

PIPELINE

Commitment to Pipeline Remains Firm — Sen. Olson



Sen. H. A. (Bud) Olson, Minister responsible for the Northern Pipeline Agency

Although a number of major energy projects around the world have collapsed as a result of global economic problems, commitment to the Alaska Highway Gas Pipeline Project by the participants remains undiminished, says Senator H. A. (Bud) Olson, Minister responsible for the Northern Pipeline Agency.

Appearing May 5 in Ottawa before the Special Committee of the Senate on the Northern Pipeline, Senator Olson gave an update on the project in light of the April 30 announcement by the gas producers and pipeline sponsors to delay completion of the 7 700 km (4,790 mi.) system until 1989, while they seek financing for the Alaskan segment. The decision came after a series of meetings, held in Salt Lake City, Utah, among senior executives of Northwest Alaskan Pipeline Company, the consortium sponsoring the pipeline in the United States, the three major Prudhoe Bay gas producers — Exxon Corporation, Standard Oil Co. of Ohio (SOHIO) and Atlantic Richfield Co. — and the Canadian sponsor, Foothills Pipe Lines (Yukon) Ltd.

Northwest Alaskan indicated in a press release that the delay is due to changing circumstances beyond the control of the project, such as a short-term excess of world energy supply, depressed crude oil prices, reduced activity in the U.S. and abroad and uncertainties in financial markets.

In his acknowledgement of the setback, Senator Olson noted the sponsors and producers are working toward the development of financial arrangements in sufficient time for completion of the system by 1989 — or earlier, if possible. He pointed out that the continuing commitment of the participants is reflected in the funds they intend to provide to cover the cost of further planning work.

"We in Canada will want to follow very carefully the progress of these U.S. companies in clearing the way for the commencement of construction of the project in Alaska. From this country's point of view, it is significant that Foothills (Yukon), the Canadian sponsor, also remains firmly committed to the project."

Outlining the developments which led to the postponement, the Minister recalled the support of the United States Administration for "prompt completion of this project based on private financing," as President Reagan declared to the Canadian Parliament on March 11, 1981 in Ottawa. However, noted Senator Olson, it became increasingly clear that amendments to certain provisions of the U.S. pipeline legislation were essential to obtain successfully private financing for the project. Such amendments included lifting the restriction on producer participation in the ownership and management of the project, incorporating the cost of the Prudhoe Bay gas conditioning plant into that of the pipeline and allowing for the possible billing of U.S. consumers before completion or operation of the entire system.

"While the need to amend the U.S. legislation in order to remove the insurmountable impediments that it presented was widely recognized, development of a precise package of waivers inevitably took time," Senator Olson said. The waiver proposals were introduced to Congress by the President in October 1981, committee hearings in both the Senate and the House of Representatives were subsequently held and by mid-December the waivers were approved and enacted into law. Following this, explained the Minister, the participating companies worked to pull together the remaining pieces required for submission to the U.S. Federal Energy Regulatory Commission (FERC) prior to receipt of the final certificate for the Alaskan section of the pipeline.

At a procedural conference, before FERC Commissioner Anthony Sousa in Washington, D.C., on March 16 the project sponsors set back the scheduled completion date for the whole system from late 1986 to late 1987 and presented a timetable for the conclusion of financing arrangements and submission of the remaining regulatory requirements in order to obtain final certification by December 1, 1982. However, soon

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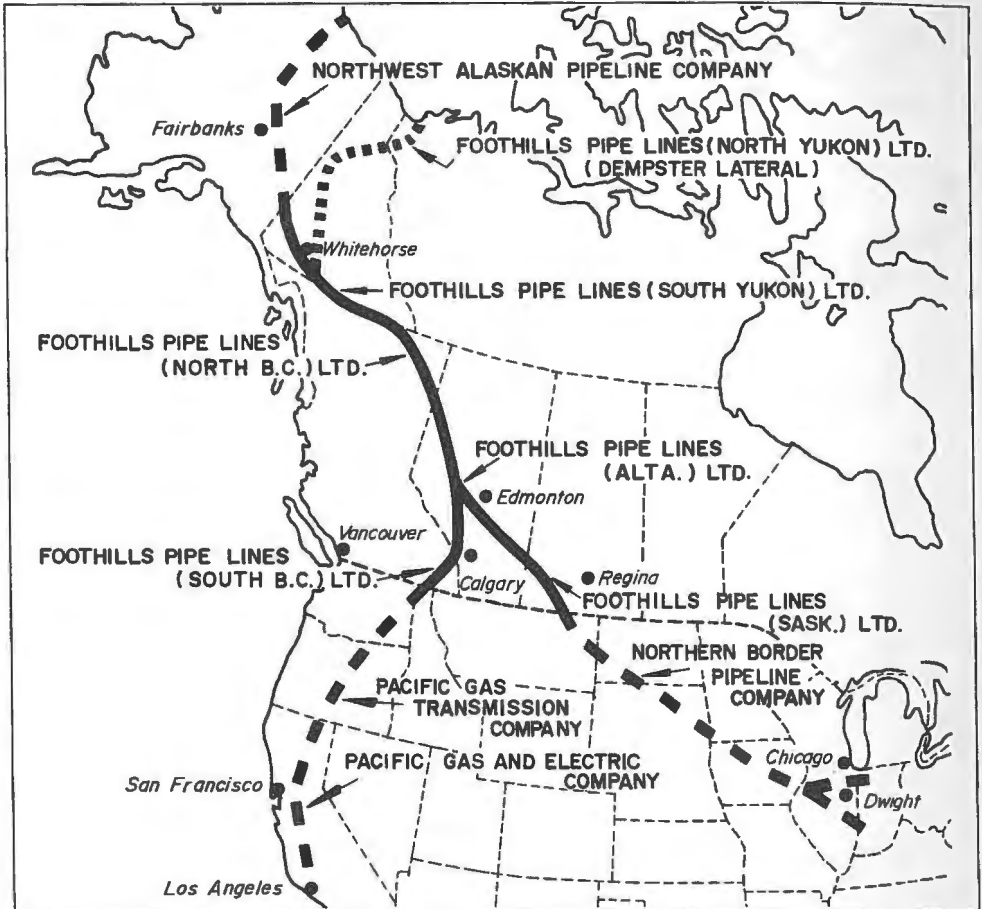
after the conference a number of project participants began to have second thoughts about the practicality of the timetable, Senator Olson continued.

"Questions were raised about the total amount of money that might have to be raised to ensure completion of the project — having in mind unavoidable uncertainties about the levels of inflation and interest rates likely to prevail over the period of construction. There were also, I am told, some misgivings about the structure of the financing plan that was then in the course of being developed. All of these problems were compounded by the general state of the economy in the United States and internationally."

In a letter to U.S. Secretary of State Alexander Haig on April 23, Mark MacGuigan, Canada's Secretary of State for External Affairs, expressed concern that the financing discussions for the Alaskan segment could lead to a "critical impasse." Mr. MacGuigan stressed the implications of any significant delay on the willingness or ability of the Canadian government and companies involved to proceed with the pipeline at some later date. "In his reply, Secretary Haig said he shared Canada's concerns about the project and once again emphasized its importance to the national security of the United States," reported Senator Olson.

Mr. MacGuigan also disclosed in his letter that the Hon. Mitchell Sharp, Commissioner of the Northern Pipeline Agency, intended to meet personally with the pipeline sponsors and gas producers to convey the concerns of the Canadian government. Mr. Sharp subsequently held that meeting in New York City on April 27, said Senator Olson. However, the companies reached the "very regrettable conclusion that the resolution of the problems associated with financing the Alaskan segment of the project ruled out completion of the system by the end of 1987, as they had contemplated only a few weeks before."

Despite the delay, the Minister told his audience the participants in both Canada and the U.S. remain firmly committed to completion of first-stage construction of the southern portions and to plan for phase two based on the new schedule. With the Western Leg completed last fall and the Eastern Leg scheduled to begin operation in September 1982, almost one-third of the Alas-



ka Highway gas pipeline will be completed, he remarked. "I believe the very fact this part of the system is nearly all in place will also provide a spur to the Alaskan participants to get on with the remainder of the job."

Besides forming an integral part of the whole system, the phase one facilities alone are a major source of benefit to Canada, Senator Olson pointed out, noting the 90 percent Canadian content figure estimated by Foothills (Yukon) with respect to procurement of components and installation of the pipeline. As calculated by the National Energy Board, the southern segments could generate net national economic benefits to Canada of some \$4.5 billion, he continued. "A substantial portion of those benefits will come through the potential sale over the lifetime of approved export contracts of around \$17 billion worth of Canadian gas and gas liquids which, in turn, will provide a positive boost to Canada's balance of payments of some \$2 billion a year."

"The construction of the southern segments in Canada alone represents a project of 'mega' proportions, with a

capital investment of approximately \$900 million involved in the Western and Eastern Legs. In the lower 48 states, approximately \$1.4 billion are being invested in first-phase construction." The Minister noted that the American Eastern Leg, by itself, is the largest single pipeline project ever initiated in the U.S., covering 1 325 km (823 mi.) from the Saskatchewan border to Ventura, Iowa.

In conclusion, Senator Olson discussed the functioning of the Northern Pipeline Agency in view of the new schedule for phase two construction and Foothills' (Yukon) anticipated revision of the pace of its activities. "It will be necessary, as a consequence, for the Agency to reorder the scale of its own operations to ensure that they are in line with the activities of the company," he said. "At least for the next several months, however, the Agency's present staff will be fully engaged in overseeing the completion of construction of the Eastern Leg and reviewing the extensive plans for the second stage of the project that have been or are in the process of being brought forward by Foothills".

Pipeline Design in Discontinuous Permafrost

by J. James Hamilton

In Yukon and northeastern British Columbia, above the 54th parallel the Alaska Highway gas pipeline route traverses the Cordilleran climatic region where the thermal condition of the ground is generally classified as discontinuous permafrost. Within this region, areas of perennially frozen ground or permafrost are interspersed with areas of unfrozen ground.

About 71 percent of the terrain crossed by the pipeline in the 221-km (137-mi.) stretch between the Alaska border near Beaver Creek to Kluane Lake is perennially frozen. As one moves southward, permafrost is found in more scattered areas, ranging from a few square metres to several hectares and is confined mainly to peatlands, north-facing slopes, shaded areas and thin snow cover locations.

Discontinuous permafrost poses certain technical difficulties in pipeline design not encountered in southern regions. A buried system must be built in ground which can support the weight of both the pipeline and the soil overburden. It must also provide adequate restraint to minimize lateral movements of the pipe as a result of pressure and temperature

changes. A pipeline operating in the "warm flow" mode, at temperatures above freezing, could cause thawing of surrounding ice-rich soils, which could result in greatly reduced pipe restraint and excessive pipe movement with changes in temperature or pressure.

Refrigerating the gas so that it remains below freezing has advantages for transmission, in addition to lessening the potential for thaw problems in ice-rich permafrost. However, a chilled pipeline buried in areas of unfrozen ground creates the potential for frost heave or upward displacement of the pipe as moisture freezes in frost-susceptible soils.

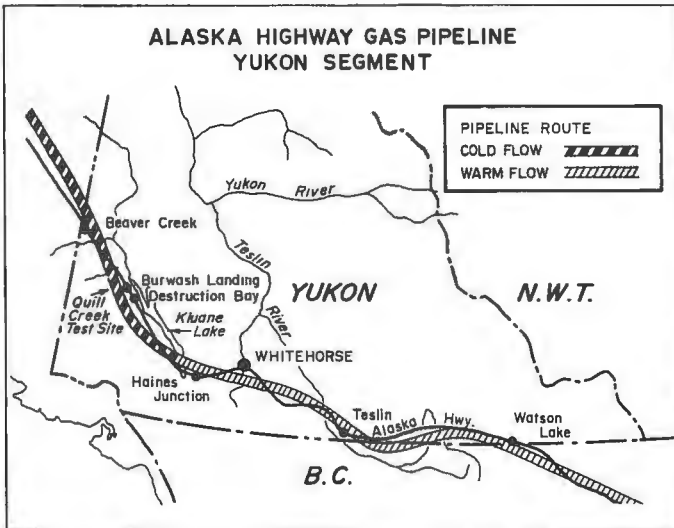
The gas flowing through the Alaskan portion of the Alaska Highway pipeline and the first 214 km (133 mi.) in Canada from the Alaska/Yukon border to a point west of Kluane Lake will be chilled, while the remainder will be operated above 0°C (32°F). As a result of ongoing research and experiment, Foothills Pipe Lines (Yukon) Ltd. has developed two basic construction modes for the chilled and warm flow sections in Yukon: buried and abovegrade. Where permafrost is found to be deeper than 7 m (23 ft.) along the chilled portion of the system,

the pipeline will be buried in the conventional manner. Where chilled pipe crosses unfrozen ground susceptible to frost heave, it will be installed above ground on an insulated gravel workpad to limit frost penetration and potential heaving. A cover of precast concrete or a gravel embankment will be placed over the pipeline for protection and to provide restraint of the pipe against vertical and horizontal movements due to temperature and pressure changes.

Where warm flow pipe sections pass through ice-rich permafrost terrain, the company proposes also to use an abovegrade restrained mode to minimize thaw settlement of the underlying soil. Foothills (Yukon) is experimenting with abovegrade restrained designs to deal with thaw settlement for warm flow pipe over permafrost at the Quill Creek Test Facility west of Kluane Lake.

In cold flow sections where the pipeline traverses uniform, frost-susceptible soil and abovegrade modes cannot be used because of intersecting roads or watercourses, other mitigative design measures are being considered for specific sites. These measures may include

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Abovegrade pipeline construction tested at Quill Creek facility in Yukon. Pipe installed on insulated workpad in gravel embankment mode (left) and concrete restrained mode (right).

Foothills Studies Eagle Nests in Yukon

Eagle nests located near the Alaska Highway gas pipeline route in Yukon are under observation for the second year by Foothills Pipe Lines (South Yukon) Ltd. The monitoring program will continue each spring and summer through the construction phase of the pipeline system to determine the effects of project-related activities on the productivity of bald and golden eagles.

During last season's research, Foothills (South Yukon) identified a total of 51 active nests — those occupied with eggs or young at least once since 1979 — within a 3.2-km (two-mi.) wide corridor through which the pipeline will pass. Of these nests, the company has selected for study 20 used by golden eagles and 12 occupied by bald eagles, with the sites evenly divided between segments slated for summer construction and those planned for winter. The sample nests will be compared with 32 others in adjacent "control" areas, remote locations outside the pipeline corridor where there is little chance of disturbance by construction activities.

The nests are checked from the air and, where possible, from the ground on a monthly basis between late April and late August to follow progress through the stages of breeding and incubation, when the birds are highly sen-



Five-week old golden eaglets near Ibx Pass in Yukon

photo by Ross Eccles, Foothills Pipe Lines (Yukon) Ltd.

sitive to disturbance. Foothills (South Yukon) plans to mitigate the impact of construction on nesting eagles by scheduling such activities as blasting and drilling later in the summer after the young birds have fledged. In addition, construction personnel will not be permitted off the right-of-way, so as to minimize harassment of birds.

Foothills' (South Yukon) raptor moni-

toring program is part of the comprehensive wildlife studies required of the company under the Northern Pipeline Agency's environmental terms and conditions. The results will be used to document how disturbance affects bird productivity, since little systematic research has been conducted on the subject to date.

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Pipeline Design in Discontinuous Permafrost

one or more of the following construction variations: excavation of the trench to depths below predicted freezing and replacement of frost-susceptible subsoil with select backfill material; insulation of the pipe or trench; and reheating of the subsoil. Several of these design options are under evaluation at test sites in Alaska, including Northwest Alaskan Pipeline Company's Fairbanks Frost Heave Test Facility. Foothills (Yukon) also continues to monitor the performance of several buried pipe designs under severe frost heave conditions at the Calgary Frost Heave Test Facility, where data have been collected for more than eight years.

In the earlier stages of design of the Alaska Highway pipeline, the concept for operating the system was to carry

the chilled gas, as received at the Alaska border, only as far as the first compressor station, 64 km (40 mi.) into Yukon, where the gas would be heated to flow through the remaining sections at temperatures above freezing. However, Foothills (Yukon) announced last December a decision to extend the last point of cold flow to the compressor station just west of Kluane Lake. Since the gas will remain chilled, the pipe may be buried without causing thaw settlement in permafrost areas between the two compressor stations. As a result, use of the abovegrade mode may be reduced from a length of more than 49 km (30 mi.) to a total of 16 km (10 mi.). The change of plans by the company was based on cost factors, as it is cheaper to bury pipe in the conventional

manner. The design decision also addressed concerns that overuse of the abovegrade mode might present a barrier to surface drainage and fish and wildlife movement across the pipeline right-of-way.

As more information is obtained from geotechnical drilling and test program from field test facilities and from detailed construction cost estimates for alternative design modes, further reductions in the amount of mitigative design modes are increases in the amount of conventional buried construction may be possible. Reductions in environmental impacts and project costs may thus be mutually achieved.

Jim Hamilton is Manager, Geotechnical Design for the Northern Pipeline Agency.

News in Brief

The information plans prepared by the segment companies of Foothills Pipe Lines (Yukon) Ltd. for the planning and construction of the Alaska Highway gas pipeline in Yukon and northern British Columbia, have been submitted to the Northern Pipeline Agency for approval.

The documents outline how Foothills (South Yukon) and Foothills (North B.C.) will provide information on the pipeline to government bodies, communities and native and interest groups affected by the project. As required under the Agency's terms and conditions, the Foothills companies aim to maintain a flexible communication system that allows interested parties to take advantage of employment and small business opportunities arising from the project, assess potential impacts, and work with the company to maximize the mutual benefits and minimize disruptions during the planning, construction and operation of the pipeline.

The Conference Board of Canada is holding its annual Western Business Outlook Conference on June 2 in Calgary, featuring panel discussions on the Alaska Highway Gas Pipeline Project, Provincial Economies, Future Trends of World Oil Prices and The Year Ahead. Mr. A. Barry Yates, Deputy Administrator of Policy and Programs for the Northern Pipeline Agency, will speak on the topic of spin-off benefits for Canadian industry as a result of the pipeline project.

The conference is intended to assist the Conference Board and others in anticipating emerging economic trends to facilitate planning. Approximately 300 senior private and public sector representatives are expected to attend.

Hearings on the potential environmental impact of construction of the Alaska Highway gas pipeline in Yukon begin June 7 in Whitehorse. The federal Environmental Assessment and Review Panel (EARP), chaired by Mr. Raymond M. Robinson, is resuming hearings which recessed in June 1981 to consider briefs on a series of reports prepared by Foothills Pipe Lines (South Yukon) Ltd. as addenda to the company's 1979 Environmental Impact Statement.

The submissions deal with geotechnical, hydrological, design mode and revegetation issues, and matters relat-



Agency Administrator Harold Millican outlines to Ken Taylor, Canadian Consul General, New York, the pipeline route through southeastern British Columbia prior to a tour of the area in early May.

ing to route alternatives, pipeline facilities and construction scheduling with respect to fisheries and wildlife. Briefs from interested parties must be filed with the panel's Ottawa office by May 14.

The Northern Pipeline Agency begins a study this summer on traffic use along the Alaska Highway. A joint project with Public Works Canada, the study is to determine the types of vehicles using the Alaska Highway between Fort Nelson, British Columbia, and the Yukon-Alaska border. The data will provide a base against which the traffic increase during construction of the pipeline can be measured.

The United States Court of Appeal for the District of Columbia Circuit in an April 20 opinion dismissed a legal challenge to the *Alaskan Natural Gas Transportation Act Waiver of Law*, given Congressional approval in December 1981. The challenge, led by Ohio Senator Howard Metzenbaum, along with 23 other members of Congress, five states and several consumer organizations, questioned the voting procedures on the waivers bill which is designed to expedite financing of the Alaskan portion of

the Alaska Highway gas pipeline. The Court responded that the operations within each House of Congress are political matters, not reviewable by the judicial system.

The Court also rejected the Senator's claim that the waivers require the consumer to bear the cost of the gas conditioning plant in addition to the pipeline and the financial risks associated with non-completion of the project and the possibility the Alaskan gas may not be marketable. Such provisions are hypothetical at the present time, the court stated, noting the complainant should wait until the contingency billing provisions are established by the U.S. Federal Energy Regulatory Commission (FERC) before seeking court review.

The challenge to the order by the FERC to include the cost of the gas conditioning plant at Prudhoe Bay, Alaska, with that of the pipeline was likewise dismissed. The Court found the order is "merely a non-discretionary, ministerial action which needs no public action."

The Court's opinion was based on the oral argument dealing with the legal challenge and interventions presented on April 8 in Washington, D.C.

Sponsors Announce Project Delay

On April 30, 1982 Northwest Alaskan Pipeline Company and Foothills Pipe Lines (Yukon) Ltd. issued the following statements after a meeting of the pipeline sponsors and the three major Prudhoe Bay gas producers to discuss future plans for the Alaska Highway Gas Pipeline Project:

Alaska Natural Gas Transportation System (ANGTS) Project Status Statement

SALT LAKE CITY, UTAH — During the past several months since the President and Congress supported and passed legislation necessary to permit private financing of the ANGTS to be attempted, the ten major natural gas transmission companies and the three major Prudhoe Bay producers have been actively working to develop a feasible financing plan. These efforts are continuing.

Financial planning must necessarily take into account changing circumstances which are beyond the control of the project, such as the current short-term excess world energy supply, depressed crude oil prices, lower levels of economic activity in the U.S. and abroad and uncertainties in financial markets.

The project participants are working diligently to explore all reasonable means of furthering the financial planning for the project. Without exception, the participants believe strongly that the Alaskan system should be built, that it is a sound project and that the domestic reserves already proved to exist in the North Slope will be needed to avoid increased reliance on foreign oil. If Alaskan gas is not ready for delivery when it is needed, foreign oil will be our only recourse when shortages again appear.

CALGARY — Executives of Foothills Pipe Lines (Yukon) Ltd. and its owners have consulted on the Alaska Highway Natural Gas Pipeline Project today with the ten major United States natural gas transmission companies and the three major Prudhoe Bay producer companies who are responsible for the Alaska segment of Phase II construction.

The companies have as a group reconfirmed their commitment to the Project.

In recognition of several current features which affect the development of a financing plan and recognizing that the con-

struction period between financing and operation is about five and one half years, a new schedule and pre-construction budget are being developed on the estimate that operations will begin in late 1989, while keeping open the possibility of advancing that date by one year.

struction period between financing and operation is about five and one half years, a new schedule and pre-construction budget are being developed on the estimate that operations will begin in late 1989, while keeping open the possibility of advancing that date by one year.

Not only will the Alaska Natural Gas Transportation System tap the 26 trillion cubic feet now proven to be available, but the system will also encourage exploration and development of the 100 to 200 trillion cubic feet projected to be available in the future. Current domestic reserves, excluding Prudhoe Bay, are approximately 175 trillion cubic feet.

The lead time for this vital project is a minimum of five and a half years from the time the financing is developed. We are developing a budget which will finance those activities necessary to a 1989 completion if a financing plan can be developed. We will work diligently to advance a feasible financing plan as soon as possible, thereby making possible the commencement of operations prior to 1989. With this in mind, the project sponsors will continue to analyze carefully the appropriate steps needed to develop the project in a time frame and at a cost, which are best suited to the needs of U.S. gas consumers.

We have consulted closely with our Canadian friends and counterparts in the Foothills' organization over the past weeks as we reached our decisions on scheduling and funding of the project budget. We believe they will work to accommodate our schedule changes, and our plans for the future.

Pre-construction work for Phase II will be maintained in both Canada and the United States, funded by the companies in today's meeting and fitting to this schedule.

Foothills will provide more detailed information in due course.



Installation of high pressure discharge piping at compressor station on Eastern Leg near Jenner, Alberta.

Pipeline

The Northern Pipeline Agency was created by Parliament in April, 1978 to oversee the planning and construction of the Alaska Highway gas pipeline project in Canada. Enquiries or suggestions regarding the Agency's publication, *Pipeline*, are welcome and may be directed to:

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