal crossing height with pipeline biologists. To date, the designated big game crossings appear to be receiving very little use. Moose and caribou are moving under the elevated pipeline at heights below six feet, with the majority of crossing observations noted at pipe heights below nine feet. Few crossings have been documented at the designated big game crossings, constructed to provide "free and uninterrupted" passage.

It should be mentioned also, that in periods of extreme snowfall, animal movements are generally restricted. If heavy snows and freezing, crusted snow conditions exist simultaneously, animal movements essentially cease.

Under these conditions, attempting to evaluate animal movements, or lack of them, adjacent to or under the TAPS system could be extremely difficult.

Reference:

Page 3-11 to 3-13

> The question of whether big game crossings are adequate will take many years of research to answer. For example, we found that passage by caribou east and west across the Haul Road and under or over the pipeline is being managed by bulls adequately--particularly in periods of insect harassment. There are also indications that cows with calves aren't managing to cope with the situation in natural efforts to reach the Sagavanirktok River bars and gravels to escape insects...
>
> OSP officials agree that a determination as to whether the stipulated big game crossings are fully effective or if they should be required of future pipelines cannot be made without further research of the total impact of TAPS on the actions and movements of big game herds.

APPENDIX VI

Comment: Considerable discussion is presented relative to the Central Arctic caribou herd on the North Slope. Nothing was mentioned of the extensive observations of caribou movements in the Nelchina Basin of South Central Alaska. In the latter area, caribou movements during both the Spring and Fall have been documented under the elevated pipeline. In this area, the traditional migration route crosses the pipeline right-of-way from East to West. To date, no interruptions to migration or "bunching or herding" on one side or the other of the elevated line have been documented or observed.

On the North Slope were the "traditional migration" route of the recently classified Central Arctic herd are generally parallel to the pipeline ROW, but less well known, considerable concern has been expressed relative to the cow/calf segment of this herd during Spring migrations. There appears to be inference that the northward migration to the calving grounds previously followed the Sagavanirktok River, but that due to the construction of the TAPS system and the haul road, the Spring movement of pregnant cows has been displaced some distance to the West. This is a highly speculative hypothesis. Due to the lack of baseline or pre-construction caribou migration information of Spring caribou movements, conclusions relative to what is happening or has happened are questionable.

A claim for reimbursement of costs of further research in this area pursuant to the Agreement and Grant of Right-of-way would be subject to dispute.

APPENDIX VI

The Central Arctic herd was not identified or described as a separate caribou herd until well after Prudhoe Bay development commenced. This herd has increased in number simultaneously with the increased activities associated with Prudhoe Bay. The productivity of the Central Arctic herd during this time was encouraging.

Reference:

Page 3-21

Revegetation efforts are still being evaluated. According to OSP, reseeding efforts require two growing seasons before evaluation is possible. A study should be undertaken to determine how long it would take for natural vegetation to return to a disturbed area without reseeding.

Nowhere along the pipeline did there appear to be permanent, fenced-in vegetation recording plots to learn the true rate of natural plant regeneration either in barren or reseeded areas. There is a cost/benefit question here needed to be examined which explores the necessity of fertilizer/exotic plant reseeding versus natural regeneration.

Comment:

It must be recognized that Alyeska was aware of the possible benefits of fertilization without reseeding, to enhance invasion of disturbed sites by natural revegetation. This option was not approved by pipeline monitors, although the utilization of the technique was presented by Alyeska for consideration by state and federal pipeline agencies. Arctic grass species were included in each of the four Alyeska seed mixes utilized in revegetation programs--the reference to "exotic" plant reseeding may, therefore, be misleading.

Reference:

Page 3-22

The planting experiments on non-indigenous willows, which currently appear healthy, are doomed to failure due to the relationship of plant physiology to microclimatic profile. Additionally, no apparent effort is being made to record plant succession under oil spill conditions, such as exists in the area of the Mile Post 734 oil leak which occurred in 1979. A study needs to be done to determine the effects of oil on permanent long-term vegetation.

APPENDIX VI

Comment: Evaluations of vegetation and soils subjected to oil spills have been conducted by University of Alaska scientists, funded by Alyeska. In every case where oil spills have occurred, i.e., Check Valve 7, Steele Creek, Mile Post 166 and Mile Post 734, the University of Alaska scientists have geen engaged to direct Alyeska restoration activities.

Alyeska suggests that considerable data is already available on techniques and procedures to utilize in restoring areas disturbed by oil spills in the Arctic.

Reference: Page 3-30

From observations noted during the summer of 1980, a need for additional maintenance was evident at some fish streams. In two instances where culverts were inadequate a small amount of downstream channeling would be desirable and hydrologically helpful without loss of fish habitat. Overall, maintenance of the TAPS right-of-way and work pad is excellent, with only few exceptions; fish passage was generally assured in the locations observed.

Comment: Alyeska recognizes the necessity for continuing maintenance at stream and river crossings. We will continue to make periodic inspections of culverts, low water crossings and bridges to check for impediments to passage of fish. Corrective actions are implemented where problems are noted.

We concur with the assessment that the overall maintenance of the system is excellent, and will continue to maintain the system in that condition.

Reference: Appendices to Report.

Comment: The appendices to the report contain many errors of fact. For instance, the statement in Appendix III that Alyeska is improperly hindering public access to public lands in exercising

rights granted under the Agreement and Grant of Right-of-Way and in carrying out necessary, reasonable and legitimate security measures, is not true. However, we do not undertake, at this time, to comment on specific inaccuracies not incorporated into the text of the report. If at any time, however, action is proposed to be taken in reliance on information contained in the appendices, we request that we be afforded an opportunity to comment.

GAO note 1: Page references in this appendix refer to the draft report and do not necessarily agree with the page numbers in the final report. Appendix VII, entitled "Full Text of Alyeska's Comments and GAO's Detailed Responses," contains page references as they appear in this final report.

APPENDIX VII

(FULL TEXT OF ALYESKA'S COMMENTS AND GAO'S DETAILED RESPONSES)

Alyeska pipeline SERVICE COMPANY 1835 SOUTH BRAGAW STREET, ANCHORAGE, ALASKA 99512, TELEPHONE (907) 278 1611, TELEX 090 25 127

October 30, 1980 Letter No. 80-2060-G

Mr. J. Dexter Peach, Director
Energy and Minerals Division
General Accounting Office
441 "G" Street, Room 5120
Washington, D.C. 20548

Dear Mr. Peach:

Alyeska Pipeline Service Company, as the Agent for the Owners of the Trans Alaska Pipeline System, appreciates the opportunity to comment on the Energy Minerals Division draft report, "Trans-Alaska Oil Pipeline Operations in Alaska: More Federal Monitoring Needed". Our comments are of two types:

1. Suggested corrections to factually erroneous statements contained in the draft report, and

2. Comments regarding the central themes, conclusions, and recommendations of the report.

There are numerous errors of fact in the draft. Alyeska believes that the Congress should have the benefit of accurate information when considering this report. Factual inaccuracies are addressed primarily in the appendix enclosed herewith. Comments on GAO conclusions and assumptions are also incorporated in the appendix. Most of the comments contained in the body of this letter concern what we perceive to be the central themes and conclusions of the report.

(GAO response: Alyeska provided various comments which it characterized as "errors of fact" but which, in reality, are either (1) disagreements with judgments OSP and its technical consultant, MRI, have made about Alyeska's programs or (2) disagreements over the need for additional monitoring recommended in the draft report. These disagreements, which are discussed in more detail in the following pages, reinforce our conclusion that OSP needs to independently adjudge whether Alyeska's variances from stipulated performances are justified and what, if any, further steps are necessary to bring Alyeska's efforts into conformance with the stipulations.)

APPENDIX VII

The primary thrust of the report appears to be that there have been substantial deficiencies on the part of the Office of Special Projects (OSP) in monitoring compliance with the Stipulations contained in the Agreement and Grant of Right-of-Way, particularly with regard to a perceived lack of long-term environmental impact research, as a result of understaffing and a moratorium on the use of outside consultants. The recommendation to increase staffing and undertake various studies and investigations assumes that much, if not all, of the costs of such increased staffing and investigation is chargeable to the TAPS Owners. It may well be, of course, that the OSP could effectively utilize people hired to fill certain vacant positions. Alyeska believes, however, that a true understanding of the Stipulations, efforts undertaken to meet them, and the monitoring of those efforts, would lead one to disfavor a greatly expanded monitoring effort. Although the Department of the Interior and the OSP are, of course, free to conduct whatever research they may deem necessary to gauge the impact of TAPS, we do not agree that the TAPS Owners may properly be charged for all of the activities recommended in the draft report. As you are aware, the issue of the extent to which OSP costs are reimbursable is currently being litigated in the United States Court of Claims.

The issue of reimbursability is brought most clearly into focus in the area of long-term environmental research. No single company or industry should be asked to bear the full cost of research undertaken to develop knowledge for the benefit of society at large. Environmental research undertaken to obtain data for the general public benefit is not a reimbursable monitoring activity within the terms of the Agreement and Grant of Right-of-Way. Section 12E of the Agreement and Grant of Right-of-Way provides that: "The Department shall administer this Agreement and such other agreements to reasonably assure that unnecessary employment of personnel and needless expenditure of funds are avoided". Alyeska, as Agent for the TAPS Owners, has the right to require the OSP and other federal agencies to justify any claims for reimbursement of costs as being proper monitoring costs within the terms of the Agreement and Grant of Right-of-Way.

(GAO's response: The draft report specifically stated that some of the research necessary to evaluate long-term environmental impacts may not be properly chargeable to Alyeska, and that the Authorized Officer should pursue alternative funding sources for such research. The draft did not recommend increased staffing but did recommend that OSP be exempted from hiring limitations which have prevented it from filling numerous staff vacancies. Many of these positions have been vacant since 1979.

APPENDIX VII

Obviously Alyeska has the right to challenge claims for reimbursement of any research costs which it thinks are unjustified. The report concludes that sufficient long-term environmental impact research is not being conducted to assure that the effectiveness of measures taken in this unique project are evaluated. Such research is also needed, in some cases, to evaluate Alyeska's compliance with the stipulations. The Authorized Officer must decide which research costs are within the Agreement and Grant of Right-of-Way and thus properly chargeable to Alyeska. The pending United States Court of Claims decision will offer guidance in this matter, but the delay in deciding this case should not preclude necessary research.)

Another recurring theme is the suggestion that Alyeska may not be conforming to the Stipulations because of a failure to achieve greater technological advances. The authors of the draft report fail to understand Alyeska's efforts to advance the state of existing technology with respect to systems designed to prevent or detect oil leaks. The report appears to be critical of Alyeska's decision to substitute other monitoring techniques for the curvature monitoring pig; the authors of the report tend to overlook the basic fact that, after the investment of millions of dollars and the expenditure of several years of intensive effort in an attempt to come up with a workable and reliable tool, the pig simply did not work. After all, when people attempt to do something that has never been done before their efforts may not always be fully successful. Alyeska has substituted a multi-faceted monitoring program for the curvature pig, is employing the best available technology, and is continuing to attempt to improve its monitoring ability. Alyeska is complying with the Stipulations. Additional monitoring by the OSP will not alter these facts.

(GAO's response: Both our draft and final report recognize that Alyeska invested millions of dollars and made extensive efforts in the superpig program. Yet the report also points out that OSP's evaluation of the program substituted for the superpig resulted in its conclusion that the program does not comply with the stipulation. Given this conclusion by OSP, the report recommends that OSP pursue further steps with Alyeska--including investigating new and alternative technologies--to develop an acceptable approach to fulfill the stipulated requirement.)

A similar misunderstanding appears to exist with regard to the line volume balance system. The report seems to lose sight of the fact that this is only one element in a comprehensive leak detection system. It also loses sight of the fact that Alyeska's line volume balance system is, to the best of our knowledge, the most sensitive leak detection system in the industry. We have already advanced the state of technology in this area, and we are continuing efforts to improve the system. Additional monitoring would not further advance the state of technology.

(GAO's response: The draft report clearly recognized that the line volume balance is only one element of Alyeska's overall leak detection system. The line volume balance system, however, was to have been by far the most sensitive, therefore a very critical, part of Alyeska's overall approach. Alyeska has not achieved the level of sensitivity called for when the system was adopted however and OSP has not independently verified that this lesser performance is either acceptable or the best that is technologically possible. Thus we are recommending that OSP make this assessment.)

We suggest, therefore, that the draft report be revised as follows:

1. Factual inaccuracies should be corrected in accordance with the attached appendix;

2. The report should recognize that the TAPS Owners are not responsible for funding all OSP projects, particularly long-term environmental studies, and that the only costs which are reimbursable by the TAPS Owners are those costs which can be justified as reasonable and necessary costs of monitoring pipeline maintenance and operation under Section 12 of the Agreement and Grant of Right-of-Way; and

3. The report should recognize that in many areas Alyeska has attempted, and is attempting, to go beyond existing technology and cannot always guarantee success in these efforts. Reliance on alternative available technological tools where new and better ones have not yet been developed is hardly a reasonable basis for criticism.

We hope that you will review the attached comments and incorporate them into the final report.

(GAO's response: Con't. on next page.)

APPENDIX VII

(GAO's response: Our analysis of Alyeska's so-called factual inaccuracies is presented in the following pages. As to point No. 2, the draft report already recognized that some of the long-term research costs may not be properly chargeable to Alyeska and that the courts may have to resolve this matter. Concerning point No. 3, it should be recognized that many of the requirements and standards were established by the pipeline owners themselves, and approved by the Federal Government as conditions for moving ahead with pipeline construction or operation. Federal monitors must verify that Alyeska's present performance meets a minimal level of acceptance and is as good as can be expected with present technology. The report states that, in fact, such variances from previously established standards may be justified. But it also states that it is necessary for Federal monitors to independently assess the facts and circumstances surrounding the variances and require Alyeska to take appropriate action.

APPENDIX VII

ALYESKA'S COMMENT TO:

U.S. GENERAL ACCOUNTING REPORT,

"TRANS-ALASKA OIL PIPELINE OPERATIONS:
MORE FEDERAL MONITORING NEEDED"

Curvature Monitoring Pig ("Superpig") - General Observations

In 1971 - three years before pipeline construction commenced - the TAPS Owners contracted with AMF Tuboscope for the development of the superpig. Tuboscope was an industry leader in development of pipeline pigs and equipment. After eight years of effort, of design and redesign, of application of very sophisticated technology, after Alyeska had retained other consultants to try to assist Tuboscope by developing mathematical models and complex computer programs to interpret data from the superpig, superpig simply did not work as had been hoped. The draft GAO report mentions only lack of reliable baseline data and safety concerns as reasons for "abandoning" the superpig program. While it is true that there was no reliable baseline data and that the pig was unsafe to run in the pipeline, these were not the only factors involved. Alyeska did not arbitrarily "abandon" a workable tool - Alyeska substituted an alternative monitoring program because the superpig had not proved to be a practical or useful tool.

(GAO's response: In fact, our draft report, in discussing the reasons for abandoning the superpig, included all the reasons given by Alyeska for abandoning the program, including its statement that a "more practical" program had been substituted. Alyeska officially notified OSP in March 1980 that the company "found it necessary to abandon further development and has discontinued use of the curvature pig in the pipeline". Lack of reliable data and safety concerns were the primary reasons given to OSP for the discontinuance of the program.)

APPENDIX VII

The discussion of the alternative Pipeline Stability Monitoring System contained in the report is incomplete and therefore misleading. Enclosed herewith is a copy of a description of that program. We disagree with any suggestion that this program fails to conform to the Stipulations. We believe that the program is comprehensive. It involves not only the Kaliper pig, visual surveillance and thermistor strings mentioned in the draft report, but also the making of soil borings, engineering analyses of construction data, the installation of settlement rods and piezometers, and the use of load cell tests. These techniques can detect deformation anomalies in the line, and are, as admitted in the draft report, the best available monitoring techniques available anywhere. Alyeska, after all, has a strong and compelling interest in avoiding oil leaks and continues to strive to improve its ability to detect potential problem areas.

(GAO's response: We do not agree that our discussion in the draft report of the alternative system was misleading because a full description of the system was not included. The Kaliper pig, thermistor strings, and visual surveillance elements, which were discussed, comprise the "problem identification" phase of Alyeska's alternative system. Our discussion was limited to this phase because its purpose is comparable to that of the superpig, which it was designed to replace. The additional elements mentioned by Alyeska are part of the "problem confirmation" phase, which come into play only after a problem has been identified. The report has been amplified, however, to state that there are additional phases to this program. With this amplification, we do not think it necessary to include Alyeska's detailed, 12 page program description. Significantly, Alyeska's program, in total, was analyzed by OSP and found not to comply with the applicable stipulation. See also discussion on p. 114.)

APPENDIX VII

Reference: Digest page ii

--OSP has determined that Alyeska, after abandoning the state-of-the-art curvature monitoring tool ("superpig"), is not complying with the stipulation for a system that would detect pipeline settling and thus provide an early warning leak prevention system. OSP's consultants, although maintaining that a curvature monitoring tool is still highly desirable, recommend waiving the stipulation...

Comment:

Alyeska is complying with the stipulations. Superpig is not mandated by the stipulations. Alyeska's alternative to Superpig is a comprehensive system that does provide early warning of potential leaks. See Superpig General Observations above.

(GAO's response: Contrary to Alyeska's position, OSP and MRI found that Alyeska's present system was not able to detect the approach to the pipeline's operational tolerance limits, as required by the stipulation. This basic disagreement between OSP and Alyeska is brought out in the report and exemplifies the need for OSP, now that it has determined that Alyeska is not in compliance with stipulated requirements, to assure that Alyeska's actions are, and continue to be, in the public interest.)

Reference: Digest page ii

The stipulation was considered necessary for the protection of public lands, and subsequent leakage incidents lend credence to its necessity (e.g., the pipeline deformation which led to the June 1979 leak at Atigun Pass probably could have been detected before any leakage occurred, had the superpig been operating as planned).

Comment:

This statement is inaccurate. The concensus of the experts is that the cracking of the line at Atigun probably resulted from a suddent failure of pipeline support. Even if the Superpig had worked as hoped for, it could not have given advance warning of such a sudden failure. While gradual deformation could

APPENDIX VII

probably have been detected by an operational Superpig, the alternative Pipeline Stability Monitoring System can also detect gradual deformation.

(GAO's response: Alyeska is in disagreement with the Federal monitoring agencies on this matter, which hold that there was gradual deformation preceding the leak. Department of the Interior, Department of Transportation, and National Transportation Safety Board officials concluded that an operational Superpig probably could have detected this and the subsequent problem before leakage occurred. On the other hand, OSP and MRI have determined that Alyeska's alternative Pipeline Stability Monitoring System can not detect gradual deformation to the degree required by the stipulation).

CORROSION PIG - GENERAL OBSERVATIONS

The corrosion pig is one aspect of Alyeska's overall corrosion control and detection plan. The scheduling and frequency of corrosion pig surveys undertaken thus far conforms to industry practice for new pipelines. The corrosion control and detection plan includes, in addition to the corrosion pig, the following:

1) A Cathodic Protection System which is monitored by means of periodic pipe-to-soil potential surveys to determine its effectiveness.

2) Examination of buried pipe at excavated sites for possible corrosion.

3) Periodic examination of metal coupons which are placed in the flowing crude oil stream to determine the rate of corrosion.

4) Periodic wall thickness readings of above-ground pipe.

With these methods Alyeska can obtain reliable information regarding potential corrosion problems from sources external and internal to the pipeline. Prudhoe Bay crude oil is not, moreover, considered to be corrosive at pipeline temperatures.

Although the corrosion pig has not been run in accordance with the schedule set forth in the original corrosion control plan we are confident that, based on data from all components of the corrosion control system, there has been no danger to pipeline integrity due to corrosion and therefore no need to run the pig more frequently than it has been. Because the use of a 17-foot long, 8,600 pound pig through a pipeline containing 80 in-line check valves does involve some risk of pipeline shutdown or loss of throughput, we believe it would not be in the national interest to run the pig more frequently than necessary to obtain essential data.

While the schedule for future runs remains to be determined, we have always kept the OSP informed regarding the scheduling of corrosion pig surveys and will continue to do so.

Reference: Digest page ii	--Alyeska has not run internal corrosion pitting surveys (the corrosion pig) as frequently as required in the approved corrosion control plan. OSP has not reached agreement with Alyeska as to the optimal usage of the corrosion pig.
Comment:	See Corrosion Pig, General Observations, above.

APPENDIX VII

(GAO's response: Alyeska admits that it has not complied with the stipulated requirement for running the corrosion pig. At the time the stipulations were written, this requirement was deemed necessary for the protection of pipeline integrity and public lands. In its November 7, 1980, response to our draft report, the Department of the Interior stated that Alyeska has been requested to submit a revised corrosion pig survey schedule and that "if a change in the frequency of surveys is requested, Alyeska has been notified that a complete justification must accompany any such report.")

Reference: Digest page ii

--The line volume balance leak detection method is not operating at the sensitivity specified in the approved design. OSP should determine whether this lesser sensitivity is justified.

Comment:

The line volume balance leak detection method is one aspect of a far broader system. Whether or not it is as sensitive as described in the approved design, it is the most sensitive system of which we are aware. We have already stretched the limits of the state-of-the-art. Alyeska can hardly be criticized for not utilizing a technology that does not exist. The OSP has been provided with all information necessary to justify the level of sensitivity of the system.

(GAO's response: Despite Alyeska's efforts, the line volume balance leak detection method has not attained the level of sensitivity proposed by Alyeska in their approved design. More significantly, OSP has not conducted the analysis necessary to determine whether the method's sensitivity is the best than can be attained, and whether the technique is, in practice, even capable of detecting leaks.

APPENDIX VII

In responding to our draft report, the U.S. Fish and Wildlife Service stated that "it is imperative that the leak detection system be refined as expeditiously as possible," and that "as dramatically illustrated by the 1979 Atigun Pass pipeline rupture, even relatively small spills have the potential for disastrous environmental impacts.")

Reference: Digest page ii

--The effectiveness of earthquake monitoring system, which Alyeska maintained was not specifically required by the stipulations, has not been thoroughly evaluated by OSP.

Comment:

Because the Earthquake Monitoring System is not required by the stipulations, the OSP has no monitoring responsibility. Alyeska installed the system to assist it to more readily identify potential problem areas in the event of an earthquake. In any case, it is our understanding that the system has been evaluated by the OSP.

(GAO's response: OSP maintains that the earthquake monitoring system falls within stipulated requirements. OSP advises that they have been unable, because of staffing vacancies, to thoroughly evaluate the system but that such an evaluation will be performed shortly.)

Reference: Digest page iii

The environmental requirements reviewed include those for big game crossings, fish passage, erosion control, and revegetation. GAO and a consultant with Arctic environmental expertise spot-checked conditions along the length of the pipeline, noting that Alyeska has been responsive to various environmental problems identified by Interior monitors. However, in order to fully adjudge the company's compliance with the stipulations, long-term environmental impact research is necessary.

Comment: Alyeska did comply with the stipulations as written and interpreted by OSP. Long-term surveillance will only determine how good the stipulations were.

(GAO's response: Compliance with the stipulations is an ongoing process, rather than a one-time act. For instance, the stipulations require that Alyeska provide for free passage of big game animals throughout the life of the project. It is also noted that the U.S. Fish and Wildlife Service took exception to our conclusion that fish passage is generally assured by current maintenance practices. If, over time, circumstances arise which require modification of Alyeska's actions in order to comply with the stipulations, such modification may have to be made. As brought out in the report, long-term environmental impact research is necessary to determine whether the actions required by Alyeska are really in compliance with stipulations.)

Reference: Digest pages iii-iv

OSP spot-checks should be supplemented by research to determine the long-term effects of Alyeska's activity. Research which has been done has been uncoordinated and inadequate. The problem is exacerbated by an OSP policy which precludes other agencies, including the U.S. Fish and Wildlife Service and the U.S. Geological Survey, from charging the cost of pipeline-related environmental studies to Alyeska. The decision was made because Alyeska contested some such charges in a suit brought in 1978. The suit is still pending in the U.S. Court of Claims. Only through an organized and sustained research effort can the efficacy of the corrective actions required of Alyeska--whether those actions suffice, or alternatively, are insufficient or excessive--be determined. OSP is neither conducting nor sponsoring such research.

Comment: Alyeska maintains that long-term environmental impact research should be funded by the public as being in the national interest. The extent of Alyeska's obligation to reimburse the government for OSP activities is subject to determination by the Court of Claims.

(GAO's response: If OSP considers such research to be necessary to adjudge compliance with the stipulations, research costs should be charged to Alyeska. Alyeska can, of course, appeal such charges to the U.S. Court of Claims. Resolution of the pending Court of Claims suit should provide OSP with guidance in this matter.)

Reference: Page 1-1 (p. 1)

Alyeska Pipeline Service Company (Alyeska) operates the pipeline for seven owner companies.

Comment:

There are eight owner companies, not seven.

(GAO's response: Change has been made.)

Reference: Page 2-1 to 2-2 (p.6)

As designed, it would have enabled Alyeska to detect the changes in pipeline curvature which precede wrinkling and possible leakage.

Comment:

"It" is the Superpig. The fact that it was designed to detect pipeline curvature does not mean that the design ever became a reality or that the superpig ever became a reliable operational tool. See Curvature Monitoring Pig-General Observations, above.

(GAO's response: The wording of the sentence has been changed to read "If operating as designed...". The report makes it abundantly clear that this design never became a reality.)

Reference: Page 2-2 (p.7)

According to officials from the Department of Interior, Department of Transportation, and National Transportation Safety Board, the pipeline deformation which led to the June 1979 leaks probably could have been detected before any leakage occurred, had the superpig been operating as planned.

Comment:

See earlier comment, re: Digest, page ii, on Superpig's ability to detect Atigun problem.

(GAO's response: See GAO response on p. 115.)

Reference: Page 2-6 (p. 10)

Stipulation 3.3.1 required that the deformation monitoring system be operational prior to the transmission of oil through the line. Oil began to flow through the pipeline in June 1977. The superpig had not been run through TAPS at this time.

Comment:

Such heavy pigs cannot be run in the TAPS system without liquid in the pipeline.

(GAO's response: Although the superpig was not tested in TAPS, it was--as stated in our draft report--tested in another pipeline prior to TAPS startup in June 1977.)

Reference: Page 2-6 (p. 10)

These leaks were caused when ice melted under the pipe causing it to settle, bend and break. This was the situation that superpig was designed to detect and prevent, according to Department of Interior officials.

Comment:

The pipe "buckled" and "cracked"; it did not "break".

(GAO's response: Correction has been made.)

APPENDIX VII

Reference: Page 2-6 (p. 10)

In July and August 1979, Alyeska ran the superpig several times in the northern section of the pipeline. On one such run, the superpig stuck in a pipeline valve. It was later determined that the pig stuck because the valve was not fully open. Removal of the pig cost between two and three million dollars, according to OSP. Alyeska cancelled all future superpig runs for 1979.

Comment:

The valve in question was a check valve. The fact that the valve was not fully open is not the only or primary cause for the pig sticking. The configuration of the pig was also a contributing factor.

(GAO's response: The evaluation of this incident which was cited in the draft report was that of MRI, OSP's technical consultant. The fact that Alyeska considers the configuration of the pig, as well as the partially closed valve, to be a contributing factor has been added to the account.)

Reference: Page 2-7 (p.11)

For instance, MRI's June 1980 final report characterized OSP's input to the superpig design as minimal. By the time OSP initiated review activities in 1974, the design was finalized.

Comment:

This is inaccurate. Design was established and fabrication was underway, but major design changes continued throughout the whole program, thus allowing the OSP ample opportunity to comment and offer its input. See also comment regarding Page 2-8 below.

APPENDIX VII

Reference: Page 2-8 (p.11)

"During early review meetings in 1974 with Alyeska and its contractor, AMF Tuboscope, some early design specifications and configuration drawings for the Curvature Measurement System (superpig) were provided. Subsequent feasibility of the instrument was demonstrated by the Lakehead tests in 1976, and operational requirements were presented in briefings by Alyeska to the APO on June 4, 1977, and June 29, 1978.

However, this information was not submitted in accordance with the formal Notice to Proceed (NTP) process which is delineated in the Stipulations. In addition, no periodic written progress reports, or detailed status reports were ever submitted, including schedules of sufficient detail to determine the critical milestones necessary to meet the 1977 startup schedule for the pipeline."

MRI concluded that the review of the curvature monitoring program design could not be adequately conducted. This was due partially to Alyeska's reluctance to submit documentation. Subsequently, when the superpig developed mechanical problems, neither OSP or MRI had sufficiently detailed knowledge of the superpig design to independently determine which aspects required correction. Thus, OSP decisions regarding the curvature monitoring system program were determined on Alyeska's information and judgment.

Comment: Alyeska conducted numerous briefings in the 1974-1978 time period. The OSP was fully informed.

MRI, the OSP Consultant, was provided with a great deal of information, and reviewed designs and design changes. Alyeska did not resist requests for access to design information that it had. It would be unreasonable to expect Alyeska's contractor to freely disclose information that was proprietary.

(GAO's response: The assessment is MRI's. Also, according to MRI, OSP's design review "...was not effective because development of the design had progressed to a state of near completion at the time formal design reviews were initiated by the APO (OSP). The prototype Superpig design, manufacture, and testing was 85 to 90 percent complete by early 1974, at the time of TAPS project authorization. Thus, any significant changes could not be properly incorporated by the modification of design details."

As to the second reference, the language is from MRI's final evaluation of the superpig project. MRI concluded that this program could not be reviewed in accordance with the design review requirements of the stipulations.)

Reference: (p. 12) As for the difficulties of running the superpig through the pipe, MRI stated that the kaliper pig (which is part of Alyeska's alternative program) also would stick in a partially closed valve.

Comment: This is incorrect. The kaliper pig is designed to pass through check valves, and, unlike the superpig, it is not an articulated or jointed device.

(GAO's response: Again, the judgment was that of MRI, OSP's technical consultants on the superpig project. Circumstances may have changed. According to OSP, recent improvements in the Kaliper pig design now allow it to pass through check valves without locking them open.)

Reference: (p. 14) "Of the three surveillance techniques presented...in the alternate monitoring program, the Kaliper pig is the only survey instrument that is capable of recording deformation anomalies in the pipe at periodic intervals. It is not, however, sensitive enough to detect the approach to operational tolerance limits of the pipeline..."

Comment: This is an inaccurate statement. First, the monitoring program also includes the placement of settlement rods, which do record deformation anomalies and are sufficiently sensitive to detect the approach to operational tolerance limits of the pipeline. Second, the Kaliper pig can, in some cases, detect the approach to operational tolerance limits.

APPENDIX VII

(GAO's response: Again, Alyeska is taking issue not with GAO but with a conclusion of the technical experts retained by OSP. MRI and OSP concluded that Alyeska's alternative to the superpig program was not sensitive enough to "detect the approach to operational tolerance limits of the pipeline" and, consequently, Alyeska was not complying with the stipulation. This basic disagreement on the capabilities of Alyeska's program accentuates the need for OSP to have the capability to assure that Alyeska is taking action toward compliance with the stipulation.

Also, as commented on earlier, the three techniques referred to by MRI comprise the problem identification phase of Alyeska's program. Settlement rods are part of what Alyeska describes as the problem confirmation phase of their program, and would be placed after the problem had been first identified by the means discussed in the report.)

Reference: Page 2-15 to 2-16 (p. 17) The pipe must be protected externally from atmospheric corrosion, and internally from the corrosive action of water and sulphur compounds which are present in the oil being transported.

Comment: Prudhoe Bay crude is not considered corrosive at pipeline temperatures. Moreover, frequent cleaning pig runs prevent the buildup of water and/or solids in low spots in the pipeline where internal corrosion might otherwise tend to occur.

(GAO's response: Alyeska's statement that Prudhoe Bay crude is relatively non-corrosive is mentioned in the report. The information on cleaning pigs has been added.)

Reference: Page 2-17 (p. 18) "This will give a measure on external corrosion as well as internal corrosion. This equipment will scan the entire 36% of the pipe and would, therefore, verify the effectiveness of the external monitoring system."

Comment: "360°"

(GAO's response: Typographical error corrected.)

Reference: (p. 18) Alyeska's approved corrosion control plan included a provision that the pig be used annually for the first three years of operation. In 1977, the year oil flow started, the Department of Transportation unsuccessfully attempted to have Alyeska run the pig right after oil startup. Alyeska refused, saying to do so was more conservative than industry practice.

"We know of no company that has ever run a corrosion pig to determine internal corrosion in a pipeline handling noncorrosive crude such as will be pumped in the Trans-Alaska pipeline."

Comment: It should be pointed out that the corrosion pig was not completed at that time. Alyeska's plan was to run the pig in the first 12 months of operation for the purpose of obtaining an early baseline - not to detect corrosion. See also Corrosion Pig - General Observations, above.

(GAO's response: We are aware that the initial corrosion pig run was to obtain baseline data. In February 1977 the Department of Transportation--several months before oil startup--unsuccessfully attempted to push Alyeska to obtain this data soon after startup. According to the Department's Office of Pipeline Safety Operations:

> *"Since the pipe wall thickness findings of the initial inspection run are to be used as a comparison standard for all subsequent inspections, it is of primary importance that this initial check be made as soon as feasible after placing the pipeline in operation."*

As stated in the report, Alyeska failed to obtain complete baseline data until December 1978--18 months after pipeline startup.)

APPENDIX VII

Reference: OSP officials stated that the major cause of pipeline leaks in the United States is corrosion.

Page 2-18 (p. 19)

Comment: These statistics include, as a large percentage, old lines that were never coated and/or that were installed prior to cathodic protection practices. Most such leaks which occurred in pipelines handling crude oil similar to TAPS crude were due to external correction. There are many modern pipelines that have no corrosion problems.

(GAO's response: The report has been supplemented to reflect this information. OSP also advised that the older a pipeline gets, the more subject it is to corrosion. Thus, OSP is considering the advisability of requiring more frequent corrosion pig runs as the pipeline ages.)

Reference: The line volume balance method is TAPS primary leak detection technique, according to MRI, because it is the most sensitive and is industry proven.

Page 2-21 (p. 20)

Comment: This method of leak detection is one part of a comprehensive plan - it is not the "primary" leak detection technique. To the best of our knowledge, the TAPS leak detection system is the best available in the pipeline industry. This has been confirmed by several independent sources. See also comment regarding Digest, p. ii on subject of leak detection.

(GAO's response: We believe OSP should independently verify Alyeska's assertion that the system is the best available. OSP agrees this needs to be checked out. See other comments on p. 110.)

Reference: Page 2-29 (p. 25)

In February 1979, the OSP advised Alyeska that it would continue to require an earthquake monitoring system as part of the operations control center data output. OSP's reasoning for this position was that there was no assurance that wrinkling or other overstressing of the pipeline would not occur in the event of an earthquake. Should such an event occur without the earthquake monitoring system in place, OSP would require that the pipeline be shut down until a thorough inspection was made to ascertain damages; if the monitoring system was in place, uninterrupted operations may be possible after such an occurrence.

Comment:

It must be remembered that the pipeline is designed to resist even the most severe earthquake. Thus, there is no basis in the Stipulations for requiring an earthquake monitoring system. The fact that we do have the system, however, is a further reason why it would be unnecessary and unreasonable to mandate a pipeline shutdown in the event of an earthquake. Also, such a shutdown without adequate reason, would not be in the national interest.

(GAO's response: Obviously, whether it would be necessary and reasonable to mandate a pipeline shutdown in the event of an earthquake depends upon the magnitude and location of the earthquake.)

Reference: Page 2-30 (p. 26)

In April 1980, GAO staff members visited the Valdez Operations Control Center and received an explanation of the earthquake monitoring system. We were advised that the system does not identify the exact epicenter of an event; however, it does give the general area, such as between two specific pump stations. The pipeline controller does not rely solely on Alyeska's earthquate monitoring system; he calls the Alaska Tsunami Center at Palmer, Alaska to determine the precise epicenter. The controller then places a plastic overview sheet on a map which indicates the portion of the pipeline which may have been affected. As of this time, there have not been any seismic occurrences near the pipeline with sufficient magnitude to activate the alarm system.

APPENDIX VII

Comment: Alyeska's primary interest is in knowing the degree of stress on the pipeline resulting from an earthquake -- this information is derived from Alyeska's earthquake monitoring system. Tsunami Center data regarding the precise epicenter of an earthquake is not essential to an assessment of pipeline integrity. The Tsunami Center would be contacted to confirm data received from Alyeska's system.

(GAO's response: Our final report has been supplemented to include this information.)

Reference: Page 3-5 (p. 32) Federal agencies which were previously conducting studies on various TAPS-related subjects are now precluded from doing so by the Authorized Officer's decision not to allow study costs to be charged to Alyeska, pending results of Alyeska's court suit. Within its presently defined role of spot-checking Alyeska's compliance, OSP is not--through staff, consultants, or agreements with other agencies--engaged in any ongoing studies which would determine the long-term effects of pipeline construction and operation on the environment.

Comment: Obviously, the respective agencies of the federal government charged with resource management obligations are not precluded from conducting TAPS-related research. What is precluded is continued funding by Alyeska of research studies that cannot be justified as pipeline monitoring activities under the Agreement and Grant of Right-of-Way.

(GAO's response: The Authorized Officer's decision also precluded agencies from charging Alyeska with study costs which could be justified as pipeline monitoring activities.

Reference: Studies have been accomplished by JFWAT to access the effects of TAPS on moose and caribou movements. These studies state that compliance with the Stipulations for free passage and movement cannot yet be demonstrated.

Page 3-8 to 3-9 (p. 34)

Comment: Quoting JFWAT reports of 1974-1977 period do not reflect the current situation regarding animal passage under TAPS. To date, there does not appear to be much doubt as to the ability of moose to move freely under the elevated TAPS system. In fact, little use of the 10x60 foot elevated animal crossings have been documented. However, what has been documented by both ADF&G and APSC biologists is that moose are not reluctant to crossing under the elevated pipeline at most locations, regardless of pipeline height. To suggest that Stipulation 2.5.4 has not been met to date by current pipeline design, for moose movements, is not supported by existing observations. Discussion of caribou movement can be found below.

(GAO's response: The JFWAT studies, and other studies discussed in the report, emphasize that compliance with this stipulation is an ongoing process. (See also GAO's response on p. 119.) The available evidence on this matter is not conclusive, and we maintain that additional study is needed to determine the effectiveness of actions taken by Alyeska toward compliance with the stipulations. For example, according to our consultant, snow conditions have not been near record maximums since pipeline completion. Thus to evaluate elevated crossings, which were designed to allow free passage during such conditions, requires additional research.)

APPENDIX VII

Reference:

Page 3-10 to 3-11 (p. 35)

State and Federal biologists agreed that the standards for construction for big game crossings, including buried sections for caribou and 10-foot high elevated sections for moose and bison, resulted in final designs which they felt might meet the stipulation calling for free passage and movement of big game animals. However, the biologists who established the standards indicated that they were not sure that big game would in fact use these kinds of buried and elevated crossings, and that they did not intend to free the pipeline builders from their obligation to meet the stipulation. The JFWAT Federal coordinator who helped develop the standards stated, "We only said the kinds of crossings we recommended stood the best chance of meeting the stipulation, based on the knowledge we had at that time."

Comment:

What has not been stated...is that the criteria established for animal crossings, i.e., 10x60 feet, to date, appears to have been an extremely conservative dimension.

Alyeska unsuccessfully attempted to negotiate a "lower" animal crossing height with pipeline biologists. To date, the designated big game crossings appear to be receiving very little use. Moose and caribou are moving under the elevated pipeline at heights below six feet, with the majority of crossing observations noted at pipe heights below nine feet. Few crossings have been documented at the designated big game crossings, constructed to provide "free and uninterrupted" passage.

It should be mentioned also, that in periods of extreme snowfall, animal movements are generally restricted. If heavy snows and freezing, crusted snow conditions exist simultaneously, animal movements essentially cease.

Under these conditions, attempting to evaluate animal movements, or lack of them, adjacent to or under the TAPS system could be extremely difficult.

(GAO's response: The construction of these crossings, as the report states, was controversial and expensive. As the report also states, Alyeska maintains that such crossings are receiving little use. The expense and importance of this issue necessitates that sufficient independent research be conducted to evaluate the adequacy of the crossings. Such research, which we presently believe is insufficient, would be of importance in the evaluation of Alyeska's compliance with the stipulation, as well as in the evaluation of the necessity for such provisions for future projects.)

Reference:

Page 3-11 to 3-13 (p. 36)

The question of whether big game crossings are adequate will take many years of research to answer. For example, we found that passage by caribou east and west across the Haul Road and under or over the pipeline is being managed by bulls adequately--particularly in periods of insect harassment. There are also indications that cows with calves aren't managing to cope with the situation in natural efforts to reach the Sagavanirktok River bars and gravels to escape insects...

OSP officials agree that a determination as to whether the stipulated big game crossings are fully effective or if they should be required of future pipelines cannot be made without further research of the total impact of TAPS on the actions and movements of big game herds.

Comment:

Considerable discussion is presented relative to the Central Arctic caribou herd on the North Slope. Nothing was mentioned of the extensive observations of caribou movements in the Nelchina Basin of South Central Alaska. In the latter area, caribou movements during both the Spring and Fall have been documented under the elevated pipeline. In this area, the traditional migration route crosses the pipeline right-of-way from East to West. To date, no interruptions to migration or "bunching or herding" on one side or the other of the elevated line have been documented or observed.

APPENDIX VII

On the North Slope were the "traditional migration" route of the recently classified Central Arctic herd are generally parallel to the pipeline ROW, but less well known, considerable concern has been expressed relative to the cow/calf segment of this herd during Spring migrations. There appears to be inference that the northward migration to the calving grounds previously followed the Sagavanirktok River, but that due to the construction of the TAPS system and the haul road, the Spring movement of pregnant cows has been displaced some distance to the West. This is a highly speculative hypothesis. Due to the lack of baseline or pre-construction caribou migration information of Spring caribou movements, conclusions relative to what is happening or has happened are questionable.

A claim for reimbursement of costs of further research in this area pursuant to the Agreement and Grant of Right-of-way would be subject to dispute.

The Central Arctic herd was not identified or described as a separate caribou herd until well after Prudhoe Bay development commenced. This herd has increased in number simultaneously with the increased activities associated with Prudhoe Bay. The productivity of the Central Arctic herd during this time was encouraging.

(GAO's response: Alyeska's observations regarding caribou movement in the Nelchina Basin have been added to the report. The issue remains controversial and unresolved, as discussed on p. 132. The report does not recommend that the costs of any specific research project be charged to Alyeska. This decision rests with the Authorized Officer and can, of course, be contested by Alyeska. The report does conclude that additional research is needed, in some cases, to adjudge compliance with the stipulations and to assure that future projects benefit from experience gained from TAPS. The report states that, if the Authorized Officer decides that a particular study is necessary, the most appropriate funding source should be pursued.)

Reference: Page 3-21 (p. 42)

Revegetation efforts are still being evaluated. According to OSP, reseeding efforts require two growing seasons before evaluation is possible. A study should be undertaken to determine how long it would take for natural vegetation to return to a disturbed area without reseeding.

Nowhere along the pipeline did there appear to be permanent, fenced-in vegetation recording plots to learn the true rate of natural plant regeneration either in barren or reseeded areas. There is a cost/benefit question here needed to be examined which explores the necessity of fertilizer/exotic plant reseeding versus natural regeneration.

Comment:

It must be recognized that Alyeska was aware of the possible benefits of fertilization without reseeding, to enhance invasion of disturbed sites by natural revegetation. This option was not approved by pipeline monitors, although the utilization of the technique was presented by Alyeska for consideration by state and federal pipeline agencies. Arctic grass species were included in each of the four Alyeska seed mixes utilized in revegetation programs--the reference to "exotic" plant reseeding may, therefore, be misleading.

(GAO's response: This study was recommended because an opportunity now exists to evaluate whether the pipeline monitors' decision was a sound one. Such research could be of benefit to future projects.)

APPENDIX VII

Reference: Page 3-22 (p. 42)

The planting experiments on non-indigenous willows, which currently appear healthy, are doomed to failure due to the relationship of plant physiology to microclimatic profile. Additionally, no apparent effort is being made to record plant succession under oil spill conditions, such as exists in the area of the Mile Post 734 oil leak which occurred in 1979. A study needs to be done to determine the effects of oil on permanent long-term vegetation.

Comment:

Evaluations of vegetation and soils subjected to oil spills have been conducted by University of Alaska scientists, funded by Alyeska. In every case where oil spills have occurred, i.e., Check Valve 7, Steele Creek, Mile Post 166 and Mile Post 734, the University of Alaska scientists have geen engaged to direct Alyeska restoration activities.

Alyeska suggests that considerable data is already available on techniques and procedures to utilize in restoring areas disturbed by oil spills in the Arctic.

(GAO's response: The research recommended by GAO's consultant, is a plant succession study. The purpose of the study would be to determine the necessity, from an effect on vegetation standpoint, for restoration techniques and procedures which have been employed to date.)

Reference: Page 3-30 (p. 47)

From observations noted during the summer of 1980, a need for additional maintenance was evident at some fish streams. In two instances where culverts were inadequate a small amount of downstream channeling would be desirable and hydrologically helpful without loss of fish habitat. Overall, maintenance of the TAPS right-of-way and work pad is excellent, with only few exceptions; fish passage was generally assured in the locations observed.

Comment: Alyeska recognizes the necessity for continuing maintenance at stream and river crossings. We will continue to make periodic inspections of culverts, low water crossings and bridges to check for impediments to passage of fish. Corrective actions are implemented where problems are noted.

We concur with the assessment that the overall maintenance of the system is excellent, and will continue to maintain the system in that condition.

Reference: Appendices to Report.

Comment: The appendices to the report contain many errors of fact. For instance, the statement in Appendix III that Alyeska is improperly hindering public access to public lands in exercising rights granted under the Agreement and Grant of Right-of-Way and in carrying out necessary, reasonable and legitimate security measures, is not true. However, we do not undertake, at this time, to comment on specific inaccuracies not incorporated into the text of the report. If at any time, however, action is proposed to be taken in reliance on information contained in the appendices, we request that we be afforded an opportunity to comment.

(GAO's response: Alyeska was asked to specifically identify any concerns regarding the appendices. The comment regarding public access relates to observations made by GAO's consultant for the purpose of recommending issues for future analysis. As such, these observations were not intended to be thorough analyses. GAO intends to pursue some of the issues raised.)

APPENDIX VIII

APPENDIX VIII

APPENDIX VIII

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

NOV 10 1980

Mr. J. Dexter Peach
Director, U.S. General
Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

Thank you for the copy of your draft report "Trans-Alaska Oil Pipeline Operations: More Federal Monitoring Needed" that you sent to the Director. We have reviewed and responded to that part of the report making specific reference to Executive Office actions. The Department of the Interior will be responding to your conclusions on the technical and environmental requirements.

In reviewing the report, I noticed that you made reference to the Executive Branch hiring limitations. As you know, although such a limitation is expected to result in reduced costs, the primary objective was to retarget resources toward programs of higher priority and away from programs of lesser priority. The fact that BLM's special project office in Alaska is not at full strength does not reflect a "low priority" emphasis but rather illustrates the Federal Government's problems with recruiting and retaining technically specialized personnel in Alaska when competing with industry salaries. It is our understanding that the Bureau of Land Management has recognized the high priority of the pipeline monitoring function and has not restricted allocation of personnel resources to this office in Alaska. We agree with you that the pipeline monitoring effort should not be jeopardized by lack of personnel, and accordingly have asked Interior to review their office structure and responsibilities once again and to indicate where contracting and consulting could be used effectively.

Sincerely,

Katherine Schirmer

Katherine P. Schirmer
Associate Director for
Natural Resources,
Energy and Science

APPENDIX IX

21 May 80

The Honorable Elmer B. Staats
Comptroller General of the
United States
U.S. General Accounting Office
441 G. Street, NW
Washington, D.C. 20548

Dear Mr. Staats:

I understand the General Accounting Office has recently initiated a review of the operations of the Trans-Alaska Pipeline System (TAPS). In accordance with the specific responsibilities of the Oversight and Investigations Subcommittee of the House Committee on Interior and Insular Affairs, I am requesting that this review include an overall evaluation of the effectiveness of the Federal TAPS monitoring effort.

It would be helpful if the review would determine to what extent Federal monitors are assuring compliance by Alyeska with the various technical and environmental stipulations and whether or not the effectiveness of the stipulations is being evaluated. This Subcommittee is particularly concerned about what the postconstruction role of the Federal pipeline office should be, how much authority the office has or should have to enforce stipulations, and what practical alternatives exist when stipulations are not being complied with.

Your evaluation can provide timely feedback to this Subcommittee as well as to the full Congress on TAPS operations.

APPENDIX IX

The Honorable Elmer B. Staats
Page 2

It could also have important implications in planning and considering future oil and gas pipelines in Alaska. In order to coincide with plans for possible future hearings by this Subcommittee, I would appreciate a copy of your report by the end of October.

With best wishes.

Sincerely,

HAROLD RUNNELS
Chairman
Oversight and Investigations
Subcommittee

tg

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—341-844-507

008944

AN EQUAL OPPORTUNITY EMPLOYER

UNITED STATES
GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE

SPECIAL FOURTH CLASS RATE
BOOK