



The Mackenzie Valley

The Pipeline Guidelines envisage two energy corridors in Canada's Northwest: one would cross the Northern Yukon, and the other would run the length of the Mackenzie Valley. I have recommended that no pipeline be built and no corridor be established across the Northern Yukon. In this chapter, I will address the Mackenzie Valley corridor.

The Mackenzie Valley is a transportation route that has seen several decades of industrial development. No major wildlife population is threatened by a pipeline along the Mackenzie Valley, and no major wilderness areas would be violated by it – but that is not to say that a pipeline would have no impact. Clearly there will be impacts, but they will be superimposed on those that have already occurred in the region, and in many respects they can be ameliorated. So, setting aside the very important social and economic issues and the overarching question of native claims, all of which I shall treat in subsequent chapters, there is no compelling environmental reason why a corridor to bring oil and gas from the Mackenzie Delta and Beaufort Sea could not be established along the Valley. However, to keep the environmental impact of a pipeline to an acceptable level, its construction and operation should proceed only under careful planning and strict regulation. The corridor should be developed only on the basis of a sensible and comprehensive plan that accounts for and resolves the many land use conflicts that are apparent in the region even today.

The Region

The Mackenzie River not only defines the Mackenzie Valley, it dominates the entire Canadian Northwest. The Dene called the river *Deh-cho*, the Big River. Alexander Mackenzie called it the Great River, by which name it was known until John Franklin descended this river during his first overland expedition, 1819-1822. Since then, we have known it as the Mackenzie River. It is the longest river system in Canada, one of the ten longest rivers in the world, and one of the last great rivers that is not polluted. The Mackenzie drainage basin encompasses nearly one-fifth of our country, taking in northwest Saskatchewan, the northern half of Alberta, most of northern British Columbia, the eastern Yukon and, of course, all of the western part of the Northwest Territories. Included within this great drainage system are the Peace, Athabasca and Liard Rivers, as well as the Finlay, Parsnip, Nahanni, Great Bear, Arctic Red and Peel Rivers. It drains the great lakes of the North: Great Slave Lake and Great Bear Lake, both of which are bigger than Lake Ontario. Within the Northwest Territories alone, the Mackenzie River and its tributaries drain an area of some one-half million square miles an area larger than the Province of Ontario.

Historically, the Valley has provided a home and subsistence for the native people. It provided the main transportation route and resources upon which the northern fur trade was built, and today it is a vital link between the people and the communities of the region. The river is also the route over which machinery and equipment are sent to the base camps and the drilling rigs of the oil companies active in the Mackenzie Delta and

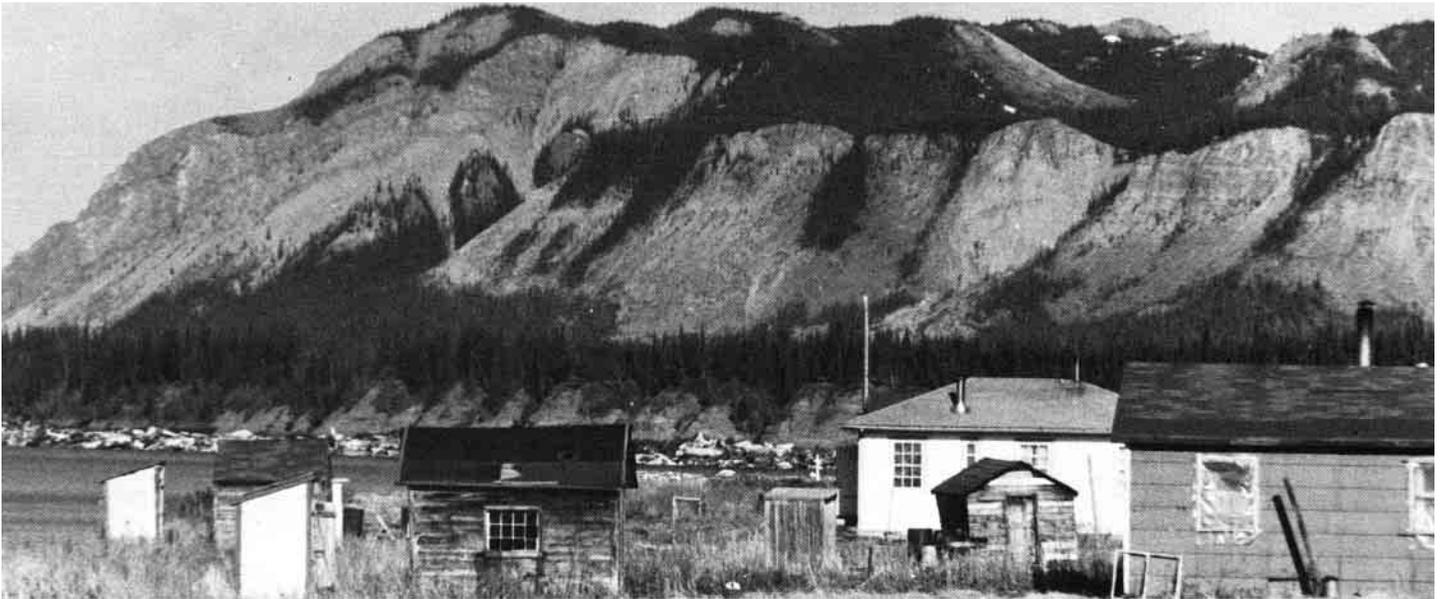
Beaufort Sea. Along this river Arctic Gas and Foothills propose to move pipe, material, equipment and supplies to their stockpile and construction sites. And along this Valley it is proposed to establish an energy corridor.

The Mackenzie Valley region that would be affected by the pipeline and oil and gas activities includes not only the Valley itself but also the basins of Great Slave Lake and Great Bear Lake. Despite the diversity of this large region, the continuity and definition given the region by the river make it a logical entity to deal with as a whole. Because it is a natural travel corridor, it now sees many competing uses by wildlife, traditional activities of native peoples, and the advance of industrial development.

When you fly along the Mackenzie Valley, you have the impression of immense distances and great isolation, but in some senses this impression is misleading. It leads to the assumption that the land is virtually empty and that its capacity to absorb impact is limitless. As each activity advances – seismic exploration, drilling, roads, highways, mines and pipelines – we tend to overlook their cumulative effects on the land, the wildlife and the native people.

The People and the Land

Native land use within the Mackenzie Valley focuses on its renewable resources: moose, caribou, furbearers, fish and birds. Environmental impacts will, therefore, bear especially on them. It is only within comparatively recent years that the incremental changes to the environment caused by successive stages of industrial development have built up to a level that is obvious to the people who live in the Mackenzie Valley. The land has



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changed. A cut-line here and there, a drilling site, a road or highway where none existed before, airstrips, and more and more aircraft flying overhead. These things together are effecting a cumulative environmental transformation.

The initial incursions of white people into the Mackenzie Valley were limited both in number and extent. Engaged in the fur trade, they lived close to the major river routes and were dependent for their living on the native people's annual harvest of furs. The pattern of that relationship has survived for more than a century. But it began to change in the early 1900s when geological parties began to explore the Valley and surrounding area. Oil was found at Norman Wells in 1920; uranium and gold deposits were discovered in the region in the 1930s. Slowly the activities of industrial man moved farther from the main river transportation routes, away from the trading posts, into lands that had been the exclusive domain of the native people.

In recent years, many hitherto remote areas have come under intensive use. Consider what is happening in an area that is still regarded as relatively untouched, the Fort Norman-Fort Franklin region. The native people have always used the lands and waters of this area to hunt, trap and fish. The main area of long-term use by the people of Fort Norman extends inland past Brackett (Willow) Lake at least 250 miles from Fort Norman, and occasionally travel takes the people another 150 miles. The people of Fort Franklin still use all of the lands around Great Bear Lake.

There has been a fur trading post at or near Fort Norman for more than 150 years. Half a century ago, industrial development began in a limited way with the discovery of oil at Norman Wells, and a refinery has been there since the 1920s. But, more recently,

there has been extensive industrial activity: now all of the lands around the communities at Fort Norman and Brackett Lake are held under petroleum exploration permit. The major permit holders include Aquitaine, Texaco, Decalta Group, Shell and Imperial Oil; some 25 wildcat wells have been drilled within 60 miles of Fort Norman, the nearest one only eight miles east of the settlement.

The oil companies have carried out widespread seismic exploration in the area for many years, and there are seismic trails everywhere. For example, Aquitaine has carried out 350 miles of seismic exploration on a block of land covering about 1,000 square miles.

There has been exploration for other minerals, too. Manalta Coal Limited of Calgary have exploration licenses on land covering some 240 square miles east and southeast of Fort Norman. They have put down about 30 shallow drill holes and found coal seams 20 feet thick at shallow depths. The same block of land is also held under a petroleum exploration permit.

There is barge traffic on the river in summer. The Mackenzie Highway alignment will pass along the north side of the village of Fort Norman, and its right-of-way is already partly cleared. The CN telephone land-line and a winter road run the length of the Valley. The feasibility of a hydro-electric development on the Great Bear River has been studied. There is extensive air traffic in the area, which rises and falls with exploration and development. A rash of activity by government and industry has anticipated construction of the pipeline.

The government regards the proposed pipeline as the key element of a transportation and energy corridor along the Mackenzie Valley. The pipeline issue has focused attention on the cumulative effects of other

forms of development on the environment and peoples of the region. The consequences of these varied developments and changes on the way of life of the native people in the region was described by Chief Daniel Sonfrere of Hay River:

... after the white man came, well things look different, everything's changing now. I'm going to tell you a few things about that...

Look at it today. If we try to go in the bush and kill something, it's pretty hard for us to find [anything] because there are too many roads going different directions. There's too many people around. It's pretty hard for us to kill anything. We have to go quite a ways to get what we want off our land. Yes, even some people [are] complaining about the fish they're catching in this river because everytime they go and pull their net, when they want to have a feed of fish it always taste of fuel.... [We] have to go in the bush and do the hunting, [we] got to go quite a ways and got to get out quite a distance before [we] can get anything [we] want. [C588ff.]

Environmental Concerns

Many parts of the Mackenzie Valley terrain are sensitive to disturbance. The region is distinguished by its silty, clayey permafrost soils that are vulnerable to dramatic thermal degradation, particularly along the many river valleys and slopes of the region. These concerns are of major importance because the north-south direction of the corridor cuts across the many east-west valleys and slopes that converge on the Mackenzie River.

Although the valleys crossed by the corridor may constitute only a small proportion of the total landscape, they are the locations of disproportionately high land use and are of particular environmental, aesthetic and recreational values. They define essential

Bear Rock behind Fort Norman. (L. Smith)

Stockpile site for petroleum exploration, Mackenzie River. (GSC-A. Heginbottom)

Peregrine falcon. (C. & M. Hampson)

Islands of the Mackenzie River near Norman Wells. (GSC-A. Heginbottom)



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fish and mammal habitat and the vegetation along them is more varied and abundant than elsewhere. Valleys have always been and still are the preferred areas for many native people.

These factors give the location of pipeline compressor stations unusual importance, because many of the compressor station complexes would be located adjacent to the valleys that are the foci of the regional ecosystem. A gas pipeline would be a dynamic linear element across the northern landscape, with nodes of great activity at compressor stations at 50-mile intervals. These nodes would extend to include wharf sites, helipads, airfields and borrow pits. They generally lie at right angles to the pipeline right-of-way and corridor.

The immediate impact of industrial development would not necessarily be dramatic in a region like the Mackenzie Valley, where the influence of the white man has been evident for many decades. Wildlife populations are affected by the cumulative influence of such factors as weather, disease, predators and habitat conditions. But wildlife populations inevitably decrease as industrial activity takes over larger and larger portions of the landscape. This process is now well underway in the Mackenzie Valley, and it will accelerate as industrial development proceeds. Let me illustrate this point by referring briefly to some of the major wildlife species in the region.

Birds

Important areas for birds in the Mackenzie Valley are chiefly of two types: those that provide staging and nesting sites for waterfowl and those that are suitable sites for raptors, such as falcons, eagles and hawks.

The Mackenzie Valley is one of North

America's great migratory bird flyways. Mills Lake near the head of the river, the islands and sandbars from Camsell Bend to Arctic Red River, and particularly the islands near Norman Wells and Little Chicago are heavily used by migrating waterfowl and shorebirds. These islands are an important link in waterfowl life cycles. River bars and flood plains, with their dynamic nature and early succession stage vegetation, are heavily used by migrating snow geese and swans in spring, because this is the first habitat available to them. The birds arrive immediately after break-up, landing on the exposed portions of the islands to feed and rest. Pair-bonding takes place during this part of their migration, and the pairs continue north to their nesting grounds in the Delta and beyond. With so short a season, they have no time to waste. Disturbance must be kept to a minimum.

Large numbers of ducks and some Canada geese, loons and shorebirds nest in the Mackenzie Valley. The most important nesting, moulting and staging areas for waterfowl along the Mackenzie Valley north of Great Slave Lake are the Ramparts River, Mackay Creek, Brackett Lake, Mills Lake and Beaver Lake. As in the Delta and the Northern Yukon, the birds are susceptible to disturbance during these critical stages in their life, but the consequences probably would not be as great because the populations are not as concentrated.

The raptors that nest in the Mackenzie Valley, Mackenzie Delta and Northern Yukon are significant portions of the surviving North American populations of these birds, especially of the peregrine falcon and the gyrfalcon. There are nesting sites for the peregrine falcon, an endangered species, and other raptors all along the proposed corridor and, in particular, in the Campbell Hills and

the Franklin Mountains. In recent decades, a number of factors, especially the widespread use of pesticides, have combined to reduce greatly the abundance of the peregrine falcon in most areas of North America. The plight of this bird is described by George Finney and Virginia Lang in the *Biological Field Program Report: 1975* prepared for Foothills:

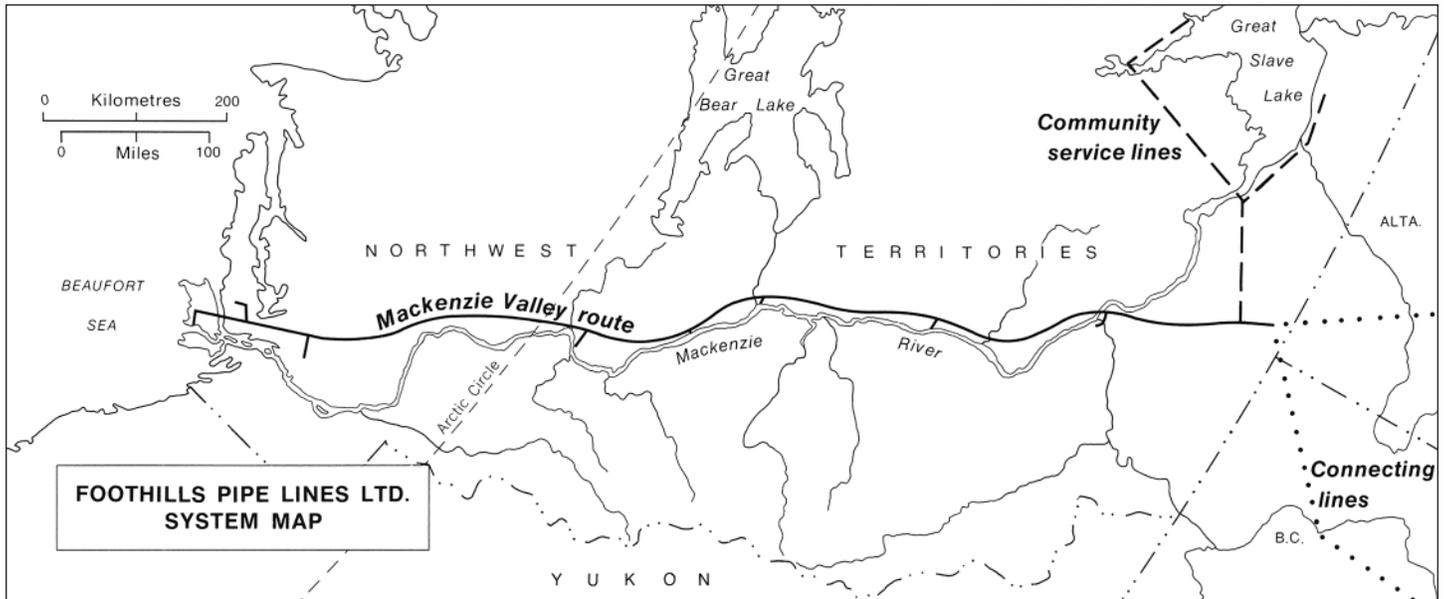
The population is at a dangerously low level and there is no indication that recovery is imminent. Due to the sensitivity of the peregrine population, developers have to face the fact that the destruction of a single nest site or interference with nesting in a single year is a serious and unacceptable impact. These constraints apply to no other birds species regularly nesting along the proposed pipeline corridor. [Vol. IV of IV, Section 4, p. 32]

I am of the opinion that we can avoid disturbance to the raptors by establishing suitable buffer zones between their nesting sites and industrial activities. I shall deal with this subject in Volume Two.

Mammals

No populations of caribou in the Mackenzie Valley are directly threatened by a pipeline. The Bathurst herd, which ranges from the north and east shores of Great Slave Lake to the south shore of Great Bear Lake, is used by hunters from Yellowknife, Detah, Rae, Lac la Martre and Rae Lakes. The people of Fort Good Hope, Fort Franklin and Colville Lake rely mainly on the Bluenose herd, which ranges from Great Bear Lake north to the tree line. Some woodland caribou are taken throughout the Valley.

The calving grounds of the Bluenose and the Bathurst herds are far away from the impact area, and their main populations lie outside the corridor. Nevertheless, even though industrial activity in the Mackenzie



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Valley does not threaten the caribou populations, such activity will drive them farther from the Valley itself. Father Jean Amourous told us, when the Inquiry visited Rae Lakes, that this has already occurred to some extent:

... it's a fact that development means, in this country, the stop of development by traditional ways. For instance, when development took place with the mining, building of roads, cat roads, cat trains, on the lakes, at about that time the caribou stopped migrating right through the Pre-Cambrian Shield and stopped going ... across to the sedimentary grounds, limestone country, like Lac la Martre, and all the way down to the other end of Lac la Martre, in 1956. No caribou there for the last 20 years. And that was about the time that the uranium mines grew up in the country, right on the caribou migrating roads.

... it was about that time that on an expedition to the barren land hunting caribou, we couldn't find any caribou that had fallen, but we found plenty of moose that had run away from this part of the country in between the Pre-Cambrian Shield and the limestone country, because of the industrial activity. And those moose have been pushed back by the noise to more isolated parts of the country.

And people here are witness to the fact that when the winter road is open, caribou don't come across it. And many times, certainly three or four times since the winter road is open to haul out to the South the minerals from around Great Bear Lake shores, it has spread the caribou pasturing in the country in between here and Great Bear Lake, and after the operation is going on of hauling that mineral ore outside, then you don't see the caribou alongside that road, or very few. [C8301ff.]

Moose, like caribou, are a heavily used resource in the Mackenzie Valley. They range widely over most types of habitat in summer and early spring. Hunting was the main cause for the decline in the moose

populations. Such a decline occurred following World War I, when there was an influx of trappers, traders and prospectors into the Mackenzie Valley. While not immediately sensitive to encroachment on its habitat, successive disturbances will cause moose to move away. The effect is subtle and gradual. The furbearers of the Mackenzie Valley region, like the other mammals, are threatened by successive developments that affect their habitat and tend to push them farther and farther away from the corridor. Localized depletions of beaver, lynx, marten and muskrat have been felt directly by many of the trappers who spoke to the Inquiry. Joe Martin told the Inquiry about conditions near Colville Lake:

There's parts around here, some areas where it used to be really good for trapping marten and stuff like that. Since explorations, all the seismic trails ... it's not so easy to go trapping and catch fur anymore. You have to really work for it, because it's really changed. Not so many furs like there used to be before.

[Horseshoe Lake] where [I] was trapping last winter, there's a lot of seismic cut lines around there. It used to be real good trapping area around there ... [but] just even cut lines like that can disturb the land, and the fur is not the same, and the wildlife is not the same. [C8338ff.]

Fish

The Mackenzie River is more productive and has more fish species than either the Porcupine River or the north slope drainage of the Yukon. Most fish in the Mackenzie Valley have specific migration routes and limited spawning, overwintering, nursery and feeding areas. Suitable water quality and food sources are obviously necessary. These habitats and conditions are particularly important because of the generally limited ability of northern fish populations to recover after

a severe environmental disruption has reduced their numbers.

Of the many species of fish in the region, some are spring spawners, others are fall spawners and one species, the burbot, is a winter spawner. These species – grayling, yellow walleye, northern pike, longnose sucker, flathead chub, whitefish, cisco, inconnu, trout, goldeye, stickleback and others – have different sensitivities to disturbance depending on their life cycles and biological traits. The arctic grayling, for example, have a complex seasonal migration. Usually they spawn over gravel in small, relatively clear tributaries during spring break-up; then, it seems, the mature fish migrate to other feeding areas in the Mackenzie system, and they overwinter in lakes or in the mainstream channels. Nursery areas for fry and immature fish are generally in clear, swiftly flowing smaller tributaries. Changes in habitat, water quality (particularly by siltation of the clear streams), toxic spills and obstruction of channels could adversely affect species like the grayling.

We have limited knowledge of the population distribution and dynamics of fish in the Mackenzie drainage system. Jeff Stein of the Department of Fisheries told the Inquiry:

Certainly we can identify the more significant populations and in some cases provide very specific measures for their protection. But for the vast majority of streams, especially small drainages, data are generally limited, thus requiring extrapolation from more intensively studied and hopefully similar watersheds. [F15723]

It is essential, therefore, that inventories and research on fisheries keep pace with industrial development in the Valley. Even so, we know that certain measures will have to be employed to protect fish habitat. These measures should include requirements for

Beaver. (NFB-Cesar)

Bundling dry fish near Fort Good Hope. (R. Fumoleau)

Moose. (A. Carmichael)



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the design and construction of culverts, dykes, coffer dams, ice bridges, handling of toxic substances, siltation, water withdrawal and waste disposal. Measures such as these will be dealt with in Volume Two.

Development of an energy corridor could interfere with the Mackenzie Valley fisheries by disturbance of the fishing sites or by direct disruption of fishing. The domestic fishery has traditionally been very important throughout the area as a source of protein. If the fisheries are to be retained, both the fish and the fishing sites must be protected.

Recreation

In this report, I have said little about outdoor recreation. It may seem to have little relevance to a pipeline or an energy corridor, but recreation and tourism are increasing in the Valley, and in future they will be of greater importance. Therefore, industrial development should be designed to limit adverse impacts on areas of recreational value. Such areas should be identified now, before further development reduces the options that are available.

Studies by Parks Canada have demonstrated that the Mackenzie River, one of the few major rivers still free of dams, may be considered as an Historic Waterway. Some of its tributaries could qualify as Wild Rivers and sites such as Bear Rock and the Upper Ramparts have been identified for consideration as National Landmarks. There are many other areas of archaeological and historical interest in the Valley. Collectively such areas constitute a rich natural and cultural heritage worthy of protection.

Corridor Development

The Pipeline Project

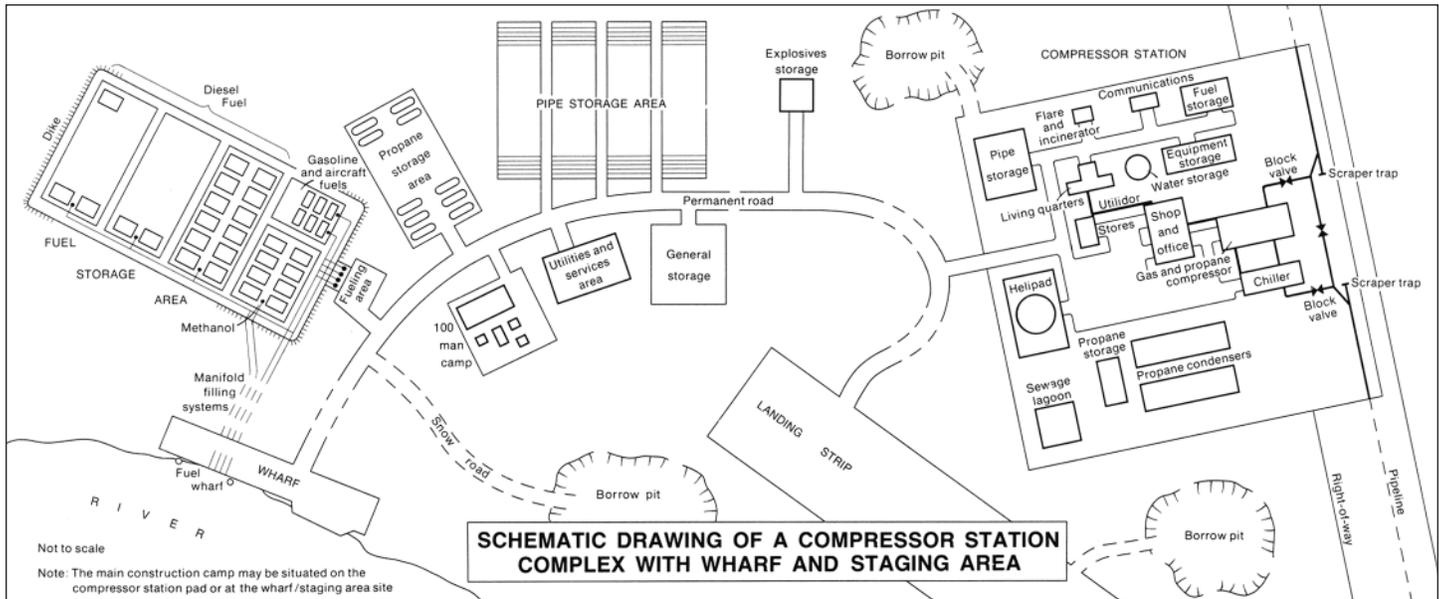
As the map of the front of this report shows, the routes proposed by both Arctic Gas and Foothills along the Mackenzie Valley are very similar. Both routes run south from the Delta along the east side of the Mackenzie River. Starting from the Delta, they pass close to Inuvik, east of Travaillant Lake and then approach the Mackenzie River near Thunder River. From here to Fort Simpson, the Mackenzie River and the routes are generally parallel, except south of Fort Good Hope, where the pipeline routes cut through a gap in the Norman Range, and north of Fort Simpson, where the Arctic Gas route crosses the Ebbutt Hills and the Foothills route skirts west of the Ebbutt Hills. Both routes cross the Mackenzie east of its confluence with the Liard (east of Fort Simpson), and then continue southeast overland, to the Northwest Territories-Alberta border, just east of the Alberta-British Columbia boundary.

The pipeline will stretch 800 miles from the Delta to the Alberta border. But the project will not be just a line of pipe buried in a clearing through the bush; its effects will be felt in distance well beyond the right-of-way and in time far longer than the two winter seasons of pipelaying. All the material, supplies and equipment will have to be shipped down the river to the construction sites during the summer. The capacity of the fleet of tugs and barges on the Mackenzie River will have to be doubled. The Great Slave Lake railway and the Mackenzie Highway will be heavily used. Hay River, as

a railhead, a road terminus, and with extensive trans-shipment facilities, and Fort Simpson, which is on the Mackenzie Highway, will both experience a boom.

There will be compressor stations at about 50-mile intervals along the pipeline. Arctic Gas propose to have 18 in the Valley, and Foothills will have 17; with each station there will be a host of other developments. Let me describe briefly what is planned for just one of the 18 compressor station sites that Arctic Gas propose, the one at Thunder River.

The permanent facilities will comprise the compressor station itself, an airstrip (one of ten airstrips that Arctic Gas propose to build in the Valley) seven miles of all-weather gravel road, and a wharf. Temporary facilities will include a construction camp to house an 800-man pipeline construction crew and, once the pipe is laid, the 200-man compressor station construction crew, a material stockpile site, two or three gravel pits and many miles of snow roads. The construction of this complex will require over two million cubic yards of gravel and other borrow material. The permanent compressor station will have between six and ten large steel buildings, which will house 30,000-horsepower turbine compressors, 17,000-horsepower refrigeration equipment, propane condensers to dispose of the waste heat from the refrigeration units, a workshop, garage, storage, control room, communications equipment, office area and living quarters for operation and maintenance staff. In addition, there will be outside storage areas for repair and maintenance material and vehicles, extra pipe, fuel and propane, a flare stack and an incinerator, a sewage lagoon and a communications dish to hook into the Anik Satellite. All this will require a fenced, gravelled pad about 1,000



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feet square. According to Carl Koskimaki, an engineer who gave evidence for Arctic Gas, the operating noise of the station turbines and at the fence line of the station would be equivalent to the noise level within 100 feet of an urban freeway in mid-morning. The material stockpile site at Thunder River will be at the compressor station site and, together with the wharf, it will be able to handle tens of thousands of tons of supplies, including 88 miles of pipe, which alone will weigh about 85,000 tons. All this, including both the permanent and temporary facilities, will require the clearing of nearly 350 acres of land.

The pipeline companies told the Inquiry that the choice of the east side of the Mackenzie River for their pipeline and their selection of a route through this area were based on financial and engineering considerations. The shortest distance, with due regard to major terrain features, such as mountain passes, river crossing sites and soil properties, defined the route in the general sense. They took the proximity of transportation facilities into account and as site-specific engineering, environmental and, to some degree, socio-economic information became available, they progressively refined the routing and made some minor adjustments. Compressor stations were located at hydraulically optimum points that were chosen for pipe and station size and design gas volumes, then adjusted slightly as required by geotechnical considerations. For engineering reasons that involve the maintenance of hydraulic balance and throughput efficiency, the degree of flexibility in choosing compressor station sites was said to be limited.

People in all the communities along the proposed route expressed to the Inquiry concern over the location of the pipeline and its

associated facilities. Their concerns were related to the location of the pipeline near the communities themselves and in or near traditional land use areas. Both routes come within two to five miles of Fort Good Hope, Fort Norman, Norman Wells and Wrigley. In addition, both companies will locate regional headquarters at Fort Simpson, Norman Wells and Inuvik. Both companies have responded to some of these concerns by changing or suggesting changes in location. For instance, Arctic Gas have proposed to relocate wharves, stockpile sites, access roads and airfields. To expedite the shipment of material, they have also made plans to carry out a large part of their trans-shipment activities at a new facility at Axe Point, downstream from Fort Providence. To date, such changes appear to have been introduced unilaterally; there has been no apparent progress towards a review process to resolve differences regarding the route of the pipeline and the location of its facilities.

Other Developments

The proposed gas pipeline is neither the first major venture, nor the final stage of corridor development in the Valley. But in many respects it is a threshold. The pipeline will stimulate oil and gas exploration throughout the Mackenzie Valley, and further gas discoveries may well be made. Robert Blair, President of Foothills, spoke at Colville Lake of the likelihood that a pipeline would connect the Tedji Lake discoveries northwest of Colville Lake with the main pipeline. The Pipeline Guidelines, which envisage an oil pipeline and other transportation systems, refer to:

... a transportation corridor that might include in the long run not only trunk pipelines, but also a highway, a railroad, electric power

transmission lines, telecommunication facilities, etc. [p. 3]

Most of these developments would be confined to a narrow strip of land on the east side of the Mackenzie River along the same general route as the proposed pipeline. The Pipeline Guidelines do not foresee a number of projects spread over a vast landscape. In many parts of the Valley, topography alone would constrict these developments into quite limited areas because restrictions on the route of one project are often similar to those of another. For example, the proposed Mackenzie Highway alignment, the CN land-line right-of-way, and the winter road between Inuvik and Fort Simpson as well as the pipeline commonly lie within a zone only a mile or two wide, and they pass through Gibson Gap, which is only one-half mile wide.

Unlike the Northern Yukon, some of these developments are already underway along the Mackenzie Valley corridor. Others are pending, and there may be others that we do not yet foresee. The gas pipeline will accelerate these activities and accentuate environmental change. It will begin a new round of impacts that may seriously affect the landscape and its wildlife.

Balancing Development with the Environment

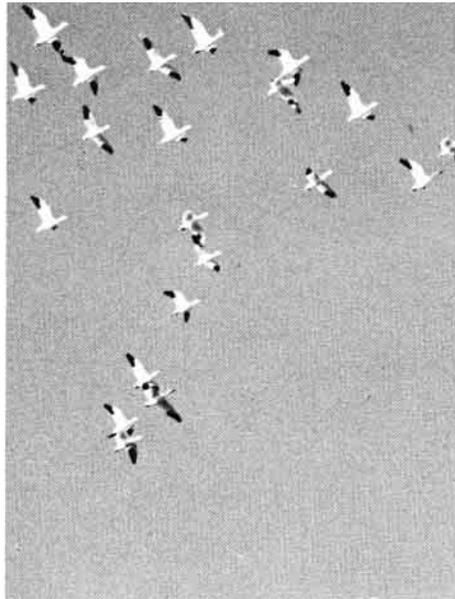
The pipeline project has focused public attention on the need to resolve conflicts created by different demands on the environment. Dr. Ian McTaggart-Cowan of the Environment Protection Board summed this up:

... there is the oft experienced human tendency to argue that, now that some tolerable

The Ramparts along the Mackenzie River.
(D. Gamble)

Snow geese. (C. & M. Hampson)

Great Bear River looking west towards Bear Rock.
(GSC-A. Heginbottom)



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impact has been permitted, it becomes easier to argue for each successive small increment – small change – each one on its own perhaps minor, but in the aggregate inducing serious impact. I have called this “destruction by insignificant increment.” This process requires that proposals for initial incursions be viewed most thoroughly to determine particularly that the route designated for this project is the one least likely to be subjected to these incremental phenomena resulting from looping, from roads, from railways, from oil pipelines, etc.

[The Environment Protection Board] urges very strongly the preparation of a comprehensive land use plan for the Yukon Territory and the Mackenzie Valley area, taking into account the environmental and social components. The corridor concept makes this particularly important. [F6267]

Comprehensive land use planning can emerge only from a settlement of native claims. However, on purely environmental grounds, there are several areas of land that warrant immediate protection. I recommend that sanctuaries be designated to protect migratory waterfowl and falcons, and the sites that I recommend have already been identified under the International Biological Programme. They are the Campbell Hills-Dolomite Lake site, which is important to falcons, and the Willow Lake (Brackett Lake) and Mills Lake sites, which are of great importance to migratory waterfowl. Many islands in the Mackenzie River are also important to migratory waterfowl, and, in time, some of them should be designated as bird sanctuaries.

Many tributaries that feed into the Mackenzie River also warrant some degree of special protection from industrial impacts. These valleys, where the permafrost terrain and slopes are most sensitive, are the focal

points for terrestrial and aquatic ecosystems that are important for traditional pursuits of the native people. These areas should be avoided by industrial development wherever possible, and any incursions that are permitted should be subjected to stringent assessments of impact and to the special ameliorative measures that I shall specify for the gas pipeline in Volume Two.

We must recognize that land will become a scarce resource in the Mackenzie Valley. It will not be long before competition for land (and competition for access to the resources that land contains) will become much more intense than it is now. The wildlife species of the region have definite requirements, and the native people will continue to need extensive lands for their purposes. Industrial developers will need land for their purposes, and yet other areas may be designated in time for such purposes as conservation and recreation. All of these uses will increasingly press against each other, and there will be conflict.

In the Mackenzie Valley, a large number of events that affect the pattern and character of land use have already occurred, and more such events may occur before a comprehensive plan of land use has been formulated and implemented. Some things are now fixed. For example, many of the communities and most industrial developments are located on the east side of the river. But we are still at a relatively early stage of development. There is still time to consider a variety of options. It is not good enough simply to promise ourselves that we can serve a variety of divergent uses equally and simultaneously.

Measures must be instituted to limit the impact of industrial development on the

land and wildlife resources of the Mackenzie Valley. This step is, after all, only good housekeeping, as the urgency of large-scale frontier development threatens to overwhelm the sustaining natural values of one of Canada's greatest river valleys.

This step cannot be taken unilaterally: there are too many interests involved – all of them legitimate. Industry, government and the local people all acknowledge the need for a comprehensive plan. As a start, the location of the proposed pipeline route and the ancillary facilities must be refined to avoid destruction of areas important to the native people and wildlife and areas important for conservation and recreation.

A settlement of native claims is the point of departure from which all other land uses, including major industrial uses, must be determined. A just settlement with the native people will not only give them the kind of protection they need to plan their own future, it will also involve them fully in planning the future of the Mackenzie Valley. If the valley environment is injured, they will be most affected.

If we take a long view of corridor development in the Mackenzie Valley and plan accordingly, the various demands on land use in the region can be successfully reconciled. There will have to be some environmental impact and some environmental change – it is unavoidable. But the existence of major wildlife populations would not be threatened, and no unique wilderness areas would be violated. The challenge we all face in the Mackenzie Valley is to maintain its environmental values with the same resolve that we plan the development of energy and transportation systems. I think, so far as environmental considerations are concerned, this challenge can be met.



Mackenzie River and Norman Range. (Arctic Gas)



Hide being stretched and dried. (R. Fumoleau)