

PIPELINE

Hydrostatic Testing - The Final Safety Check



Water withdrawal and discharge sites in Alberta along the Red Deer River (left) and the South Saskatchewan River (right).
Photos courtesy of NOVA, An Alberta Corporation

By August the completed sections of the Eastern Leg of the Alaska Highway gas pipeline in Alberta and Saskatchewan will be ready for the final safety check, hydrostatic testing. Required by the National Energy Board (NEB), the procedure is comparable to a dress rehearsal before the line is in operation, using pressurized water instead of gas, remarks Bill Currie, Engineering Technician in Pipeline Design for the Northern Pipeline Agency. "The pipe is filled with water, emptied of air pockets, pressurized to a specified level and held at that pressure for 24 hours to ensure it is leak-proof and defect-free."

During the 24-hour hold period, only a 2.5 percent deviation is allowed from the test pressure, which is required by the NEB's *Gas Pipeline Regulations* to be higher than that of normal pipeline operating conditions. Currie notes, "If the pipeline can maintain a stable pressure under stress, it is accepted as safe."

Water is generally used for testing because, as a fluid, it is less susceptible to temperature fluctuations and is safer

when pressurized than air, explains Currie. "Water readily transmits any pressure placed upon it. For every additional pound of force you exert on water, a proportionate volume is displaced, whereas air has the capacity to compress tightly and absorb force," he continues. "It takes a considerably greater volume of air than water to reach the same pressure, so if a break in the pipe were to occur during the test, it could take hours for all the air to release. With water, the pressure would be back to zero within 20 seconds because a comparatively little loss of liquid would release the pressure immediately."

Under the Agency's environmental terms and conditions, which take into account provincial and federal regulations governing the use of water, the segment companies of Foothills Pipe Lines (Yukon) Ltd. must obtain Agency approval for a hydrostatic test plan. Approval from the NEB is also required under the *Gas Pipeline Regulations*. The plan details from where water is withdrawn, the amount, how it is to be used and at what rate, and to where it is to be

discharged upon completion of the test.

It is important that withdrawal and use do not affect the quality of the water body nor disturb existing uses by fish, wildlife and man and that water discharge does not aggravate erosion, says Bryan Grey, the Agency's hydrology and water quality scientist.

Grey identifies Wolf Coulee in Alberta and Swift Current and Gunn Creeks in Saskatchewan as dewatering sites with considerable erosion potential. These are narrow streambeds with little surrounding vegetation, and will probably be dry at testing time in the fall, he notes. "The concentrated force of the water may erode the bed and banks unless the discharge is controlled with a pressure diffuser - often a large sheet of metal or plywood. When the water hits that sheet at the end of the test line, all its energy dissipates and it runs off harmlessly," explains Grey. "The effect is like that of a sprinkler or spray nozzle on a garden hose." Both the company and the Agency's onsite surveillance officers will be checking for the application of proper

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diffusion techniques, he adds.

Protective measures will also be followed during the withdrawal of water for hydrostatic testing, continues Grey. "The intake pipes must be meshed to prevent fish from getting drawn in. To ensure the watercourse does not dry up as a result of testing, it must be of substantial size and the amount of water to be withdrawn is limited to a maximum of 10 per cent of the flow."

The hydrostatic test plan for the Alberta portion of the Eastern Leg now under construction is straightforward, says Grey, because water sources and discharge points are sufficiently available. However, in Saskatchewan, the test plan is complex due to a scarcity of

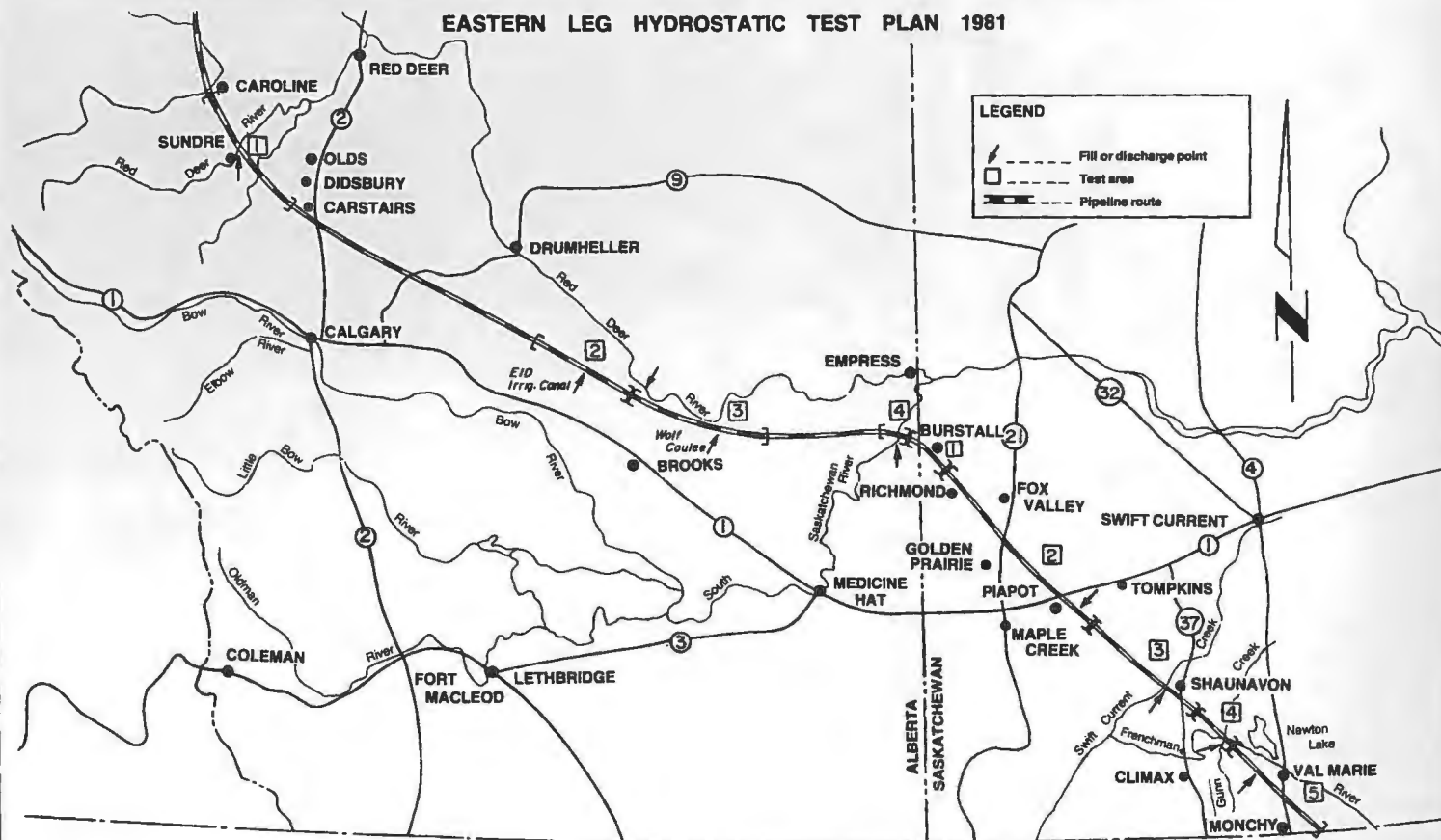
suitable sites for water withdrawal and discharge. Approximately 174 km (109 mi.) out of 258 km (160 mi.) of pipe to be tested will be filled with water from the South Saskatchewan River, at a point on the Alberta side of the border. "Volumes of water will be used and then shunted along for use further down the line," Grey explains. The remaining 84 km (52.5 mi.) of pipeline in Saskatchewan will be tested with water from Newton Lake, a dammed reservoir on the Frenchman River.

Part of the water for hydrostatic testing in Saskatchewan will be emptied into sources of drinking water, says Grey. Swift Current Creek eventually feeds into the reservoir which provides water

for the City of Swift Current, and Newton Lake is the source of water for the surrounding rural communities. To safeguard against possible contamination of the water by metals from the pipe, such as iron, the Province of Saskatchewan requires Foothills Pipe Lines (Sask.) Ltd. to take samples of the test water for analysis prior to discharge.

Grey suggests that some aspects of hydrostatic testing along the Eastern Leg may prove beneficial to agriculture. Certain dewatering sites in Saskatchewan such as Swift Current and Gunn Creeks, as well as a private reservoir near Piapot, will receive water where during a normal season they would not," he concludes.

EASTERN LEG HYDROSTATIC TEST PLAN 1981



Alberta Test Areas

Area	Fill Site	Discharge Site
#1	Red Deer River, near Sundre	same as fill site
#2	Eastern Irrigation District canal near Gem	same as fill site
#3	Red Deer River near Matzihiwin Creek crossing	Wolf Coulee near Princess
#4	South Saskatchewan River at pipeline crossing	same as fill site

U.S.A.

Saskatchewan Test Areas

Area	Fill Site	Discharge Site
#1	South Saskatchewan River on Alberta side of the border	same as fill site
#2	"	private reservoir near Piapot
#3	"	Swift Current Creek near Shaunavon
#4	Newton Lake	Gunn Creek
#5	" "	same as fill site

SPECIAL SUPPLEMENT — Senior officials of the Northern Pipeline Agency presented the following report to the Standing Committee of the House of Commons on Northern Pipelines in Ottawa on June 18, 1981.

The Hon. Mitchell Sharp, Commissioner :

Mr. Chairman, I would first like to thank you and other members of the Committee for this opportunity to outline the role that is being played by the Northern Pipeline Agency with respect to the building of the Alaska Highway Gas Pipeline Project in Canada.

As you know, the Agency has now been in operation for a little over three years. During that period it has been actively engaged in developing the detailed socio-economic and environmental terms and conditions and technical requirements that will govern the project, overseeing the formulation of plans for the whole of the system in this country, and supervising actual first-stage construction of the southern segments of the pipeline in British Columbia, Alberta and Saskatchewan.

It seemed to me that members might find it timely and appropriate at this juncture for the Agency to outline the manner in which it has been interpreting and implementing the mandate assigned to it by Parliament under the *Northern Pipeline Act*.

I propose briefly to outline the broad philosophy and general principles that have served to shape the role being played by the Agency since its establishment. I will then ask Mr. William Scotland - who as you know is the Designated Officer and one of two Deputy Administrators in the Agency, as well as being an Associate Vice-Chairman of the National Energy Board - to outline the technical engineering requirements that must be met by Foothills (Yukon) to ensure the safety and integrity of the system in Canada. In carrying out these responsibilities, Mr. Scotland exercises the authority delegated to him under the *Northern Pipeline Act* and further authority transferred to him by the NEB.

Following the conclusion of his remarks, I will call on Dr. John Naysmith, the Assistant Administrator for socio-economic and environmental matters. Dr. Naysmith will explain the process followed by the NPA in drawing up the detailed socio-economic and environmental terms and conditions with which Foothills is required to comply, the development of various plans by Foothills for implementing those terms and conditions, and the subsequent surveil-

lance maintained by the Agency during construction.

To provide some perspective, Mr. Chairman, it is worth recalling at the outset that one of the major factors that led to the initiation of the *Northern Pipeline Act* and the establishment under it of the Northern Pipeline Agency was the adverse experience that surrounded the building of the Alyeska oil pipeline in Alaska. This included major delays and massive cost-overruns, severe technical and environmental problems, serious social problems resulting from the heavy influx of tens of thousands of job-seekers into Alaska, and an almost total lack of co-ordination among a myriad of federal and state departments and agencies.

A growing concern that Canada could undergo a similar or even worse experience in the building of a gas pipeline from the Arctic to the southern Canadian-U.S. border was reinforced by the reports of the Berger, Lysyk and Hill Inquiries and the report on competing northern pipeline proposals by the National Energy Board.

The *Northern Pipeline Act* approved by Parliament in April, 1978, contained extensive provisions designed to meet these concerns and established the Northern Pipeline Agency to oversee their implementation.

As you know, the 'management and direction' of the Agency was placed under a Minister designated by Order in Council, currently Sen. H.A. (Bud) Olson. The Act provided for the appointment of a Commissioner to serve as deputy to the Minister and for an Administrator to supervise the day-to-day operations of the Agency - a role that is carried out by Harold Millican from our Calgary office. The legislation also provided for a member of the National Energy Board to act as Designated Officer in the Agency and to serve also as either Administrator or Deputy Administrator. As I have indicated, Mr. Scotland fills this latter post.

Under the Act, the Agency in particular was assigned responsibility for the realization of two of the major objectives of the legislation. One of those objectives is, as it states in the Act, "to facilitate the efficient and expeditious plan-

ning and construction of the pipeline, taking into account local and regional interests and the interests of residents, particularly the native people ..."

The other objective is, and again I quote, "to maximize the social and economic benefits from the construction and operation of the pipeline .. while at the same time minimizing any adverse effects on the social and environmental conditions of the areas most directly affected by the pipeline."

The Act itself contains a number of provisions aimed at ensuring the achievement of these two major objectives. Schedule III of the legislation establishes broad terms and conditions with which Foothills must comply. These cover such areas as socio-economic and environmental matters, the development of procurement and manpower plans that will best serve Canadian economic interests, and the financing of the project.

In addition, however, the legislation also provides authority to the Northern Pipeline Agency to develop supplementary and more detailed socio-economic and environmental terms and conditions for achieving the objectives of the Act, which may be established by order of the Designated Officer with the concurrence of the Governor in Council. Members may recall that these terms and conditions have now been adopted for all sections of the pipeline in Canada with the exception of the Yukon. In his remarks, Dr. Naysmith will outline the very extensive consultative process that was undertaken with other federal bodies, provincial and territorial governments and the public as part of the development of these terms and conditions.

While these supplementary socio-economic and environmental terms and conditions are fairly broad in their scope there is a requirement on Foothills to develop a series of plans in considerable detail for the approval of the Agency that outline how it proposes to meet these requirements. I might add that the company also must satisfy the Agency as to how it plans to meet the many technical requirements that we have also laid down to ensure the safety and integrity of the pipeline system throughout Canada.

The final phase of this approach involves the establishment of field surveillance teams to ensure full compliance by the company and its contractors with the terms and conditions and the technical requirements.

Agency Provides Single Window Approach

As members are aware, the Northern Pipeline Agency was established to provide a single window in all dealings between federal authorities and Foothills and in relationships involving provincial and territorial governments in Canada and the Government of the United States.

In keeping with the *Act*, extensive authority provided under legislation normally administered by other federal departments and agencies that is of particular relevance to the project, has already been delegated to the Agency for the purposes of the pipeline only. In addition, the Agency has developed close working relationships with other federal departments and agencies which continue to exercise certain other responsibilities related to the project.

As a further part of this 'one-window' approach, the Northern Pipeline Agency maintains a close and continuing contact on a day-to-day basis with provincial and territorial authorities in order to co-ordinate the wide range of activities that come within the respective jurisdictions of the two levels of government. These day-to-day contacts are supplemented by quarterly meetings of the Federal-Provincial-Territorial Consultative Council established under the *Northern Pipeline Act*.

In this connection, Mr. Chairman, I might recall that earlier on there were suggestions from some quarters that the Agency should assume responsibility for "managing" all aspects of the pipeline project. I am sure that members of this Committee will readily appreciate that not only would the exercise of such a responsibility be beyond the mandate of the Agency, it is also one that would be beyond the authority of Parliament itself to provide because of the transgression of provincial and territorial jurisdiction that necessarily would be involved.

There is one further point of contention with which I would also like to deal. From time to time it has been suggested that the dual role delegated to the Agency by Parliament of both facilitating the project and ensuring that adverse impacts are minimized and benefits

maximized places us in an ambiguous if not conflicting position. Indeed, a recent article in a publication of the Canadian Arctic Resources Committee entitled *Northern Perspectives* maintained that the NPA sees its role as being, in its words, "first and foremost as that of pipeline 'expeditor'", the implication being, of course, that the Agency sees its regulatory role as only a very secondary function.

In point of fact, Mr. Chairman, we do not consider there is any conflict between these two responsibilities delegated on us by Parliament, nor is either one given emphasis at the expense of the other. On the contrary, the Agency considers its dual role to be complementary and mutually reinforcing.

The Agency endeavours to facilitate the project in many ways. We do so, for example, through extensive discussions with Foothills during the planning stage with respect to regulatory requirements. The same purpose is served by our efforts to ensure co-ordination between the exercise of our regulatory powers and those of other federal departments and agencies, U.S. authorities, and provincial and territorial governments in Canada.

Two - fold Responsibility - Facilitate and Regulate

The complementary nature of our dual role is particularly evident in the continuing consultations we undertake with the company regarding our regulatory requirements. By ensuring that Foothills understands and takes account of these requirements, we seek to facilitate the efficient and expeditious planning and construction of the pipeline in full compliance with the regulations.

At the same time, we recognize that we have a responsibility as a regulator to see that the job is done properly - that is, that everything reasonably possible is done to ensure the safety and integrity of the system, to maximize economic benefits through employment and procurement, and to minimize adverse social and environmental impacts.

I want to emphasize that because of the great size, complexity and sensitivity of this project from a social, environmental and economic point of view, the regulatory terms and conditions Foothills is being required to meet go far beyond those that are traditional with respect to the planning, construction and operation of pipelines in Canada - or, for that mat-

ter, in most other countries.

When he testified before the National Energy Board some weeks ago during a hearing relating to cost estimates, Murray Stewart, Executive Vice-President for Corporate Affairs of Foothills, pointed out that all of the companies involved in the project were operating in a new regulatory environment. "We have never had in the history of pipelining the number of permits, plans, terms, conditions, inspection people on the job - those are at least five instances of the kinds of new regulatory requirements," he told the Board. "I would hazard a guess," Mr. Stewart added, "that the permits and permissions that we must receive before we construct and during the construction of a piece of this project are probably a multiple of somewhere between eight and ten of what a normal project in the pipelining world would require."

That most of these requirements are reasonable in view of the size and exceptional circumstances surrounding the project was implicitly recognized by Foothills itself through the extensive undertakings which the senior management of the company gave during the course of testimony before the National

Energy Board in 1976 and 1977. But we are aware that it is no easy task for pipeline planners and builders who have to work day-by-day to meet these extensive new requirements.

As might be expected, our first experience with construction under these new and demanding conditions - that of the Western Leg of the pipeline through Alberta and southern British Columbia last year - turned up some problems that had to be dealt with. I believe that both Foothills and the Agency have learned a lot from that experience, however, and I would expect planning and construction to move forward with relative smoothness from now on.

Just before I conclude my remarks, Mr. Chairman, the essential point I would like to underline is that under the *Northern Pipeline Act*, the Northern Pipeline Agency is charged with the two-fold responsibility of both facilitating and regulating the planning and construction of the project. We believe those two responsibilities are quite compatible and are endeavouring to carry out both to the best of our ability.

W.A. Scotland, Deputy Administrator and Designated Officer:

Mr. Chairman, as the Commissioner indicated to you earlier, my purpose is to outline for members of the Committee the process that has been developed with respect to regulating the engineering and other technical aspects of the Alaska Highway Gas Pipeline in Canada.

These requirements have been spelled out in a variety of codes adopted by the Canadian Standards Association, the *Gas Pipeline Regulations* of the National Energy Board, and specific technical orders which I issued to the five segment companies of Foothills, with the concurrence of the Minister, on January 31, 1979.

The process of considering Foothills' plans for meeting these engineering and other technical requirements is similar to that adopted in the case of socio-economic and environmental matters, which Dr. Naysmith will outline later. This involves an informal submission by the company and an initial exchange of views with Agency officials, a further review of company proposals as they are developed leading to their conditional acceptance, followed in time by my approval as Designated Officer, if I agree.

The extensive technical orders which I issued in January, 1979, deal with such matters as the detailed engineering design - including specific operations and maintenance procedures which have application to design considerations, project scheduling and cost control procedures, and construction and inspection procedures. Prior to submitting the detailed engineering design, each segment company is required to submit for approval all of the details of several different types of tests. These involve such matters as frost heave, thaw settlement, pipe fracture control, seismic disturbance, slope stability and terrain assessment. These assessments set out the particular locations for the pipeline that might be susceptible to any of the previously mentioned hazards and the tests undertaken by the company in an effort to ensure that its design will adequately deal with those hazards. The technical orders issued to each of the segment companies are quite detailed, as illustrated by the fact that the one for the Yukon alone is 14 pages long.

As a member of the National Energy Board I have been delegated a number of functions and authorities of the Board in relation to this pipeline and until the Board itself grants Leave-to-Open for each segment of the pipeline, I exercise

that authority within the Agency as part of my regulatory function. This delegated authority is sufficient for me to regulate all of the design, construction and surveillance aspects of the pipeline on behalf of the Agency. For example, I am empowered to approve the plan, profile and book of reference for the pipeline, which involves approval of the precise location of the line of pipe in the right-of-way and its depth. I have authority to require from the company any further material, including plans, specifications and drawings, that I may consider necessary. I may direct the company to divert or relocate its pipeline if I consider it to be in the public interest. I may hear applications and, if I am satisfied, grant the company leave-to-take additional lands for its facilities and I can authorize the pipeline to cross any other work or utility. Finally, I may conduct hearings, approve documents and take evidence under oath in order to achieve the above objectives.

I have also been authorized by the Board to report to it, as a single member, on a number of matters which the Board is required to decide either under the *National Energy Board Act* or under the *Northern Pipeline Act*. I have made a number of such reports and, in each instance, the Board has adopted my particular report as its own and has issued the necessary approvals to the company.

Under the socio-economic and environmental terms and conditions and the technical orders, Foothills is required to satisfy the Designated Officer on a great many points. These range from everything in the final engineering design to a wide variety of plans for implementing the terms and conditions. All of my decisions indicating satisfaction with various submissions by the company are formally recorded and Foothills duly notified by the Agency's Executive Secretary for Operations. In this respect, the Agency functions in a very similar manner to a Court of Record. Where required by the *Northern Pipeline Act*, these decisions must be concurred in by the Minister or, on his behalf, by the Commissioner before they become effective. Certain of these decisions may also be concurred in by the Administrator of the Calgary office under authority specifically delegated to him by the Minister. Since both the Administrator and I are located in Calgary, this very much facilitates the approval process.

A particularly useful illustration of the

authority of the Designated Officer is contained in the terms and conditions issued to each company. For Alberta, Condition 7 states:

When requested by the Designated Officer, Foothills shall give the Designated Officer any reasonable assistance that he may require to carry out his duties in respect of the pipeline and shall furnish him with such information in respect of the construction or operation of the pipeline as he may request.

Beginning with this year's construction of the Eastern Leg, the authority expressed in that requirement has been delegated by me to the Senior Surveillance Officers of the Agency in the field, so that they may perform their duties properly and swiftly. I will, of course, assess any and all use of that delegated authority to see that it is only used properly and when required.

Another regulatory avenue which has proven to be very useful is set out in Section 26 of the *Northern Pipeline Act*. This section provides that when the company fails to comply with a term or condition or an order or direction issued by the Board or the Designated Officer, the Designated Officer may give the company notice of such failure, setting out in that notice the time within which the company must comply. On three occasions to date the Agency found it appropriate to issue such a direction to the company, as Dr. Naysmith will explain at greater length in his remarks. In each instance, the company rapidly complied with the direction and it was not necessary to progress further through Section 26, which provides that the Minister may issue an assessment against the company consisting of a penalty, not to exceed \$10,000 per day.

Section 30 stipulates that if the company fails or refuses to comply with a term or condition or an order issued by the Designated Officer with ministerial concurrence, the Minister after 30 days notice may take steps to ensure that the requirements are fulfilled.

In extreme circumstances the Agency could invoke the provisions of Section 43 of the *Northern Pipeline Act*. This provides that every person, such as an officer, director or agent of the company who wilfully and without lawful excuse fails to comply with a term or condition or order by the Board or the Designated Officer is guilty of an offence and is liable on summary conviction to a fine not ex-

ceeding \$10,000 per day for each day that the offence continued.

I expect that these severe measures would be used rarely, if ever, given the company's own undertakings and the provisions which it has set out in its plans and documents.

Mr. Chairman, in the remarks that follow Dr. Naysmith will outline the general surveillance process and procedures adopted by the Agency to ensure compliance by the company and its contractors with the environmental and socio-economic terms and conditions and the engineering and other technical requirements.

It might be helpful, however, if I took a moment to indicate some of the aspects

of construction that are of particular concern from an engineering point of view. This includes ensuring that the trench bottom is smooth and properly padded to avoid damage to the pipe, that all pipe joints are properly welded - as verified by x-ray examination, that pipe bent in the field conforms precisely with the contour of the ditch bottom and is free of flattening or wrinkling and that there are no holes or weaknesses in pipe coating and wrapping that could reduce protection against corrosion. River crossings present unique problems and must be carefully checked by the surveillance teams. And, of course, the final hydrostatic pressure tests of completed sections of the pipeline are of crucial importance in

establishing the safety and integrity of the whole system.

In his opening comments, ^{e t} Sharp noted that the regulatory requirements governing the planning and construction of the Alaska Highway Gas Pipeline in Canada are considerably more far-reaching than has traditionally been the case in this industry.

I might just add that, as a concomitant, the extent of surveillance maintained by the Agency over Foothills' activities in the field is also much greater than has usually been the case in the past. It will not surprise you that on occasion this has caused some friction but, I believe that all concerned are in the process of adjusting to this new regime.

Dr. J.K. Naysmith, Assistant Administrator Socio-Economic & Environmental:

Mr. Chairman, as he indicated earlier, Mr. Sharp has asked me to outline the way in which the Agency has developed and defined its regulatory role with respect to socio-economic and environmental matters - a process that has involved extensive public hearings, consultations and discussions with a substantial number of public and private groups.

The development of this regulatory role has involved three distinct phases:

- 1) the formulation of broad terms and conditions;
- 2) the review of detailed plans submitted by Foothills for implementing various aspects of those terms and conditions and their ultimate adoption following approval by the Agency; and
- 3) the maintenance of field surveillance to ensure compliance by the company with the terms and conditions and the plans developed for their implementation, and the engineering requirements.

There is a fourth and final phase in this process with which I will not deal today because it is still in the course of being developed in consultation with provincial and territorial governments and other interested bodies. That fourth phase involves monitoring of the impacts of the project as it proceeds to determine the effectiveness of the terms and conditions and of mitigative measures adopted by governments in achieving their stated objectives.

1) Development of Socio-Economic and Environmental Terms and Conditions

The Agency's objectives in drafting the terms and conditions were as follows:

- i) to ensure achievement of the objects of the *Northern Pipeline Act*;
- ii) to ensure compliance with the relevant clauses of the Canada/U.S. agreement;
- iii) to incorporate certain requirements normally imposed under federal legislation administered by other federal departments and agencies which for purposes of the pipeline have been transferred to the Agency. One example is the responsibility and authority provided under the *Fisheries Act*.

Initially, the Agency prepared a very general set of socio-economic and environmental terms and conditions in draft form, drawing on the recommendations of the various inquiries in Canada and some of the lessons learned from the experience encountered in the planning and construction of the Alyeska oil pipeline in Alaska.

These first drafts were subsequently widely distributed to the many federal, provincial, territorial and local government departments and agencies and private interest groups concerned with the project, as well as Foothills, in order to obtain their views and comments.

Undoubtedly the most important single point to emerge from this initial process was the need to develop terms and conditions that were shaped to meet the specific social, environmental and governmental circumstances prevailing in each of the main pipeline segments in Canada.

Subsequently, therefore, separate sets of terms and conditions were drafted for each of these segments: South Yukon; Swift River - the short portion where the pipeline dips into northern

British Columbia from the Yukon before swinging back into the Territory; North B.C.; Alberta; South B.C.; and Saskatchewan. These second drafts, which reflected comments already received from public and private bodies, and the company, provided a basis for still further discussion. Public hearings on these proposed terms and conditions were conducted in communities along the pipeline route in Yukon, North and South B.C., in addition to meetings with a number of interest groups. All of these comments were taken into consideration in preparing final terms and conditions for each segment of the project.

It might be of interest to explain how certain drafting objectives were met. For example, the Canada/U.S. agreement calls for the non-discriminatory treatment of the pipeline and the objects of the *Northern Pipeline Act* require co-ordination with provincial and territorial governments.

One illustration of the way in which these two objectives were met is provided by one of the requirements laid down in the environmental terms and conditions for Alberta. It stipulates:

"Where, in this Part, Foothills is required to take measures and implement procedures in respect of the environment, Foothills shall:

a) incorporate in such measures and procedures those environmental practices ordinarily followed in constructing and operating pipelines in the Provinces; and

b) comply with those standards established under the laws of the Province that are applicable to any pipeline constructed and operated under the laws of the province except where such

standards are inconsistent with the Act, any terms and conditions made thereunder or any other law of Canada."

The desire to require adherence to the provincial normal standards and practices referred to in this clause led to the negotiation of administrative agreement with the provincial governments and with the Government of the Yukon Territory. These agreements provide for definition of 'normal' standards and practices and co-operation in their enforcement.

As Mr. Sharp indicated previously, one of the major objectives of the *Northern Pipeline Act* calls for the efficient and expeditious construction of the pipeline, while a second major objective is maximization of social and economic benefits and the minimization of adverse impacts on the environment. Clearly the realization of these objectives calls for the exercise of judgment. In the terms and conditions, this judgment was allowed for by making many of the provisions subject to the satisfaction or the approval of the Designated Officer. In this way professional judgment and the balancing of possibly conflicting requirements can be realized. The Agency has also allowed for co-ordination with the provincial and territorial governments by agreeing that where appropriate the Designated Officer will consult with them before decisions are made.

In order to ensure that Foothills complies with the standards and follows the practices stipulated in the terms and conditions, the company is required to submit detailed plans, technical designs and supporting information to the Agency. In these submissions, the company sets out how it intends to comply with the terms and conditions. The Agency reviews the submissions and approves them if it is satisfied that they will meet the requirements of particular terms and conditions.

2) Plan Review and Approval

The Agency has on its staff a number of personnel with a broad range of expertise and experience both in engineering and other highly technical fields and in the physical and social sciences. During the course of planning for the multiplicity of different aspects of the project, issues inevitably arise touching on a number of different areas of concern that are not always easily reconcilable. In the case of a major river crossing by the pipeline, for example, a certain routing, timing or construction procedure might appear preferable from an engineering point of view. From the point of view of providing maximum protection

to the physical environment or fish life, however, such an approach might be judged to be less desirable. The wide range of expertise existing among its staff helps the Agency not only to identify these types of varying concerns, but to seek to strike the best possible balance in the circumstances of each case.

This approach goes to the heart of the objective of the *Northern Pipeline Act* with respect to maximizing benefits and minimizing detrimental effects.

1) Informal Plan Submissions

As a first step, the Agency has developed a process for the informal review of initial drafts of plans prepared by the Foothills Group of Companies. When one of the companies submits such a draft plan, schedule or design to the Agency for review, the Agency Secretary distributes copies of the submission to appropriate Agency divisions. Officials of the Agency may reply by letter or may meet company staff to discuss the submission. Questions put by the Agency and answers made by the company are recorded as correspondence or in the minutes of meetings. Such minutes are reviewed and approved by both parties and form a record of the process. The informal review process may involve other entities than the Agency and the company. The Agency in particular invites provincial and territorial governments and other federal departments to participate if it is considered they would be interested in doing so.

Implicit in this process is the resolution of any conflict between the various federal agencies and departments, or other governments involved and the balancing of the concerns of the various departments of the Agency where there is any interaction between them.

The informal review process normally ends with the issuance to Foothills of a conditional acceptance of the submission. This indicates to Foothills that the submission is satisfactory and will be approved subject to public comments received by the Agency and the views of the Designated Officer.

ii) Formal Submission

The initial submission may go through several drafts as a result of this process of informal review before it is ready for formal submission. When the company formally submits a plan, the Agency makes it available to the public for comment.

Any submissions received within the period allotted for public review of the formal Foothills plan, design or schedule would be considered by the Designated Officer, who might subsequently ap-

prove the submission as it stands or require certain amendments in order to meet concerns that have been raised.

iii) Environmental Review Process

Because of the different nature of the issues involved, the process for reviewing environmental matters follows a somewhat different pattern. This process can perhaps best be illustrated by reference to a specific example - considerations involving the land through which the pipeline will be routed in Alberta. There is considerable variation in topography, soil and climate throughout the province. In some areas, the conditions present significant problems with respect to the control of ground erosion and the restoration of vegetation.

Detailed consultant studies, including a field test program, were commissioned by the company to determine the best combination of topsoil stripping techniques, seed mixes and seeding rates and planting and cultivation procedures to achieve cover, soil stability and a rapid return of the land to normal productivity.

These consultants' reports and their recommendations were reviewed by the Agency and the Alberta Provincial Departments of Agriculture and Public Lands. Tripartite meetings, involving the Agency, the province and the company took place in the field and the office to discuss these procedures and to make fine adjustments in the proposed techniques based on the knowledge of those involved in the review and the experience gained by all concerned during last year's construction of the Western Leg.

The result was the approval by the Agency of what was considered to be an acceptable set of procedures for revegetation. These are outlined in a general way in the Environmental Plans and Procedures Manual and detailed, kilometre by kilometre, on the alignment sheets. These alignment sheets give precise instructions to the contractor on the procedures to be used in any given area.

iv) Review of Socio-Economic Plans

Under the socio-economic terms and conditions, Foothills is required to prepare plans indicating how it proposes to meet a number of different requirements. These include plans for the provision of job training and employment opportunities for native people and women, local business opportunities, community information, orientation of pipeline workers and for the protection of traditional harvesting. Because these involve issues that do not lend themselves to the same kind of precise scientific analysis as environmental

matters, a different approach is taken to the review of socio-economic plans.

Standing Groups have been formed for each region comprising representatives of the appropriate provincial government or territorial government and the Northern Pipeline Agency.

'Planning Research Sheets' have been developed by each group listing each term and condition that imposes a particular requirement on the company, the specific issues that need to be addressed, and the kind of indicators that should be established to measure actual performance in relation to the requirements of the terms and conditions. These planning sheets also indicate the interrelationship of certain of the terms and conditions.

As company plans are submitted, they are considered by Agency, provincial and territorial personnel within the context of the Planning Research Sheets. Following review, discussions with the company and subsequent modifications, the plans are formally submitted to the Agency and made available for public review over a 30-day period. Following this period, and any modifications made as a result of public comment, the plan is approved by the Designated Officer.

v) Review of the Manpower Plan

The *Northern Pipeline Act*, under section 9 of Schedule III, requires the company to submit a detailed Manpower Plan to the Minister for his approval. This plan is intended to ensure the maximum possible use of Canadian labour in the planning, construction and operation of the pipeline.

In order to ensure that the company's plan would satisfy the requirements of section 9, the Minister some time ago provided the company with a set of guidelines for its preparation.

The company subsequently submitted a draft plan concerning construction of all segments of the project except the Yukon. Extensive consultation on this draft was carried out by the Agency with other federal departments including, particularly, the Canada Employment and Immigration Commission and provincial and territorial governments. In July, 1980, the Minister approved an interim Manpower Plan for the Western Leg only, which, in accordance with the guidelines, addressed the following elements: entry requirements, labour supply and source, manpower requirements, training, opportunity measures, employment and training information, recruiting procedures and local hire, mobility and reporting system. In May, 1981, the Minister approved the com-

plete Manpower Plan for the whole of the pipeline other than Yukon.

3) Surveillance

Surveillance, the final major phase in the regulatory process, is carried out by the Agency to ensure compliance by the company with the various terms and conditions and the engineering requirements in accord with the procedures approved during the review process. Earlier in his remarks, Mr. Scotland indicated the range of engineering matters that were overseen by the surveillance teams. This year, the Agency has three teams in the field overseeing construction of the Eastern Leg. They consist of a Senior Surveillance Officer and two to four surveillance officers carrying out on-site observations on a daily basis and making regular reports to the Calgary office.

Because extensive authority has been delegated to the Agency by Parliament to ensure compliance by Foothills with the requirements of the *Northern Pipeline Act* and regulations passed under its authority, it is particularly imperative that this authority be exercised in a fair, reasonable and consistent manner.

Among other things, fairness requires that those being regulated have the opportunity to become completely familiar with the rules and the manner in which they are expected to comply with them. It is, therefore, important that all of the appropriate company and contractor personnel are made fully aware of these regulatory requirements.

Finally, the company must be given adequate opportunity to rectify situations in the field in which it is in breach of these requirements before penalties are imposed. It is important, then, that the Agency's surveillance practices be consistent and provide for a timely flow of information between its surveillance staff and the company's inspection team.

The Senior Surveillance Officer in charge of each section is empowered to require the company to remedy immediately any shortcomings on its part in complying with regulatory requirements, failing which the particular activity of non-compliance may be temporarily halted on this order. During Western Leg construction, two reports of non-compliance were issued by the Senior Surveillance Officer dealing with such things as the inadequacy of protection provided for an archaeological site and the leakage of a small amount of diesel fuel from a storage tank near a watercourse.

Under the *Northern Pipeline Act*, the Designated Officer is authorized to issue

a formal notice of non-compliance to the company, which would advise with respect to the action required to meet the requirements of the Agency. Failure to comply with the order of the Designated Officer could result in the assessment of penalties against the company by the Minister.

Up to the present time, the Designated Officer has issued three such notices of non-compliance to the company in connection with construction of the Western Leg. The first notice required that a ditching operation be halted temporarily because of the excessive length of ditch that had been opened, the inadequate passage provided for crossing by large animals, and the failure to provide proper protection against ditch erosion - all of which were considered in violation of the environmental terms and conditions.

Two directions were issued recently by the Designated Officer requiring Foothills not to undertake any clean-up or revegetation activities in south B.C. until adequate provision had been made for the employment of local native workers in keeping with the socio-economic terms and conditions.

The success of the Agency in carrying out its regulatory responsibilities is contingent upon several factors, beginning with a thorough understanding by the company and its contractors of the requirements under the socio-economic and environmental terms and conditions and the provisions with respect to engineering. The review process leading to approval of company plans and submissions must be conducted methodically and give adequate opportunity for provincial and territorial government and public input. The process must also ensure that consideration is given to each submission so that direction to the company to modify its plans is the result of a fair and objective analysis. Finally, the surveillance procedures to ensure company compliance with the requirements must include an 'early warning system' so that the company can take the necessary corrective action before a non-compliance notice is issued.

The Agency's regulatory task is not made easier by the fact that for much of the project provincial laws and regulations have to be taken carefully into account because the question of respective jurisdiction is never far removed. In this rather critical area, as well as in its dealings with the Foothills Group of Companies, the socio-economic and environmental group within the Agency seeks to resolve all issues on their merit

News In Brief

Robert Walker Hornal has been appointed as the Northern Pipeline Agency's Administrator for British Columbia effective August 1. Based in Vancouver, Hornal will assume responsibility for overseeing field surveillance to ensure Foothills Pipe Lines (North B.C.) Ltd. complies with the Agency's terms and conditions during planning and construction of the Alaska Highway gas pipeline in northern B.C. He will also maintain contact with native, community and various interest groups and both provincial and federal governments.

Hornal has 20 years' experience in northern Canada, monitoring mineral exploration and implementing resource legislation. For the past six years he has served as Director of the Northwest Territories Region for the Department of Indian Affairs and Northern Development (DIAND) in Yellowknife.

Foothills Pipe Lines (North B.C.) Ltd. has submitted a plan schedule, listing the dates on which 11 plans relating to the construction of the Alaska Highway gas pipeline in northern B.C. will be filed with the Northern Pipeline Agency for approval. Under the Agency's environmental and socio-economic terms and conditions, the company is required to undertake a number of measures that include informing and consulting interested parties on the pipeline project, providing training and employment opportunities for native people and women and minimizing adverse environmental impact.

Foothills (North B.C.) will develop the plans, in consultation with the Agency, the provincial government and concerned interest groups. The company's formal submission of plans begins September 1 and continues to December 1, during which time they will be on display for public review in the main public libraries in Dawson Creek, Fort St. John, Fort Nelson and Watson Lake, as well as in the Northern Pipeline Agency offices in Vancouver, Whitehorse, Calgary and Ottawa. The plan submission schedule is now available for review in these locations. Comment on the document is welcome and should be forwarded to the Agency.

A schedule for the submission of three socio-economic plans covering the short Swift River portion of the pipeline in

northern B.C. has also been submitted to the Agency for approval by Foothills Pipe Lines (South Yukon) Ltd. These plans will also be available for public review in the aforementioned libraries and Agency offices when submitted between September 1 and December 1.

Information workshops between representatives from native groups, the B.C. government, the federal departments of Indian Affairs and Northern Development (DIAND), Economic Development (MSED) and the Canada Employment and Immigration Commission (CEIC), the Northern Pipeline Agency and the major resource industries operating in northern B.C. were held in late June in Dawson Creek and Prince George. Co-ordinated by DIAND, the discussions focussed on the potential for status and non-status Indians and Metis people in the region for training and employment opportunities in relation to resource projects and how Indian bands can best use funds for economic development.

Despite unusually wet weather in Alberta and Saskatchewan in June, construction continues at a steady rate on the Eastern Leg. On the Alberta segment running 54 km (33.5 mi.) east from James River Junction, as of July 6, 48 km (30 mi.) have been graded, 31 km (19 mi.) have been strung with pipe, 19 km (12 mi.) have been ditched, 11 km (7 mi.) have been automatically welded and 8 km (5 mi.) of pipe have been wrapped, lowered-in and backfilled. Tie-ins are completed on 6 km (4 mi.) and initial clean-up has started. Pipe has been coated with concrete and tested in preparation for the crossing of the Red Deer River.

Grading, pipe stringing and ditching have been completed on the steep banks of the South Saskatchewan River, at the crossing area about 16 km (10 mi.) east of the Alberta - Saskatchewan border. Welding, wrapping, lowering-in, backfilling, tie-ins and initial clean-up continues.

In Saskatchewan, as of July 6, 136 km (84 mi.) have been graded, 96 km (60 mi.) have been strung with pipe, 75 km (47 mi.) have been ditched, 72 km (45 mi.) have been welded and 59 km (37 mi.) have been wrapped, lowered-in and

backfilled. Tie-ins on 47 km (29 mi.) of pipe and initial clean-up on 22 km (14 mi.) have been completed. Preparations are underway for hydrostatic testing of the completed pipeline sections.

Environmental hearings, which began in Whitehorse June 16 on the proposed routing of the Alaska Highway gas pipeline through the Ixex Pass area in Yukon by Foothills Pipe Lines (South Yukon) Ltd., were wrapped up after two and a half days. The Environmental Assessment and Review Panel (EARP) heard briefs from the federal departments of the Environment, Indian Affairs and Northern Development, Fisheries and Oceans and Energy, Mines and Resources. Statements were also heard from the Yukon Conservation Society, a local trapper and an outfitter.

The EARP panel is expected to hand down its recommendations based on the hearings in mid-July.

Based on a week-long visit in early June to Yukon, Alaska and the Northwest Territories, the Special Committee of the Senate on the Northern Pipeline recommends that it be authorized to report on the transportation of petroleum and natural gas in Canada, north of the 60th parallel.

The trip by 13 members of the committee was arranged in order to gain a deeper insight into pipeline and related activities and to hear the concerns of local municipal and native people regarding pipeline development. As part of its investigations, the Committee met with Canadian and U.S. government and energy industry officials and community and native leaders and toured oil and gas facilities in the north. The concern that northern residents should receive manpower and employment benefits from the Alaska Highway gas pipeline project and other regional developments was emphasized in talks with the Yukon Advisory Council and the Council for Yukon Indians.

Established by the Senate in 1978 to monitor progress on the Alaska Highway gas pipeline project, the committee's original terms of reference have expanded to include the study of enhanced oil recovery and the Trans-Quebec & Maritimes Pipeline.

Revegetation in South B.C. — The Key to Successful Erosion Control

Sedimentation in Streambeds Main Concern

Equally as important as the measures taken to ensure environmental protection during pipeline construction are the final clean-up and revegetation procedures which follow. These activities are now underway along the constructed sections of the Western Leg of the Alaska Highway gas pipeline in Alberta, a total of 127 km (77 mi.), and in south-eastern British Columbia, a total distance of 88 km (54.6 mi.).

All lands along the pipeline right-of-way which were disturbed by construction will be covered with topsoil, fertilized and reseeded with grasses native to the area. "Grass is used because it comes up and forms a protective cover rapidly, and that's essential for minimizing erosion of the surface", explains Dr. Tony Yarranton, the Northern Pipeline Agency's Environmental Manager. "Our principal concern in south B.C. is to prevent the build-up of sediment in streambeds, which can endanger fish and incubating fish eggs. Sedimentation is produced if erosion control measures, including revegetation, fail. The surface material of any slope is washed away by rain into the water, with the consequent impact on fish."

Erosion control is the most immediate objective of the revegetation program in

south B.C., stresses Yarranton, while a second more gradually achieved objective is to encourage the re-establishment of natural plant types. "It's important to make sure the kinds of grasses being used for revegetation will not inhibit the invasion of the surrounding vegetation into the disturbed area," he notes.

The environmental group at the Agency is developing a system for monitoring the effectiveness of the revegetation program in south B.C. "We want to get plants growing as quickly as possible to shield the soil surface from the beating effect of rain," Yarranton explains. "A reasonable amount of plant cover intercepts rain so that it hits the leaves and just trickles down. About 50 percent cover is enough to reduce the amount of sediment being removed from the surface to a basic minimum." Yarranton suggests that success may be judged by comparing the amount of plant cover on sample plots of revegetated land with cover on adjacent undisturbed land.

Another factor Yarranton proposes to measure is the density of stem distribution across a given area. Plant stems help reduce the velocity of water flowing over the surface and serve as filters by

keeping soil particles from being washed away, he says.

According to Yarranton, successful revegetation of the pipeline right-of-way in south B.C. depends upon a number of considerations. Seeds need moisture and will not germinate if sown when conditions are very dry. At the other extreme, heavy rainfalls and flash floods can wash away a whole surface and cause severe gullies on steep slopes which prevent plants from becoming established. Yarranton notes proper replacement of topsoil as another factor which affects seed germination.

"In the broader context, we're concerned with the effects of building this pipeline," Yarranton continues. "Have the Agency's terms and conditions succeeded in protecting the environment? Have the company's practices worked and if not, what can be done to rectify the situation?" Yarranton says he hopes the results of monitoring the revegetation and erosion control measures in South B.C. will suggest practical improvements in the methods to be applied to construction of the mainline sections of the Alaska Highway gas pipeline, as well as the additional sections in south B.C. and Alberta to be built in 1984.



Instream crossing of the Moyie River in south B.C. took place early last winter. Revegetation of the right-of-way next to the river is underway.

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 are welcome and may be directed to:

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