YUKON
ENVIRONMENTAL TERMS, CONDITIONS AND RELATED GUIDELINES
ALASKA HIGHWAY GAS PIPELINE

DRAFT II

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YUKON

ENVIRONMENTAL TERMS AND CONDITIONS

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INTRODUCTION

Commencing in March 1979 joint public hearings related to the environmental and the socio-economic aspects of the proposed Alaska Highway Gas Pipeline will be held in the Yukon. These hearings will be co-chaired by the Northern Pipeline Agency and the federal Environmental Assessment and Review Panel. In preparation for this public review process, potential participants will have the opportunity to examine, in detail, the following documents: the company's environmental impact statement; the Northern Pipeline Agency's draft socio-economic terms and conditions; and the Agency's draft environmental terms and conditions and related guidelines.

The close, and in some cases direct, relationship between the social, economic and environmental aspects of the project is reflected in the fact that these elements are to be considered in concert during the public review process. Following this public review these elements will be integrated with other terms and conditions, including those of an engineering and technical nature. In addition, the socio-economic and environmental terms and conditions and related guidelines will be considered in conjunction with the engineering and technical requirements during the design review stage.

Essentially, the purpose of the environmental terms and conditions and related guidelines is twofold, viz:

i) to minimize to the extent practicable any adverse environmental effects of the pipeline – one of the objectives of the Northern Pipeline Act, which was proclaimed on April 13, 1978; and

ii) to document the requirements and means to attain that objective.

The present document, which applies specifically to Foothills Pipe Lines (South Yukon) Ltd., differs substantially from the initial draft made public in May 1978. Many submissions were received in response to the earlier version and these were considered in the preparation of this document.

In the present document the environmental terms and conditions are set out in the first three sections; these will become part of the company's certificate by Order of the Governor-in-Council. For purposes of clarity, the environmental and project components have been divided into 23 categories for each of which stipulations are listed in Section 2. In addition, the requirements for submission of detailed environmental plans and documentation are set out in Section 3.

The stipulations under each category are of two distinct kinds: first, specific requirements that are to be met by the company; second, principles of environmental performance that the Agency expects the company to meet. The latter are qualitative rather than quantitative, include qualifying clauses, and include concepts requiring interpretation and judgement in their application. This interpretation and judgement will be exercised through the approval of company plans by the Agency and by the field inspectors of the Agency.

Sections 4 and 5 comprise supplementary and complementary information as guidelines for the company and the Agency. The purpose of these guidelines is twofold:

i) to clarify and amplify the nature of the environmental concerns by suggesting, where appropriate, some numerical values which are considered to be desirable standards. The inclusion of these values is specifically to avoid words like "minimize" and therefore give specific guidance as to what may be considered "desirable minimum" conditions. It may be readily demonstrated that the guideline in some site-specific cases is too stringent a goal; in other cases the goal itself may be shown to be unworkable in practice and then it can be amended to reflect such circumstances. Generally accepted environmental standards are not yet fully developed, therefore, it is quite possible that some of the numerical values in the guidelines can be shown to be inappropriate for a particular setting.

ii) to make available to the designated officer the nature of a series of environmental concerns. The pertinent numerical values may be refined during the life of the project by the Agency in concert with the company and may subsequently form the basis for specific orders for parts of the pipeline or for specific times in order to adequately protect the environment.

The company's Environmental Impact Statement and the environmental terms and conditions, Sections 1, 2 and 3, were prepared simultaneously and without reference to each other. Final terms and conditions and related guidelines will take into account both the Environmental Impact Statement and the public review processes of the Agency and of the Environmental Assessment and Review Panel appointed by the Minister of the Environment.

Sections 4 and 5 provide guidelines of environmental performance which are desirable. The company is expected to bear these guidelines in mind when planning, designing, building, and operating the pipeline and the Agency will be guided by them in carrying out its regulatory function. In some cases the environmental concern will be the predominant factor in a decision; in such cases the Agency will normally expect the company to follow these guidelines. In other cases the environmental concern may be relatively minor in comparison with engineering, economic or social factors; in these cases the Agency will accept plans and actions appropriate to the particular situation. These sections will guide both the Agency and the company to obtain the best results practicable which cannot be obtained either by the use of inflexible standards or by the absence of any standards.

The final document, by describing a set of environmental stipulations and required plans and submissions each supplemented by a series of related guidelines, will incorporate two functional points, viz:

1) that environmental terms and conditions should include statements of intent as well as requirements, but should retain flexibility and avoid attempting to prescribe how the job is to be done; and

2) that minimizing to the extent practicable detrimental environmental impacts can be accomplished most effectively by taking them into account during the planning and design review stages rather than after the actual job is under way.

SECTION 1 – GENERAL

1.1 BASIC PRINCIPLE

In the planning, design, construction and operation of the pipeline the principle of minimum practicable environmental and land use disturbance shall apply, and the company shall, to the satisfaction of the designated officer, provide information and do such things and take measures to ensure that its activities will not unduly interfere with environmental quality.

1.1.1 These terms and conditions may be cited as the *Northern Pipeline Environmental Terms and Conditions* for the Yukon.

1.2 DEFINITIONS

"Agency" means Northern Pipeline Agency;

"big game animals" means animals so defined in the Yukon Game Ordinance (1971) as amended from time to time;

"company" means Foothills Pipe Lines (South Yukon) Ltd;

"construction" means field activities relating to the building of the pipeline up to the granting of leave to open the pipeline, and with respect to a particular section of the pipeline means all such activities up to the granting of leave to open that section;

"designated officer" means designated officer as defined in the Northern Pipeline Act or his authorized representative;

"environmental impact" means any change in the existing physical or biological conditions resulting from the construction or operation of the pipeline;

"inspection" means activities of observation and measurement to ensure that construction and operation are in accordance with designs and specifications and the terms and conditions;

"hazardous materials" means fuels, lubricants, chemicals, explosives and other toxic materials, and other substances which, if spilled or misused, will cause significant damage to the environment;

"monitoring" means programs of data gathering, data analysis and interpretation, and data presentation to determine magnitudes and characteristics of environmental change;

"operation" means activities relating to the pipeline or part of the pipeline for which leave to open has been granted;

"pipeline" means the pipeline as defined in the Northern Pipeline Act;

"waste" means discarded gaseous, liquid and solid matter and materials including human waste, trash, garbage, refuse, oil drums, petroleum products, ashes and equipment;

"waterbodies" means lakes, ponds and permanent and seasonal rivers and streams.

1.3 GENERAL STATEMENTS

1.3.1 The company shall in the construction, maintenance and operation of the pipeline comply with all applicable federal, provincial, territorial and municipal laws, orders, ordinances, regulations and by-laws.

1.3.2 To the extent applicable conditions 3 and 4 of Schedule III of the Northern Pipeline Act shall also apply to environmental matters, including the development and updating to the satisfaction of the designated officer of: emergency measures; inspection and monitoring; and preventive, mitigative and remedial measures with respect to adverse impacts.

1.3.3 The company shall, in entering into any contract for the construction and operation of the pipeline, require as a condition of such contract that the contracting party or any subcontractor comply with these terms and conditions. The company shall be responsible for any breach of the terms and conditions by the contracting party or any subcontractor as if the breach had been committed by the company itself.

1.3.4 The company shall give the designated officer all reasonable assistance to enable him to carry out his duties and shall furnish him with such information with respect to the construction of the pipeline as he may require.

SECTION 2 – ENVIRONMENTAL STIPULATIONS

2.0 In all phases of the project, and in all activities related thereto, except as otherwise required by relevant acts or regulations, the company shall meet the following requirements and conform to the following principles of environmental performance. Moreover, the company shall be responsible for ensuring the compliance of contractors, employees, and any others involved in that section of the project under its control.

2.1 TERRAIN, LANDSCAPE AND WATERBODIES

2.1.1 The areas of land and water used by any part of the project or physically disturbed by it shall not exceed a minimum practicable level satisfactory to the designated officer. The selection of locations for right-of-way, roads and facilities must take into account the effect upon other existing or identifiable potential uses of land and waters. Furthermore, the selections shall also recognize that waterbodies and certain valleys containing waterbodies are particularly sensitive to environmental disturbance.

2.1.2 The company shall monitor to the satisfaction of the designated officer all lands disturbed by the project so that the environmental conservation practices adopted can be evaluated and remedial action taken where required.

2.2 PERMAFROST AND FROZEN GROUND

2.2.1 In permafrost areas, in addition to the "permafrost measures" undertaken to meet engineering concerns, the company shall as soon as practicable implement measures acceptable to the designated officer to avoid or reduce environmental impacts arising directly or indirectly from the thawing or build-up of frozen ground. Such environmental concerns include detrimental effects on water quality, fish, wildlife, aesthetic values and land use for other than pipeline purposes arising from ground surface degradation (thermokarst), slope failure, ponding or other drainage changes, changes in groundwater movement including flow through river-bed gravels, and build up of frost bulbs or icings.

2.2.2 The company shall establish a program acceptable to the designated officer of regular inspection and monitoring of permafrost areas on company lands and adjacent lands for any detrimental effects of frost heave or thaw settlement and evaluation of any remedial measures necessary.

2.3 DRAINAGE, EROSION CONTROL AND REVEGETATION

2.3.1 The company shall demonstrate to the satisfaction of the designated officer that the pipeline route, pipeline scheduling, facilities locations, and other lands that will be disturbed by the pipeline project avoid insofar as practicable erosion-sensitive terrain and periods. In permafrost areas the designated officer may impose deadlines for the implementation of erosion control measures. The pipeline shall be located and built so as to avoid or minimize disruption to natural drainage systems.

2.3.2 The erosion control measures undertaken by the company in areas disturbed by pipeline activities shall be designed to protect not only the pipeline itself, but also the physical and living environment and non-pipeline land and water uses.

2.3.3 The company shall implement a program of appropriate rehabilitation or revegetation on lands disturbed by the pipeline project. The program and schedule shall be satisfactory to the designated officer and shall be designed as a first priority to control erosion and its impacts, and as a second priority to re-establish native plant communities and to restore aesthetic appearance. Any revegetation shall complement non-biological measures to control drainage and erosion.

2.3.4 Revegetation and implementation of other erosion control measures shall be completed as soon as practicable.

2.3.5 The company shall monitor the functioning of erosion control measures and the success of its revegetation program and shall implement any necessary remedial programs acceptable to the designated officer.

2.4 WATER QUALITY

2.4.1 Where any run-off or discharge from pipeline lands, facilities or activities enters a waterbody, the company shall protect the quality of the receiving waters so that the water quality criteria to be specified by the designated officer are met.

2.4.2 The company shall establish a program of water sampling and analysis, acceptable to the designated officer, to monitor receiving water quality.

2.5 AIR QUALITY

2.5.1 The company shall select and operate all facilities and devices used in connection with the pipeline system so as to minimize air pollution and ice fog and to avoid adverse effects on health, nearby communities, road or air transportation, aesthetic values and recreation.

2.5.2 The company shall monitor ambient air quality and carry out source testing at each compressor station within six months of start-up, and thereafter at least once a year or more frequently as required by the designated officer. Testing procedures shall require approval of the designated officer.

2.6 NOISE

2.6.1 The company shall design and implement the pipeline project in accordance with good noise abatement practices as specified by the designated officer to minimize environmental disturbance, particularly at times and at locations that are critical to wildlife populations and to local people.

2.6.2 The company shall monitor and report noise levels during normal operation of all pipeline facilities and equipment. Where the designated officer considers these levels unacceptable, remedial action shall be taken by the company.

2.7 WILDLIFE

2.7.1 For areas and during periods sensitive to wildlife the company shall, in the planning and design phases, determine schedules, right-of-way, access and facilities locations, all to be approved by the designated officer, so as to avoid or reduce adverse effects on wildlife. Prior to the approval of the final design, specific areas and specific times will be designated as sensitive for wildlife. In identifying such sensitive areas and times, emphasis will be placed on protection of rare and endangered species and significant concentrated populations of other species in critical habitat or during critical phases of their life cycle. Critical habitat areas may include those necessary for breeding, denning, lambing or calving, nesting, wintering, staging or migration. In addition to approving the submitted plans and designs, the designated officer may determine that other specific areas and specific times are critical and require additional protective measures.

2.7.2 The company shall take measures to prevent persons employed on the pipeline project from harassing or feeding wildlife.

2.7.3 To limit increases in hunting wildlife during the construction phase of the project, the company shall to the extent it has authority and to the satisfaction of the designated officer:

a) implement controls on access to lands which it holds or uses; and

b) take appropriate measures to control hunting by any persons resident in pipeline camps.

2.7.4 The company shall design and implement measures satisfactory to the designated officer to prevent big game animals from being obstructed or entrapped by the pipeline or its facilities, by construction or by other pipeline activities.

2.7.5 The company shall implement a wildlife monitoring program, acceptable to the designated officer, during construction and operation of the pipeline project. The program shall monitor seasonal distributions of major populations and rare or endangered species, habitat quality and day-to-day movements during construction phases, so that measures designed to mitigate impacts can be evaluated and modified where necessary.

2.7.6 The company shall demonstrate to the satisfaction of the designated officer that construction and operation of the pipeline and associated activities do not unduly interfere with local hunting or trapping activities.

2.8 FISHERIES RESOURCES

2.8.1 Where the scheduling and/or location of pipeline activities or facilities will be potentially disruptive to fish, the company shall take measures, approved by the designated officer, to minimize or avoid adverse effects on fisheries resources. These measures shall focus on the protection of important fish populations rather than scattered individuals and the protection of areas where and when fish are most sensitive and numerous, including spawning grounds, overwintering areas and along migration routes.

2.8.2 The construction and operation practices of the company shall protect, to the extent practicable, important fish habitat against the adverse effects of siltation, gravel removal, spills of fuels and toxic chemicals, changes in water temperature and chemistry, and reductions in dissolved oxygen. In addition, fish migration routes shall not be disrupted at critical times by any blockage , diversion or prolonged acceleration of flow; nor during critical times shall water withdrawal be permitted from crucial overwintering areas or from groundwater directly replenishing these areas unless site-specific approval is given by the designated officer.

2.8.3 The company shall demonstrate, to the satisfaction of the designated officer, that construction and operation of the pipeline and associated activities do not interfere unduly with domestic, commercial or sport fishing.

2.8.4 In order to limit increases in fishing during construction of the pipeline project, the company shall to the extent it has authority and to the satisfaction of the designated officer:

a) institute controls on access to lands which it holds or uses; and

b) take appropriate measures to control all sport fishing by any person resident in pipeline camps.

2.8.5 The company shall implement a fish monitoring program, acceptable to the designated officer, during construction and operation of the pipeline project. The program shall monitor seasonal distributions of major populations, habitat quality and day-to-day movements during construction phases so that measures designed to mitigate impacts can be evaluated and modified where necessary.

2.9 SPECIAL INTEREST AREAS

2.9.1 The pipeline route and facilities shall avoid, insofar as practicable, any areas identified by the designated officer as having natural or cultural significance whether or not such areas have been withdrawn or reserved under the *Territorial Lands Act*. Where areas of natural or cultural significance cannot be avoided, the company shall implement special protection measures acceptable to the designated officer so that the natural or cultural values of the areas are maintained.

2.9.2 Any pipeline-related activity within 3 km of an area designated or pending as a park, wildlife sanctuary, ecological preserve, International Biological Programme site, or other designated research, conservation or recreational sites, shall be subject to the approval of the designated officer.

2.9.3 Any pipeline related land use activity within 30 metres of a monument, archaeological site or burial ground shall be subject to prior approval of the designated officer.

2.9.4 An archaeological program satisfactory to the designated officer shall be established to identify, protect, excavate and investigate archaeological sites and to analyze the archaeological and associated paleoecological materials on lands used and disturbed by or for the pipeline project.

2.9.5 At the termination of the archaeological program and at such earlier times as may be required by the designated officer, the company shall file with the Agency reports satisfactory to the designated officer on the archaeological investigation undertaken in the program. The company shall also provide, at times required by the designated officer, evidence satisfactory to the designated officer that all archaeological and related materials collected by those involved in the program, together with all field notes, plans and maps, photographs, analyses, and other relevant documents are deposited with the appropriate territorial and federal agencies, or are retained elsewhere under arrangements acceptable to those agencies.

2.9.6 The company shall avoid, where practicable, disturbance of geodetic or legal survey monuments.

2.9.7 The company shall report to the designated officer any disturbance of topographic, geodetic or legal survey monuments.

2.10 AGRICULTURAL LANDS

2.10.1 Where soil on any potential and existing agricultural land, identified by the designated officer, is disturbed or removed during construction or pipeline related activity, the soil shall be replaced, stabilized and returned, as far as is practicable, to the previous level of fertility as soon as practicable following disturbance.

2.10.2 The company shall implement a program acceptable to the designated officer to monitor post-construction effects on agricultural lands and shall correct any deficiencies.

2.11 CLEARING

2.11.1 The company shall, by taking appropriate measures and adopting schedules satisfactory to the designated officer, minimize to the extent practicable the impact of clearing operations, particularly on sensitive terrain. Only essential areas shall be cleared and any debris entering waterbodies as a result of clearing operations shall be promptly removed.

2.11.2 Buffers of undisturbed vegetation shall be left between cleared areas and waterbodies and between cleared areas and roads except where specifically approved by the designated officer.

2.11.3 Merchantable timber shall be cut, stacked and disposed of in a manner satisfactory to the designated officer as the first step in the actual clearing operation.

2.12 FUELS AND OTHER HAZARDOUS MATERIALS

2.12.1 The company shall implement measures, satisfactory to the designated officer, designed to minimize the chance of spills during storage and handling of fuels and other hazardous substances.

2.12.2 The company shall establish procedures satisfactory to the designated officer to contain and clean up spills.

2.12.3 The company shall demonstrate to the satisfaction of the designated officer that storage and handling sites for fuels or other hazardous materials are located so as to minimize the possibility that a spill could contaminate water, or critical habitat or important harvesting areas for fish, birds or mammals.

2.12.4 Design requirements for fuel storage sites include the following:

a) bladder tanks shall not be used and the specific approval of the designated officer is required for any storage area to be located within 500 metres of a waterbody; and

b) any storage area with any single above-ground tank exceeding 4,600 litres in capacity shall be surrounded by reinforced concrete or earth dykes. The design of the dykes and of the area that they surround shall meet requirements of the designated officer.

2.12.5 Approval of the designated officer shall be required for:

a) any use, transport and disposal of radioactive materials; and

b) use of herbicides and other such chemicals.

2.12.6 The company shall establish a program acceptable to the designated officer to monitor the fuel and other hazardous material storage and handling facilities.

2.13 WASTE MANAGEMENT

2.13.1 Waste from construction camps, permanent facilities and construction activities associated with the pipeline during the construction, operation and abandonment shall be collected, treated and disposed of in a manner, as approved by the designated officer, that will minimize any associated hazard to public health, minimize the creation of a nuisance, maintain the quality of the environment, and protect the indigenous flora and fauna.

2.13.2 Natural waterbodies, swamps and marshes shall not be used for waste treatment or disposal except where specifically approved by the designated officer.

2.13.3 The company shall meet wastewater treatment requirements and effluent standards to be specified by the designated officer.

2.13.4 Unless otherwise approved by the designated officer, liquid waste lagoons and disposal sites shall be located at least 300 metres from waterbodies and shall be situated to avoid contamination of any waterbody or groundwater.

2.13.5 Solid waste disposal sites shall be located so as to avoid contamination of waterbodies or groundwater. The specific approval of the designated officer is required for any disposal site to be located within 300 metres of a waterbody, campsite or other dwelling.

2.13.6 Approval of the designated officer shall be required for the disposal of hazardous wastes.

2.13.7 Waste disposal sites, incinerator sites, or other waste storage sites shall be operated in a manner to minimize their attractiveness to wildlife. Where required by the designated officer such sites shall be fenced while in use.

2.13.8 Use of borrow pits as waste disposal sites shall require site-specific approval by the designated officer.

2.13.9 The company shall establish programs acceptable to the designated officer to monitor:

a) the liquid waste treatment facilities and effluent discharges; and

b) the effectiveness of solid waste management procedures.

2.14 GRANULAR RESOURCES, PITS AND QUARRIES

2.14.1 The company shall select, develop, operate, close and re-habilitate pits and quarries in a way that minimizes disturbance to land and the living environment and that minimizes the amount of land used and the amount of materials extracted. In particular, the company shall not extract borrow materials from within the wetted perimeter of waterbodies and shall leave buffer strips at least 100 metres wide between the site and roads. If material extraction sites adjacent to lakes, rivers, streams or wetlands are approved, the designated officer may require the company to construct levees, berms or other effective means to protect fish resources by prevention or minimization of siltation.

2.14.2 The use of granular resources by the pipeline project shall be compatible with the demand made on such resources by local activities and by developments that can be reasonably anticipated in the future. In particular, the pipeline company shall employ designs and construction practices that minimize the use of limited local natural resources so far as practicable.

2.15 BLASTING

2.15.1 The company shall plan its blasting procedures, schedules and locations so as to reduce or avoid adverse effects on bird or mammal populations and so as not to unduly interfere with hunting and trapping activities. The designated officer may require procedures and schedules to be submitted for prior approval.

2.15.2 In order to afford protection to fish and aquatic mammals there shall be no blasting in waterbodies or within 300 metres of waterbodies unless site-specific approval is granted by the designated officer.

2.15.3 The company shall notify local people of areas, dates and times of blasting, in a manner satisfactory to the designated officer.

2.16 WATER CROSSINGS

2.16.1 Design plans for water crossings shall be based upon appropriate design criteria which take into account environmental concerns. For each crossing the site-specific design shall have an adequate level of site-specific data on hydrological and geotechnical conditions. Construction procedures and schedules shall be planned in such a manner as to recognize the particular environmental sensitivity of a specific site and its surroundings.

2.16.2 To reduce or avoid the need for environmentally disruptive emergency repairs at water crossings, the company shall implement programs of monitoring and regular maintenance acceptable to the designated officer.

2.17 WATER WITHDRAWAL

2.17.1 Before withdrawing significant quantities of water from any waterbody or groundwater system the company shall demonstrate to the satisfaction of the designated officer that the proposed water withdrawal will not unduly adversely affect:

a) natural hydrologic regimes;

b) other uses of the water such as for domestic or recreational purpose, transportation or access to the waterbody, or trapping or fishing by local people;

c) fish populations in or dependent upon the waterbody; and

d) waterfowl or mammal populations using the waterbody or its margins.

2.17.2 The company shall design and operate all water-related systems, such as camp and compressor station water systems and granular washing systems, and carry out hydrostatic testing during construction and operation in a manner that will minimize the use of water.

2.17.3 An individual whose qualifications are satisfactory to the designated officer shall supervise water withdrawal operations and shall monitor all withdrawals that will be used for industrial or related purposes during pipeline construction and testing.

2.18 ROADS AND OTHER FACILITIES

2.18.1 The location, design, construction and operation of access roads, storage sites, camps and other off right-of-way pipeline sites and facilities shall make due allowance for the local and regional environment, including hydrology, terrain conditions, ground thermal regime, wildlife, fisheries resources, land and water use for non-pipeline purposes, archaeological resources, and aesthetic values of landscape and waterbodies.

2.19 MACHINERY AND TRANSPORTATION EQUIPMENT

2.19.1 Transportation and construction equipment and other machinery shall be used only under a set of operating rules and conditions which are approved by the designated officer. In particular, the movement of ground vehicles and equipment off public and access roads, the right-of-way and other lands controlled by the company shall be severely limited.

2.19.2 Operation of machinery or vehicles within any lake, pond, river or stream shall be in accordance with time- and site-specific requirements of the designated officer.

2.19.3 Aircraft owned, operated or chartered by the company shall be flown in accordance with rules and conditions pertaining to timing and minimum operating heights over specified sensitive and critical wildlife zones, having at all times full regard for airflight safety rules and regulations.

2.20 HYDROSTATIC TESTING

2.20.1 The company shall provide site-specific information to the designated officer in a manner satisfactory to him for water withdrawal for pipe testing and for discharge of the test fluid after use. In the application, the company shall specify adequate measures for the protection of natural water regimes, fish and wildlife habitat, and existing water uses.

2.20.2 The company shall establish procedures satisfactory to the designated officer to control and where necessary clean up any spills of test fluid.

2.20.3 All hydrostatic pipeline tests shall be monitored by company personnel whose qualifications are acceptable to the designated officer. These tests will be conducted in the presence of the designated officer.

2.21 INSPECTION AND MONITORING

2.21.1 The company shall develop inspection and monitoring programs, approved by the designated officer, for all environmental aspects of the pipeline project. The purpose of these programs is to provide warning so that any remedial actions necessary can be taken to ensure environmental integrity. The company may request permission from the designated officer to modify any of the monitoring programs when sufficient evidence is available to show that engineering or environmental concerns have been adequately met.

2.21.2 Inspection and monitoring requirements shall be fulfilled by the company or its authorized agent and the company shall be responsible for all inspection and monitoring done on its behalf.

2.22 EMERGENCY MEASURES

2.22.1 The company shall establish procedures, satisfactory to the designated officer, for dealing with emergencies that involve or adversely affect the environment or local people.

2.22.2 Company emergency measures and equipment shall be compatible with those utilized for the same purpose by government and by other industrial concerns in the area.

2.22.3 The location and quantity of equipment and supplies stockpiled to implement emergency measures shall be satisfactory to the designated officer.

2.22.4 The company shall identify and train personnel to carry out emergency measures to the satisfaction of the designated officer (see Environmental Training).

2.22.5 Company emergency measures shall include measures acceptable to the designated officer for testing and maintaining the equipment and supplies, and for simulated emergency exercises.

2.22.6 The company shall set up procedures, satisfactory to the designated officer, for prompt reporting of emergencies and the remedial actions taken.

2.23 ENVIRONMENTAL TRAINING

2.23.1 The company shall develop and implement environmental training programs, acceptable to the designated officer, for all project personnel. Emphasis of this training program shall be on the principles of prevention of environmental damage and prompt appropriate action in environmental emergencies.

SECTION 3 – PLANS, SUBMISSIONS AND IMPLEMENTATION

3.1 COMPREHENSIVE ENVIRONMENTAL PLAN

3.1.1 As a basis for the preparation of final detailed design and schedule of submissions the company shall prepare a series of environmental plans which together form a Comprehensive Environmental Plan (hereinafter referred to as the Comprehensive Plan). These plans shall be satisfactory to the designated officer and shall, with respect to proposed and alternative locations of the pipeline, describe proposed measures to deal with environmental and land use impacts and locations of archaeological, palaeontological, historical and scientific importance.

3.1.2 The Comprehensive Plan shall further consist of: environmental information presented in applications; environmental impact studies; an environmental atlas; detailed descriptions of environmentally sensitive areas; measures for the prevention and mitigation of adverse impacts, and measures for rehabilitation.

3.1.3 The Comprehensive Plan shall be updated and provide such further information and evaluations as may be ordered by the designated officer, including the establishment of baseline and reference level information for monitoring purposes.

3.1.4 Subsequent to the approval of the Comprehensive Plan, the company shall immediately inform the designated officer of any additional findings or events of environmental significance or with respect to environmental sensitivity.

3.1.5 On approval of the Comprehensive Plan, the company shall implement its plan in a timely manner.

3.1.6 The designated officer may from time to time require the company to amend the Comprehensive Plan, and the company shall comply with and implement any changes thereto.

3.2 PREVENTION AND CONTROL OF ENVIRONMENTAL IMPACTS

3.2.1 The company shall obtain forecasts for phenomena, including weather, runoff, flooding, fire and seismicity, and shall obtain or establish data analyses to allow the reasonable planning and implementation of its activities in a manner satisfactory to the designated officer.

3.2.2 The company shall throughout the planning, construction and operation of the pipeline set forth to the satisfaction of the designated officer the measures it proposes to take, including preventive, mitigative, and remedial measures for adverse environmental impacts, with respect to:

a) **Unique Areas and Features**

i) environmentally sensitive areas;

ii) archaeological, palaeontological and historic sites; existing and proposed conservation areas, parks, reserves, preserves, sanctuaries and other such areas, and materials and areas of scientific importance; and

iii) aesthetic values;

b) **Hazards:**

i) the existence or creation of hazardous situations, including those stemming from seismicity, the use and probability of fire, and the use of toxic or otherwise hazardous materials;

c) **Disposal:**

i) the disposal of gases, liquids and solids, including effluents, garbage, wastes, construction debris, slash, stones, materials, equipment, and the accidental release of deleterious substances;

d) **Terrain:**

i) the degradation of terrain features, including aesthetic values;

ii) soil erosion, mass movement and permafrost aggradation or degradation, with particular reference to slopes, induced instabilities, and the banks and shores of waterbodies;

iii) the separation, saving, replacement and rehabilitation of topsoil during construction and operation; and

iv) the rehabilitation and stabilization of topsoil wherever damaged;

e) **Water:**

i) the alteration of the flow and/or quality of surface and ground waters and water supply sources;

f) **Agriculture:**

i) the disturbance of livestock and to forage and crop lands, including drainage, soil compaction and the degradation of topsoil;

g) **Biotic Resources:**

i) the alteration of plant communities;

ii) the alteration of fish habitats, including spawning, nursery and overwintering areas, and interference with fish occupancy, movement, productivity and fisheries management;

iii) the alteration of wildlife habitats and wildlife management, and the harassment of or interference with wildlife, including attraction, obstruction, displacement or entrapment;

iv) the interference with rare or endangered species; and

v) the alteration or disruption of environments upon which subsistence, commercial and recreational hunting, fishing and trapping depend;

h) **Noise:**

i) the suppression of noise;

i) **Facilities:**

i) the use of existing facilities, the installation and use of permanent and temporary facilities, and the removal of facilities;

j) **Personnel:**

i) the activities of personnel on the pipeline with respect to and including travel, hunting, fishing, trapping, shooting and camping;

k) **Abandonment:**

i) the abandonment of any part of the pipeline during the period up to one year after leave to open the pipeline has been granted; and

l) **Other:**

i) any other actions or circumstances specified by the designated officer.

The company shall implement all the measures, referred to in 3.2.2., in a timely manner.

3.3 INSPECTION AND MONITORING

3.3.1 For environmental protection and project control, the company shall plan and conduct inspection and monitoring in a manner satisfactory to the designated officer.

3.3.2 In the detailed design, the company shall document its inspection and monitoring plans, including scheduling, organization, personnel capability and reporting procedures.

3.4 RESIDUAL IMPACTS

3.4.1 The company shall throughout the construction and operation of the pipeline carry out assessments of residual impacts that may occur after measures identified in item 3.2 have been implemented and shall implement further measures for resolution of the persisting impacts.

3.5 ENVIRONMENTAL EMERGENCIES

3.5.1 In the detailed design and prior to undertaking clearing, trenching, installation, testing and operation of the pipeline, the company shall, to the satisfaction of the designated officer submit details of its environmental contingency plans and shall demonstrate its preparedness to handle emergency situations by providing for:

a) a systematic environmental safety analysis of the proposed construction and operation of the pipeline including natural and induced hazards, malfunctions and human error which could give rise to an environmental emergency, and plans to respond thereto; and

b) the stocking and maintenance of materials and equipment at strategic locations.

YUKON

ENVIRONMENTAL GUIDELINES

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SECTION 4 — GUIDELINES RELATED TO THE ENVIRONMENTAL STIPULATIONS

4.0 These environmental guidelines are supplementary and complementary to the environmental stipulations. The guidelines in this section provide standards related to environmental matters which are desirable, but not necessarily mandatory. It is intended that the guidelines will guide the company and the Agency in obtaining the best results practicable — a situation which may not be realized either by the use of inflexible standards or by the absence of standards.

4.1 TERRAIN, LANDSCAPE AND WATERBODIES

Precautions designed to reduce or avoid adverse environmental effects on terrain, landscape and waterbodies include the following:

4.1.1 For environmental as well as for technical reasons avoid locating the pipeline, wherever practicable, in areas of sensitive terrain and particularly in areas in which terrain disturbance could adversely affect nearby waterbodies or lands important to wildlife.

4.1.2 Design, locate and construct the pipeline and facilities so as to protect, as far as practicable, the natural aesthetic values of landscapes and waterbodies. Locate and construct all facilities so that, as far as practicable, the surrounding area is left in its natural state.

4.1.3 Design and locate the pipeline and facilities so that environmental change leading to interference with the ongoing use of the region by others is kept to a practicable minimum. Consider, in so doing, the cumulative effects of all construction, operation and abandonment activities, along with the effects of other developments that can be reasonably anticipated in the region over the life of the project.

4.1.4 In view of the particular environmental, land-use, aesthetic and recreational values of lakes, streams and valleys containing streams, take special measures to protect, wherever practicable, waterbodies and their surroundings from disturbance:

a) locate, wherever practicable, works, groups of facilities and activities that adversely affect waterbodies, narrow valleys, shores and banks (including pipeline crossings, roads, sewage and waste disposal sites, stock-pile sites, work pads, camps, compressor stations and borrow areas) away from waterbodies by the distances specified below. Leave buffer strips undisturbed and, in particular, leave wider buffer strips where the pipeline or roads run parallel with waterbodies;

b) design and carry out works and activities which encroach upon waterbodies, such as pipeline crossings, road crossings and water intakes, so as to minimize changes in water quality, flow or level, or morphology of the channel or bank;

c) carry out all works and land-use activities on river banks, in valleys, and on valley walls so as to minimize disturbance of the ground surface. Take special precautions where disturbance has occurred to promptly stabilize the ground surface and to prevent entry of silt-laden run-off into waterbodies; and

d) the potential for the pipeline project to cause land-use conflicts and for unacceptable damage to aesthetic values or degradation of wilderness or areas important for recreation is particularly substantial around waterbodies. Carry out the project to avoid or minimize impacts of this nature.

4.1.5 As swamps and marshes are environmentally sensitive components of the landscape, accord their hydrologic and biologic values the same level of protection as other sensitive elements in the landscape and environment.

4.1.6 Design, locate, construct and operate the pipeline and facilities so that maintenance and repair activities that could damage the landscape and disturb wildlife are kept to a minimum and so that terrain integrity in permafrost and other sensitive terrain is maintained to the extent practicable.

4.1.7 Identify unstable and potentially unstable slopes, and develop and implement, in consort with the Agency, a program for monitoring slope stability during construction and operation.

4.1.8 Wherever disturbance of the landscape is inevitable, leave a buffer strip of undisturbed vegetation between the disturbed site and waterbodies and public roads including the following:

Guidelines for Buffer Strips and Separation Distances

		Minimum desirable separation (in metres)
Between waterbody and	— road	100
	— borrow pit	100
	— sewage lagoon	100
	— pipeline right-of-way	100
	— fuel storage	300
	— construction camp	300
	— solid waste disposal site	300
	— stockpile site	300
	— cleared area	100
	— burning site	100
	— spoil pile	100
	— oil change area	100
Between public road and	— borrow pit	100
	— compressor station	100
	— stockpile site	100
Between fish spawning or overwintering area and		
	— water intake	300

4.2 PERMAFROST AND FROZEN GROUND

4.2.1 Measures to reduce or avoid adverse environmental impacts relating to permafrost and frozen ground include the following:

a) acquisition of adequate geotechnical, groundwater and terrain data, including slope stability analysis, as a basis for site-specific design;

b) flexibility permitting site-specific design adjustments in response to unexpected permafrost/terrain conditions actually encountered during construction;

c) flexibility for local adjustment to avoid, to the extent practicable, geotechnical materials sensitive to thawing or freezing, particularly on sloping terrain;

d) minimize disturbance of the ground surface and, in particular, of any insulating mat of vegetation and organic materials;

e) avoid ponding of water and the disruption of natural drainage patterns;

f) use thaw-stable materials as backfill where appropriate;

g) stabilize and rehabilitate disturbed sensitive permafrost terrain as soon as practicable and, if necessary, insulate the subsurface; and

h) adopt design practices which would adequately compensate for the potential problems inherent in the types of permafrost terrain encountered.

4.2.2 The following tests and procedures are designed to achieve environmental protection in addition to pipeline integrity and should be followed where appropriate:

a) demonstrate that any frost bulb around the chilled buried pipeline will not lead to adverse environmental effects involving terrain, groundwater or riverbeds, particularly effects on habitat used by overwintering fish. At a river crossing where reduced flow could have potential adverse effects on overwintering fish, adopt measures to ensure continued winter groundwater and channel flow adequate to protect the fish population;

b) adopt measures to relieve subsurface water pressures on the uphill side of any frost bulb; and

c) when necessary, conduct field studies to resolve environmental as well as engineering problems related to frost heave and thaw settlement.

4.3 DRAINAGE, EROSION CONTROL AND REVEGETATION

Drainage, erosion control and revegetation measures suitable for minimizing disturbance to the environment include the following:

4.3.1 In permafrost terrain, rehabilitate and stabilize, as soon as practicable, organic mats, vegetation and soils that have been disturbed. In such terrain, particularly with fine-grained soils, remedial measures require effective action because of the progressive nature of thermokarst degradation, slope failure and erosion.

4.3.2 Locate sediment traps and other devices so as to ensure that sediments, particularly silt particles, in water flowing from the right-of-way or from facilities do not adversely affect the surrounding terrain or waterbodies. Particularly control erosion on the banks of rivers and streams, valley slopes, cut-slopes and in cuts along the right-of-way.

4.3.3 Maintain natural drainage patterns, so far as practicable, in order to avoid the adverse environmental effects of ponding water and of erosion that may be caused by channelized overland flow.

4.3.4 Provide surface drainage across the pipeline right-of-way including any backfill mound, road, airstrip, or other facilitiy.

4.3.5 Maintain, repair or remove drainage and erosion control devices at all sites that are no longer in use, as directed by the designated officer. Such sites include temporary roads, borrow sites, spoil disposal sites, stockpile sites, and work pads.

4.3.6 Design and maintain all drainage ways and control structures to accommodate changes in ground level that might be caused by frost heave, growth of the frost bulb, thawing of the ground or surface subsidence along the right-of-way. Take into account potential disruption of drainage arising from the growth of stream icings and surface icings.

4.3.7 Implement revegetation and install erosion control structures, as appropriate, after completion of each major construction activity.

4.3.8 Where revegetation is not possible, leave disturbed areas in a stabilized condition by measures which may include placement of mat binders, soil binders, rock or gravel blankets or other structures.

4.3.9 In all revegetation programs, give priority to the areas that are most susceptible to erosion. Where there are conflicts between revegetation activities and the disturbance of wildlife, implement appropriate measures to minimize such disturbance to the extent practicable.

4.3.10 Monitor the success of revegetation programs and take remedial measures as required.

4.3.11 Monitor the performance of drainage structures, their impact on stream banks and beds, and changes in water levels and velocities.

4.3.12 Conduct periodic inspections of all culvert installations and take appropriate action prior to and during spring snow-melt to clear culverts blocked by ice or debris.

4.4 WATER QUALITY

Guidelines designed to minimize changes in water quality may include the following:

4.4.1 Where effluent is released into a lake or river, or where any other project activity results in physical, chemical or biological changes to a lake or river, environmental protection can be attained by adopting the following standards for the quality of the receiving waters:

a) total coliform density not to exceed 5000/100 mℓ and fecal coliform density not to exceed 200/100 mℓ;

b) dissolved oxygen not to be reduced below 6 mg/ℓ and reduction not to be by more than 20% of its natural concentration;

c) pH not to be altered by more than 0.5 from ambient conditions; maintain in the 6.5 to 8.5 range wherever practicable;

d) water temperature not to be altered by more than 2°C of natural;

e) colour not to be increased by more than 30 colour units above natural;

f) phenolics not to exceed 0.005 mg/ℓ;

g) oils and greases arising from project sources not to exceed concentrations that produce a visible iridescent sheen;

h) only nonpersistent air-fogging pesticides to be permitted;

i) toxic substances not to exceed concentrations recommended in *Water Quality Criteria, 1972* (U.S. National Academy of Sciences and the National Academy of Engineering);

j) levels of total nitrogen and phosphorus not to exceed 1.0 and 0.05 mg/ℓ respectively.

4.4.2 Procedures designed to maintain water quality and protect aquatic habitat include the following. Desirable suspended sediment concentrations during construction or operation would not exceed the following maxima in waterbodies identified as providing important aquatic habitat as measured at designated locations:

a) the average concentration not to exceed natural levels by more than 500 mg/ℓ or 5 times the natural levels, whichever is greater, during any 24-hour period;

b) the average concentration not to exceed natural levels by more than 100 mg/ℓ or 2 times the natural level, whichever is greater, during any 5-day period.

c) when the natural level is less than 25 mg/ℓ then it is not to be exceeded by more than 5 mg/ℓ during any 30-day period.

d) when the natural level is greater than 25 mg/ℓ then it is not to be exceeded by more than 20% during any 30-day period.

4.4.3 Turbidity, measured in nephelometric turbidity units (NTU), may be used as an index for suspended sediment monitoring. The procedure would be developed in consort with the Agency and standardized under field conditions.

4.4.4 Specify the frequency and location of water sampling. Include sampling sites at agreed upon locations. Locate control sites in unaffected parts of the same waterbody or in a similar, nearby waterbody. Develop sampling frequency sufficient to adequately assess changes in water quality during periods of disturbance and recovery.

4.4.5 Adopt analytical procedures in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater* developed by the American Public Health Association, American Water Works Association and Water Pollution Control Federation.

4.4.6 In waterbodies identified as containing important aquatic habitat, institute monitoring programs, as appropriate, that will measure the effects of construction disturbances on water quality.

4.4.7 Collect all water quality data in a form so that it can be incorporated into the National Water Quality Data Bank (NAQUADAT).

4.5 AIR QUALITY

Procedures designed to maintain air quality include the following:

4.5.1 Control emissions from the pipeline so that ambient air quality figures do not exceed "maximum desirable levels", where practicable, as defined in the Clean Air Act: Ambient Air Quality Objectives *(The Canada Gazette,* Part II, Vol. 108, No. 11, and Vol. 109, No. 3).

4.5.2 Locate, if possible, all pipeline facilities and devices which cannot be prevented from producing ice fog so as not to interfere with airfields, communities and roads.

4.6 NOISE

The following noise-level standard and approaches are designed to limit disturbance of wildlife and people:

4.6.1 Adopt the following noise level standard: noise to be less than 65 dBa at the fenceline of the compressor stations and measured on a Leq (24) basis under normal operating conditions. Leq (24) is: 24 hour equivalent energy level (normally applied to man).

4.6.2 Incorporate special noise abatement designs for compressor stations that cannot be located to avoid environmentally sensitive areas or areas used extensively for recreation or by local people, and adopt operating measures to reduce the disturbance effects to levels that permit normal use of the region.

4.6.3 Schedule, in so far as is practicable, intermittent noise producing events, such as those from compressor station blowdown or aircraft overflights, so they do not disrupt critical stages in the life cycles of susceptible wildlife species.

4.6.4 Monitor and report noise levels at the fenceline of compressor stations during normal operation within six months and again 18 months after compressor station operation commences. Monitor noise levels using standard procedures and equipment.

4.6.5 Locate airfields and helipads at least 5 km, or a clearly justified lesser distance, from areas in which there are important bird populations or mammal concentrations that have been identified as sensitive to disturbance by noise. Locate airfield runways so that landing and take-off paths avoid overflight of sensitive areas.

4.6.6 Require that standard noise suppression equipment on all construction machinery and vehicles be maintained in good order.

4.7 WILDLIFE

4.7.1 Critical or sensitive wildlife habitat and periods referred to in 2.7.1 include, but are not limited to, the following:

a) Dall's Sheep

i) within winter range during the period October 15 to April 30;

ii) within 2 km of lambing areas during the period May 1 to June 15; and

iii) within 2 km of mineral licks during the period May 1 to August 31.

b) Woodland Caribou

i) within migration routes during the periods March 15 to May 31 and September 15 to November 30 when they are on or approaching such routes; and

ii) within winter range from December 1 to March 31.

c) Raptors

i) within 2 km of nesting sites of: peregrine falcons from April 15 to August 31; gyrfalcons from February 1 to August 31; and ospreys, golden eagles and bald eagles from March 1 to August 31. Areas encompassed by this item henceforth will be referred to as Raptor Protection Zones.

d) Waterfowl

i) within 1 km of spring and fall staging areas from April 1 to June 15 and August 15 to October 15, respectively; and

ii) within 1 km of nesting and moulting areas from May 15 to August 31.

Additional critical or sensitive wildlife zones and periods reflecting the potential impact of blasting on some wildlife species are recorded in the guidelines for blasting.

4.7.2 With respect to critical and sensitive wildlife habitat and periods as referred to in 2.7.1 other species will be considered including: moose, wapiti and mule deer, wolf, fox, grizzly bear, fur-bearers and sharp-tailed grouse. Specific guidelines defining periods and distances to be used in determining safe distances between project activities and habitat will be established by the Agency in concert with the company.

4.7.3 In order to reduce or avoid impact on wildlife from low-altitude aircraft and helicopters during pipeline construction and operation, the following measures are appropriate:

a) establish aircraft flight corridors; and

b) establish minimum flight altitudes along these corridors avoiding, as far as practicable, those areas and times identified as sensitive to wildlife. Site-and time-specific routing and altitude constraints along the corridor may be required where or when such areas cannot be avoided.

4.7.4 Measures to prevent obstruction, disturbance or entrapment of big game animals during pipeline construction or operation should take into account:

a) open trenching, pipe, or snow fencing as potential obstacles to the movement of animals; and

b) vehicle traffic scheduling to avoid harassment and vehicle operation to avoid accidents.

4.7.5 The appropriate wildlife monitoring program referred to in 2.21 and 3.3 may include, but is not limited to: Dall's sheep, woodland caribou, raptors and waterfowl, and aspects of their life cycles which could be affected by pipeline activities such as timing of movements, reproductive activities, and use of ranges.

4.8 FISHERIES RESOURCES

Measures to protect fish and aquatic habitat include the following:

4.8.1 Avoid in-stream pipeline construction and other activities during sensitive periods for fish in areas required for spawning, migrating or overwintering. Scheduling of stream crossings to avoid sensitive periods will be determined on a site-specific basis by the Agency in concert with the company.

4.8.2 Adopt construction and operation practices to minimize the release of silt into waterbodies frequented by fish. Where silt loads from project activities are expected to be significant, institute silt control measures before construction activities start. These measures should satisfy the suspended sediment standards (Water Quality 4.4.2).

4.8.3 Prohibit gravel removal within the wetted perimeter of areas frequented by fish and immediately upstream thereof (Granular Resources, Pits and Quarries 4.14.3 and 4.14.5).

4.8.4 Protect fish habitat from spills of fuels and hazardous materials by instituting the measures outlined in Fuels and other Hazardous Materials 4.12, Waste Management 4.13.3, and Hydrostatic Testing 4.20.4 and 4.20.5.

4.8.5 Adopt construction and operation practices so that the water temperature in areas frequented by fish is not altered by more than 2°C from the ambient temperature.

4.8.6 Avoid changes to the chemistry of waterbodies frequented by fish during construction and operation in order to meet the criteria outlined in Water Quality 4.4.1.

4.8.7 Apply construction and operation practices that ensure the dissolved oxygen concentration in waterbodies frequented by fish is not reduced more than 20% of its natural concentration. Avoid project activities that will reduce the dissolved oxygen concentration to less than 6 mg/ℓ.

4.8.8 Design and schedule installations and activities in waters that are frequented by fish to minimize effects on sensitive areas for fish and to allow their uninterrupted movement and safe passage.

4.8.9 Provide fish passage facilities for any unavoidable structures or stream channel changes that may cause blockage to fish, or that may create velocity barriers to fish movements.

4.8.10 Schedule several stages for construction and use of temporary coffer-dams, berms and diversion dykes in any watercourse frequented by fish to ensure that the changed water velocity and depth do not prevent fish passage. Plug and stabilize abandoned water diversion structures in a manner to avoid trapping or stranding fish.

4.8.11 Avoid making changes in stream channels affecting fish spawning beds, nursery or overwintering areas. Where changes cannot be avoided in such beds, construct new channels providing suitable habitat for fish.

4.8.12 Remove, as soon as practicable, any debris from clearing operations that may hinder fish passage.

4.8.13 Ensure that culverts placed in watercourses frequented by fish conform to the requirements outlined in *Guidelines for the Protection of the Fish Resources of the Northwest Territories During Highway Construction and Operation* (Fisheries and Marine Service Technical Report Series No. CEN/T-75-1).

4.8.14 Mitigate adverse effects of water withdrawal from waterbodies frequented by fish by conforming to Water Withdrawal 4.17.

4.8.15 Protect fish resources from blasting operations by adopting Blasting Guidelines 4.15.

4.8.16 Develop and implement monitoring programs to facilitate the protection of fish and aquatic habitat. Carry out monitoring before construction and during construction and operation. The programs could include the following aspects:

a) compare suspended sediment concentrations with pre-construction levels. During construction compare levels downstream from construction activities with upstream levels;

b) monitor dissolved oxygen to ensure adequate oxygen levels in water frequented by fish. Measure dissolved oxygen, which is most critical in winter, in waters that may be disturbed during construction or operation;

c) observe and record low water levels and flows to facilitate maintenance of adequate quantities of water for fish;

d) monitor nutrient levels in waste disposal areas to facilitate prevention of overenrichment of fish habitat and high biological oxygen demand;

e) observe and record fish and bottom sediment contaminant levels as a baseline measure that will warn of any contamination of a fishery resource;

f) monitor water temperatures to ensure that acceptable limits for aquatic resources are maintained, and that water temperature is low enough to maintain adequate oxygen levels;

g) monitor water quality in locations where pipeline-related activities may create chemical changes detrimental to fish;

h) observe and record water velocities through culverts and diversion structures to establish whether velocities exceed the capabilities of fish migrating upstream; and

i) monitor pipeline crossing sites to establish whether erosion control devices are working and whether disturbed areas are returned to a stable condition.

4.9 SPECIAL INTEREST AREAS

There are no guidelines for special interest areas.

4.10 AGRICULTURAL LANDS

Measures for reducing or avoiding adverse effects on agricultural lands include the following:

4.10.1 Separate and replace topsoil and subsoil where and when appropriate, in a manner suited to the local situation.

4.10.2 Reseed grazing lands with species of forage plants suited to the local situation.

4.10.3 Monitor effects resulting from construction on agricultural lands with respect to:

a) soil and crop productivity on farmlands affected by construction of the pipeline.

b) locations where further rehabilitation of the agricultural soils may be warranted.

c) any action or measures which should be taken to restore the productivity of the agricultural soils.

4.11 CLEARING

Clearing procedures to reduce or avoid adverse environmental effects include the following:

4.11.1 Clear only the area essential for the construction of the pipeline or of a facility.

4.11.2 Where necessary, use hand clearing techniques to maintain undisturbed organic cover on sensitive terrain.

4.11.3 Except in areas where grading is necessary, use appropriate blade-shoe or blading techniques to minimize disturbance of the ground surface.

4.11.4 Where necessary, implement erosion control procedures as soon as practicable after clearing. Refrain from clearing vegetation from river and stream banks, valley walls or erosion-sensitive slopes, except for clearing required for the movement of men and equipment, and except where the right-of-way is to be cleared a year or more in advance of construction.

4.11.5 Schedule and carry out clearing in permafrost areas to reflect the sensitivity of the terrain, the season during which construction will be done, the method of clearing to be used, and the potential for drainage and erosion problems. Delay alteration of the ground surface, such as by the removal of the organic layer and by the levelling of hummocks to facilitate equipment movement, until construction is about to begin.

4.11.6 Burn, or otherwise dispose of in an approved manner, all trees, snags, brush and other woody materials resulting from clearing, with the exception of those to be salvaged and those from survey lines and winter trails, where lopping and scattering is sufficient. Schedule burning of cleared woody materials concurrently with clearing, except where or when burning would be hazardous.

4.11.7 When burning in permafrost areas, use burning racks or sleds; do not burn where subsidence could result from thawing of frozen ground.

4.11.8 Remove all debris from clearing that may impede stream flow, hinder fish passage and contribute to flood damage as a result of stream bed scour and erosion. Prevent wood chips and tree bark from entering any waterbody.

4.11.9 When clearing parallel to waterbodies and permanent roads, leave undisturbed buffer strips in accordance with 4.1.8.

4.11.10 Locate burning sites and excess spoil material sites for cleared debris within the perimeter of the cleared areas and, where practicable, at least 100 metres away from waterbodies.

4.12 FUELS AND OTHER HAZARDOUS MATERIALS

The following measures are intended to prevent or decrease the possibility of spills or to reduce the adverse environmental effects of spills arising from the storage and handling of fuels and hazardous materials. Procedures for spill detection, containment and clean-up are dealt with under emergency measures 4.22.

4.12.1 Develop and apply an overall project strategy for the transportation, transfer, storage, use and disposal of fuels and other hazardous substances that will be used during construction and operation of the pipeline and all related facilities. Emphasize in this strategy, prevention of spills and control of fuels and hazardous substances. Demonstrate that facilities and handling equipment are designed to minimize the risk of spills and that suitable operating procedures are instituted.

4.12.2 Construct fuel storage, fueling and lubricating areas with impervious subgrades and dykes.

4.12.3 Where appropriate, design and construct tank farms located on permafrost terrain to control permafrost degradation and to ensure that the ground will support the loads placed upon it without significant settlement or movement.

4.12.4 Minimize, as far as practicable, the use and storage time of non-fuel environmentally hazardous materials during all phases of pipeline construction and operation. Use the least hazardous material where suitable alternatives are available. (The Contaminants Control Branch, Environment Canada, is developing a list of hazardous materials with associated data regarding each one).

4.12.5 Use hazardous materials in a manner to minimize hazardous waste residues.

4.12.6 Prepare a manual of procedures to be used for handling hazardous materials during pipeline construction and operation.

4.12.7 Store stockpiles of toxic water soluble chemicals inside buildings or cover with waterproof plastic sheeting and elevate from the ground surface.

4.12.8 Design areas, used for storing hazardous materials, with berms which are impermeable and lined with inert material resistant to corrosive substances, to contain potential spillage plus runoff.

4.13 WASTE MANAGEMENT

Waste handling practices designed to reduce or avoid adverse environmental effects include the following:

4.13.1 Where the discharge of liquid wastes is by means of portable disposal units ensure that public health protection prevails through suitable procedures pertaining to collection, removal and disposal.

4.13.2 Where the discharge of liquid wastes is continuous, as from construction camps and permanent facilities, with ultimate discharge into adjacent receiving waters implement the following measures:

a) limit effluent concentrations to be no greater than: BOD 60 mg/ℓ and suspended solids 75 mg/ℓ or BOD and suspended solids each less than 10% of the influent values;

b) disinfect only those waste waters which are deemed necessary by the agencies responsible for public health protection and then in accordance with section 2.10 of *Interim Guidelines for Wastewater Disposal in Northern Canadian Communities,* published by Environment Canada, EPS 2-WP-74-1; and

c) design and operate waste water and sewage treatment systems to ensure that organic and hydraulic loadings are within the acceptable ranges for optimum treatment and to minimize the likelihood of hydraulic overloading of the systems by measures including:

(i) installing systems to handle maximum peak flows and surges plus 20%;

(ii) providing flow equalization systems for all mechanical treatment plants;

(iii) providing parallel biological treatment plants at facilities that experience wide variations in population;

(iv) providing continuous flow treatment systems with temporary emergency storage facilities having a capacity of 5 days design sewage flow;

(v) keeping on site spare parts for equipment essential to the operation of the system;

(vi) providing continuously recording flow metres at effluent points; and

(vii) providing an adequately equipped laboratory for routine effluent analysis.

4.13.3 Where the discharge of liquid wastes is of an intermittent nature and a lagoon is used, design the lagoon on a total retention basis and locate it at a sufficiently isolated site to ensure adequate public health protection.

4.13.4 Where construction camps and permanent facilities are involved, design and operate wastewater and sewage treatment lagoons to avoid hydraulic overloading and unacceptable environmental impact by measures including:

a) locate lagoons in areas having suitable terrain, geotechnical and drainage conditions;

b) designing lagoons for a minimum retention period of one year under the worst case of infiltrated water conditions and with maximum population plus 20%;

c) limit discharge from lagoons during critical periods of the year such as the period of ice-cover; and

d) provide a separate primary cell in lagoons and clean out the sludge as required for disposal in an environmentally acceptable manner.

4.13.5 Plan, develop and operate solid waste management facilities in accordance with appropriate guidelines and codes of good practice pertaining to solid waste management including *Code of Good Practice for Handling Solid Wastes at Federal Establishments,* EPS 1-EC-78-7, and *Code of Good Practice on Dump Closing or Conversion to Sanitary Landfill at Federal Establishments,* EPS 1-EC-77-4, both published by Environment Canada.

4.13.6 Locate and operate solid waste disposal sites in a manner as to have minimal effect on natural drainage patterns and runoff and on groundwater and surface water quality.

4.14 GRANULAR RESOURCES, PITS AND QUARRIES

Procedures to reduce or avoid adverse environmental effects include:

4.14.1 In developing access to borrow sites, use existing roads, trails or cutlines wherever possible.

4.14.2 As a major borrow operation may involve a washing plant or may otherwise involve discharge of water, develop and adopt suitable strategies to minimize the impact of water withdrawal and of siltation from water disposal.

4.14.3 Recognizing the high noise levels associated with borrow operations, develop and adopt suitable strategies for reducing or avoiding impact of noise on local populations of mammals and birds during sensitive or critical periods.

4.14.4 Where practicable, select upland borrow pits for new aggregate sources and separate them from streams and lakes by a minimum of a 100 metre wide buffer strip of undisturbed terrain in order to minimize siltation and protect aesthetic values. Where upland borrow sources are unavailable or where the environmental disturbances associated with upland aggregate removal would be unacceptable, the use of borrow materials from flood plains may be approved.

4.14.5 Locate and utilize borrow pits so as to avoid disrupting unnecessarily fox, wolf or bear denning.

4.14.6 Where a borrow site is opened in a flood plain, construct dykes and other works to minimize the possibility that the river changes its course through the pit. Leave a minimum of a 100 metre wide buffer strip of undisturbed flood plain between the channel zone and the pit.

4.14.7 Adequately address the following concerns for each pit or quarry:

a) In selecting borrow sites that utilize granular resources, pay due consideration to the adequacy of local supplies of such resources and the stated projected demands for such resources for non-pipeline purposes. Adjust proposals for gravel use by reference to any available granular resource use plans;

b) Design the borrow operation, pit boundaries, pit depth and other aspects so as to achieve prudent use of the resource, bearing in mind the quantities and grades of material required and the form and extent of the deposit being exploited;

c) Design the borrow pit so as to take best advantage of the topographic and geologic characteristics of the site and with appropriate allowance for the presence of permafrost and groundwater. Obtain the geotechnical (including borehole) data necessary for this purpose;

d) Design methods for control of drainage and erosion associated with each borrow operation so as to minimize terrain disturbance and siltation of waterbodies; and

e) Rehabilitate all borrow sites, to the extent practicable, after the borrow operation has ceased.

4.15 BLASTING

Blasting procedures designed to reduce or avoid adverse environmental effects include the following:

4.15.1 Restrict blasting operations where they might disturb Dall's sheep, woodland caribou, raptors and waterfowl in critical or sensitive areas or at critical or sensitive times. Similar precautions may also be needed in respect of active grizzly bear, wolf and fox denning areas, wapiti, mule deer and moose range, and sharp-tailed grouse arenas.

4.15.2 When blasting near a waterbody take mitigative measures to protect fish from blasting debris and siltation.

4.15.3 If blasting in waterbodies frequented by fish is necessary, take effective measures to protect the fish. These measures may include scheduling to avoid fish sensitive periods; maintaining a distance of 300 metres from areas in which concentrations of fish eggs are present, restricted areas where fish are spawning or overwintering or areas where fish are migrating in concentrated schools; temporarily blocking fish access to blast areas; using blast deflectors or absorbers; using minimum size charges necessary and instituting appropriate suspended sediment controls.

4.16 WATER CROSSINGS

In addition to the guidelines in section 4.8, stream and lake crossing procedures designed to reduce or avoid adverse environmental effects include the following:

4.16.1 a) In terms of environmental concerns for the project design and recognizing the lack of quantitative surface water data in the project area, it is recommended that stream and lake crossings be designed to withstand Project Design Flood conditions. The Project Design Flood is a stream flow estimate based on historical information for the area. In the absence of such information, use estimates established in a manner agreed to by the designated officer, such as the Standard Project Flood. The Standard Project Flood is a stream flow estimate based on the assumption that the most severe meteorological and hydrological conditions that may reasonably be considered as characteristic of the specific region is occurring;

b) It is also recommended that design water levels that take into account ice jamming, storm surges or any other meteorological or hydrological phenomena which affect the design of stream and lake crossings be determined in a manner similar to that used in the Project Design Flood or, where applicable, the Standard Project Flood. Evaluate separately potential effects of glacial surges and outburst floods on stream and lake crossings; and

c) Submit supporting data and computations that have been used to determine design flood levels and velocities at water crossings.

4.16.2 a) Avoid stream or river crossings adjacent to confluences and lake inlets or outlets wherever possible;

b) Avoid lakes wherever possible, and minimize the number of crossings of watercourses to protect aquatic resources;

c) Select river and stream crossings to provide maximum terrain integrity of shores and banks and to avoid slope failure or accelerated erosion; and

d) Cross streams within straight and stable reaches. Locate crossings of floodplains and channel zones to be as short as practicable.

4.16.3 In streams where groundwater contributes significantly to winter flow, both in and under the bed, and where maintenance of such flow is of demonstrated importance to fish and aquatic furbearer populations, incorporate measures into the project design to maintain adequate winter groundwater and channel flows.

4.16.4 Where a buried river crossing could cause major environmental problems, a comparison of the buried crossing with an overhead crossing in both engineering and environmental terms may be required before approval is given for either mode.

4.16.5 Recognizing environmental concerns arising from emergency repairs at water crossings, it is recommended that the designs of water crossings make particular allowance for hydrologic hazards such as scour, ice jamming, river icing and channel migration.

4.16.6 Where permanent river training structures may be necessary, locate them where practicable on floodplains rather than in channel zones.

4.16.7 a) Design, construct and operate stream crossings, approaches and water diversion channels to control accelerated erosion and siltation. Construct settling basins on approaches to crossings where necessary to control entry of suspended sediments to waterbodies; and

b) To reduce accelerated erosion at particularly sensitive river crossings, special control may be necessary.

4.16.8 On completion of pipeline construction across a stream where and when specified restore the stream bed to its original or other approved shape using the original or not less stable material than the surrounding stream bed.

4.16.9 During construction in floodplains avoid concentration of runoff and creation of channels along the pipeline.

4.17 WATER WITHDRAWAL

Water withdrawal procedures designed to reduce or avoid adverse environmental effects include the following:

4.17.1 Choose sites for withdrawal and return of water in areas where water withdrawal from, and return of effluent to, surface water or groundwater will not result in detrimental effects to the natural hydrologic regimes.

4.17.2 Design water withdrawal facilities to include measures to be taken during installation, use, and upon abandonment to stabilize the bed and the approaches to the water source so that accelerated erosion will not occur.

4.17.3 Provide separate site-specific details of each water withdrawal and give consideration to the immediate and cumulative environmental impacts.

4.17.4 To protect the physical and living environment, the following measures for the design of all water withdrawal facilities are desirable:

a) Do not remove water from a waterbody frequented by fish, waterfowl, or aquatic furbearers, unless it can be demonstrated that this withdrawal will not unduly affect fish, waterfowl or aquatic furbearer populations and habitats in and around the waterbody, either at the time of removal or at a subsequent time. The initial assumption is that all waterbodies are frequented by fish;

b) Locate water intakes not less than 300 metres from fish spawning or overwintering areas that have well-defined boundaries unless otherwise approved. Water removal from large waterbodies that have scattered fish overwintering and spawning areas require appropriate screening and maintenance of approved velocities;

c) Avoid water withdrawal from a lake or stream containing fish which will significantly affect fish and their habitat during periods of low water and freezing;

d) Avoid water removal which may cause siltation or turbidity in excess of the standards set out in 4.4;

e) Locate and design intake structures so that the maximum inlet velocity is 30 cm/sec or a velocity that is demonstrated to avoid interference with fish, muskrat, beaver and otter populations, assuming the worst-case situation with ice accumulation on the screen and in the water. Where it is necessary to avoid adverse effects to migrating juvenile fish, recess intakes into stream banks;

f) Design stationary intakes to conform with the specifications outlined in *Water Intake Fish Protection Facilities,* available from Fisheries and Oceans Canada, Pacific Region;

g) Ensure specifications for movable intakes are similar to those for stationary intakes; and

h) Avoid groundwater withdrawals where the groundwater is important for the survival of overwintering fish or aquatic mammals.

4.18 ROADS AND OTHER FACILITIES

Measures for roads and other facilities designed to reduce or avoid adverse environmental effects include the following:

4.18.1 Design permanent access roads and associated structures with reference to the relevant sections of *Environmental Design for Northern Road Developments* (Environment Canada Report, EPS 8-EC-76-3) and locate them wherever practicable so that an undisturbed buffer at least 100 metres wide remains between roads and waterbodies.

4.18.2 Maintain any right-of-way gravel travelling surface so that cross drainage is both efficient and effective without causing accelerated erosion or ponding. If, following construction, part of any such travelling surface is no longer considered necessary for maintenance, inspection or repair traffic then remove from such sections any culverts and suitably breach the pad to allow annual run-of without danger of accelerated erosion or ponding.

4.18.3 Requirements for temporary gravel access roads used in only one season are similar to those for permanent access roads. They require the same care in locating them, maintaining cross-drainage and in minimizing disturbance to vegetation. Following abandonment of such roads and, if instructed to do so, remove any culverts, contour the roadbed to restore natural drainage and block access.

4.18.4 Snow access roads require care in locating, minimizing disturbance to vegetation (when clearing for right-of-way), and in preparation for spring run-off by breaching. Clean up any materials used in construction.

4.18.5 Locate ice bridges to minimize approach grades and avoid cuts in river and stream banks. In areas where significant numbers of overwintering fish or eggs are present, maintain the natural water flow and minimize siltation by appropriate controls.

4.18.6 Locate compressor stations, construction camps and stockpile sites at least 100 metres from permanent roads and 300 metres from waterbodies.

4.19 MACHINERY AND TRANSPORTATION EQUIPMENT

The following measures are designed to prevent or decrease the possibilities of adverse environmental impact by machinery and transportation equipment:

4.19.1 Equip and maintain all machinery and transportation equipment with satisfactory standard emission and noise control devices.

4.19.2 Operate road vehicles only on public roads and suitably prepared access roads or work surfaces on lands under permit for pipeline-related use.

4.19.3 Schedule vehicle operation to reduce as far as practicable adverse impacts on wildlife.

4.19.4 Operate all off-road vehicles with particular care so as to avoid unnecessary disturbance to the environment. Keep movement on the shores and banks of lakes, rivers and streams to a minimum to avoid undue siltation of the water.

4.19.5 Specify in all aircraft contracts the stipulations regarding harassment of wildlife and other orders pursuant to the wildlife guideline on aircraft corridors and minimum flying heights having at all times full regard for air flight rules and regulations.

4.20 HYDROSTATIC TESTING

Hydrostatic testing procedures designed to reduce or avoid adverse environmental effects include the following:

4.20.1 If the approved minimum flow or depth in the watercourse or lake is reached during water withdrawal, terminate the extraction of water. Resume water withdrawal only when flow or water levels exceed approved minimum values.

4.20.2 Station an individual qualified to supervise water withdrawal operations at the withdrawal site at all times during withdrawals of water used for pipeline testing, and assign him authority to stop water withdrawal should he be asked to do so on site by the designated officer or should he deem it necessary.

4.20.3 If water is used as a test liquid, treat it to remove oils, organic compounds and particulates considered harmful before discharge to takes or streams. Unless approved by the designated officer, discharge the test liquid effluent at rates which will not increase the flow regime by more than 10% of the receiving water flow at the time of discharge.

4.20.4 Demonstrate that the effluent from pipe testing is not toxic to aquatic fauna. Procedures for the toxicity test may include provisions similar to those outlined in *Petroleum Refinery Effluent Regulations and Guidelines,* published by Environment Canada, EPS 1-WP-74-1.

4.20.5 If methanol is used as a freezing point depressant, carry out final disposal in a manner not harmful to fish or aquatic furbearers through reduction of the methanol concentration to less than 1% by volume.

4.20.6 If pipeline test fluid containing methanol or other toxic substances is stored between tests, store it in accordance with section 4.12

4.21 MONITORING

4.21.1 During construction and operation of the pipeline, monitor the various environmental aspects that may be affected by the pipeline project. Develop programs in cooperation with the Agency, to outline methods, frequency, timing and reporting procedures to be followed. Monitoring programs form a basis for plans for emergencies and require careful integration with emergency measures.

4.21.2 Include in the monitoring program:

a) slope stability,

b) erosion control,

c) frost heave and thaw settlement,

d) water quality (waste treatment and receiving waters),

e) water withdrawal and hydrostatic testing,

f) river and stream crossing,

g) drainage structures,

h) revegetation,

i) wildlife and wildlife habitat,

j) fish and aquatic habitat,

k) noise levels, and

l) air quality.

4.22 EMERGENCY MEASURES

Emergency measures designed to reduce or avoid adverse environmental effects include the following:

4.22.1 Establish strategies and procedures relating, but not limited to the following:

a) containment and clean up of spills of fuels and other hazardous materials;

b) unusual and substantial fish migrations and wildlife movements that could be placed at risk by pipeline-related activities;

c) pipe failures, pipeline system malfunctions or potential malfunctions arising from such occurrences as earthquakes, slope failures, wash-outs, floods or forest fires, to ensure that repair or other emergency measures make due allowance for sensitive components of the environment;

d) spills of toxic hydrostatic testing fluid or major unplanned discharges of water during hydrostatic testing;

e) each hazardous material, including toxic hydrostatic testing fluids and demonstrate their adequacy; and

f) immediate control measures to be implemented, assuming the worst conditions with respect to the environmental sensitivity of the spill site, weather conditions, quantity and material involved, and direction of spill flow.

4.22.2 Identify potential disposal sites for contaminated material and document their surface and subsurface conditions. Develop detailed site-specific procedures for use of these sites, including the burning, burying or recycling of contaminants and contaminated debris.

4.22.3 Describe fire prevention and suppression measures including:

a) employee education and training;

b) operation and maintenance of equipment;

c) conduct of all pipeline activities associated with burning to minimize fire hazard, with special attention given to preventive measures in summer;

d) restriction of personnel and curtailment of activities during periods of high risk;

e) protection of lands under company permits;

f) fire detection and reporting procedures that take into account existing practices; and

g) placement of necessary equipment and the availability of properly trained teams for fire fighting at construction sites, camps, stockpile areas and all lands adjacent to the pipeline right-of-way and availability of on-site personnel of both the company and its contractors to fight fires, if required.

4.23 ENVIRONMENTAL TRAINING

4.23.1 The following measures are designed to assist the company to train project personnel in order that they can comply with and understand the environmental requirements.

4.23.2 Design the environmental training program so as to recognize that all personnel have a varying potential for creating unnecessary damage to the environment. Design environmental training for all project personnel commensurate with their damage potential in fulfilling their responsibilities and exercising their authority.

4.23.3 Provide periodic on-the-job upgrading courses so that the environmental training program remains effective.

4.23.4 Emphasize the principle of prevention of environmental damage rather than the less desirable alternative of rehabilitation and reclamation except when damage to the environment is unavoidable.

4.23.5 Periodically evaluate the effectiveness of environmental training programs and, if required, modify to enhance the programs to facilitate compliance with the stipulations and the spirit of the guidelines.

4.23.6 Foci for environmental training programs include:

a) To inform all project personnel about the special conditions of the particular segment of the right-of-way to which an individual is assigned;

b) To inform all personnel concerning these stipulations, guidelines and the basic requirements of all the regulations, the Pipeline Act and other appropriate matters;

c) To instill in all project personnel an appreciation of the nature of the environment and the need for measures to protect and preserve it; and

d) To inform personnel of good conservation and environmental protection practices to be adopted so as to prevent unnecessary environmental damage which may result from the performance of work or day-to-day living in the area.

SECTION 5 – GUIDELINES RELATED TO THE PLANS AND SUBMISSIONS

5.1 INTRODUCTION

Under section 3, the company shall prepare a comprehensive plan which may include information currently filed and such further information that may be required by the designated officer during planning and construction, for the prevention and mitigation of adverse inpacts and rehabilitation. Such information may pertain to:

5.2 PIPELINE ROUTING

5.2.1 A description, together with mapped information in sufficient detail of alternative routes, the environmental factors evaluated in respect of such routes, and the reasons for selecting the proposed route, recognizing that as additional geotechnical data is acquired significant changes in routing and design may have to be effected.

5.3 PROJECT PLANS AND DESCRIPTIONS

5.3.1 Plans and descriptions of the project including:

a) the project schedule and forecasts;

b) environmental information with respect to all construction activities, including the disposal of timber and wastes or their use where practicable, the stockpiling and assembling of materials and equipment, plans for crossing waterbodies and permafrost terrain, plans for pipeline operations, and plans for the establishment, operation, and abandonment of all temporary structures;

c) the frequency, timing, method, and organization of environmental inspection and monitoring, together with an identification of anticipated environmental problems and problem areas; and

d) preparations with respect to environmental emergencies.

5.4 ENVIRONMENTAL COMPONENTS

5.4.1 Maps and narrative descriptions, supplemented by diagrams, tables and photographs as appropriate, of the environment as it exists prior to disturbance or preparation of land used for the pipeline, including prints of the most recent edition of the maps of the National Topographic Series, photomosaics, or other equally clear, current and detailed maps at a scale which adequately portrays features and descriptive information, and shows the location of the environmental features influencing or being influenced by the routing, design, construction, operation, and abandonment of the pipeline, and providing the following information therein:

5.4.1.1 The approved pipeline route and the locations of facilities;

5.4.1.2 The bedrock, types of unconsolidated deposits, landforms, the presence of permafrost conditions, seasonal behaviour of soils, and the sensitivity of terrain types to pipeline construction and operation;

5.4.1.3 The location and description of potential hazards including landslides, mudflows, slumping, avalanches, potential subsidence, water and wind erosion, fault zones, earthquakes, floods, glacier-dammed lakes and areas susceptible to fires;

5.4.1.4 The unique features, aesthetic values, existing land uses and land uses that are presently planned or may be reasonably expected during the lifetime of the pipeline, together with a description of their locations as determined by research, reference to communities, governments, corporations, agencies, institutions, individuals, and information such as Canada Land Inventory data, including at least the following:

a) residential, rural, and urban areas;

b) Indian reserves;

c) industrial and commercial areas;

d) palaeontological, archaeological and historical sites and areas, and materials and areas of scientific importance; and

e) controlled, managed and designated areas including forests, agricultural lands, recreational areas, conservation areas, national and other parks, International Biological Programme sites, and other ecological reserves and preserves and wildlife sanctuaries and management areas;

5.4.1.5 The soil types and capability classes of lands for agriculture;

5.4.1.6 The location of household, agricultural, municipal and industrial water supply sources or intakes located downstream from or within the zone of effect of the pipeline;

5.4.1.7 The plant communities, and rare and unique habitats and flora;

5.4.1.8 The migratory patterns and routes, spawning beds, nurseries, feeding areas, and overwintering areas of fish species of recognized economic and ecological importance, the important habitat areas for food-chain organisms, and fisheries management areas; and

5.4.1.9 The fauna including:

a) wildlife populations;

b) classification of wildlife habitat;

c) the seasonal range use, movement, and population status of wildlife of ecological, subsistence and economic importance and of human interest;

d) essential habitats relative to wildlife species, including limited habitat, calving and rearing grounds, nesting sites, avifauna staging areas and migration stops, and special locations such as mineral licks, habitats within parks, preserves, sanctuaries and wildlife management areas; and

e) habitats of any rare or endangered wildlife.

5.5 ASSESSMENT

5.5.1 A qualitative or quantitative assessment of impact on the environment, on land and resource uses including agriculture, and on human health and well-being, of the pipeline, its routing, design, construction, operation and abandonment including:

5.5.1.1 An assessment of effects upon soil, hydrological characteristics and phenomena, and upon the landscape, with emphasis on permafrost and unstable terrain conditions, resulting from:

a) the removal of borrow materials;

b) the clearing of vegetation, grubbing, and the timing, location and area of land to be cleared;

c) the susceptibility of soil to erosion, and the removal, storage and replacement of topsoil and subsoil on agricultural lands, including the actual or estimated thickness of topsoil to be removed;

d) channelled surface drainage, unchannelled overland flow, agricultural drainage including tile-drainage systems, and groundwater flow; and

e) the degradation of aesthetic values, and the lack of harmonization of design with the location of above-ground facilities;

5.5.1.2 A description of the rates or expected noise emission levels at pumping, chilling or compressor stations, and an assessment of effects of those noise levels upon employees, the public, and wildlife;

5.5.1.3 An assessment of effects upon livestock, wildlife populations and their habitats, and upon the habitats and populations of rare or endangered fauna;

5.5.1.4 An assessment of effects upon fish migration, productivity, and habitats including spawning beds, rearing areas, and overwintering areas, upon fisheries management programs, and the environments upon which subsistence, commercial and recreational fisheries depend;

5.5.1.5 An assessment of effects upon the pipeline facilities of any environmental hazard referred to in paragraph 5.4.1.3 including induced hazards, and an assessment of the environmental consequences;

5.5.1.6 An assessment of effects upon existing land uses and land uses that are presently planned or may be reasonably expected during the lifetime of the pipeline, including the information described in paragraph 5.4.1.4;

5.5.1.7 An assessment of effects upon slope stability and the banks, shores and beds of waterbodies and known and potential problems and sites with respect to permafrost and stream scour;

5.5.1.8 An assessment of effects on water quality, supplies and uses identified under paragraph 5.4.1.6 of pipeline activities including pipeline testing;

5.5.1.9 An evaluation of the toxicity of any hazardous substance to be used, and an assessment of effects upon people and upon the environment of the use, storage, disposal and accidental release of any toxic substances including fuels, insecticides, herbicides, anti-corrosive materials, coating materials, and flushing or purging agents; and

5.5.1.10 A description including historical information on:

a) the statistical probability of accidental loss of the product from the pipeline;

b) the adequacy, accuracy and effectiveness of methods and systems to be used for leak detection, and the maximum rates and volumes of loss of the product from the pipeline prior to detection; and

c) the probable effects upon people and upon any environmental components referred to in clause 5.4.1 of accidental leaks, with and without combustion.

5.6 PREVENTION, MITIGATION, REMEDIAL AND REHABILITATION MEASURES

5.6.1 A description of remedial and rehabilitation plans and measures, and their implementation, including site-specific actions, specifications and construction schedules, and flexibility therein to prevent and mitigate adverse effects on the environment as described under item 5.4, and with respect to the assessment under item 5.5;

5.6.2 The plans and measures for the collection, treatment, storage, and disposal of wastes;

5.6.3 The plans and measures for the prevention and management of gaseous wastes and product emissions;

5.6.4 The organization, plans and measures for inspection and supervision during pipeline construction activities to ensure adherence to and implementation of environmental protection methods, procedures, and requirements; and

5.6.5 The plans and measures for monitoring of environmental effects of the pipeline during construction and operation.

5.7 ADDITIONAL INFORMATION

5.7.1 Copies of any application, studies, and related documentation held by the company related directly or indirectly to the environment;

5.7.2 A description of the plans, procedures and methods of:

a) environmental education programs and training; and

b) the management of human activities, including travel, hunting, fishing, trapping, shooting and camping, with particular reference to unique and sensitive areas and habitats, and terrain and resource management;

5.7.3 Plans for the installation of markers for purposes including the identification of sites for monitoring, and to alert people against practices such as excavation of waste disposal sites;

5.7.4 Plans for the abandonment of the pipeline, including descriptions of environmental impacts, problems, solutions, and recommendations; and

5.7.5 Any additional information as required by the designated officer.